Effect of inflation on Performance of Equity Market in Nairobi Securities Exchange, Kenya

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Abstract: **The key aim of the study was determining the effect of inflation on performance of equity market in Nairobi Securities Exchange, Kenya. Specifically the study determined the effect of investor sentiment on performance of equity market in Nairobi securities exchange, Kenya. The study was based on Fishers hypothesis. The study was also based on positivism paradigm and explanatory research design. The study relied on monthly secondary data obtained from Central bank of Kenya, Nairobi Securities Exchange, Capital Markets Authority and Kenya National Bureau of Statistics between 2008 and 2018. The target population was all 67 listed firms in Nairobi securities exchange as captured by the Nairobi Securities Exchange All Share Index. The instruments of data collection were document review guides. The study used ARDL and NARDL models for data analysis. The findings of the study reported significant negative relationship between inflation and performance of equity market. The study recommended that capital markets authority should monitor changes inflation in the market as it significantly affects equity market performance.**

Keywords: **inflation, contagion effects, systematic risk, macro risk factors, asymmetric effects, private sector credit, causality.**

1. INTRODUCTION

1.1 Background to the Study

Emerging economies registered disappointing equity market performance with substantial differences in equity market activity across the different markets during the period under study. Latin American and Caribbean region reported lackluster equity market performance with Brazil dominating most of the initial public offers. For example, Countries in Latin America have reported slow growth in their markets (United Nations Conference on Trade and Development , 2017). For example, market capitalization for Latin American countries stood at 42% compared to 94% for Group seven countries and 146% in East Asia (World Bank Group, 2018). More recently, market capitalization of the Latin American and Caribbean region was 2.6% of global market capitalization for Peru, Mexico, Argentina, Colombia, Chile and Brazil (OECD, 2017). Mexico experienced volatility in market capitalization to GDP with average lows of 34% and highs of 43%. Market capitalization to GDP stood at 38% in 2009 before dropping to 34% in 2018. Mexico's stock index showed gradual increase from an average of 30000 points to 40000 points from 2008 to 2018 with fluctuations in-between (Mexico Stock Exchange, 2020). In Argentina, equity market capitalization declined significantly with market capitalization standing at 107% in 2008 then rising to 175% in 2009 then falling to 72% in 2018 with significant volatility in between. Argentina's equity index showed a gradual rise from an average of 2000 points in 2008 to 35000 points in 2018. Colombia's market capitalization to GDP stood at 57% in 2009 then rose to 77% in 2010 then dropped to 65% in 2011 then rose to 73% in 2012 before declining to 35% in 2018 while the equity index also showed a gradual decline from 1400 points in 2010 to 1100 points in 2016 before rising to 1500 points in 2018. Chile's equity Market capitalization declined on average with figures in 2009 standing at 132%, which rose to 160% in 2010 before declining to 93% in 2018 with volatility in between. Chile's equity index rose from an average of 3500 points in 2010 to 5500 points in 2018. In Peru, market capitalization to GDP stood 85% in 2009 and then rose to 107% in 2010 before declining to 69% in 2011 and 51% in 2015, then rose to 75% in 2017 before declining to 65% in 2018. On average, market capitalization declined

in Peru while the equity index experienced volatility during the period from 2008 to 2018 (CEIC, 2020; World Bank, 2020).The Latin American states were characterized by capitalization and large trade volumes concentrated on few firms. Delisting and migrations of large companies to other major stock exchanges were also reported in Latin America and Eastern Europe (United Nations Industrial Development organisation, 2018). Asian companies raised USD 4 trillion dollars through Asian equity markets. Asian companies form part of the largest users of public equity markets with secondary public offering and initial public offering forming forty seven percent of all equity raised publicly globally. Chinese companies' extensive usage of public equity markets has underpinned the rapid growth in Asian equity markets (United Nations, 2018).

According to Vena (2014), inflation refers to the increase in commodity prices annually as often measured by retail prices. Consumer price indices are produced every month by the government and inflation rate is calculated over the previous 12 months as the increase in the index (Humpage, 2008). Mousa, Al-safi and Hasoneh (2012) define inflation as the permanent rise in aggregate price levels resulting in rising living costs due to purchasing power decline. The stock market and the whole economy are affected by rising commodity prices since inflation influences the macroeconomic environment including economic growth, interest rates and unemployment. Consumer price indices measure inflation at consumer price level (Oner, 2018).

1.2 Theoretical literature review

In accordance with Fisher (1930) who developed the hypothesis, stocks can be used as protection against inflation since they present claims against real business assets. When expected inflation is pronounced, investors can dispose of their financial assets and substitute them for real assets. The relationship between inflation and stock prices is positive since nominal stock prices reflect expected inflation (Grande, Locarno, & Massa, 2017).

