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Macroeconomic Determinants of Market Capitalization of PSX 100 Index: An Application of VAR Approach

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Abstract
This study highlighted the significance of macroeconomic determinants on market capitalization of the PSE 100 Index in Pakistan. Market capitalization obliges as a crucial indicator of economic activities in the country. Independent variables include exchange rate, GDP, inflation, and interest rate, while market capitalization is treated as the dependent variable. Key findings from this research include utilization of VAR methodology to explore the relationships among these variables over the period from 2014 to 2023.Granger causality analysis indicating that most variables influence each other. Hypothesis testing revealing a significant relationship between interest rate and inflation, while relationships with exchange rate and GDP are found to be insignificant regarding their impact on market capitalization. Conclusion that, except for exchange rate and GDP, all variables significantly affect market capitalization. This study suggests implications for policy, recommending that the State Bank of Pakistan adopt stringent policies to enhance market capitalization. This research contributes to understanding how macroeconomic factors shape the dynamics of the stock market in Pakistan.
Keywords: Macroeconomic determinants, Vector Autoregressive Regression, Market capitalization, Granger Causality

1. Introduction

The rapid growth in market capitalization has fascinated investors as well as researchers, to study the impulsive performance of market capitalization as result of different economic factors. The role of market capitalization is one of the best means to measures of a company' size and it can be determining the company worth by stock market. Public company individually sells share in stock market and the stock market change the value, the market capitalization is affected by change in share sell prices. Investors don't know actual company worth so by market capitalization show better results and to help investor's decision. This study explores the investors to make efficient and effective investment decisions and also helps to determine the company worth and to observed significant result between market capitalization and macroeconomic influence. Market capitalization growth can be driven by factors such as stock issuance or fluctuations in stock prices. Research on the impact of market capitalization on stock returns presents mixed findings. Some studies suggest a positive effect Alshubiri (2021) This study may argue that larger market capitalization can attract more investors and provide greater liquidity, which can drive up stock prices and returns Hidayati & Sukmaningrum (2020) Their findings might indicate that higher market capitalization companies are often more stable and profitable, leading to higher returns for investors. Wibowo & Hendratno (2019) They could suggest that firms with larger market capitalization benefit from economies of scale and stronger market positions, translating into better stock performance. Conversely, other studies have shown a negative impact Idris & Bala (2015) This research indicates that larger market capitalization may lead to lower returns, possibly due to overvaluation or diminishing growth prospects. Tahmat et al. (2021) Their study might suggest that as companies grow larger, they face more significant operational challenges and market competition, which can negatively affect returns. These contradictory findings demonstrate how intricate the relationship is between market capitalization and stock returns, which is impacted by a number of variables like the state of the market, the overall state of the economy, and firm-specific characteristics. Investors often use market capitalization to gauge a company's future forecasts before deciding whether to invest (Kumar & Kumara, 2020, Hussain, Maitlo, ul Mustafa, & Mujahid, 2022). Moreover, studies like that of Elfeituri et al. (2023) discovered a favorable correlation between Gulf countries' economic growth and the stock market. Their study highlights that factors such as stock turnover and market capitalization significantly influence this relationship. The findings suggest that active and well-capitalized stock markets contribute positively to economic growth in these regions. These insights underscore the importance of understanding how market capitalization dynamics affect stock market behavior and economic growth across different contexts. However, the impact of macroeconomic factors is uncontroversial, but it is significantly difficult to examine which macroeconomic factors focal influence in this context However, Qureshi, Ahmad, Ullah, and ul Mustafa, (2023); Fatima (2016) disuses that the macroeconomic factor effect on market capitalization and it's significantly important for economic development. Pervaiz and Masih (2018) inquire the investors to make efficient and effective investment decisions and also helps to arbitrate the company worth, these results are also supported by Rishab Mittal (2017), The one important study mentioned earlier is fluctuation the exchange rate can also impact on stock prices. Either, international firms and domestic firms influence stock market price, these changes enhance economic value of foreign firms' operation. According to Abro, ul Mustafa, Ali, and Nayyar, (2021); Philomena (2016) this study focuses on stock market development in Ghana and appears evidence foreign investment for international investors, in this study used variable stock market liquidation, domestic saving, GDP. VAR Model used for data analyses from stock exchange in time series data. The results of this study demonstrate the intricate relationship between macroeconomic variables and stock market dynamics. They show that GDP has a significant positive impact on the stock market but also has a significant negative impact on stock market capitalization over the short and long terms. To properly forecast and control market changes, analysts, policymakers, and investors must comprehend these relationships. and analysts aiming to predict and manage market fluctuations effectively.

1.1. Problem statement

"The present work inquires whether macroeconomic determinants affect the market capitalization or not. This research is connected to the developing market of Pakistan by focusing on market capitalization of the economy."

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1.2. Research Objective

- To evaluate the determinants of macroeconomic on market capitalization
- To find out the effect of GDP, IR INF and ER on each other
- To find out the granger causality among all variables
- To find out impulse response and variance decomposition among all variables

1.3. Research Significance

This research focuses on the macroeconomic determinants of market capitalization, particularly within the context of Pakistan's developing economy. Key points highlighted include benefit for Investors the study provides valuable insights for investors interested in understanding how macroeconomic factors influence market capitalization. This knowledge can aid in making informed investment decisions across different sectors. Capital Formation It also contributes to understanding capital formation, particularly how high share prices in the stock market can reflect company size and attract investment for economic develop. The research underscores the importance of studying macroeconomic volatility in Pakistan and its impact on financial and non-financial sectors. Market capitalization is highlighted as resilient, influenced significantly by trade policies**.** Methodology The use of VAR modeling allows for testing how macroeconomic variables interact and impact each other, providing a systematic analysis of these relationships. Overall, your study is positioned to provide actionable insights for stakeholders navigating Pakistan's economic landscape, particularly in relation to stock market investments and economic development strategies.

1.4. Scope

This research emphases on macroeconomic factors, particularly volatility indicators that are crucial for ensuring the safety and stability of market capitalization. Key points emphasized include Knowledge for Investors The study aims to provide investors with insights into major variables influenced by GDP, inflation, interest rates, and currency exchange rates. This knowledge expands beyond conventional understanding, offering a deeper look into how these factors impact market capitalization. Impact on Financial Sector By analyzing volatility in macroeconomic factors, the research aims illustrate how changes in these variables affect the financial sector and market dynamics**.** Contribution to Literature The results of your research are expected to contribute to the existing literature on market capitalization, filling knowledge gaps and providing a clearer understanding of its determinants. In summary, the goal of this research is to improve knowledge of the ways in which market capitalization is impacted by macroeconomic volatility. This will help stakeholders and investors navigate market situations and make wise decisions.

