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Do Inflation and Exchange Rates Predict Sectoral Equity Returns? Evidence from Banking (Interest-Sensitive) and Healthcare (Non-Interest-Sensitive) Sectors in Pakistan (2013–2023). A Segmented Market Performance Analysis

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Abstract

This study explores the predictive impact of two significant macroeconomic indicators; (inflation and exchange rate) on sectoral returns on equity in Pakistan, focusing on interest-sensitive (banking) and non-interest-sensitive (healthcare) sectors. Due to the sharp economic instability in emerging markets economies (EMEs), the research utilizes analytical tools, a quantitative time series approach using monthly data from 2013 to 2023. The methodology combines unit root testing, descriptive statistics, correlation analysis, and out-of-sample forecasting to investigate the stationarity and predictive dynamics of the variables. The results show that inflation has a statistically substantial and adverse effect on stock returns and banks in the healthcare sector, with stronger effects detected in the interest-sensitive sector. In contrast, exchange rate depreciation is originating to have a positive and significant influence on equity returns, predominantly in the healthcare sector after the analysis of healthcare markets, signifying sectoral resilience to currency fluctuations. The results support the notion that inflation and exchange rates have meaningful predictive power over sectoral performance, highlighting their role in determining investment strategies and macroeconomic policy. The study relates to the limited body of literature on sector-specific financial forecasting and simulation in emerging market economies (EMEs) and provides valuable understandings for policymakers to develop well-structured government policies and regulations. It also provides the essential information for investors seeking to mitigate risk and improve portfolio performance among macroeconomic volatilities and uncertainty.

Keywords: Financial forecasting and simulation G17, banks G21, government policies and regulations G28, analysis of healthcare markets I11

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1. Introduction

Examining the predictive influence of macroeconomic variables on equity returns is always considered a significant topic of discussion in financial economics, particularly in emerging markets like Pakistan. Among these variables, inflation and exchange rate fluctuations are critical, especially for interest-sensitive sectors such as banking and finance. These sectors are directly affected through lending limits, imported costs, and borrower's capacity to repay their loans (Khan & Billah, 2023). According to the current empirical evidence from Pakistan, it focuses on significant associations between macroeconomic variables like inflation, exchange rate volatility, and stock market performance, but it remains inconsistent. Meanwhile, analysis in report banking perspective 2024 shows the resilience of the financial sector notwithstanding macroeconomic disorders like double-digit inflation and currency fluctuations (Pakistan, 2024). This advocates potential sector-specific responses. Globally, frontier market research highlights that stabilizing inflation and exchange rates can rejuvenate the confidence of investors and improve stock returns (Humza Jilani, 2024).

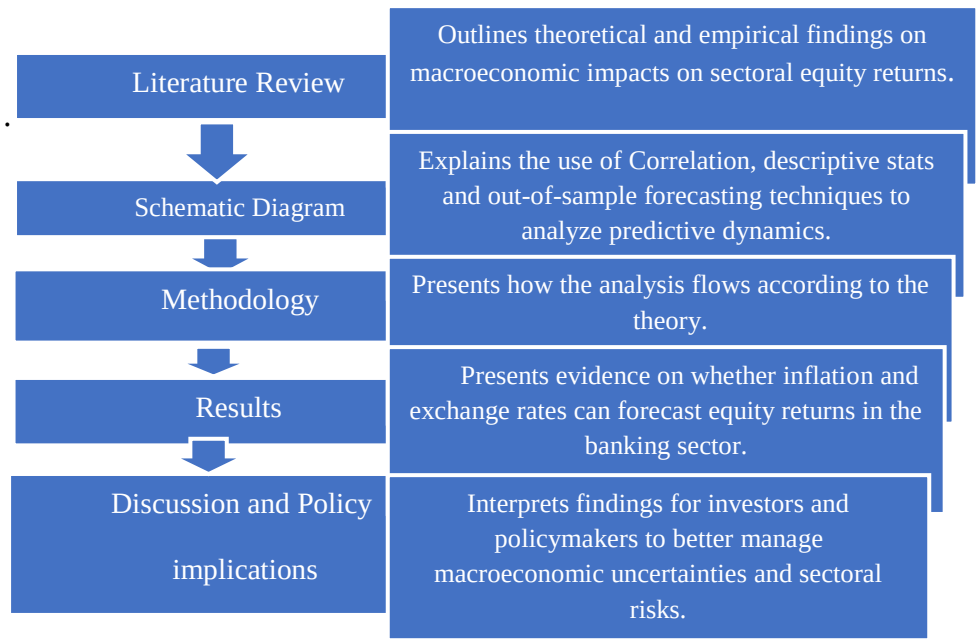
Several studies are conducted to explore the integration of macroeconomic variables and sectoral equity returns. This ultimately affects the future due to savings and investments by the investors (Alzoubi, 2022). The Stock market is a barometer of any economy. The Stock market is sensitive to movement in economic parameters. It always remains a matter of discussion for every investor in all over the world (Batra & Vohra, 2025). Macroeconomic factors affect the intrinsic value of the stock (Wang et al., 2023). However, the effect of the same macroeconomic factors may differ in different stock markets (Mensi et al., 2021). Due to financial crises, banks suffer more with financial difficulties that create the significant disruption in the economy within the financial system (Muñoz-Izquierdo, 2020) and creates the financial distress and decrease their value (Ibrahim & Ismail, 2024).

This research adds to the body of literature by examining the relationship of two key important macroeconomic variables, inflation and exchange rate with sectoral equity returns. One is interest sensitive sector (banking sector) and the other is non-interest-sensitive sector (healthcare sector) of Pakistan. Most of the prior studies are conducted in developed countries as a whole. This kind of research is considered to be more significant for investors and policymakers to generate the resilient investment strategies and regional development policies in emerging countries (Metwally et al., 2025). There are limited studies available to investigate the effect of macroeconomic variables and including tax revenue, inflation and GDP on health sector expenses. Some studies show the linear relationship between the

macroeconomic variables healthcare sector. This study moves further to investigate the significant to the predictive power of these indicators. This research is important not only for all emerging markets but also at a global level. Somehow, there is a negative and significant association seen between the inflation and healthcare sector (Zhou et al., 2020).

Following is the design of the study to explain how the study flows in this research paper. Each heading explains its significance related to the defined variables to be researched, sectoral equity and macroeconomic variables.

Figure 1: *Structure of Study*



Classification of Interest sensitive Sector and Non-Interest Sensitive Sector

Interest sensitive stock is the stock that is specially influences by the variations in interest rates. Financial institutions and highly leveraged business are the interest sensitive sectors. Interest rate sensitivity shows interest rate projections as a key element to analyzing the stock as an investment.