The use of stocks as a hedge against inflation ensures that investors are fully compensated when inflation increases through corresponding gains in stock prices. Furthermore, the stock market can be used as a hedge against inflation in the long run because equities present claims against the company's current and future earnings (Ioannides, *et.al.*, 2005). The limitation of fisher's hypothesis is that empirically, studies show that the relationship between inflation and stock markets is not always positive and at times may be negative. Inflation has the effect of increasing operating costs for businesses, this in return reduces corporate profitability and dividends causing decline in stock prices, and consequently this reduces performance of equity markets (Oprea, 2014).

Uwubanmwen and Eghosa (2015) add that during periods of high inflation, individuals switch their expenditure from investments to consumption. This reduces the demand for securities in the market evidenced by reduced trading volumes and values in the market leading to overal decline is equity prices (Ozurumba, 2012). Other studies have also shown that inflation has no effect on stock market performance (Hau, 2017). In view of the arguments of fisher's hypothesis that inflation has a positive effect on stock prices, the study determined the effect of inflation measured by consumer price index on performance of equity market in NSE, Kenya.

1.3 Empirical Literature Review

Chauque and Rayappan (2018) used multiple regression and granger causality to determine the effect of inflation and exchange rate on stock market performance in Malaysia. The study found that inflation and exchange rate had a significant negative effect on performance of stock market in malaysia. The findings were in agreement with Akani and Uzobor (2015) and Njogo, Inim and Ohiaeri (2018). Chauque and Rayappan (2018) ignored the moderating effect of institutional ownership, investor sentiment as an independent variable and asymmetric effects which were captured by the present study using ARDL and NARDL.

Njogo, Inim and Ohiaeri (2018) determined the relationship between inflation rate and stock returns in Nigerian stock exchange between 1995 and 2014 using error correction and granger cointegration model using the Consumer Price Index and the All Share Index on the Nigerian stock market. The findings indicated the existence of cointegration and inflation significantly and negatively affects stock returns in Nigeria. Also, the findings pointed out the existence of unidirectional causality between the variables. A similar study in Nigeria on stock prices by Akani and Uzobor (2015) also indicated that inflation negatively affects stock prices. These findings were in disagreement with Sokpo, Ioember and Usar (2017) in Nigeria which calls for the further research into the nature of relationship between inflation and stock returns. Njogo, Inim and Ohiaeri (2018) did not capture moderation effect, cointegration and causality which were captured by the present study.

Similarly, Udi and Ohwofasa (2018) used cointegration and error correction model to examine the factors influencing performance of stock market in Nigeria during the period 1986 to 2016. The study used market capitalization as proxy for performance of stock market. The study found that inflation, per capita income and interest rate negatively affected performance of stock market. Udi and Ohwofasa (2018) ignored moderation effect of institutional ownership, investor sentiment as an independent variable and asymmetric effects which were addressed by the current study.

Megaravalli, Sampagnaro and Murray (2017) employed Johanssen cointegration and granger causality to examine the impact of macroeconomic indicators in stock market performance in India, China and Japan(ASIAN 3) using monthly data between 2008 to 2016. Inflation proxied by consumer price index and exchange rate were used as macroeconomic indicators. The study found that inflation had no significant effect while exchange rates had a significant positive effect on performance of stock markets. The findings were in agreement with Sokpo, Iorember and Usar (2017) and in disagreement with Udi and Ohwofasa (2018). However, Megaravalli, Sampagnaro and Murray (2017) ignored the moderating effect of institutional ownership and asymmetric effects which were captured by the current study. In addition, ASIAN 3 countries have well established and developed markets hence the need to test their findings in a emerging market like Kenya characterised by market concentration risks, trading limited to a few stocks and market inefficiency.

Sokpo, Iorember and Usar (2017) used GARCH and EGARCH analysis to determine the influence of inflation measured by consumer price index, on stock returns of Nigerian Stock Exchange. The study concluded that inflation has no significant effect on stock market returns in Nigeria. No asymmetric effects were reported meaning that both good and bad news had the same effect on Nigeria's stock returns. Sokpo, Iorember and Usar (2017) ignored foreign equity flows, private sector credit and investor sentiment which form subject of the current study. They also ignored moderation effects which also covered by the current study. Unlike Sokpo, Iorember and Usar (2017) who used GARCH and EGARCH, the current study estimated an ARDL and NARDL model for analysis of symmetric and asymmetric effects.

