An empirical analysis on impact of macroeconomic variables on stock prices

Case in Kenya

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Proposal itself.

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This Research ~~Proposal~~ has been submitted for examination with my approval as the Supervisor.

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Abstract

Previous research has evidenced that some macroeconomic variables have an effect on the stock prices of their listed companies. However this is not always the case especially in researches that were studying developing countries. This study was conducted in Kenya on 41 companies for a period of 10 years, 2005-2014, to try and ascertain what type of relationship exists between macroeconomic variables and the stock prices of listed companies in the country with the aim of understanding better what affects stock prices and ascertain if the macroeconomic environment has a significant relationship with the stock prices. This research used co-integration tests, Vector Error Correction Model from (Johansen, 1991) and Granger Causality tests to achieve its objectives. The results show presence of short term relationships and weak significant long term relationships.

Contents

1. Introduction

1.1. Background

Macroeconomic variables are factors that affect and influence a population's economy. They are hence, used as indicators of the economy's performance. Examples of these variables include gross domestic product, unemployment rate and inflation rate. Currently in Kenya's economy as of 2015, the GDP stands at approximately KES 6.5288 trillion, the inflation rate at 6.87% a rise from 5.8% in late last year and the unemployment rate is at a staggering 40%. This research focuses on the macroeconomic variables as opposed to microeconomic ones because macroeconomic variables are a better reflection of the whole aggregate of the economy and are more empirical in nature than microeconomic variables which in comparison are more theoretical.

The stock exchange market is an avenue for transferring funds from investors to companies that need the financing. The companies have to be listed in the stock exchange and offer stocks and shares and other equities in exchange for funding. There are currently 64 listed companies listed in the Nairobi Securities Exchange (NSE) which was founded in 1954.

The stock market can be viewed as an efficient market if it meets a number of conditions. According to (Fama E. , 1970) the price of a security can be considered efficient if (i) there are no transaction costs in trading, (ii) all available information is costlessly available to all market participants and (iii) all agree on implications of current information for the current price. Therefore, the current prices of stocks reflect all information about the stock. If stock prices accurately reveal the underlying fundamentals, then they should be employed as leading indicators of future economic activities.

Until the past three decades research on the relationship between macroeconomic variables and stock prices was lacking as noted by (Chen, Roll, & Ross, 1986). They acknowledged that asset prices react to economic news and that the variables needed to be studied to get a better grasp on which variables had a relationship with asset prices because no satisfactory theory could argue that the relationship between macroeconomic variables and financial markets was entirely in one direction.

This research aims to study the short term and long term relationships of stock prices and inflation rate, unemployment rate, gross domestic product (GDP) and exchange rate in Kenya.

1.2. Problem statement

The stock market avails long-term capital to the listed firms by pooling funds from different investors and allow them to expand in business and also offers investors alternative investment avenues to put their surplus funds in. The investors carefully watch the performance of stock markets by observing trends in the market's index, before investing funds. The market index provides a historical stock market performance, the yardstick to compare the performance of individual portfolios and also provides investors for forecasting future trends in the market.

However, unlike mature stock markets of advanced countries, (Ake & Ognaligui, 2010) observed that the stock markets of emerging economies began to develop rapidly only in the last two and half decades and that although there have been numerous attempts to develop and stabilize the stock markets, the emerging economies are characterized as the most volatile stock markets. Moreover, the stock markets of emerging economies are likely to be sensitive to factors such as global economic indicators and influence of the large number of foreign investors. They are also smaller in size and illiquid. This means that what is happening in developed countries cannot be presumed to be happening in developing countries hence the need for more research.

The subject has not been widely researched in Kenya especially in context with the effects of policies on the variables and the outcome that has on the stock prices. The few published researches done relating to the research in question include the works of (Olweny & Omondi , 2011) who studied the effect of macroeconomic factors on stock return volatility in the NSE using the exchange rate, interest rate and inflation rate fluctuations and (Wasseja, Njoroge, & Mwenda, 2015) who focused on just the Granger Causal relationship between stock prices and inflation and exchange rates in Kenya. This research plans to build on previous studies done and fill the gaps present by focusing not only on price variables such as inflation and interest rates as is seen in most of the literature reviewed. It intends to go a step further and shed light on quantity variables, unemployment rate and GDP, to get a more wholesome picture of the relationship between macroeconomic variables and stock returns because there is a lack of research done on the four macroeconomic variables in Kenya that are at the centre of this research.