Table 1: *Classification of Sectoral Indices*

Sector	Classification	Exchange Rate Sensitivity	Inflation Sensitivity
Banking	Interest-sensitive	Low to Moderate	Moderate
Real Estate	Interest-sensitive	Low	Moderate

Consumer Staples	Less sensitive	Low	Moderate
Utilities	Less sensitive	Low	Low
Textiles	Consumer Discretionary	High	High
Technology	Mixed	Moderate to High	Low to Moderate
Healthcare	Less sensitive	Low	Moderate

Source: (Goda et al., 2024)

Research Objectives

1. To investigate the predictive power of macroeconomic variables (inflation) for equity returns in Pakistan's interest-sensitive sector and non-interest sensitive sector.
2. To investigate the predictive power of macroeconomic variables (exchange rate) for equity returns in Pakistan's interest-sensitive sector and non-interest sensitive sector.

Significance of the Study

The subject of this study is significant to determine the impact of macroeconomic factors, inflation and exchange rates, to understand the predictive relationship knowledge. This helps to enhance portfolio management and hedging strategies to design better investment strategies. It also helps to analyze the fluctuations of macroeconomic variables and their impact on sectoral performance. This analysis will help central banks and fiscal policy decisions. This actually defines the novelty of this research.

Hypotheses Testing

H1: *Inflation Rate has a significant predictive effect on interest sensitive sectoral equity in Pakistan.*

H2: *Inflation Rate has a significant predictive effect on non-interest sensitive sectoral equity in Pakistan.*

H3: *Exchange rate has a significant predictive effect on interest sensitive sectoral equity returns in Pakistan.*

H4: *Exchange rate has a significant predictive effect on non-interest sensitive sectoral equity returns in Pakistan.*

2. Literature Review

The relationship between macroeconomic indicators and capital market indicator performance is always considered as a scholarly interest. Among these macroeconomic indicators, inflation and exchange rates are often emphasized for their potential predictive power over stock returns across various sectors. These two economic indicators are very important for any emerging country like Pakistan to

understand the crucial stage of economy. In emerging markets this economic volatility and policy uncertainty are predominant. Inflation negatively and significantly affects the profitability of the banking sector by plummeting savings and loan distribution, even though exchange rate oscillations have a positive and significant impact. Additionally, advancement in economic circumstances positively impacts profitability, with 62.36% adjustment toward equilibrium annually (Rasheed et al., 2022).

Among macroeconomic indicators, inflation and foreign direct investment significantly influence banking profitability**,** despite the fact that the growth rate of gross domestic production and exchange rate have insignificant effects on banking profitability (Ayub & Shah, 2024). On the other hand, fluctuation in Exchange rate intensify the credit risk and the loan-to-deposit ratio while significantly dropping banks' return on capital. This ultimately demonstrates a negative influence on the profitability of the financial institution**.**

Inflation advances financing costs and deteriorates banking performance due to the negative influence on the loan-to-deposit ratio and overall returns of bank (Keshtgar et al., 2020)**.** Similarly, in Jordan**,** both in the short and long term, inflation has a statistically significant detrimental effect on the growth of the financial industry**.** Conversely, economic growth and previous financial sector policies positively influence financial sector performance over time (Batayneh et al., 2021)**.** Volatility in inflation and market returns have a moderate but negative correlation and no causality detected among them (Khan M. S., 2025). In Canada and UK, exchange rate deviation moderately affect inflation during economic development but show stronger transmission during downturns. During the last 25 months, a huge expected economic extension was detected as the inflation reflects more abruptly on the exchange rate (Boubaker & Mouna, 2024)**.** Moreover, macroeconomic factors, especially inflation and exchange rates, play a crucial function in forming the sustainability and financial returns of healthcare organizations, highlighting the need for policy-level intrusions (Ofuonye et al., 2024). Therefore, macroeconomic indicators substantially influence behavior of investors in the financial sector (Sitasari & Firmansyah, 022).

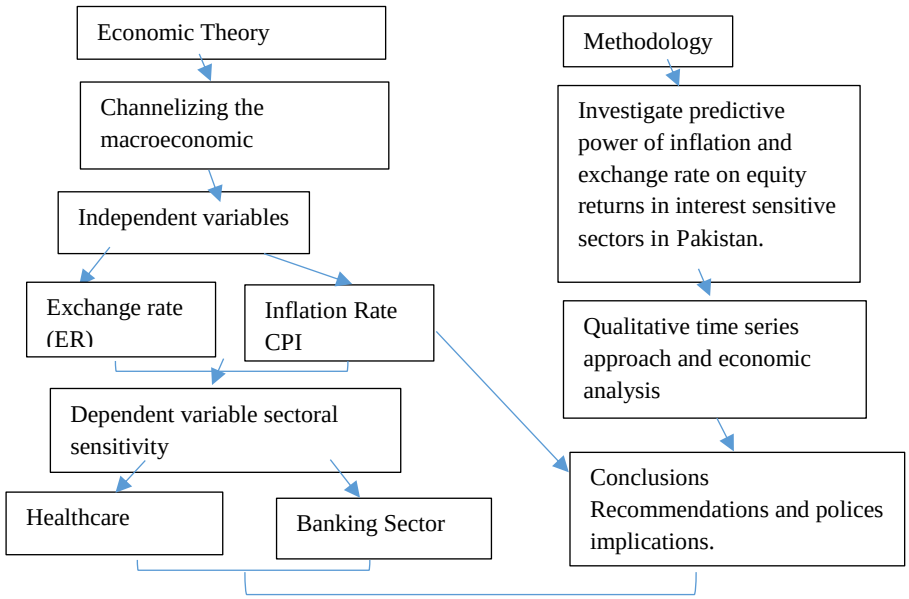
According to the Indonesia Sharia Stock Index, the macroeconomic variables do not have the significant effect independently on healthcare companies. Earnings per share also have a significant effect on the stock prices (Lukiawati & Fatoni, 2023). On the other side, the banking sector, devaluation of the domestic currency against the USD generally achieves the negative impact on returns of bank stocks**,** and the market return rate also significantly influences stock performance

(Bandara, 2021). Macroeconomic variables such as inflation, GDP, money supply, interest rate, and exchange rate significantly influence banks' lending performance in Pakistan along with negative shocks that fall the credit creation. International banks face the higher exposure to external shocks due to macroeconomic fluctuations because they are more sensitive to macroeconomic indicators as compared to the local banks (Hussain et al., 2024). Additionally, GDP, inflation, and exchange rate, these macroeconomic variables negatively affect profitability (Akbari & Naseri, 2022). In healthcare firms, tax revenue, labour force participation, and GDP per capita positively influence public healthcare expenses; on the other hand, inflation has a negative relationship with health expenses in developing countries. A U-shaped relationship exists between public health spending and economic development. This further suggests the strategic economic and fiscal policies to improve healthcare investment (Zhou, et al., 2020). Somehow, the big health events like SARS, H1N1, and COVID-19 affect the stock prices of pharmaceutical companies. This shows stock prices change depending on how the market reacts to the health crisis (Maleki & Ghahari, 2024).