1.5. Limitations

- This research study on selected macroeconomic indicator. Period of study would be from 2014-2023.
- Macroeconomic factor effect on overall economic but, this study focuses on the market capitalization.
- This study is theoretical and time-limited, you are utilizing a small dataset for your analysis. This approach allows you to focus on specific aspects of the research topic within the defined scope and timeframe

2. Literature Review

As of the literature this study will evaluate how macroeconomic factors and market capitalization interact, emphasizing the importance of these factors for country development. Indeed, there is a wealth of literature exploring different facets of macroeconomic drivers and their relationship with market capitalization. This existing body of research provides a solid foundation upon which to build your study, allowing you to contribute to the understanding of how macroeconomic conditions influence market dynamics and economic growth.

The economist of Pakistan in stock market feels that macroeconomic indicators significantly effect on overall economy growth, because of stock prices. The total market value of a company's outstanding shares of stock is known as market capitalization. It is computed by multiplying the market price per share by the total number of outstanding shares. (Kumar & Kumara, 2020) The rupiah's exchange rate vs the US dollar and inflation have a significant effect on the price of Islamic stocks, according to studies by Mashudi et al. (2020, 2019). These factors can significantly influence investor behavior and market dynamics within the Islamic finance sector. These findings underline the importance of macroeconomic influences in shaping the performance of Islamic stocks and provide valuable visions for investors and policymakers in managing economic stability and investment strategies. Islam et al.'s (2023), Hye, ul Mustafa, & Mahmood, (2010) study examined the effects of macroeconomic factors on the Bangladesh Stock Market, such as the GDP growth rate, inflation rate, and industrial output index. Their analysis revealed a strong and favorable correlation between the GDP growth rate and the index of the Bangladesh Stock Market. Multiple regression analysis and Pearson correlation analysis were two of the research approaches used, and these helped determine the type and strength of the links between these macroeconomic variables and the performance of the stock market. While multiple regression analysis offers a more thorough insight of how these factors interact and simultaneously influence stock market performance, Pearson correlation analysis aids in determining the linear relationship between the variables. Moreover., Mustafa, Abro, and Awan, (2021); Awadzie Garr, Omodero (2020) showed that the outcome of exchange rate and inflation rate on capital market capitalization is insignificant and unfavorable, while the influence of interest rate is significant and detrimental to market capitalization. This study examines the gross domestic product (GDP) has an expressive and optimistic effect on market capitalization. It recommends that the growth of the economy should be maintained to sustain the growth of the capital market. However, to ensure solidity, the relevant establishments in the country should closely monitor and regulate economic determinants such as exchange rate, inflation and interest rate. From the study by Nafees et al. (2016), which focuses on macroeconomic variables impacting the capital market, several key findings emerge Macroeconomic Variables Studied The study examines variables such as the discount rate, GDP, money market indicators, inflation, and exchange rates. These variables are crucial as they reflect economic conditions that influence investor decisions in the capital market**.** Data Sources and Duration The researchers utilized data from authoritative sources such as the International Financial Statistics and the International Monetary Fund, along with GDP data collected quarterly from 2000 to 2015 by the Pakistan Institute of Development. This robust dataset allows for comprehensive analysis over a significant period. Impact on Stock Exchange Index

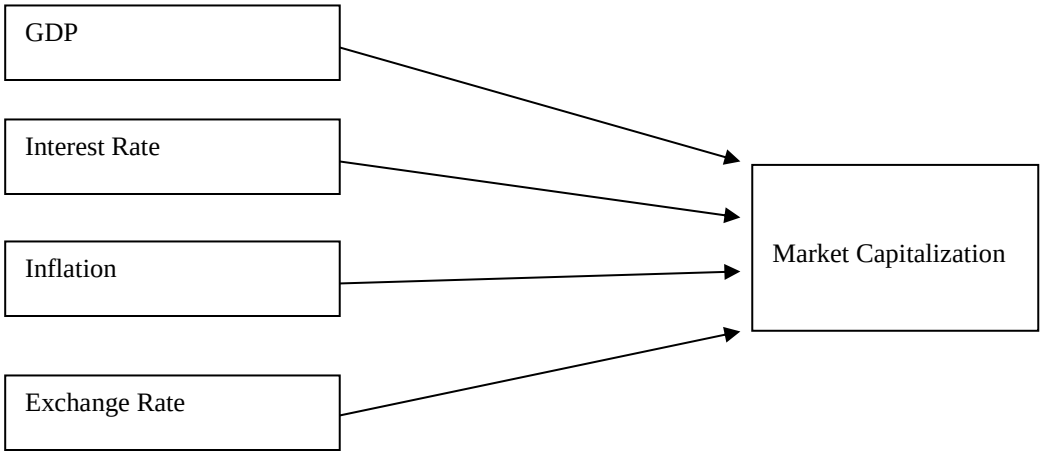
The study concludes that GDP and the supply of money have a significantly positive influence on the stock exchange index. This suggests that economic growth, as indicated by GDP, and adequate liquidity, reflected in the money supply, tend to correlate with higher stock market performance. Considerations in Financial Analysis the study emphasizes the importance of considering timeframes, rates of return, and economic indicators like inflation when evaluating present and future values in financial analysis. Inflation, specifically, is noted for its impact on purchasing power and overall economic stability. This research underscores the complex interplay between macroeconomic factors and capital market dynamics, providing valuable insights for investors and policymakers alike.