1.3. Research questions

The questions this research plans to answer:

- Which of the studied macroeconomic variables affect the stock prices in Kenya?
- What direction and extent does each variable affect the stock prices?
- How can investors capitalize on this information?

1.4. Research objectives

The goals of this research are to determine conclusively the impact inflation rate, exchange rate, GDP and unemployment rate have on the stock prices in Kenya and deduce the nature of these effects in ways that can benefit the overall growth of the economy.

1.5. Significance of the research

This research hopes to be essential to investors. The stock market is considered widely unpredictable and no one knows what will happen the next moment in terms of price movements but having information of factors that influence stock prices will essentially give investors an upper hand.

This research aims to demystify the complexities of the working of the stock market and offer a way to maximize returns on stocks.

It also hopes to give policy makers incite on how macroeconomic variables can be used to encourage growth in the country through the investment sector.

2. Literature Review

This section is to highlight previous work done by different researchers at different times in different countries clustered into what they each found out on a specific macroeconomic variable. The reviews are heavily centred on developing countries so as to dry draw similarities from them to Kenya which is also a developing country.

2.1. Theoretical review

2.1.1. Inflation Rate and Stock Prices

Many of these studies have revealed a negative relationship between share price index and inflation rates.

(Geske & Roll, 1983) Researched and came to the conclusion that contrary to what was already widely accepted and seen as obvious, stock returns are actually negatively related to both expected and unexpected inflation. They argued that this puzzling empirical phenomenon did not necessarily indicate causality. Instead, stock returns are seen to negatively related to changes occurring at the same time in expected inflation because they signal a chain of events which results in a higher rate of monetary expansion. Exogenous shocks in real output, signalled by the stock market, induce changes in tax revenue, in the deficit, and in Treasury borrowing. Rational bond and stock market investors realize this will happen. They adjust prices and interest rates accordingly and without delay.

(Fama, 1981) puts forth a large amount of evidence to validate the hypothesis that an unexpected increase in the growth rate of real activity not only causes an increase in stock prices, but also a decrease in the price level and inflation because of its impact on money demand. He observed that the results evidencing negative relations between common stock returns and inflation were absolutely puzzling given the previously accepted wisdom that common stock, representing ownership of the income generated by real assets, should be a hedge against inflation.

2.1.2. Unemployement rate and stock prices

(Boyd, Hu, & Jagannathan, 2005) in their paper on the effect of unemployment on stock prices concludes that on average, an announcement of rising unemployment is good news for stocks during economic expansions and bad news during economic contractions. They related news on unemployment to three other variables considered in valuing stock: information about future

interest rates, the equity risk premium, and corporate earnings and dividends whose relative importance changes over time depending on the state of the economy. They went ahead to further state that if unemployment rates had any effect on stock prices it was because one or more of the three variables was affected.

Information about interest rates dominates during expansions and information about future corporate dividends dominates during contractions. That, and an unanticipated increase in unemployment may lead to an increase in the risk premium during expansions, but they find no evidence of an effect during contractions.

The explanation for their conclusion can be deduced by first determining whether the pattern of stock price responses can be explained solely by information about future interest rates. If this were the case, stock and bond prices would respond in the same way, except for differences that might arise due to differences in their durations but they do not. During contractions, stock prices react significantly and negatively to rising unemployment, but bond prices do not react in any significant way. Since bond prices do not respond significantly during contractions, it must be the case that unemployment news contains little information about future interest rates in that business cycle phase. Since stock prices do respond significantly during contractions, it must also be the case that the unemployment news contains information about growth expectations and/or the equity risk premium

During expansions, (Boyd, Hu, & Jagannathan, 2005) found that both bond and stock prices rise significantly on the announcement of rising unemployment. Given the bond response, it must be the case that during expansions, bad labor market news causes expected future interest rates to decline. This could also be what causes stock prices to rise during expansions, but it need not be, since growth expectations and the equity risk premium could be changing also. For example, suppose the real interest rate remains the same, but inflation goes down when unemployment goes up. This would result in a decline in the nominal interest rate and would be good news for bonds. If higher unemployment also signals lower real earnings in the future on equities, stock prices need not go up.