3. Schematic Diagram and Theoretical Framework

The schematic diagram mentioned below illustrates the theoretical foundation and methodological approach. These approaches facilitate the investigation of macroeconomic influences on healthcare and exchange rate equity returns. The economic theory explains the framework that transmits the broader macroeconomic mechanism by analyzing the two key independent macroeconomic variables, exchange and inflation rate (CPI). These variables are evaluated for their forecasting out sample predictive power on equity returns within the healthcare and banking sectors. The methodology integrates and incorporates the qualitative time series approach and economic analysis to evaluate sectoral sensitivity by conducting in-depth analysis that finally approaches conclusions, recommendation and policy implications.

Figure 2*: Schematic Diagram of the Research Study*



4. Methodology

The methodological framework highlights the investigation of the predictive power of inflation and interest rates on the returns on equity of interest-sensitive and non-interest sensitive sectors in Pakistan. This research finds out the historical values of macroeconomic factors, inflation and exchange rates and forecasts returns on sectoral equity, banking and health care sectors. This research adopts a quantitative time series approach employing historical monthly data from inflation rate, exchange rate and sectoral indices. The analysis contributes testing for econometric function stationarity, examining time series features through correlograms and descriptive statistics, and configuring time series forecasting models for the test of equality of mean**.** The methodology is premeditated to test both overall and sector-specific hypotheses related to the directional effect of macroeconomic variables. The detailed data analysis is directed using EViews 12 to forecast accuracy and causality inference. The rationale for selecting these tools depends on their capability to accomplish critical econometric functions like differencing, lag structure analysis, and forecasting error evaluation.

Data Collection and Sources

The data applied in this research contains historical monthly time series for macroeconomic variables: inflation rates, exchange rates, and sectoral equity indices. The research emphasizes two key segments of sectoral equity indices in

Pakistan: The interest sensitive banking sector and the non-interest sensitive health care sector. Data used in this research covers a minimum 10 years of time period from January 2013 to December 2023, to ensure strength in time series analysis. The data used in this study was transformed into stationarity with different level differences analyzed in EViews 12.

Inflation Rate: The Consumer Price Index (CPI) to measure the inflation rate in Pakistan and its data is obtained from the Pakistan Bureau of Statistics. **Exchange Rate:** Represented by the State Bank of Pakistan's policy rate, accessed via The Business Recorder website. **Banking Sector Index:** Data is accumulated from the Pakistan Stock Exchange (PSX) sectoral performance records. **Health Care Sector Index:** Data is tracked from PSX, representing price-weighted average returns of listed health care companies in the sector.

Table 2: *Variable Description*

Variable	ADF Result	Stationarity Order	Forecast Behavior	Correlogram Pattern	Summary Trend
Exchange Rate	I (1)	First difference	Upward, uncertain	Slow decay → flat	Trending upward
Health Care Sector	I (2)	Second difference	Volatile, stabilizes	Persistent → random	High persistence
Inflation Rate	I (1)	First difference	Stable, bounded	Flat after diff	Cyclical, mean-reverting
Interest Sensitive Sector	I (1)	First difference	Volatile, stabilizes	Drops quickly	Responsive to shocks

Econometric Techniques and Design Model

To test the hypotheses, a combination of various techniques is employed in this study such as stationarity testing, descriptive statistics, correlations analysis, and out-of-sample time series forecasting. This helps in evaluating the in-depth analysis of the data provided.

Table 3: *Dated Data Table*

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Year
							2021						2021
Exchange rate	160.6	159.4	156.1	153.2	153.3	156.4	160.0	164.7	168.5	172.0	173.5	177.6	162.9
Health care Sector	860.2	775.7	798.1	799.3	840.1	865.2	858.7	802.7	781.5	696.3	649.6	687.6	784.6
inflation rate	565.0	870.0	905.0	1,110.0	1,087.0	965.0	840.0	8.4	898.0	920.0	1,150.0	1,230.0	879.0
Interest-Sensitive Sector	8,674.55	8,598.57	8,702.43	9,450.58	9,105.21	9,252.72	9,461.55	9,329.41	10,158.8	10,125.8	9,762.74	10,188.9	9,400.95
							2022						2022
Exchange rate	176.5	175.6	180.0	184.8	194.1	204.7	216.8	220.9	230.5	221.1	222.4	225.2	204.4
Health care Sector	657.0	630.3	641.0	588.8	587.6	589.0	590.7	566.7	555.3	539.4	465.1	398.1	567.4
inflation rate	1,300.0	1,220.0	1,270.0	1,340.0	1,380.0	2,130.0	2,490.0	2,726.0	2,320.0	2,660.0	2,380.0	2,450.0	1,972.2
Interest-Sensitive Sector	10,054.7	9,913.01	10,083.9	9,512.28	8,514.54	8,394.58	8,909.49	8,219.59	8,189.47	8,371.06	7,984.20	8,009.08	8,846.32
							2023						2023
Exchange rate	234.1	265.4	280.2	283.8	285.7	286.6	281.6	293.6	297.6	279.4	284.1	282.0	279.5
Health care Sector	409.1	416.0	413.6	399.9	373.7	384.8	376.3	371.8	377.6	427.0	473.0	476.2	408.3
inflation rate	2,760.0	3,150.0	3,540.0	3,640.0	3,800.0	2,940.0	2,830.0	2,740.0	3,140.0	2,680.0	2,920.0	2,970.0	3,092.5
Interest-Sensitive Sector	8,121.08	8,192.37	8,695.64	8,546.19	8,562.40	11,308.3	10,728.0	10,698.2	12,455.4	14,604.2	15,131.4	15,455.6	11,041.6
							2024						2024
Exchange rate	279.9	279.0	278.6	278.1	278.3	278.4	278.3	278.3	278.3	277.8	277.9	278.1	278.4
Health care Sector	473.2	508.0	515.2	659.9	654.8	691.3	695.7	750.4	804.6	958.9	1,232.9	1,251.1	766.3
inflation rate	2,830.0	2,310.0	2,070.0	1,730.0	1,180.0	1,260.0	1,110.0	960.0	690.0	720.0	490.0	410.0	1,313.3
Interest-Sensitive Sector	16,507.0	17,360.4	18,780.4	20,402.2	21,987.5	22,358.5	22,040.8	23,196.4	24,825.9	28,743.7	29,621.5	30,813.4	23,053.1
							2025						2025
Exchange rate	278.7	279.5	280.3	--	--	--	--	--	--	--	--	--	279.5
Health care Sector	1,259.0	1,252.1	1,221.5	--	--	--	--	--	--	--	--	--	1,244.2
inflation rate	240.0	150.0	70.0	--	--	--	--	--	--	--	--	--	153.3
Interest-Sensitive Sector	30,605.5	31,273.3	32,271.2	--	--	--	--	--	--	--	--	--	31,383.3