The study by Sulaiman et al. (2013) also worked to find out relationship between interest rate and investment, Investment is a one of the most significant elements of any economy. The study duration was 49 years from 1964 t0 2012 by SBP and Pakistan Economy Survey. This research shown that there is an insignificant relationship between interest rate and investment, but it has significant affiliation between incomes. Therefore, increase in income gives opportunity cost to investors for investment. Afzal (2012) explore the study about the influence crisis of power and differential interest rate on Pakistan Textile industry and its production. The sample comprised 11 years 2000 to 2010 in this research Multiple Linear Regression was used to examine the data, and it's collected from Pakistan Textile Mill Association and Economic survey of Pakistan. The study shows that crisis of electricity and interest rate indirectly significant effect on Textile industry growth. However, Ali (2014) evaluate the impact of interest rate on stock market and its recital, and also analyze that factors effects on investor's choice in making investment in stock market of Pakistan. The sample size used 120 months KSE stock market index from 2004 to 2013.In this research used methods Regression and correlation. Moreover, this study finds that interest rate differentials indirect impact of stock market, stock market efficiency is affected by high interest rate. Yahya (2020) conducted a study that found significant effects of various macroeconomic variables on the Jakarta Islamic Index (JII) in together the long and short term. The key macroeconomic factors analyzed included inflation, Bank Indonesia interest rates, and currency supply. These findings highlight the sensitivity of the Jakarta Islamic Index to key macroeconomic indicators, providing insights for investors and policymakers. Understanding these relationships helps in formulating strategies to moderate risks associated with macroeconomic fluctuations. The study provides insight into the impact of macroeconomic factors on the Pakistani stock market and its prices, including inflation, interest rates, GDP, and currency rates. The sample duration 2001-2011.Stock prices taken from KSE 100 index, meanwhile macroeconomic data together from SBP and IFS. In this research used Granger causality has been apply for estimate the Hypothesis. According to the study, there is a short-term negative correlation between stock prices and interest rates, currency rates, GDP, and inflation.Zulfiqar (2015) give views about the effect of macroeconomic elements on the recital of textile industries of Pakistan and to investigate which independent variables influence on ROE and ROA. Ameur et al. (2013) further analyzes the effect of strategies on presentation of financial sector and its outcome. Moreover, this study expressions that the relationship between interest rate inflation is a significant, and the author also find the impact of inflation on ROA and ROE is a positively insignificant. But interest rates highly significant impact on ROE. According to Nadeem et al. (2016) observe that the differentials interest rate and change loanable fund quantity impact on economic factors such as level of income, GNP and employment. This research analyzes the volatility of interest rate and its effect on private sector credit, and this private credit sector effected by macroeconomic factor such as discount rate and inflation, because of interest volatility. The authors observe investors decision change due to differentials interest rate, either its effect on positive or negative. In this study data considered duration 1975to2011 from SBP.ARD model used for data analyses. this study observes that there is a significant negative relationship with interest rate volatility and private sector credit, but on the other hand inflation positively significant with private sector credit from the study by Waseem (2014) give view about the influence of interest proportion on the concert of banking sector in Pakistan. The author analyzes volatility monetary policy impact on banks profitability, and it can be determined by the macroeconomic factor influence on performances. According to Emmanuel et al. (2012) explore the study the recital of the market can be determine through market capitalization and its one of the major factors that affected by inflation. The observers focus on time series data duration was 1999-2010 from Nigerian stock Exchange. The Regression analysis used to determine testing variable such as market capitalization ratio, GDP and total value of shares trade ratio. They author examines that there is negative relationship concerning inflation and stock market recital. Moussa and Delhoumi (2021); Rehman, Abro, Mustafa, Ullah, and Khattak, (2021) examined the effects of exchange rates on the primary stock market index of five MENA nations in their study. Their study's findings supported the continued existence of the cointegration between stock returns and currency rates. However, Masih (2018) explore the study on Karachi stock market Returns affected by macroeconomic determinants such as exchange rate, inflation and interest rate. The authors used Regression Analyses for result and its duration was 2007 to 2017-month wise data from KSE 100 index. They are of the opinion that there is negative relationship with inflation and stock markets while Exchange rate determine that the investors of Karachi stock market not care regarding the exchange rate volatility because they priority to invest in market rather than foreign currency. Moreover, Owolabi (2017) explore the link between monetary appearances and financial concert in Nigeria. According to the study, the following economic factors are present: government spending, interest rates, currency rates, and inflation rates. The sample that the author focusses on includes 31 industrial companies that are listed on the Nigeria Stock Exchange and spans the years 2010 through 2014.Additionally, the conclusion examines how direction spending, inflation, interest rates, and exchange rates affect EPS. It finds that while ROE is not significant, interest rates are relevant for ROE alone. Suriani et al. (2015) conduct the study on Pakistani data in short run to assess the volatility of exchange rate with the change in prices. They find that the theirs is insignificant relationship exist among exchange rate and stock market prices. Granger Causality used for analyses. Statistics information collected from KSE 100 index on monthly basis its duration was 2004-2009 for test feasibility of the data. The observers suggested that foreign currency seems negative impact on Portfolio Balance approach.

2.1. Conceptual framework

The theoretical model framework for this study has been designed based on a comprehensive literature review. The framework aims to explore the impact of various macroeconomic factors on market capitalization. That sounds like a robust theoretical model framework. Here's a structured outline for this study, incorporating the dependent and independent variables: Here, market

capitalization is the dependent variable, while GDP, interest rate, inflation, and exchange rate serve as independent variables. This framework will help in determining how these macroeconomic factors influence market capitalization.



2.2. Hypothesis statement

H1: There is an impact of GDP on market capitalization in Pakistan.
H1: There is an impact of Interest rate on market capitalization in Pakistan.
H1: There is an impact of Inflation on market capitalization in Pakistan.
H1: There is an impact of Exchange rate on market capitalization in Pakistan.

3. Methodology

This study is comprised of the deductive method. This research is based on quantitative approach because it based on numerals data. The simple sampling method used to gather the data. The data collection was based on secondary data.in secondary data, time series data is being used, and its duration was 2014-2023 from State Bank of Pakistan, PSE and WB.SBP keeps the records of all PSE 100 Index.

3.1. Test to be applied

The study approves dynamic Vector Autoregressive Regression (VAR) approach which examine Granger Causality enquiry. The choice of this approach is to permit us detention dynamic among determinants changes and market capitalization and at the same to detect the causal link between these variables such as GDP, interest rate, inflation and exchange rate were used to identify the volatility of the market capitalization of PSE 100 index.