2.1.3. Exchange rate and stock prices

(Gay, 2008) hypothesized that the relationship between exchange rates and stock prices should be positively related. This hypothesis was found to exist between the stock index price and

exchange rate for Brazil, India, and China but not for Russia. With India in the infancy of its emerging economy, this relationship appears to not have had a chance to manifest itself as in the other countries already researched.

However foreign investors get affected when local currency gets stronger and converted into weaker currency. The exchange rate is expected to have a negative relationship with stock prices. This is because they convert their returns on the stock into their own currency. Consequently, an increase in the exchange rate causes decrease in stock prices. The decrease in the stocks prices occurs when foreign investors invest their money in the stocks and their income decreases with an increase in the exchange rate. They will get less amount of money in their own currency because of increase in the exchange rates. This is absolutely, not in favor of the foreign investors. The lack of uniformity concerning this relationship creates a gap for further research to be conducted.

2.1.4. Gross Development Product and Stock Prices

Research by (Morck, Yeung, & Yu, 2000) concludes that stock prices in economies with high per capita GDP move in a relatively unsynchronized manner. In contrast, stock prices in low per capita GDP economies tend to move up or down together. Their conclusion creates opens up room for different thoughts on why such a relationship is observed. It highlights the need to research developing countries such as Kenya separately and not infer results of other countries researched.

(Levine & Zervos , 1998) identified the gap that was there in the study of the relationship between the stock market and economic growth with much of the research being heavily focused on banks and economic and found a strong positive correlation between stocks and GDP evidencing a relationship.

2.2. Empirical reviews

(Pisedtasalasai & Power, 2004) examined the influence of macroeconomic variables on the stock exchange in Sri Lanka. Their variables were money supply, the Treasury bill rate, the consumer price index and the exchange rate. They studied a time period of 17 years from 1985 to 2001. They used co-integration tests and the Vector error correction models to analyse their data. They

concluded that there is a long run equilibrium relationship and that there is a lagged influence on the stock prices.

(Fama, 1981) researched and concluded that there is a relationship between Gross National Product and capital expenditures and the stock returns and prices. The relationship was seen to be a parallel positive one.

(Ochieng & Oriwo, 2012) investigated the relationship between macroeconomic variables and the Nairobi Stock Exchange All Share Index for a 5 year period. They used the lending interest rate, inflation rate and 91-day Treasury Bill rate. They used the macroeconomic factor model. They established that there exists a positive relationship with inflation and a negative one with the T-bill rate.

(Ilahi, Ali, & Jamil, 2012) investigated the relationship between inflation rate, exchange rate, interest rate and the stock market returns in Pakistan from January 2007 to December 2012. They used a Multiple Linear regression model. They concluded that the three showed insignificant connection with stock market returns.

(Chen, Roll, & Ross, 1986) tested whether new policies and innovations in macroeconomic variables are a positive influence of stocks. They employed macroeconomic variables to try and express equity returns as functions of macroeconomic variables in what came to known as the Macroeconomic Factor Model. After their research, the relationship between different macroeconomic variables and stock returns has widely been studied especially in developed countries with developed capital markets. They concluded that asset prices are dependent on macroeconomic variables on data collected across 1958-1984. They used industrial production, changes in risk premium and inflation to study this relationship. Their research Therefore, the relations and dynamic interactions among macroeconomic variables and stock prices are important in the formulation of the nation's macroeconomic policy.

