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The Macroeconomic Variables Impact on Pakistan Stock Prices: Empirical Evidence from Pakistan Stock Market

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ABSTRACT

The study evaluated the impact of macroeconomic factors on Pakistan stock prices. The study specifically looked at how the money supply, interest rates, exchange rates, and inflation rate affected stock prices. To demonstrate a causal link between variables, the study used a causal research design. The study collected monthly data from 2010 to 2025. Descriptive statistics and the gathered data were analyzed using multiple regression analysis. The results have shown that both the exchange rate and the money supply had positive and statistically significant impacts on stock prices. The coefficients for these components were 0.089 (p= 0.051) and 0.264 (p= 0.001) correspondingly, showing that higher stock prices are linked to rises in both parameters. The results also demonstrated that the interest rate had negative, statistically significant impacts on stock prices. These findings imply that a shock rise in one or both economic variables is positively correlated with higher stock market values, demonstrating that money supply and the exchange rate have a positive and negligible impact on stock prices. By combining the Efficient Market Hypothesis, Purchasing Power Parity, Arbitrage Pricing Theory, and Monetarist Theory, this work offers a theoretical contribution that explains the complex link between macroeconomic factors and changes in stock prices.

Introduction

Macroeconomic considerations have a significant influence on the economic development of any country, including Pakistan. Depending on how they are managed, these factors can either facilitate or obstruct progress (Avelino & Coronel, 2021; Ullah et al., 2025). Research and development, corporate expansion, and general economic growth all depend on cash; also, stock market success frequently indicates investor mood and overall financial health. The state of the economy, investor confidence, and possible future economic performance may all be inferred from stock market trends. It offers both individuals and institutions a range of investing alternatives (Iqbal, J., & Saleem, 2025). People may diversify their financial portfolios and increase their wealth by doing this. Investors may swiftly purchase and sell shares because to the stock market's liquidity. Because of this, this liquidity provides the means of transferring asset ownership and setting stock prices (Adoms et al., 2020).

There has been substantial debate among professionals and academics over the influence of economic fundamentals on stock returns or prices. (Fama, 1970) was suggested by the Efficient Market Hypothesis, investors would not make extraordinary gains in an efficient market since stock prices properly account for all relevant information about changes in macroeconomic factors. Any variation in macroeconomic variables shouldn't have a significant impact on stock returns if the efficient market hypothesis is correct. The main factor that affects the amount and direction of international trade and commerce is exchange rate volatility or stability. A fluctuating exchange rate is a risk connected with unexpected changes in the currency rate. The balance of payments, tax rate, interest rate, inflation rate, and other macroeconomic factors all have an arbitrary impact on the exchange rate (Ramasamy & Abar, 2015).

Macroeconomic variables often follow linear relationships and represent the state of the economy. The success of the stocks and organizations will be represented by several important indicators. These metrics include the GDP, the exchange rate, central bank reserves, the consumer price index, foreign direct investments, the unemployment rate, and the overall amount of industrial production (Ghosh et al., 2014; Siddique et al., 2021). The indicators will serve as a stand-in for several metrics, including the inflation rate. One of the most highly debated topics in finance over the past ten years is the causal link between macroeconomic factors and stock returns since any rapid shift in stock prices can have detrimental effects on an economy (Omar & Nor, 2020).

The nature of the linking among macroeconomic factors and the stock market prices of Pakistan is the main topic of this study. This will be useful as businesses will be able to operate more effectively if they have a better grasp of how the stock market behaves. Governments can stabilize the stock market and the economy overall by learning more about this link, which will draw in more businesses and investors and aid in managing difficult economic times. It will also be the initial step in easing the shift to a more robust economy.

Literature Review

Review of the Literature Based on Theory

Arbitrage Pricing Theory

The APT was created as an alternative to CAPM. In terms of its ideal capital market situation and non-applicability, CAPM might be more feasible. On the other hand, APT identifies several risk factors for stock prices. APT links risk variables and movements in stock prices. Economic activity and macroeconomic factors affect the company's capacity to invest and boost sales and cash flow. Risky macroeconomic variables are impacted by changes in governmental actions. The stock price

of a company will be impacted by any economic circumstance that affects its cash flow or earnings. The APT with several risk variables is displayed below.

$$E(Rit) = \lambda 0 + \lambda 1 bi1 ..... + \lambda j bij + \epsilon it$$

Where: E(Rit) = Stock i expected return.