Here the above dated data table 3 shows the structure of time series, ordered over time on monthly basis from January 2021 to March 2025. Software EViews 12 uses this table to analyze the past value and forecast the results.

Stationarity Checking and Unit Root Test

The first step is to analyze the detection of unit root test to confirm whether the data sets used in this research are stationary or not. Following are the tables of unit root tests and correlograms to analyze the stationary.

Figure 3: *Correlogram and Unit Root Test of Exchange Rate at Level 1*

Date: 05/17/25 Time: 16:40
Sample (adjusted): 2021M02 2025M05
Included observations: 50 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.315	0.315	5.2682	0.022
		2	0.107	0.009	5.8878	0.053
		3	0.070	0.038	6.1581	0.104
		4	-0.194	-0.253	8.2930	0.081
		5	-0.030	0.119	8.3461	0.138
		6	0.202	0.235	10.767	0.096
		7	0.126	0.027	11.725	0.110
		8	-0.005	-0.183	11.726	0.164
		9	0.214	0.284	14.641	0.101
		10	-0.023	-0.079	14.675	0.144
		11	0.024	0.090	14.715	0.196
		12	-0.002	-0.242	14.715	0.257

Table 4: *Exchange Rate Unit Root Test*

Null Hypothesis: D(EXCHANGE_RATE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.959231	0.0002
Test critical values:	1% level	-3.571310	
	5% level	-2.922449	
	10% level	-2.599224	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCHANGE_RATE,2)
Method: Least Squares
Date: 05/17/25 Time: 16:59
Sample (adjusted): 2021M03 2025M05
Included observations: 49 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCHANGE_RATE(-1))	-0.684627	0.138051	-4.959231	0.0000
C	1.703308	0.996358	1.709535	0.0939

R-squared	0.343520	Mean dependent var	0.042594
Adjusted R-squared	0.329552	S.D. dependent var	8.022362
S.E. of regression	6.568779	Akaike info criterion	6.642493
Sum squared resid	2027.996	Schwarz criterion	6.719710
Log likelihood	-160.7411	Hannan-Quinn criter.	6.671789
F-statistic	24.59397	Durbin-Watson stat	2.011159
Prob(F-statistic)	0.000010		

This means the first-differenced exchange rate is stationary, and the p-value is statistically significant as represented in the above table 4-unit root test.

Figure 4*: Correlogram and Unit Root Test of Health-Care-Sector at Level 2*

Date: 05/17/25 Time: 16:44
Sample (adjusted): 2021M03 2025M05
Included observations: 49 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.336	-0.336	5.8817	0.015
		2	-0.032	-0.163	5.9360	0.051
		3	-0.013	-0.093	5.9456	0.114
		4	-0.112	-0.182	6.6443	0.156
		5	-0.061	-0.215	6.8559	0.232
		6	0.006	-0.173	6.8581	0.334
		7	0.196	0.103	9.1476	0.242
		8	-0.144	-0.088	10.406	0.238
		9	0.072	-0.022	10.726	0.295
		10	-0.013	-0.021	10.737	0.378
		11	-0.157	-0.167	12.363	0.337
		12	0.096	-0.032	12.985	0.370

Table 5: *Non-Interest Rate Unit Root Test*

Null Hypothesis: D(HEALTH_CARE_SECTOR,2) has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.772617	0.0000
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	
	10% level	-2.603944	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HEALTH_CARE_SECTOR,3)
Method: Least Squares
Date: 05/17/25 Time: 17:23
Sample (adjusted): 2021M09 2025M05
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HEALTH_CARE_SECTOR(-1),2)	-5.390411	0.933790	-5.772617	0.0000
D(HEALTH_CARE_SECTOR(-1),3)	3.617942	0.834936	4.333198	0.0001
D(HEALTH_CARE_SECTOR(-2),3)	2.915997	0.705812	4.131410	0.0002
D(HEALTH_CARE_SECTOR(-3),3)	2.234674	0.562466	3.972992	0.0003
D(HEALTH_CARE_SECTOR(-4),3)	1.341700	0.405666	3.307403	0.0021
D(HEALTH_CARE_SECTOR(-5),3)	0.489122	0.207263	2.359910	0.0238
C	9.804039	8.427725	1.163308	0.2524

R-squared	0.795422	Mean dependent var	0.600930
Adjusted R-squared	0.761325	S.D. dependent var	108.9093
S.E. of regression	53.20692	Akaike info criterion	10.93415
Sum squared resid	101915.2	Schwarz criterion	11.22086
Log likelihood	-228.0843	Hannan-Quinn criter.	11.03988
F-statistic	23.32861	Durbin-Watson stat	1.951808
Prob(F-statistic)	0.000000		

Table 5 means the second-differenced series HEALTH_CARE_SECTOR is stationary, and the p-value is statistically significant

Figure 5: *Correlogram and Unit Root Test of Inflation at Level 1*

Date: 05/17/25 Time: 16:54
Sample (adjusted): 2021M02 2025M05
Included observations: 50 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.005	-0.005	0.0012	0.972
		2	0.224	0.224	2.7293	0.255
		3	-0.107	-0.111	3.3613	0.339
		4	0.066	0.018	3.6047	0.462
		5	-0.134	-0.093	4.6493	0.460
		6	0.060	0.038	4.8632	0.561
		7	0.350	0.436	12.255	0.092
		8	0.115	0.076	13.077	0.109
		9	0.369	0.282	21.696	0.010
		10	-0.020	-0.003	21.722	0.017
		11	0.071	-0.092	22.060	0.024
		12	-0.441	-0.410	35.342	0.000
		13	0.129	0.061	36.518	0.000
		14	-0.136	-0.081	37.850	0.001
		15	0.126	-0.056	39.023	0.001
		16	0.018	-0.157	39.046	0.001
		17	0.110	-0.151	40.008	0.001
		18	-0.017	-0.061	40.032	0.002
		19	-0.217	0.003	43.975	0.001
		20	-0.054	0.029	44.228	0.001
		21	-0.297	0.016	52.158	0.000
		22	0.032	0.014	52.255	0.000
		23	-0.079	0.075	52.862	0.000
		24	0.139	-0.032	54.788	0.000