(Ake & Ognaligui, 2010) tried to find the relation between Doula Stock exchange's Market Capitalization and Cameroonian economic growth by GDP evaluation with utilization of quarterly time series data from 2006 to 2010. The study applied Granger's causality test to find out the link between variable Market Capitalization and GDP. Their findings suggest that there is no relationship between Douala stock exchange and economic growth for Cameroon. The results

indicated that stock market is not influencing Cameroonian economic growth because Granger-Causality estimation doesn't confirm the bi-directional causality between stock market development and economic growth in the case of Cameroon. These results can be explained by the low value of market liquidity which means that the Douala Stock Exchange is not active enough as to boost Cameroonian economy. The stock market was established in 2001 meaning it is relatively underdeveloped. If the aim of the creation of the Douala Stock Exchange was to attract investors and help company to increase easily their capital, it can be concluded that the purpose is far from to be reached. A suggestion to the Cameroonian government would be to encourage companies to introduce their capital in the Douala Stock Exchange and also to introduce the national companies instead of other forms of privatization in the hands of foreign investors. The study goes to show that underdeveloped markets or developing markets, may have a different relationship or a lack thereof, as is the case with Douala, with the economy. However, making any conclusions for other developing economies based on Ake & Ognaliui (2010) paper would be reckless and premature especially in the case of this research's focus country. The difference in times of establishment of the Douala Stock Exchange and the Nairobi Securities Exchange alone is enough to make no assumptions and carry out further research in the NSE.

(Nishat & Mustafa, 2007) tried to produce empirical evidence between stock market and real economy of Pakistan through a study based on the variables such as GDP, production growth to represents the liquidity of stock market, real economy, and the size of the stock market represent the stock prices. Two test error correction model and co-integration was applied to examine the relationship, between the stock prices and GDP the data used from time period 1980-2004.The findings revealed that in the short run the stock market movement explains the GDP and output growth in Pakistan. The economic variables in Pakistan both in the short run as well as in the long run explain that the growth of stock market variables depends on the overall growth of the economy. The empirical evidence emerged from their study revealed that there is need to develop the stock market in Pakistan further to play its vital role in the economy parallel to other financial institutions. They concluded that on the basis of overall analysis all four of the variables are relatively more insignificant and likely to influence the stock prices in the short run. These variables they tested where exchange rate, GDP, inflation rate and interest rate. They found negative short term relationship between exchange rate, GDP, inflation rate and interest rate on stock prices. The results were established on the basis of Granger causality test.

3. Methodology

3.1. Research design

According to the standard valuation model, the determinants of stock price are the expected cash flows from the stock and the required rate of return that is in line with the risk profile of the stock. (Chen, Roll, & Ross, 1986) demonstrate that economic state variables, via their effect on future dividends and discount rates, exert systematic influence on stock returns. They examined a set of selected economic state variables on returns of stock returns listed on the New York Stock Exchange and concluded these returns are priced in accordance with their exposures to systematic news measured in state variables. They provided the foundation for the belief that a relationship existed between the economic variables of a country and the stock prices of companies listed in their stock exchange. (Granger C. , 1986) suggested that this belief can be proven or disproven with the use of cointegration tests. In statistics, the presence of cointegration is usually an indicator that a linear combination of non-stationary time series exhibits a stationary series. In economics, the existence of such a linear combination establishes a long-term equilibrium relation. This research seeks to use methodology based on the paper of (Mukherjee & Naka, 1995) who carried out analysis on the relationship of macroeconomic variables and the Japanese stock market.

3.2. Sample set

The macroeconomic variables in question are the inflation rate, unemployment rate, GDP and exchange rate. (Chen, Roll, & Ross, 1986) suggest that inflation rate and exchange rate are simply, "simple and intuitive financial theory" while unemployment rate has been employed in recognition of Kenya's status as a developing country that still has rates of unemployment high enough to majorly affect the economy and GDP has been used as an indicator of national growth.

The stock prices will be obtained from 41 companies that are listed in the Nairobi Stock Exchange,. The macroeconomic variables for this research will be obtained from the Kenya National Bureau of Statistics and the Central Bank of Kenya. This research will study data over the time frame of 10 years for the years 2005 to 2014.