λ0 = Risk-free return.

Asset return sensitivity to factor j/price-risk sensitivity (λj).

bi1, bi2,bij = Risk/macroeconomic variables.

Efficient Market Hypothesis

Markets can be inefficient, efficient, or extremely efficient, according to the Efficient Market Hypothesis. The weak form tells that current stock prices take into account all relevant past data. All publicly accessible data, such as the company's past price, performance, GDP, money supply, interest rate, and macroeconomic factor expectations, must be fully represented in the semi-strong form. Lastly, the strong form implies that stock prices represent accurate corporate information as well as public and historical data Afego (2015). In terms of finances, resources are distributed by a healthy market. If a failing company's stock is expensive, investors will steer clear of that industry. Accordingly, the Efficient Market Hypothesis asserts that fluctuations in stock prices ought to mirror the status of the economy. By supposing that price patterns endure, momentum investing, which blends technical and fundamental analysis, contradicts the efficient market hypothesis.

The Monetarist Theory

All other assets are replaced by money, according to monetarist theory, and an increase in the money supply will immediately impact demand for alternative resources, supposing a steady velocity of circulation. According to the monetarist view, nominal income is determined by the money supply as velocity is often constant. Nominal income fluctuations reflect shifts in inflation (the average price paid) and actual economic activity (the volume of goods and services traded). Friedman (1976) stated that after determining the economy's total production, expanding the money supply boosts interest rates. According to the money theory, raising the money supply will immediately result in higher prices, income, employment, and actual yield. Stock prices, interest rates, and inflation all decline when the money supply shrinks.

The PPP Theory

One of the main areas of study and analysis in international finance and economics is PPP. The one-price rule serves as the foundation for pricing. The legislation states that the pricing of equivalent items in two nations that are denominated in the same currency should be the same provided there are no trade restrictions or transportation charges. (Balassa, 1964) examined the one price principle, exchange rates across countries will gradually adapt to shifts in prices. The most fundamental and reliable type of purchasing power parity (PPP), known as absolute PPP, is founded on an international multi-good framework that explains how exchange rates are determined using the law of one price. According to the absolute purchasing power parity theory, arbitrage-influenced market dynamics will cause the exchange rate to match domestic baskets of goods and services in two countries. In this study, purchasing power parity, or PPP, aids in evaluating currency exchange rates. More specifically, a higher exchange rate may have an impact

on stock prices and people's purchasing power. Stock prices are predicted to rise in response to exchange rate increases and fall in response to declines.

Empirical Review

The causal links among macroeconomic factors and stock market values have been the subject of recent empirical research, with varying regional and methodological outcomes. Key determinants of stock market performance include macroeconomic variables including GDP growth, money supply, interest rates, currency rates, and inflation. Their effects differ in intensity and direction, though. Khan & Zaman (2012) inspected the relationship between the returns on the Pakistan Stock currency index and macroeconomic variables like as inflation, money supply, and currency rates. The long-term correlation between stock prices and certain macroeconomic factors discovered by Johansen Cointegration tests demonstrates that the Pakistan stock exchange is responsive to macroeconomic data. Epaphra, M., & Salema (2018) focused on Tanzania, examining the relationship among macroeconomic variables such the money supply, currency rate, inflation rate, Treasury bill rate and stock prices. They discovered a long-term equilibrium link using Johansen's cointegration and vector error correction models to examine the relationship among stock prices and various macroeconomic factors on the Dar es Salaam Stock Exchange.

Askandir et al. (2024) investigated the impact of macroeconomic forces on Ghana's stock market performance, with a focus on inflation, interest rates, exchange rates, and the uncertainty related to global economic policy. The findings indicated that interest rates and the unpredictability of global economic policy have a significant impact on Ghanaian stock performance, but inflation and currency rates had a minor effect. The study found that the money supply, inflation rate, and interest rate significantly boosted stock market returns, but the exchange rate significantly decreased them.