3.2. Vector autoregressive regression (VAR)

VAR approach used to analyze the data. The VAR is numerical model that capture the true interdependencies surrounded by several time series which was initially presented through Toda and Yamamoto in 1995.The test is parallel to the Granger causality test but amplified with extra lags contingent on the extreme order of integration of the time series under consideration. In this study Impulse responses and variance decomposition have been too checked among the different variables for more reliable and strong results. Macroeconomic factors play a key role in an economy. Economists and analysts contemporary look at macroeconomic factors, While, they are finding economic policy goals and growth of economy. In this regarding, they repeatedly attempt to predict future level of inflation, GDP, interest rate, exchange rate, and additional key macroeconomic factors. Meanwhile these indicators perdition effect on investors, government and company's decision. Macroeconomic factors effect on overall economic activities and seemed to be caused by surprise in economy policy that portrays in jump like effect which increases inflation. Moreover, Roberto et al. (2012) find that the monetary policy decision and volatility macroeconomic variable derive these jumps. They suggest that the central banks can generate favorable jumps to determine the market interest rate because of macroeconomic environment that can be stable by the more predictable jumps.

3.3. Econometric Model

The econometric model is as follows:

$$MC_{it} = \beta_{0it} + \beta_{1it}GDP + \beta_{2it}IR + \beta_{3it}INF + \beta_{4it}ER + \varepsilon_{it}$$

4. Results

This study focuses on evaluating how macroeconomic determinants impact the market capitalization of the PSE 100 Index. Independent variables include exchange rate, inflation, GDP, and interest rate, while market capitalization serves as the dependent variable. The study is structured into five parts, Descriptive Statistics Providing an overview of mean, median, maximum, and minimum values of the variables. Stationarity Check Using unit root tests to ensure the data is stationary. VAR Analysis Applying Vector Autoregression to analyze the interrelationships among variables and their impact on market capitalization. Results Analysis Interpreting and discussing the findings from the VAR analysis. Summary of Results Systematically summarizing the key outcomes and implications of the study.

This structured approach will enable a comprehensive evaluation of how changes in exchange rate, inflation, GDP, and interest rate affect market capitalization in the context of the PSE 100 Index.

Table 1: Unit root Test

Independent Variables	Statistic	Probability Value	Stationary
GDP	-3.686874	0.0190	1st difference
IR	-3.554073	0.0255	2nd difference
INF	-4.694045	0.0034	1st difference
ER	-6.129957	0.0009	2nd difference
Dependent Variable			
MC	-4.369812	0.0077	1st difference

Note: Whereas, GDP is gross domestic product, IR is interest rate, and INF is inflation, ER exchange rate and MC market capitalization.

Table 2: Vector Auto regression

	DGDP	DDIR	DINF	DDER	DMC
DGDP(-1)	0.081065	-0.000104	-0.001509	-0.002021	0.142347
	(0.36521)	(0.00020)	(0.00106)	(0.00220)	(0.31993)
	[0.22197]	[-0.51776]	[-1.42925]	[-0.91655]	[0.44493]
DDIR(-1)	817.0913	-0.364660	5.915197	-2.643504	-993.3758
	(766.757)	(0.42295)	(2.21665)	(4.62860)	(671.685)
	[1.06565]	[-0.86218]	[2.66852]	[-0.57112]	[-1.47893]
DINF(-1)	31.42213	-0.049749	-0.587028	-0.144826	-74.35465
	(94.5730)	(0.05217)	(0.27341)	(0.57090)	(82.8467)
	[0.33225]	[-0.95364]	[-2.14709]	[-0.25368]	[-0.89750]
DDER(-1)	124.1997	-0.027652	-0.182000	-0.336590	-113.4762
	(87.9893)	(0.04854)	(0.25437)	(0.53116)	(77.0793)
	[1.41153]	[-0.56972]	[-0.71548]	[-0.63369]	[-1.47220]
DMC(-1)	-0.083273	0.000206	-0.001420	0.000132	0.071654
	(0.46009)	(0.00025)	(0.00133)	(0.00278)	(0.40304)
	[-0.18099]	[0.81119]	[-1.06731]	[0.04765]	[0.17778]
C	716.8377	-0.112617	1.644042	0.319939	297.3308
	(509.420)	(0.28100)	(1.47271)	(3.07516)	(446.256)
	[1.40716]	[-0.40077]	[1.11634]	[0.10404]	[0.66628]
R-squared	0.710938	0.374943	0.696761	0.163087	0.510419
Adj. R-squared	0.673280	-0.145938	0.444061	-0.534341	0.102435
Sum sq. resids	8171587.	2.486394	68.29478	297.7768	6270789.
S.E. equation	1167.018	0.643738	3.373791	7.044819	1022.317
F-statistic	0.541498	0.719825	2.757271	0.233840	1.251075
Log likelihood	-97.61486	-7.582823	-27.46082	-36.29589	-96.02630
Akaike AIC	17.26914	2.263804	5.576804	7.049315	17.00438
Schwarz SC	17.51160	2.506257	5.819257	7.291768	17.24684
Mean dependent	685.1425	-0.016667	-0.330833	-0.782208	497.8417
S.D. dependent	1038.312	0.601352	4.524856	5.687336	1079.077

Table 3: VAR Lag Order apply for Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-277.5966	NA*	1.97e+14	47.09943	47.30148*	47.02463
1	-249.3968	28.19984	1.88e+14*	46.56613*	47.77839	46.11730*

* INDICATES LAG ORDER SELECTED BY THE CRITERION

LR: SEQUENTIAL MODIFIED LR TEST STATISTIC (EACH TEST AT 5% LEVEL)