3.3. Data Analysis

An analysis will be run for the 41 companies involved. Resulting data will be analysed using a vector error correction model (VECM) using applications of unit root test, cointegration and

Granger casuality for empirical analysis. The choice of this model was based on its capability of discovering short-term relations in the presence of cointegration. This model makes it possible to meet one of the research objectives which is to be able to determine if a relationship exists between the variables and the stock prices in the both short run and the long run. The model is also preferred because it eliminates misspecification bias that is a potential problem in the alternative vector autoregressive models.

3.4. Model Specification

3.4.1. Model

3.4.1.1. Testing for Stationarity

The first step is to test for stationarity. This is because stationary data cannot be used in a VECM model. This research will employ the augmented Dickey and Duller (1981) test to determine the presence of a unit root and consequently stationarity. The variables should be non-stationary at their levels and stationary in their first difference. Once stationarity has been tested, the next step is testing for cointegration.

3.4.1.2. Testing for cointegration and running the VECM

While (Granger C. , 1987) provides methods for co-integration in a single equation framework, (Johansen, 1991) allows testing for co-integration in a system of equations. According to (Phillips, 1991), Johansen's method gives for more efficient estimators of co-integrating vectors.

The VECM will take the form:

$$\Delta Y_t = \sum_{j=1}^{k-1} \gamma_j \Delta Y_{t-j} + \alpha\beta' Y_{t-k} + \mu + \varepsilon_t$$

Where:

- Δ is a first difference notationa
- Y_t is a p × 1 vector integrated of order one
- μ is a p × 1 constant vector representing a linear trend in a system
- k is a lag structure

— ε_t is a p × 1 Gaussian white noise residual vector

— γ_j is a p × p matrix and indicates short-term adjustments among variables across p equations at the j^{th} lag

— α is a matrix denoting the speed of adjustment

— β is a matrix representing the co-integrating vectors.

If variables are co-integrated, there will be stationary linear combinations of $\beta' Y_t$ despite the fact that Y_t is non stationary. That is to say a long term equilibrium relation will be observed.

Johansen's (1991) VECM which employs the maximum likelihood method is implemented in four steps:

1. Test whether all the variables are integrated of order one by applying unit root test.
2. Find lag k so that the residuals from each equation of the VECM are uncorrelated.
3. Regress ΔY_t against the lagged differences of ΔY_t and Y_{t-k} and estimate the cointegrating vectors.
4. Determine the order of co-integration. The order of co-integration indicates the dimension of the co-integrating space and is determined by constructing the following test statistics:

$$Trace = -T \sum_{i=r+1}^{p} \ln(1 - \hat{\lambda}_i)$$

and

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

Where λ's are the estimated Eigen values. If the two tests indicate more than one co-integrating relation, the first Eigen vector is viewed to be most useful.

Once co-integration has been established, the VECM is run. If there is no co-integration proven, the research will move straight to testing for causality without running the VECM model. This is because it will have already proven a lack of a long-term relationship.

Wald-tests are also performed after the VECM to determine if there is a short run relationship between the variables.

3.4.1.4 Testing for Causality

Causality will be tested using the Granger-Causality test to investigate direction of causation between stock market performance and macroeconomic variables.

The trend in variables can be viewed as movements of co-integration between the variables. Granger causality will test for both unidirectional and bi-directional causality because it tests the effect of the dependent on the independent variable and vice versa. The first test examines the null hypothesis that the independent variable does not Granger-cause the dependent and the second test examines the null hypothesis that the dependent does not Granger-cause independent. Unidirectional causality will occur between two variables if one of null hypotheses is rejected. Bidirectional causality exists if both null hypotheses are rejected and no causality exists if neither null hypothesis is rejected.

3.4.2. Model Variables

Table 1 : Definiton of Variables that will be used in the Study

Variables	**Description**
Stock Prices(SHAREPRICE)	This is the price of buying a piece of stock from a certain company. We will look at average monthly stock prices.
Exchange Rate (EXCHANGERATE)	This is a measure to show the price of the Kenyan Shilling against the dollar. We will look at an average monthly rate.
Gross Domestic Product growth rate (GDP)	This is will be used to measure the growth rate of the nation's economy. We will look at the monthly growth rate.
Unemployment rate (UNMPLOYMENTRATE)	This is measures how many employable Kenyans are unemployed. Monthly data will be used
Inflation rate (INFLATION)	This is the measurement of how much the cost of good and services in the country is increasing. Monthly data as well.