Table 6: *Inflation Rate Unit Root Test*

Null Hypothesis: D(INFLATION_RATE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.949940	0.0000
Test critical values:	1% level	-3.571310	
	5% level	-2.922449	
	10% level	-2.599224	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLATION_RATE,2)
Method: Least Squares
Date: 05/17/25 Time: 19:14
Sample (adjusted): 2021M03 2025M05
Included observations: 49 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION_RATE(-1))	-1.004762	0.144571	-6.949940	0.0000
C	-16.36686	48.24443	-0.339249	0.7359

R-squared	0.506829	Mean dependent var	-7.857143
Adjusted R-squared	0.496336	S.D. dependent var	475.7020
S.E. of regression	337.6022	Akaike info criterion	14.52157
Sum squared resid	5356838.	Schwarz criterion	14.59879
Log likelihood	-353.7786	Hannan-Quinn criter.	14.55087
F-statistic	48.30166	Durbin-Watson stat	2.002870
Prob(F-statistic)	0.000000		

The above-mentioned table 6 confirms that the differenced series of inflation rates is stagnant, which means stationarity and the p-value is statistically significant.

Figure 6: *Correlogram and Unit Root Test of Interest Sensitive Sector at Level 1*

Date: 05/17/25 Time: 19:13
Sample (adjusted): 2021M02 2025M05
Included observations: 50 after adjustments

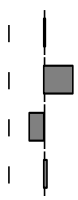
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.005	-0.005	0.0012	0.972
		2	0.224	0.224	2.7293	0.255
		3	-0.107	-0.111	3.3613	0.339
		4	0.066	0.018	3.6047	0.462

Table 7: *Interest Sensitive Sector Unit Root Test*

Null Hypothesis: D(LINTEREST_SENSITIVE_SECTOR,2) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.21534	0.0000
Test critical values:	1% level	-3.577723	
	5% level	-2.925169	
	10% level	-2.600658	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LINTEREST_SENSITIVE_SECTOR,3)
Method: Least Squares
Date: 05/17/25 Time: 17:42
Sample (adjusted): 2021M05 2025M05
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LINTEREST_SENSITIVE_SECTOR(-1...	-2.262478	0.201731	-11.21534	0.0000
D(LINTEREST_SENSITIVE_SECTOR(-1...	0.592520	0.119778	4.946813	0.0000
C	-0.000924	0.009788	-0.094436	0.9252

R-squared	0.816319	Mean dependent var	-0.001290
Adjusted R-squared	0.807970	S.D. dependent var	0.153126
S.E. of regression	0.067102	Akaike info criterion	-2.503517
Sum squared resid	0.198115	Schwarz criterion	-2.385422
Log likelihood	61.83264	Hannan-Quinn criter.	-2.459077
F-statistic	97.77312	Durbin-Watson stat	2.271126
Prob(F-statistic)	0.000000		

Table 7 depicts the unit root test of interest sensitive sector confirms that the differenced INTEREST_SENSITIVE_SECTOR series is stationary, and the p-value is statistically significant.

Table 8: *Test for Equality of Means between Series and Bar Chart Exploration*

Test for Equality of Means Between Series
Date: 05/17/25 Time: 20:01
Sample: 2021M01 2025M05
Included observations: 51

Method	df	Value	Probability
Anova F-test	(3, 200)	153.2531	0.0000
Welch F-test*	(3, 85.7493)	137.4847	0.0000

*Test allows for unequal cell variances

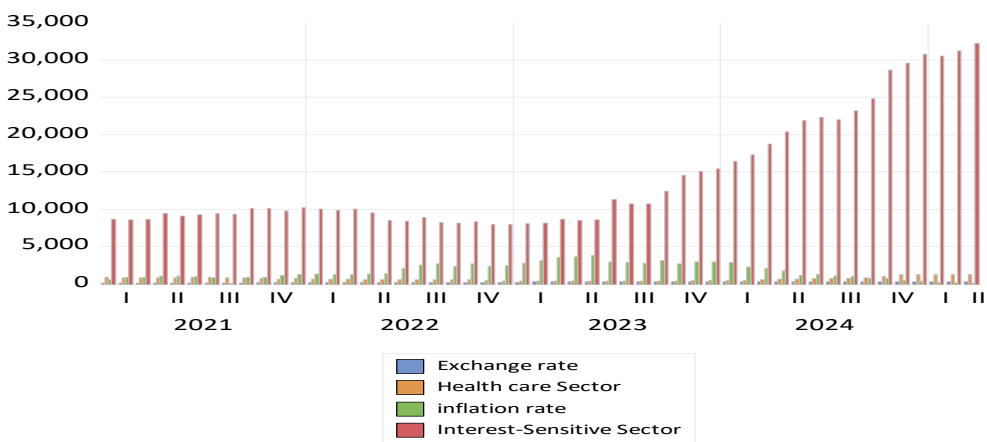
Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	3	6.81E+09	2.27E+09
Within	200	2.96E+09	14821141
Total	203	9.78E+09	48169379

Category Statistics

Variable	Count	Mean	Std. Dev.	Std. Err. of Mean
EXCHAN...	51	234.1517	51.83774	7.258735
HEALTH_...	51	667.6745	248.1672	34.75036
INFLATIO...	51	1716.556	1044.015	146.1913
INTERES...	51	14161.84	7624.325	1067.619
All	204	4195.055	6940.416	485.9263

Figure 7: *Bar Chart Representing Four Variables Frequency*



The above mentioned table 8 analysis further discovers that the test of equality of means between series specifies that the difference in mean values is statistically significant. The above table is about the comparison of means using ANOVA and Welch F-Test to examine the same trends of averages, they are highly

significant results (F=153.25 and 137.48 with p<5%). This represents the deviation in terms of strong divergence in mean values. It indicates that inflationary pressure may differently affect the dynamics of sectoral equity performance in Pakistan. It further elabortaes and justifies its investigation in systematic forecasting model. In short both results are F-values are very high whereas P- values are low. This identifies outcomes that are statistically strong and reliable.