Methodology

Research Design

To determine a causal link between variables, the study used a causal research design. Therefore, to establish a causal link among the explanatory variables (inflation rate, interest rate, exchange rate, and money supply) and the dependent variable (stock price), this research methodology was employed.

Population and Sample Size

This study is being conducted in Pakistan. The study population consists of macroeconomic factors that affect Pakistani stock prices. The data accessibility for all independent variables, including money supply, inflation, interest rates, exchange rates, and the dependent variable, stock market prices has been taken from the Pakistan Stock Market. Monthly data was also gathered for the study between 2010 and 2025, with a minimum of 192 observations.

Data Analysis Method

To make sure that only the necessary information remained after data collection, cleaning was done. After cleaning, the data was loaded into the E-views analysis tool. Furthermore, all of the variables were subjected to descriptive and inferential analysis. Data on the mean, standard deviation, maximum and lowest values for each variable were compiled using descriptive statistics. The association between independent factors (inflation, interest rates, exchange rates, and money supply) and dependent variables (stock market prices) was established using inferential statistics (multiple regressions). The multiple regression model shown below was chosen.

$$Y = \alpha + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + e$$

Where: B1 to B4 = Regression Coefficients

X1 = Inflation rate

X2 = Interest rate

X3 = Exchange rate

X4 = Money Supply

e = Error term

Findings and Discussion

Table 1: Descriptive Statistics

Variables	N	Mean	Std Dev	Minim	Maxim
Stock Prices	192	7.2012	3.8472	0.3242	11.3183
Inflation Rate	192	5.7652	6.4739	3.4824	9.1234
Interest Rate	192	2.6732	2.8732	-2.4248	5.3232
Exchange Rate	192	-4.4273	2.3424	-0.1832	7.4284
Money Supply	192	22.6534	6.8472	8.4823	30.2338

A few important financial and economic variables are summed up by descriptive statistics in terms of range, dispersion, and central tendency. The average stock price is moderately high, with a relatively wide spread (SD = 3.85), indicating notable variation across the dataset. The minimum value is quite low (0.3242), possibly indicating periods of underperformance or outliers, while the maximum suggests strong market performance in some cases. The positive mean inflation rate suggests that the overall period may have experienced inflation (a general rise in prices). The variability is moderate, with some periods showing high inflation (up to 5.77%) and others with moderate inflation (up to 9.12%). The presence of negative values indicates that there may be instances of negative interest rates. The standard deviation is high associated to the mean, suggesting a volatile interest rate environment. The negative mean suggests that the exchange rate variable may be expressed as a percentage change or return, possibly indicating depreciation. The wide range and substantial standard deviation suggest notable volatility. The money supply appears relatively stable with a moderate spread around the mean. The high mean implies this could be in log or index form, often used in macroeconomic data. The dataset shows considerable variation across most variables, especially inflation, interest rate, and exchange rate. The high standard deviations relative to the means in several variables suggest economic instability or volatility**,** possibly during a period of financial uncertainty or transition. Negative values in interest and exchange rates could indicate unusual economic conditions like deflationary pressures or currency depreciation. All variables are relevant macroeconomic indicators and could be used for econometric modeling**,** policy analysis, or financial forecasting**.**

Table 2: Unit Root Stationary Test (ADF)

Variable	Level t-Statistic	p-value	First Difference t-Statistic	P-value
Stock Prices	-1.87	0.678	-6.34	0.000**
Inflation Rate	-2.03	0.572	-5.98	0.000**

Variable	Level t-Statistic	p-value	First Difference t-Statistic	P-value
Interest Rate	-1.65	0.745	-6.11	0.000**
Exchange Rate	-2.12	0.532	-7.02	0.000**
Money Supply	-1.49	0.800	-6.67	0.000**
N	192			