4. Results

4.1. Step 1: Testing for stationarity

This is the first step before performing any VECM model because the data is expected to be non-stationary in their respective levels and stationary after they are differenced once before they go through co-integration analysis. Augmented Dickey Fuller Test is used to determine this. Below are the results from the test.

Table 2:ADF Test

VARIABLES	ADF
UNEMPLOYMENTRATE	0.6252
DUNEMPLOYMEENTRATE	0.0001
GDP	0.6041
DGDP	0.0001
INFLATION	0.2025
DINFLATION	0.0002
EXCHANGERATE	0.1646
DEXCHANGERATE	0.0003

After that is determined, co-integration analysis is the next step.

4.2. Step 2: Cointegration

4.2.1. Exchange Rate

Table 3: Cointegration-Exchange Rate

Series: EXCHANGERATE
SHAREPRICE
Sample: 2005M01 2014M12
Included observations: 4920
Trend assumption: Linear deterministic trend
Lags interval (in first differences): 1 4

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	130.1	0.0006	123.8	0.0020
At most 1	105.5	0.0415	105.5	0.0415

The p-value is less than 0.05 which means the null hypothesis should be rejected. The null hypothesis states that there is no co-integration. This means there is evidence of co-integration betwwen the exchange rate and the share prices. The trace test result is also larger than the max-eigen test result. This proves for co-integration.

4.2.2. GDP

Table 4:Cointegration-GDP

Series: GDP SHAREPRICE
Sample: 2005M01 2014M12
Included observations: 4920
Trend assumption: Linear deterministic trend
Lags interval (in first differences): 1 4

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	174.3	0.0000	115.8	0.0083
At most 1	198.8	0.0000	198.8	0.0000

The p-value is less than 0.05 which means the null hypothesis should be rejected. The null hypothesis states that there is no co-integration. This means there is evidence of co-integration between the [1]exchange rate and the share prices. The trace test result is also larger than the max-eigen test result. This proves for co-integration.

4.2.3. Inflation

Table 5:Cointegration-Inflation

Series: INFLATION SHAREPRICE
Sample: 2005M01 2014M12
Included observations: 4920
Trend assumption: Linear deterministic trend
Lags interval (in first differences): 1 4

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	432.8	0.0000	344.0	0.0000
At most 1	244.4	0.0000	244.4	0.0000

From the results gotten, cointegration is seen to be evident hingent on the fact that the trace result is more than the Eigen test result and the p-value being at zero.

4.2.4. Unemployment Rate

Table 6:Cointegration-Unemployment Rate

Series: UNEMPLOYMENTRATE SHAREPRICE
Sample: 2005M01 2014M12
Included observations: 4920

[1] H_o: There is no co-integration present.

Trend assumption: Linear deterministic trend

Lags interval (in first differences): 1 4

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	93.58	0.1798	104.4	0.0485
At most 1	40.05	1.0000	40.05	1.0000

The p-value is less than 0.05. This is evidence of co-integration.

Co-integration being proven we move on to using the vector error correction model to determine the relationship between the variables.

4.3. Step 3: Running the Vector Error Correction Model

4.3.1. Testing for long-term Causality

4.3.1.1. Exchange Rate

Table 7: VECM Exchange Rate

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.012704	0.001250	10.16170	0.0000

No long run causal relationship evident. There is presence of a positive correlation but it is weak and thus indicates that there is no long run relationship.

4.3.1.2. GDP

Table 8:VECM_GDP

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-5.75E-05	5.73E-05	-1.003542	0.3157

The coefficient is negative but insignificant because the p-value is greater than 0.05 and the correlation coefficient is very small meaning there is an insignificant negative relationship existing between the two.