The Figure 7 bar chart shows the continuous upward trend means inflation leads to price growth and currency depreciate overtime. As far as the sectoral variable, they are improving sector performance so, this time trend graph reveals a continuous increase in variables, indicating macroeconomic pressures or sectoral momentum during the periodic analysis so, and Pakistan's recent macroeconomic environment observed the rising pattern of series. This research bar graph shows the volatility trends and fluctuations.

Table 9: *Descriptive Analysis*

	EXCHANG...	HEALTH C...	INFLATION...	INTEREST...
Mean	234.1517	667.6745	1716.556	14161.84
Median	265.4420	640.9800	1300.000	10083.86
Maximum	297.6135	1259.020	3800.000	32271.23
Minimum	153.1679	371.8300	8.350000	7984.200
Std. Dev.	51.83774	248.1672	1044.015	7624.325
Skewness	-0.363978	0.991589	0.239447	1.200649
Kurtosis	1.428816	3.414905	1.845849	3.034787
Jarque-Bera	6.371896	8.723422	3.317982	12.25582
Probability	0.041339	0.012757	0.190331	0.002181
Sum	11941.74	34051.40	87544.35	722253.7
Sum Sq. Dev.	134357.6	3079349.	54498325	2.91E+09
Observations	51	51	51	51

Among all of the above variables, inflation rate has the highest mean value represented in Table 9 descriptive analysis. This represents persistent inflationary pressure in the economy. The inflation rate has the high value of standard deviation, which shows inflation in Pakistan has been volatile with periods of both high and low inflation. The maximum and minimum value of inflation show that both values of inflation remain positive, indicating that Pakistan is continually facing the situation of inflation, not deflation. Maximum inflation in Pakistan represents the crisis period of Pakistan. Finally, inflation has the lowest JB value with the highest p-value is closest to the normal. In Pakistan, stable and predictable inflation is observed following the normal distribution. This suggests relatively symmetric inflation without extreme voltility.

Table 10: *Correlation*

	EXCHANG…	HEALTH_C…	INFLATION…	INTEREST…
EXCH…	1	-0.1472022…	0.40666743…	0.57570069...
HEAL…	-0.1472022…	1	-0.8678134...	0.67228476...
INFLAT…	0.40666743…	-0.8678134...	1	-0.4777657..
INTE…	0.57570069...	0.67228476...	-0.4777657…	1

The correlation table explains that inflation is strongly but negatively correlated with the health care sector (-0.860) and the banking sector (-0.477), these reveal that a rise in inflation tends to reduce the returns of these sectoral equity. Moreover, the exchange rate explains a moderate positive correlation with inflation (0.406), demonstrating the cost-push inflation trend in Pakistan. Unexpectedly, a positive correlation exists between the exchange rate and banking sector (interest-sensitive-sector) (0.576).

Out of Sample Time Series Forecasting

Figure 8: *Non-Interest Sensitive Sector*

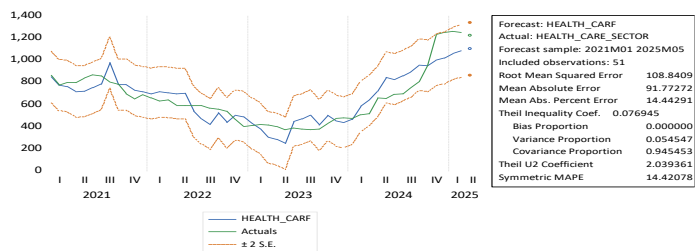
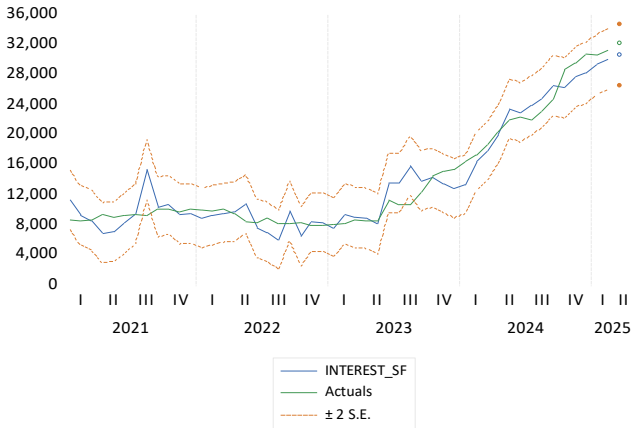
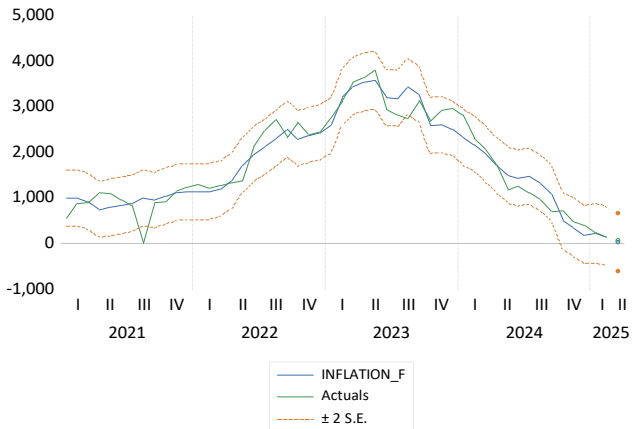


Figure 9: *Interest Sensitive Sector*



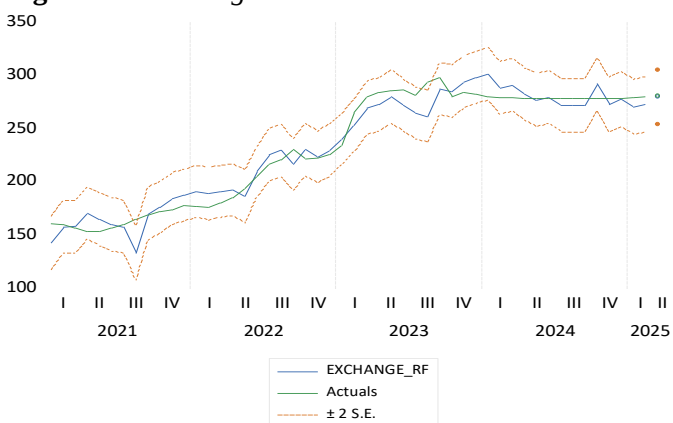
Forecast: INTEREST_SF	
Actual: INTEREST_SENSITIVE_SECTOR	
Forecast sample: 2021M01 2025M05	
Included observations: 51	
Root Mean Squared Error	1870.194
Mean Absolute Error	1441.591
Mean Abs. Percent Error	12.04403
Theil Inequality Coef.	0.058467
Bias Proportion	0.000000
Variance Proportion	0.015833
Covariance Proportion	0.984167
Theil U2 Coefficient	2.250735
Symmetric MAPE	11.66014