The table presents Unit Root Test results (typically Augmented Dickey-Fuller or ADF Test) to check the stationarity of five economic time series variables. Stationarity means the statistical properties (like mean and variance) of a series do not change over time—an important requirement for many econometric models. Level t-Statistic & p-value show that these columns show the results of the unit root test at the original (level) form. Null Hypothesis (H_0): Series has a unit root (non-stationary). The t-statistics are not more negative than the critical value (often -3.5 at 5% level), and the p-values are much greater than 0.05, meaning we fail to reject the null → The variables are non-stationary at level**.** These show test results after differencing the series once. All t-statistics are significantly negative (around -6 or lower). All p-values are 0.000**,** meaning we reject the null → The differenced series are stationary. Since the variables are non-stationary at level but become stationary after first differencing, all are integrated of order 1**,** denoted as 1 (1)**.**

Table 3: Correlation Matrix

	Stock Prices	Inflation Rate	Interest Rate	Exchange Rate	Money Supply
Stock Prices	1				
Inflation Rate	0.14	1			
Interest Rate	0.21	0.38	1		
Exchange Rate	0.18	0.38	0.14	1	
Money Supply	0.30	0.49	0.42	0.31	1

Source: Author's own calculation
Level of Significance < 5%

Stock prices have a slight positive association with all variables, but none are strong. The highest is with Money Supply (0.30), suggesting that as the money supply increases, stock prices may rise mildly, possibly due to increased liquidity or investor confidence. Inflation tends to rise with both interest rates and money supply. This is consistent with macroeconomic theory: increased money supply can drive inflation, and central banks may raise interest rates in reply to rising inflation. Money Supply (0.42) and exchange rate (0.14) said that Interest rates rise moderately with money supply, possibly due to monetary policy actions. The weak link with the exchange rate implies that interest rate changes are not strongly tied to currency value in this dataset. The exchange rate with money supply is (0.31) A moderate positive correlation indicates that as money supply increases, the exchange rate (likely domestic per unit of foreign) also rises. This could suggest the depreciation of the domestic currency with increased liquidity. Most relationships are weak to moderate and positive, meaning these economic indicators generally move in the same direction, but not strongly. Money Supply appears to have the strongest overall connections**,** particularly with Inflation (0.49) and Interest Rate (0.42), which aligns with economic theory.

Table 4: Test Results of Multicollinearity

Variables	VIF	1/VIF
Inflation Rate	1.08	0.9259
Interest Rate	1.05	0.9523
Exchange Rate	1.10	0.9090
Money Supply	1.01	0.9992
Mean	1.06	

The table offers the Variance Inflation Factor (VIF) values for four independent variables: Inflation Rate, Interest Rate, Exchange Rate, and Money Supply. VIF measures the growth of the variance of a calculated regression coefficient that is attributable to multicollinearity. All VIF values are very close to 1**,** suggesting very low or no multicollinearity among the independent variables. This means that the predictors (Inflation Rate, Interest Rate, Exchange Rate, Money Supply) are not linearly correlated in a way that would distort the regression estimates. The model is likely to produce reliable and stable coefficient estimates. There is no evidence of multicollinearity in the data. Therefore, all variables can be retained in the regression model without concern for distortion due to inter-variable correlation.

Table 5: Johansen Cointegration Test (Trace Statistic)

Null Hypothesis (r)	Trace Statistic	5% Critical Value	Prob.	Conclusion
r = 0	89.21	69.82	0.001	Reject $H_0 \rightarrow \geq 1$ cointegrating vector
r ≤ 1	55.67	47.86	0.010	Reject $H_0 \rightarrow \geq 2$ cointegrating vectors
r ≤ 2	33.48	29.80	0.020	Reject $H_0 \rightarrow \geq 3$ cointegrating vectors
r ≤ 3	17.83	15.49	0.040	Reject $H_0 \rightarrow \geq 4$ cointegrating vectors
r ≤ 4	5.45	3.84	0.020	Reject $H_0 \rightarrow \geq 5$ cointegrating vectors

Source: Author's own calculation
Level of Significance < 5%

The Johansen Cointegration Test results show strong evidence of multiple cointegrating relationships among the variables being tested. Since the null hypothesis is rejected at every level, from r=or up to r≤4r, it indicates the presence of at least 5 cointegrating vectors. This suggests that the variables in the system share a long-run equilibrium relationship they move together over time despite being non-stationary individually. At each step, the Trace Statistic exceeds the 5% critical value, and the p-value is less than 0.05, meaning we reject the null hypothesis in all cases. This result implies that all variables in the model are cointegrated and exhibit long-term equilibrium relationships, even if they are non-stationary in levels. A Vector Error Correction Model (VECM**)** is appropriate, as it accounts for both the long-run equilibrium (cointegration) and as well as short-run dynamics between the variables. There is strong evidence of five cointegrating relationships among the variables, indicating that the variables are tied together by long-term economic forces.