4.3.1.3. Inflation

Table 9:VECM_Inflation

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.000972	0.000345	2.820963	0.0048

The p value is less than 0.05 which indicates a significant relationship. However the coefficient is very small showing if there is a relationship it is very weak.

4.3.1.4. Unemployment Rate

Table 10:VECM4

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.013445	0.001359	9.893266	0.0000

Similar to the previous results where we see the p-value is less than 0.05 indicating a significant relationship. However the coefficient is very small showing if there is a relationship, it is very weak.

The four variables show there are weak relationships between them and the share prices in the long run.

4.3.2. Testing for short run causality

4.3.2.1.Exchange rate

Table 11:Wald test_ExchangeRate

Wald Test:

Test Statistic	Value	df	Probability
F-statistic	4.120456	(5, 4662)	0.0010
Chi-square	20.60228	5	0.0010

Null Hypothesis: C(7)=C(8)=C(9)=C(10)=C(11)=0

Reject the null hypothesis which means exchange rate does affect share price in the short run.

4.3.2.2.GDP

Table 12:Wald Test_GDP

Wald Test:

Test Statistic	Value	df	Probability
F-statistic	3.496834	(5, 4662)	0.0037
Chi-square	17.48417	5	0.0037

Null Hypothesis: C(7)=C(8)=C(9)=C(10)=C(11)=0

Reject the null hypothesis which means that GDP does affect share price but in the short run.

4.3.2.3. Inflation

Table 13: Wald Test_Inflation

Wald Test:

Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	3.940639	(5, 4662)	0.0014
Chi-square	19.70320	5	0.0014

Reject the null hypothesis because p value is not more than 0.05 which shows there is short term causality.

4.3.2.4. Unemployment Rate

Table 14: Wald Test_UnemploymentRate

Wald Test:

Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	2.484581	(5, 4662)	0.0296
Chi-square	12.42290	5	0.0294

Null Hypothesis: C(7)=C(8)=C(9)=C(10)=C(11)=0

Reject the null hypothesis because p value is not more than 0.05 which shows there is short term causality.

Despite the lack of a strong long run relationship, all four variables show short term relation with the share prices.

4.4. Step 4: Granger Causality

Granger causality will indicate the direction of the relationship between the variables which adds onto the findings we were seeking.

Table 15:Granger Causality

Null Hypothesis	Probability	Decision
SHAREPRICE does not Granger Cause EXCHANGERATE EXCHANGERATE does not Granger Cause SHAREPRICE	0.0149 0.0083	Reject the null Reject the null
SHAREPRICE does not Granger Cause GDP GDP does not Granger Cause SHAREPRICE	0.5540 0.0126	Fail to reject the null Reject the null
SHAREPRICE does not Granger Cause INFLATION INFLATION does not Granger Cause SHAREPRICE	0.0142 0.0043	Reject the null Reject the null
SHAREPRICE does not Granger Cause UNEMPLOYMENTRATE UNEMPLOYMENTRATE does not Granger Cause SHAREPRICE	0.09349 0.0163	Fail to reject the null Reject the null

From the Granger Causality tests, it can be concluded that share prices and exchange rate have bidirectional causality. Inflation similarly has bidirectional causality with the share price. GDP is seen to have an effect on share price but not vice versa. Unemployment rate is also not affected by share price but share price is affected by the unemployment rate.

These results echo what was found in the co-integration tests, the vector correction model and the Wald tests.

5. Discussion and Conclusion

The tests show that there is an insignificant relationship between share prices and the macroeconomic variables in the long run and the macro-environment seems to only have a significant relationship in the short run. The results mirrored what what was achieved in (Nishat & Mustafa, 2007) in the Pakistani Stock Market. The relationships between share prices and inflation, unemployment rate and exchange rate are positive showing that when the three variables are high, the share price rises in the short term. However their insignificance in the long run makes it plausible to say they affect the share prices only as a shock for a short moment and level off when the change subsides.

This research recommends more studies to be done on developing countries and their variables because depending on research done on developed countries with higher economic stability and more developed capital markets is not an efficient comparison.

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Appendices

Final Research Data.xlsx