Figure 10*: Inflation Rate*



Forecast: INFLATION_F	
Actual: INFLATION_RATE	
Forecast sample: 2021M01 2025M05	
Included observations: 51	
Root Mean Squared Error	286.0760
Mean Absolute Error	213.1514
Mean Abs. Percent Error	246.9254
Theil Inequality Coef.	0.071751
Bias Proportion	0.000000
Variance Proportion	0.019917
Covariance Proportion	0.980083
Theil U2 Coefficient	0.061074
Symmetric MAPE	20.31694

Figure 11: *Exchange Rate*



Forecast: EXCHANGE_RF	
Actual: EXCHANGE_RATE	
Forecast sample: 2021M01 2025M05	
Included observations: 51	
Root Mean Squared Error	11.47268
Mean Absolute Error	9.255088
Mean Abs. Percent Error	4.164155
Theil Inequality Coef.	0.023944
Bias Proportion	0.000000
Variance Proportion	0.012813
Covariance Proportion	0.987187
Theil U2 Coefficient	1.709558
Symmetric MAPE	4.192505

Here the first forecasted trend, figure 11, is exchange rate which is upward. This reveals further depreciation in the Pakistani rupee. This must say countinued inflationary pressure particularly linked to external debt repayments or increase in global commodities. Secondly figure 8, the health care sector forecast graph, follows a similar path, this shows the strong model fit. The forecasted values of the model are stable and showing the rising trend. This stability may show the resillience of the sector to macroeconomic shocks, which might be due to growing demand for health services. On the other hand interest sensitive sector figure 9, the banking sector, indicates the speedy growth. This might indicate the market expectations of future monetary easing that could be possibly done through a high interest rate environment. This point particulary indicates how sensitive this secotr is to interest rate dynamics. Moreover, the inflation forecast graph figure 10 suggests the continuous upward pressure and indicates the price increase in Pakistan. There could be the reason of global inflation spillovers, energy cost or monetary challenges within the country. The forecasted out sample model shows the upward momentum. This may explore the ongoing inflationary situation. In the nutshell, time series forecasting graphs indicate that the model used in this research has good fit, especially in the equity return sector.

Table 11: *Equation Estimation and Modeling*

Dependent Variable: HEALTH CARE SECTOR
Method: Least Squares
Date: 05/17/25 Time: 19:50
Sample: 2021M01 2025M05
Included observations: 51

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCHANGE RATE	1.179947	0.335028	3.521939	0.0010
INFLATION_RATE	-0.230109	0.016635	-13.83289	0.0000
C	786.3825	73.44558	10.70701	0.0000

R-squared	0.803801	Mean dependent var	667.6745
Adjusted R-squared	0.795626	S.D. dependent var	248.1672
S.E. of regression	112.1907	Akaike info criterion	12.33530
Sum squared resid	604163.9	Schwarz criterion	12.44894
Log likelihood	-311.5501	Hannan-Quinn criter.	12.37872
F-statistic	98.32505	Durbin-Watson stat	0.623400
Prob(F-statistic)	0.000000		

Dependent Variable: INTEREST_SENSITIVE_SECTOR
Method: Least Squares
Date: 05/17/25 Time: 19:53
Sample: 2021M01 2025M05
Included observations: 51

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCHANGE_RATE	135.6914	5.756722	23.57094	0.0000
INFLATION_RATE	-6.228948	0.285835	-21.79214	0.0000
C	-6918.191	1262.002	-5.481918	0.0000

R-squared	0.938628	Mean dependent var	14161.84
Adjusted R-squared	0.936071	S.D. dependent var	7624.325
S.E. of regression	1927.752	Akaike info criterion	18.02312
Sum squared resid	1.78E+08	Schwarz criterion	18.13676
Log likelihood	-456.5895	Hannan-Quinn criter.	18.06654
F-statistic	367.0574	Durbin-Watson stat	1.131258
Prob(F-statistic)	0.000000		

Dependent Variable: EXCHANGE_RATE
Method: Least Squares
Date: 05/17/25 Time: 19:41
Sample: 2021M01 2025M05
Included observations: 51

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HEALTH_CARE_SECTOR	-0.066717	0.016980	-3.929124	0.0003
INFLATION_RATE	0.032628	0.003401	9.592703	0.0000
INTEREST_SENSITIVE_SECTOR	0.007509	0.000313	24.01903	0.0000
C	116.3531	14.90592	7.805832	0.0000

R-squared	0.950038	Mean dependent var	234.1517
Adjusted R-squared	0.946849	S.D. dependent var	51.83774
S.E. of regression	11.95092	Akaike info criterion	7.874678
Sum squared resid	6712.747	Schwarz criterion	8.026193
Log likelihood	-196.8043	Hannan-Quinn criter.	7.932576
F-statistic	297.9062	Durbin-Watson stat	1.031424
Prob(F-statistic)	0.000000		

Dependent Variable: INFLATION_RATE_0
Method: Least Squares
Date: 05/25/25 Time: 18:27
Sample: 2021M01 2025M05
Included observations: 51

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HEALTH_CARE_SECTOR	-0.065116	3.98E-07	-163788.7	0.0000
EXCHANGE_RATE	20.28704	1.72E-06	11772957	0.0000
INTEREST_SENSITIVE_SECTOR	-0.143404	1.57E-08	-9161007.	0.0000
C	-959.3529	0.000445	-2158035.	0.0000

R-squared	1.000000	Mean dependent var	1716.556
Adjusted R-squared	1.000000	S.D. dependent var	1003.240
S.E. of regression	0.000243	Akaike info criterion	-13.73337
Sum squared resid	2.77E-06	Schwarz criterion	-13.58186
Log likelihood	354.2010	Hannan-Quinn criter.	-13.67547
F-statistic	2.85E+14	Durbin-Watson stat	1.955082
Prob(F-statistic)	0.000000		

$$\boldsymbol{inflation = \alpha + \beta(banking\ Sector) + \beta_2(health\ care\ sector) + e}\ldots\ldots\ldots\textbf{i}$$

$$\boldsymbol{exchnage\ rate = \alpha + \beta(banking\ sector) + \beta_2(health\ care\ sector) + e}\ldots\ldots\ldots\textbf{ii}$$