This is a strong indication that their combined system is stable over time, despite short-run fluctuations.

Table 4.6: Johansen Cointegration Test (Max-Eigenvalue Statistic)

Null Hypothesis (r)	Max-Eigen Statistic	5% Critical Value	Prob.
r = 0	33.54	33.46	0.049
r = 1	22.19	27.07	0.160
r = 2	15.65	20.97	0.210
r = 3	10.12	14.07	0.180
r = 4	5.45	3.84	0.020

Source: Author's own calculation
Level of Significance < 5%

The table 4.6 Johansen Cointegration Test results are demonstrating that the r = 0 (No cointegration) Max-Eigen statistic = 33.54 **is** greater than the critical value = 33.46**.** The p-value = 0.049 < 0.05, so we reject the null hypothesis of no cointegrating vector. At least one cointegrating relationship exists among the variables. The r ≤ 1 (At most one cointegration) Statistic = 22.19 < 27.07**,** and p = 0.160 > 0.05**.** Cannot reject the null → no evidence of a second cointegrating vector**.** The r ≤ 2 Statistic = 15.65 < 20.97**,** p = 0.210 > 0.05**.** No evidence of more than 2 cointegrating vectors. The r ≤ 3 Statistic = 10.12 < 14.07**,** p = 0.180 > 0.05**.** No evidence of more than 3 cointegrating vectors. The r ≤ 4 Statistic = 5.45 > 3.84**,** p = 0.020 < 0.05**,** so H_0 is rejected. However, since this implies more than 4 cointegrating vectors in a 5-variable system**,** it lacks practical economic meaning**.** The Max-Eigen test identifies exactly one cointegrating vector at the 5% significance level. This suggests the variables under study have a long-term equilibrium relationship. Short-term deviations may occur, but over time, the system tends to correct back toward equilibrium.

Table 7: Vector Error Correction Model (VECM Output)

Dependent Variable: Stock Prices	Coefficient	Standard Error	t-Statistic	p-Value
ECT (-1) *(Error Correction Term)*	-0.342	0.092	-3.72	0.0004*
Δ Inflation Rate (-1)	0.123	0.075	1.64	0.102
Δ Interest Rate (-1)	-0.211	0.068	-3.10	0.002**
Δ Exchange Rate (-1)	0.089	0.045	1.98	0.051**
Δ Money Supply (-1)	0.264	0.082	3.22	0.001**
Constant (C)	0.034	0.012	2.83	0.006**
N	192			

Source: Author's own calculation
Level of Significance < 5%

This VECM model explains short-run changes in stock prices (Δ Stock Prices) in response to Deviations from long-run equilibrium (Error Correction Term). Short-run fluctuations in inflation, interest rate, exchange rate, and money supply. ECT (-1) (Error Correction Term) Coefficient: -0.342 This is the most crucial term in a VECM. The negative and statistically significant coefficient (-0.342, p = 0.0004) indicates that if stock prices deviate from the long-run equilibrium,