FPE: FINAL PREDICTION ERROR

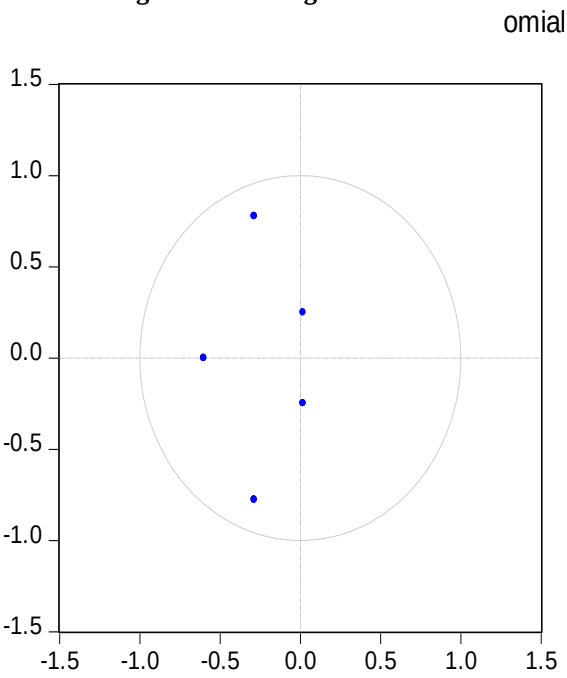
AIC: AKAIKE INFORMATION CRITERION

SC: SCHWARZ INFORMATION CRITERION

HQ: HANNAN-QUINN INFORMATION CRITERION

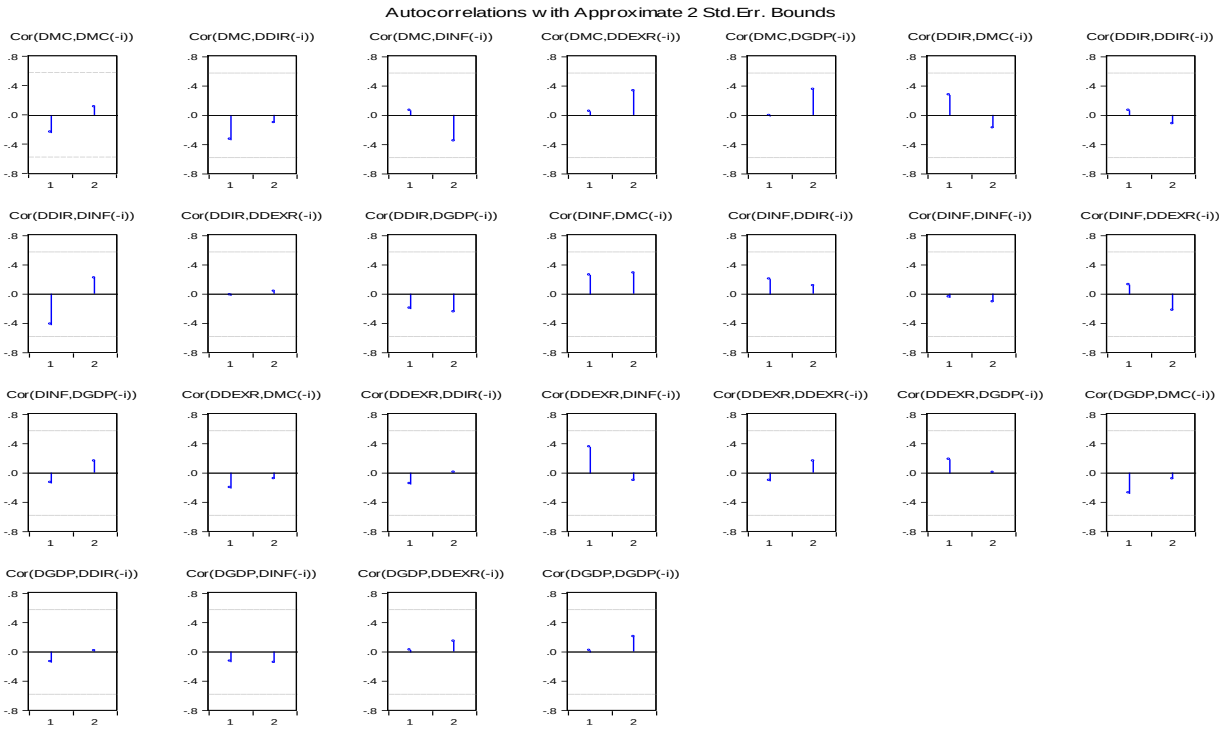
Based on the Hannan-Quinn (HQ) criterion used for lag order selection, the table indicates that a maximum lag length of one is deemed appropriate. This criterion suggests that the optimal lag structure for your VAR model is determined to be one lag based on the HQ selection criteria.

Figure 1: Autoregressive Root



It seems like describing a situation where there is a diagram with points inside a circle, it means interpreting VAR is applicable and can be applied.

Figure 2: Residual Testing through Correlogram



Above picture referring to a graphical representation where most data points lie within a band or a range, with only a few outliers. It sounds like interpretation suggests that because most values are within this band, there may not be an issue of autocorrelation.

The determination of an impulse response involves analyzing how a single shock to one variable affects itself or other variables over time. After a shock is applied to each variable in each equation, the impulse response function calculates the responses and reactions of a dependent variable within a VAR (Vector Autoregression) system. It is crucial to shock the error term by one unit and track the impact of each shock. In our study, we have five variables, resulting in the generation of five impulse responses. It is crucial that the shocks or innovations are uncorrelated, as noted by Enders (1995).

Figure 3: Impulse Response

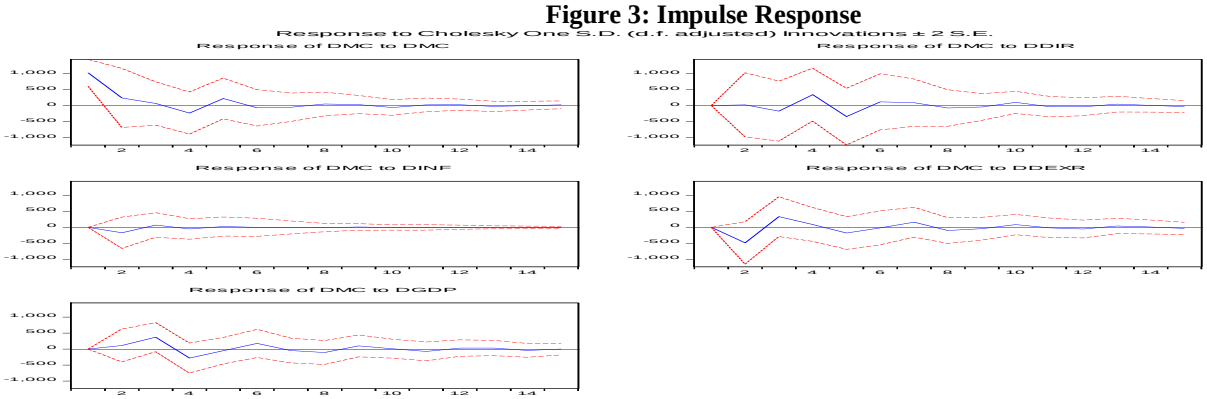


Table 4: VAR Model Results and Hypothesis Testing

Dependent variable: DGDP

Excluded	Chi-sq	Df	Prob.
DDIR	3.135602	1	0.0364
DINF	0.110392	1	0.3325
DDER	4.992424	1	0.0181
DMC	0.032758	1	0.2564
All	2.598072	4	0.6272

Table 4 presents the effects of Granger causality among different variables. It shows that GDP is influenced by IR and ER, while INF and MC are not affected by GDP.