Here in above equation estimation and modeling tables the exchange rate has a positive and statistically significant effect on health care equity returns. This interprets a rise in exchange rates tending to increase the returns in health care sector equity due to international trade conditions. The inflation rate has a negative and statistically significant impact on the health care equity return. As the inflation in Pakistan rises, the operational cost of these health care companies increases which leads to a negative effect on profitability and stock returns. The inflation table is quite clear that both variables are highly significant. Depreciation in currency affects the increase in the banking sector index. This is because of foreign investors' activities. Similarly, inflation also increases because prices of stocks increase and returns increase, and investors change their perceptions and interest towards sensitive stocks. Similarly exchange rate predicts that inflation rates and interest sensitive sector positively affect the exchange rate. Suggest inflationary pressures and banking sector movements are the main source of depreciation. Whereas the health care sector negatively affects exchange rate. Somehow in the last table, all variables have a positive and significant impact the inflation. Similarly, when currency depreciates it ultimately boosts inflation. On the other hand, growth in the

health care sector and banking sector also increases the inflation, due to demand pull effects, meaning increase in the cost of production.

$$\boldsymbol{inflation\ rate = \alpha 969.3 + \beta(-0.143) + \beta_2(-0.065) + e}\ldots\ldots\textbf{i}$$

$$\boldsymbol{exchange\ rate = \alpha 116.5 + \beta 0.0075 - \beta_2 0.0667 + e}\ldots\ldots\ldots\textbf{ii}$$

These results reveal that inflation and exchange rates play a significant role in predicting equity returns in the healthcare sector and banking sectors, with inflation having positive predictive power for interest sensitive banking sectors and negative predictive power for healthcare, whereas exchange rates negatively affect equity returns in healthcare.

5. Hypotheses Acceptance and Rejection

The research study examines the predictive power of two fundamental macroeconomic variables, inflation and exchange rate, and their impact on sectoral equity returns, the banking sector, and the healthcare sector. From this research study, hypothesis H1 is accepted, signifying that inflation has a statistically significant and negative effect on banking sector returns. Though it's negative, the significance of the impact shows its predictivity and consistency across the models. This strengthens the relevance of forecasting. Therefore, inflation has a negative and significant impact on the banking sector (Rasheed et al., 2022). Similarly, hypothesis H2 is also accepted. This reveals that devaluation in exchange rate positively affects the equity returns of the banking sector in Pakistan (Hussain et al., 2024). This represents the predictive power of banking sector equity return through foreign investor behavior and monetary policy expectation (Bandara, 2021). Nevertheless, Hypothesis H3 is rejected, showing the relationship between the non-interest-sensitive sector and inflation, which shows a statistically significant negative effect. It reflects economic pressure rather than prediction of generation of equity return (Ofuonye et al., 2024). On the other hand, hypothesis H4 is also accepted, indicating a positive and statistically significant relationship between exchange rate depreciation and healthcare equity return (Goda et al., 2024). This sector's equity return has predictive influence due to the benefits of international trade, or this sector is resilient enough to cling to the economic problems well. Finally, both inflation and exchange rates are statistically significant predictors for interest-sensitive sectors, whereas exchange rate independently reveals reliable positive predictive power across both sectors.

6. Conclusion

This research finalizes that the macroeconomic variables inflation rate and exchange rate are statistically significant, having significant predictive power over the stock returns of interest-sensitive sectors in Pakistan. The findings indicate that out of all variables, inflation rate has the strongest negative influence on the returns of both the interest-sensitive banking sector and the health care sector, signifying that an increase in prices may reduce the profitability and stock performances of both sectors. While on the other hand depreciation in exchange rate has a positive and statistically significant impact on stock returns of both sectors, especially in the healthcare sector. This could be possibly due to trade-related benefits. The healthcare sector is a volatile sector, but it is resilient against the macroeconomic shocks, possibly due to its consistent demand. On the other hand, the banking sector is highly responsive to macroeconomic conditions, mainly currency fluctuation. Using the out-of-sample forecasting makes sure that past values of both the macroeconomic variables (inflation and exchange rate) signify a reliable forecast of future movements in equity returns of both sectors. The analysis provides the advantages of using different robust and vigorous statistical techniques. These techniques provide the stationarities in variables by having no unit root in all variables after differencing. Nevertheless, the descriptive statistics, the test of equality of means, and the correlograms underpin the validity of the observed trend.

7. Recommendations

The above-mentioned conclusions further help in drawing up the recommendations. It is important for investors to carefully observe the inflation and exchange rate trend during the decision-making process about portfolio allocations, especially in both sectors like the interest-sensitive banking sector and the healthcare sector. Investors need to understand the inflation and exchange rate. Investors need to make the decisions after closely monitoring the data to understand the impact of inflation rates and exchange rates on the economy. They need to create investment based on risk tolerance. It is very important at the government level to control inflation. They need to work on it as its primary goal. This will ensure the stability of the overall market. On the other hand, the government also needs to work on the stability of exchange rate fluctuation to reduce the wide economic effects. This research applied different statistical techniques like out-of-sample forecasting, tests of equality of means, correlation, and description to generate in-depth analysis to help the policymakers in making responsive decisions. Moreover, policymakers need to work on such programs that guide, train, and educate the investors to know about the impact of macroeconomic indicators on sectoral equity performances. This

will not only help the investor to create the portfolio but also help to strengthen the investor's resilience and improve the efficiency of the market. These trends are very important to fill up the gap between economic policies and the financial market's prospects.

8. Policy Implications

The government needs to work on certain strategies that help out in generating policy implications. This research contributed to the formation of macroeconomic management and the development of the capital market in Pakistan. This research clearly represents the influence of exchange rate movements and the continuous increase in inflation on equity returns. Economic authorities need to contribute to the development of strategies to work on coordination between monetary, fiscal, and exchange rate policy at a greater level. Economists need to work on stabilizing the exchange rate, as it is continually depreciating, which is particularly adding fuel to the inflation change in the behavior of investors towards the capital market. To overcome these situations, economists and policymakers need to adopt proactive measures such as managing foreign reserves, reducing the dependence on foreign debt, and boosting export competitiveness. Additionally, the government needs to adopt the inflation-target regime to anchor the inflation expectations and improve the confidence of investors towards investment in the capital market. The healthcare sector needs to have strong policy support. The healthcare sector needs to consider good investment in infrastructure and innovation to improve healthcare sector resilience during times of high inflation and currency depreciation. Eventually a detailed, integrated, and in-depth analysis of macroeconomic policies, through analysis of data, provides empirical insights. This can contribute to sustainable economic growth and provide a more stable stock market environment for the investor in Pakistan.

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