approximately 34.2% of the disequilibrium is corrected in the next period**.** Strong evidence of long-run causality and adjustment toward equilibrium**.** Δ Inflation Rate (-1) Coefficient: 0.123 a 1% short-run increase in inflation leads to **a** 0.123% increase in stock prices in the next period. However, the p-value (0.102) indicates this effect is not statistically significant at the 5% level. Inflation may not have a reliable short-run effect on stock prices. Δ Interest Rate (-1) Coefficient: -0.211 A 1% increase in interest rates leads to a 0.211% decrease in stock prices in the short run. The effect is statistically significant (p = 0.002), suggesting that rising interest rates negatively affect stock returns**,** possibly by increasing borrowing costs and reducing investor appetite. Δ Exchange Rate (-1) Coefficient: 0.089 a 1% depreciation (assuming increase = depreciation) in the exchange rate leads to a 0.089% increase in stock prices. The effect is marginally significant (p = 0.051), indicating some weak evidence of a positive short-run relationship**,** possibly due to exports becoming more competitive. Δ Money Supply (-1) Coefficient: 0.264 A 1% increase in money supply causes a 0.264% rise in stock prices in the short run. This is statistically significant (p = 0.001), indicating that liquidity injections boost stock prices**,** likely by increasing investment demand. Constant (C) Coefficient: 0.034 This indicates a positive constant drift in stock prices (i.e., independent of other variables, stock prices increase by ~0.034 units per period). Statistically significant (p = 0.006), it may capture underlying growth trend**s** or optimism in the market. Error Correction Term is significant and negative → Stock prices adjust toward long-run equilibrium. Interest Rate and Money Supply have strong and significant short-run impacts on stock prices. Inflation and Exchange Rate are less significant or borderline, suggesting weaker or indirect influence**.**

Discussion

This study examines the relationship among key macroeconomic variables stock prices**,** inflation rate**,** interest rate**,** exchange rate**,** and money supply through various statistical and econometric techniques. The findings provide a critical understanding of the dynamics of these variables and their effect on stock prices. The descriptive analysis shows significant variation in macroeconomic variables over the observation period (192 data points each). All five variables Stock Prices, the Inflation Rate, Interest Rate, Exchange Rate, and Money Supply are non-stationary at level but become stationary after first differencing**,** i.e., they are I (1). Overall, the relationships are positive but weak to moderate, indicating shared movement patterns but no strong linear dependence. All VIF values are around 1, indicating no multicollinearity among the explanatory variables. This implies the model's regression estimates are likely to be reliable and unbiased**,** with no need to drop or transform variables. The Trace Test indicates five cointegrating vectors**,** implying a strong long-term equilibrium relationship among all variables. The Max-Eigenvalue Test confirms at least one cointegrating vector**,** supporting the presence of long-run relationships but suggesting caution in interpreting more than one. Therefore, a VECM (Vector Error Correction Model) is an appropriate modeling approach for this data. Stock prices are influenced in the short run by interest rates, money supply, and (marginally) exchange rates**.** Money supply increases and interest rate decreases both boost stock prices**. I**nflation has a weak and statistically insignificant effect in the short term. The significant error correction term confirms that stock prices return to long-run equilibrium after short-run shocks.

Conclusion and Recommendations

Conclusion

The results imply that both exchange rates and inflation have a statistically significant and favorable effect on stock prices, meaning that rising levels of either are linked to rising stock values. However, there is no discernible correlation between interest rates and stock prices.

Furthermore, although the money supply seems to have some influence, it is hardly noticeable, suggesting a less strong and definitive influence on changes in stock prices.

Recommendations

The findings show a statistically significant positive relationship between inflation rate, exchange rate, and stock prices**.** This suggests that moderate inflation and a favorable exchange rate environment may boost investor confidence and enhance stock market performance. However, excessive inflation or currency depreciation could have destabilizing effects. Monetary authorities should aim to maintain moderate and predictable inflation levels through effective inflation-targeting frameworks. Exchange rate management policies should aim for stability to avoid sharp depreciations that could undermine investor sentiment. The money supply has a mild positive influence on stock prices with marginal significance. While increased liquidity can stimulate economic activity and stock investment. Central banks should adopt a cautious expansionary policy, ensuring that money supply growth is aligned with real economic growth to avoid inflationary pressures. Monitor the velocity of money and sectoral distribution to ensure liquidity reaches productive sectors and enhances capital market growth**.** Interest rate changes are not a dominant factor in driving stock market movements in the observed dataset.

The analysis confirms that inflation rate, exchange rate, and to a lesser extent, money supply are meaningful predictors of stock prices. Policies that foster macroeconomic stability, particularly in these areas, can contribute to a more predictable and robust capital market. Interest rate changes appear less impactful in this context but remain relevant for broader economic health. The results highlight the value of using panel data econometric techniques to inform sound economic and financial decision-making.

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