H0*: GDP has no significant impact on* market capitalization in Pakistan. *(Accepted)*

H1*:* GDP has no significant impact on market capitalization in Pakistan. *(Do not Accepted)*

From the table above, the p-value for GDP is 0.6272, which is greater than 0.05. This indicates an overall insignificant influence of GDP on market capitalization. Therefore, we accept the null hypothesis and reject the alternative hypothesis.

Table 5: Dependent variable: DDIR

Excluded	Chi-sq	Df	Prob.
DGDP	5.268078	1	0.0102
DINF	8.609428	1	0.0340
DDER	0.324580	1	0.5631
DMC	6.458034	1	0.0132
All	3.359620	4	0.0495

Table 5 shows the effects of Granger causality among different variables. IR is influenced by GDP, INF, and MC. On the other hand, ER is not affected by IR.

H0*: IR has no significant influence on* market capitalization in Pakistan. *(Do not Accepted)*

H1*:* IR has a significant influence on market capitalization in Pakistan. (*Accepted)*

From the table above, the p-value for IR is 0.0495, which is below 0.05. This indicates an overall significant impact of IR on market capitalization. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

Table 6: Dependent variable: DINF

Excluded	Chi-sq	Df	Prob.
DGDP	6.042745	1	0.0129
DDIR	7.121020	1	0.0076
DDER	0.511918	1	0.4543
DMC	1.139159	1	0.1458
All	12.09380	4	0.0167

Table 6 shows the effects of Granger causality among different variables. INF is influenced by GDP and IR. On the other hand, INF is not affected by ER and MC.

H0*: INF has no significant influence on* market capitalization in Pakistan. *(Do not Accepted)*

H1*:* INF has a significant influence on market capitalization in Pakistan. (*Accepted)*

From the table above of the VAR effect model, the p-value for INF is 0.016, which is below 0.05. This indicates an overall significant impact of INF on market capitalization. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

Table 7: Dependent variable: DDER

Excluded	Chi-sq	Df	Prob.
DGDP	0.840064	1	0.3594
DDIR	0.326182	1	0.1767
DINF	0.064354	1	0.2997
DMC	8.012271	1	0.0262
All	1.131753	4	0.6921

Table 7 shows the effects of Granger causality among different variables. ER is not influenced by GDP, IR, or INF; it is affected only by MC.

H0*: ER has no significant influence on* market capitalization in Pakistan. *(Accepted)*

H1*:* ER does not have a significant influence on market capitalization in Pakistan. (Do not *Accepted)*

From the table above, the p-value for ER is 0.6921, which is greater than 0.05. This indicates an overall insignificant influence of ER on market capitalization. Therefore, we accept the null hypothesis and reject the alternative one.

Table 8: Dependent variable: DMC

Excluded	Chi-sq	Df	Prob.
DGDP	3.197963	1	0.0663
DDIR	5.187240	1	0.0392
DINF	7.805501	1	0.0169
DDER	2.967375	1	0.0210
All	6.254546	4	0.02809

Table 8 shows the effects of Granger causality among different variables. MC is influenced only by GDP.

H0*: MC has no significant influence on* market capitalization in Pakistan. *(Do not Accepted)*

H1*:* MC has a significant influence on market capitalization in Pakistan. (*Accepted)*

From the table above, the p-value for MC is 0.0280, which is below 0.05. This indicates an overall significant impact of MC on market capitalization. Therefore, we reject the null hypothesis and accept the alternative one.

The dynamics of classification can also be examined through variance decomposition, which attributes the fraction of movements in a dependent variable to its own shocks and the shocks of other variables in the system. These shocks not only impact the original variable but also influence others due to the unique nature of VAR.

According to the table, GDP is primarily affected by its own shocks initially, but later it is predominantly influenced by IR. IR, in turn, is initially influenced by itself and later mostly affected by INF. INF shows a pattern of being influenced by its own shocks initially, and later by IR. ER is affected by its own shocks initially and later mostly influenced by INF and MC. MC is primarily influenced by its own shocks initially, and in the longer term, it is generally affected by IR.

This analysis highlights how variables in the system react to their own shocks over time and how these interactions evolve in a VAR framework.

Table 9: Variance Decomposition

Variance Decomposition of DGDP:

Period	S.E.	DGDP	DDIR	DINF	DDER	DMC
1	1167.018	100.0000	0.000000	0.000000	0.000000	0.000000
2	1283.666	82.65339	1.157581	0.002659	16.01224	0.174127
3	1334.196	79.52681	1.118099	1.729532	17.08751	0.538052
4	1370.134	76.62078	3.893716	2.133171	16.72841	0.623922
5	1405.612	72.80325	6.583915	2.315182	16.87439	1.423267
6	1414.559	72.29773	6.563833	2.867143	16.66708	1.604211
7	1424.371	71.38919	7.013212	2.831944	17.10754	1.658116
8	1430.812	70.84384	7.125737	3.036080	17.18793	1.806414
9	1434.017	70.68633	7.223077	3.123114	17.16902	1.798452
10	1438.358	70.26123	7.480731	3.125414	17.26162	1.870998

Variance Decomposition of DDIR:

Period	S.E.	DGDP	DDIR	DINF	DDER	DMC
1	0.643738	4.723877	95.27612	0.000000	0.000000	0.000000
2	0.709890	5.346417	82.65709	6.634679	1.881800	3.480018
3	0.745511	7.153573	80.50874	7.278362	1.886427	3.172903
4	0.781307	6.618786	78.56771	6.934591	3.660158	4.218751
5	0.791295	7.117226	76.84939	7.831814	3.607305	4.594263
6	0.799997	7.231662	76.01846	7.719725	4.465600	4.564555
7	0.807122	7.193558	75.17820	7.897967	4.933498	4.796779
8	0.809842	7.435074	74.77194	8.078307	4.938362	4.776317
9	0.813916	7.374698	74.53923	8.008801	5.234637	4.842630
10	0.815555	7.429088	74.29375	8.127603	5.249093	4.900468

Variance Decomposition of DINF:

Period	S.E.	DGDP	DDIR	DINF	DDER	DMC
1	3.373791	40.74756	3.614406	55.63803	0.000000	0.000000
2	5.923967	13.83981	61.99030	19.52410	2.269536	2.376249
3	6.967273	11.07289	67.37552	14.58896	1.659103	5.303526
4	7.142693	10.60686	66.89632	14.56900	1.906050	6.021761
5	7.194870	10.47982	65.93195	14.36607	3.287413	5.934746
6	7.233658	10.55229	65.22791	14.46553	3.808998	5.945273
7	7.263935	10.71881	65.12071	14.46977	3.789743	5.900968
8	7.297185	10.62957	65.11811	14.35746	3.917123	5.977731
9	7.307124	10.65413	64.99767	14.42016	3.909315	6.018737
10	7.313948	10.65930	64.93418	14.40081	3.994486	6.011228

Variance Decomposition of DDER:

Period	S.E.	DGDP	DDIR	DINF	DDER	DMC
1	7.044819	0.876140	61.76394	1.874874	35.48505	0.000000
2	7.487326	8.706299	54.69175	1.675569	34.91346	0.012929
3	7.540341	9.176607	53.92770	2.324966	34.52727	0.043458
4	7.622872	8.997118	54.06175	2.276019	34.41365	0.251460
5	7.661863	9.024170	53.81082	2.553490	34.15060	0.460913
6	7.680599	9.102408	53.68170	2.611015	34.14558	0.459299
7	7.703487	9.051455	53.59168	2.644150	34.16584	0.546877
8	7.711022	9.116408	53.48769	2.731979	34.09937	0.564549
9	7.721248	9.109983	53.48274	2.725311	34.10023	0.581746
10	7.727370	9.109135	53.44233	2.758872	34.07740	0.612262

Variance Decomposition of DMC:

Period	S.E.	DGDP	DDIR	DINF	DDER	DMC
1	1022.317	40.05753	3.510627	16.05482	0.786065	39.59096
2	1173.785	37.29208	2.901688	13.00974	16.60991	30.18658
3	1291.764	33.47620	5.577925	14.11503	21.54523	25.28561
4	1388.100	32.22541	13.65821	13.04362	18.78406	22.28871
5	1458.892	29.20630	18.74699	12.15048	18.16425	21.73197
6	1475.854	29.04813	18.75170	12.75115	17.75800	21.69102
7	1488.935	28.67112	18.91506	12.54698	18.49693	21.36990
8	1498.889	28.42125	18.88293	12.69065	18.69869	21.30649
9	1503.886	28.48683	18.94809	12.77527	18.62388	21.16593
10	1510.806	28.23208	19.26624	12.67922	18.72979	21.09267

4.1. Summary

In this chapter, we investigated the results of macroeconomic variables. Initially, we examined the descriptive statistics of the data, which provided us with measures such as mean, median, maximum, and minimum values. Following descriptive statistics, we used unit root tests to evaluate the data's stationarity, specifically the Augmented Dickey-Fuller (ADF) test, applied individually to each sample. Once we confirmed stationarity of the data, we proceeded with VAR (Vector Autoregression) testing to determine whether a fixed or random effects model was appropriate for our analysis. This VAR testing helps us understand the interrelationships and dynamics among the macroeconomic variables under consideration.

5. Conclusion

This study focuses on analyzing macroeconomic determinants and their impact on Market Capitalization. The main objectives include understanding how these macroeconomic factors influence Market Capitalization, determining there is Granger causality among them, and exploring impulse response and variance decomposition among all variables. The uniqueness of this research lies in its use of the VAR (Vector Autoregression) approach to investigate causal relationships among variables. While GDP, interest rates, inflation, and exchange rates are examined as independent factors, market capitalization is the dependent variable. Key methodologies discussed include VAR Modeling Used to analyze how different variables affect each other over time. Stability Testing ensuring the reliability of the VAR model through residual testing. Impulse Response Function determines how Market Capitalization responds to shocks in each variable. Variance Decomposition Quantifies the proportion of variability in Market Capitalization clarified by its own shocks and shocks from other variables. Granger Causality examines whether past values of one variable help predict another. From the findings Granger Causality Indicates significant relationships between Interest Rate and Inflation, while relationships with GDP and Exchange Rate are deemed insignificant regarding their impact on Market Capitalization. Variance Decomposition shows that all variables, except Exchange Rate and GDP, contribute significantly to explaining Market Capitalization.

Overall, this research contributes to understanding how macroeconomic variables interact and influence Market Capitalization, providing insights into economic dynamics and policy implications.

5.1. Recommendation

- The market capitalization should improve their operation and Effective strategies and it should be to reduce the volatility in these variables by the monetary authorities.
- The performance of the market analysts always forecast about the market capitalization and practitioners have role it measurement about risk.
- Shareholders must predict how financial market fluctuates in prices by the market capitalization.
- The market capitalization tries to get more investors and keep the right amount of investment to increase its company worth.
- State Bank should apply strike check and balance on the financial intermediates to keep in view the Macroeconomic determinants by the market capitalization.

5.2. Future Directions

- Stock market indexes can also be included for future research.
- Macroeconomic variables such as Income, foreign direct investment is not included in this investigation which can be taken for future research.
- This research is conducted on market capitalization whereas VAR approach used and other than it can be applied ARMA, ARIMA to identify particular volatility of indicators.
- This study is based on secondary data; mixed method technique can also be used or assumed in future.
- In future research, exploring microeconomic financial ratios would be beneficial. These ratios provide detailed insights into individual firms' financial health and performance, complementing the macroeconomic variables typically studied. Integrating microeconomic financial ratios can enhance understanding of how firm-specific factors interact with broader economic conditions to influence various outcomes, such as market capitalization and financial stability.

References

Abro, A. A., Ul Mustafa, A. R., Ali, M., & Nayyar, Y. (2021). Does Ramzan effect the returns and volatility? Evidence from GCC share market. *The Journal of Asian Finance, Economics and Business*, *8*(7), 11-19.

Afzal, H. M. (2012). Impact of electricity crisis and interst rate on textile Industry of pakistan . *Acadmey of conteporay Research*, v 1(1) 32-35.

Ahmed Imran Hunjra and Muhammad IrfanChani and Muhammad ShahzadIjaz and . (2014). The Impact of MacroEconomic Variables on stock prices in pakistan . *International Journal of economic* , 2(1) ,13-21.

Ali, H. (2014). Impact of Interest rate on stock marker . *Journal of Business and Managment In ghana Business Research*, 6(4),312-327.

Alshubiri. (2021). The stock market capitilisation and financial growth nexus:an empirical study of western European countries. *Future Business Journal.*

Amir Raza, AzamShafiq, Syed Atif Ali and Huda Khan . (2012). Determinants of exchange rate and its Impact on pakistani economiy . *Global Journal and Management and Business*, 12.

Bilal Nafees ,Fasial Javaid,Muhammad Ali Jibran Qamar. (2016). Impact of Macro economic Indicator on diffrent capital market . *pakisan*, 11.

Daferigh,Emmanuel ,charli,samuel sunday. (2012). The Impact of inflation on stock market performance in nigeria. *American Jiurnal of social and Managment Sciences*, vol 2156-1540.

Elfeituri,Hatem,Lubna Elgehani,and sabri Elkghli. (1993-2019). The Impact of stock market on economy growth in the Gulf countries . *Libyan International madical university ,Faculty of business Administration ,Benghazi,Libyan*.

Fatima Farooq ,Sadia Anwer, Imram Sharif Chaudhry. (2016). Impact of intrest rate differential on market capitalization in pakistan:An empirical analysis. *Pakistan Journal of commerce and social science*, vol,10(3),687-707.

Hidayati,S & Sukmaningrum, p,S. (2020). Pengaruh Variable Makroekonomic Terhadap Jakrata. *Ekonomic Syariah Teori San Terapan https:e-//doi.org/10.202473/vol6iss20199pp1894-1908*, 6(9).

Hussain, T., Maitlo, S., Raza-ul-Mustafa, A., & Mujahid, H. (2022). Corruption, Governance, and Government Revenue. *Journal of History and Social Sciences*, *13*(2), 122-133.

Hye, Q. M. A., Raza-ul-Mustafa, A., & Mahmood, K. (2010). Causality between exports and imports of agricultural sector in the case of Pakistan. *Indian Journal of Agricultural Research*, *44*(3), 201-205.

Idris,I,& Bala,H. (2015). Firms Specific characteristics and stock market returns(evidence from listed food and beverages firm in Nigeria). *Research journal of finance and Accounting* , 6(16).

Islam,Md,Saiful, Ruksana Parvin,Mohammad Milion,and Mridul Kanti Das. (2023). The Impact of gross domestic product on the Bangladesh Stock Market :An Emprical Aalysis. *International Journal of Finance and Accounting*, 12, 1-12.

Javed Pervaiz,Junaid Masih and Teng Jian-zhou. (2018). Impact of Macroeconomic variables on karachi stock market returns. *International journal of Economic*, 10, 2018.

Khalid, M., Khan, A. A., & Jafri, M. K. (2023). Impact of Macroeconomic Instability on Income Inequality in South Asian Countries. *GISRAS Journal of Management & Islamic Finance (GJMIF)*, *3*(4).

Khan, A., Nasim, F., & Khan, A. (2024). Impact of Tariff, Exchange Rate and Investment Efficiency on Economic Growth: Evidence from Pakistan. *Journal of Law, Social and Management Sciences*, *3*(1), 1-9.

Khan, W. A. (2014). Impact of Interest rate changes on the Profitability of four major Commercial banks in pakistan. *International Journal Finance and Financial Reprting*, 4, 1.

Kumar,M.P, &Kumara,N. V.M. (2020). Market capitalization :Pre and post COVID-19 analysis. *Materials Today :Proceedings*, 37(part 2).

Kuvshinov,D &Zimmermann,K. (2022). The big bang stock market capitalization in the long run. *journal of financial economic*, 145(2).

Mashudi,D.,Ibrahim, M.A.,& ILahi, F . (2020). The Effect of Macroeconomic Variables on Sgaria stock price in the Jakarta Islmic Index.

Mittal, R. (2017). The effect of market capitalization Ratio on GDP growthand capital market Robustness in newly Industrialized countries. *Uchicago undergraduate Business Journal*.

Moussa,F .and Delhoumi, E. (2021). The asymmetric Impact of interest and exchange rate on the stock market index:evidance from MEAN region . *International Journal of emerging markets*, 17, 1746-8809.

Muhammad Farooq and Kamran khan. (2014). The Impact of Macro Economic Variables on stock price in pakistan . *International jouurnal of economic*, 2(1),13-21.

Nowbutsing, B. M. (2009). Stock market development and economic growth . *Mauritius Business and economic research*, 8.

Omodero, c. (2020). Capital Market Determination and market capitalization in Nigeria. *International Journal of Financial Research* , 462-473.

Owolabi, B. (2017). Economic characteristics and financial performance of selected Manufacturing companies in Nigeria.

Pilomenakorsha. (2016). The effect of Exchange Rate Movements on stock market capitalization.

Qureshi, M., Ahmad, N., Ullah, S., & ul Mustafa, A. R. (2023). Forecasting real exchange rate (REER) using artificial intelligence and time series models. *Heliyon*, *9*(5).

Rehman, S., Abro, A. A., Mustafa, A. R. U., Ullah, N., & Khattak, S. W. (2021). An analysis of stock market integration in the Asian developed and emerging markets. *Humanities & Social Sciences Reviews*, *9*(3), 1175-1190.

Seri Surani,M.Dileepkumar,Farhanjamil,saqibumuneer. (2015). Economic and financial issue. *International journal of Economic and financial issue*, 5.

Sulaiman D ,Muhammad Ghulam Rasoolla khan,Saba Zafar ,Muhammad Noman . (2013). Rate of Interest and its Impact on investment of the extent of pakistan. *OPakistan Journal of Commerce and social science*, 7(1).91-99.

Tahamat,Lilyana ,F & Mulyani, A. (2021). Terhadap Return Saham Top Market Capt. *JEMPER(Jurnal Eknomic Manjemen Perbankan*, 3(2).

ul Mustafa, A. R., Abro, A. A., & Awan, N. W. (2021). Social Protection and Economic Growth: An Empirical Analysis for Emerging Economies. *Elementary Education Online*, *20*(5), 6932-6942.

Wibowo ,A R,&Hendratno. (2019). The Effect of Stock Trading Frequency,Stock Trading Market Capitaalization on stock Return on LQ45 stock Index listed in Indonesia . *Exchange (IDX) period EP recodring of Management*, 336-340.

Zulfiqar, Z. (2015). Inflation ,Interest rate and firm's performance . *Journal of Arts and Commerce International*, 2.