1.4 Conceptual Framework

The conceptual framework assimilates investor sentiment ownership and performance of equity market.
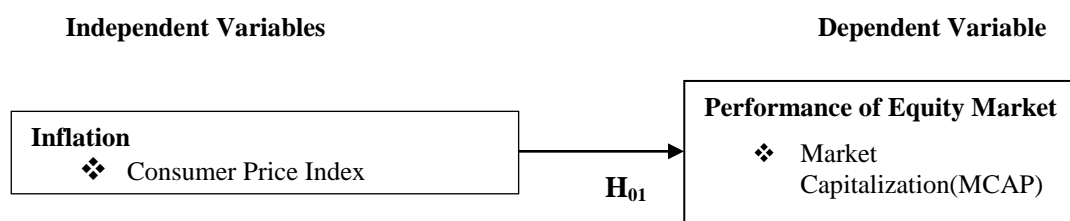
Independent Variables   **Dependent Variable**

Figure 2.1: Conceptual Framework

Source: Researcher, 2018

1.5 Statement Of The Problem

Kenya's vision 2030 envisions the equity market as a source of financing for both corporate and government sectors aimed at achieving a 10 per cent average annual gross domestic product growth with 90 Percent market capitalization to Gross Domestic Product (Government of Kenya, 2007). The government of Kenya has instituted reforms on corporate governance, conduct of business, introduction of real estate investment trusts, demutualization and introduction of growth enterprise segment to improve stock market efficiency and performance. However, Kenya's equity market remains constrained with low market capitalization to gross domestic product, absence of new initial public offerings since 2014 and few listed stocks limiting liquidity. For instance, between the period 2015 to 2018, market capitalization to Gross Domestic product in Kenya stood at approximately 33 percent in 2015, 27 percent in 2016 and 31 percent in 2017 before dropping to 24 percent in 2018 against the targeted 90% market capitalization to GDP (Finacial Sector Regulators , 2018). The market has high market concentration risks whereby the top 5 companies by market capitalization; Safaricom, East African Breweries, Equity Bank, Kenya Commercial Bank And Cooperative Bank control 70% the market value on average indicating their market dominance and exposing the equity market to financial contagion effects (Capital Markets Authority, 2018). Furthermore, performance of equity market indicators has declined significantly during the period under

study. Investors lost an average of KES.20 billion in 2009, KES.299 billion in 2011, KES.262 billion in 2015 and KES.461 billion in 2018 in market capitalization losses (Capital Markets Authority, 2018b) equivalent to 20 percent of the country's budget for the year 2018/2019. On average, the equity market has contributed less than one percent to economic growth against the government's vision 2030 target of ten percent. (Ngugi, Maana, & Amanja, 2013).Consequently, the study determined the effect of inflation on performance of equity market in Nairobi securities exchange, Kenya.

1.6 Research Hypothesis

Inflation has no effect on performance of equity market in Nairobi securities exchange kenya.

2. RESEARCH DESIGN AND METHODOLOGY

Positivism research paradigm forms the backbone of the study. Positivism paradigm views reality as real, external and independent and advocates for the use of scientific methods when dealing with observable and measurable facts (Sharma., 2010). The researcher maintains an objective stance. (Saunders, Lewis, & Thornhill, 2016). Existing financial theories were used to derive hypotheses for data collection, analysis and empirical testing to support or reject hypotheses. This was concurrence with Mogaka (2016).

2.1 Model Specification

The study adopted an ARDL model developed by Pesaran, Smith and Shin(2001) and applied by Odhiambo(2010), Ahmed and Ullah(2013) and Ho(2017) to determine the effect of macro risk factors and investor sentiment on performance of equity market in NSE, Kenya. The model was selected because the variables were of mixed stationarity; Market capitalisation, domestic savings, private sector credit, inflation and investor sentiment were non stationary and had to differenced to become stationary 1(1). Foreign equity flows and institutional ownership were stationary at level. Guided by Meo(2018) and Shrestha & Bhatta (2018) (see figures 3.3a and 3.3b) the study adopted an ARDL model. Further, the model tested for cointegration and the presence of cointegration was followed by granger causality test as stipulated by Shrestha & Bhatta (2018).

The generalised ARDL (p,q) model is specified as follows.

$$Y_t = \gamma_{0i} + \sum_{i=1}^{p} \delta_i Y_{t-1} + \sum_{i=0}^{q} \beta_i X_{t-1} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.1)$$

Where Y_t is a vector and the variables in X_t are allowed to be integrated of order zero, I(0) or integrated of order one, I(1) or co integrated. β and δ are coefficients while γ is a constant. $i = 1\ldots$k number of variables in the model; p, q represent optimal lag order.

2.2 Operationalization and Measurements of Study Variables

Table 1: Variable Operationalization And Measurement

Variable Type	Variable	Operationalization	Measure	Direction Hypothesized
Dependent Variable	Performance Of Equity Market	❖ Market capitalization-Measures the market value of listed company for shares issued	❖ Shares outstanding * market price per share.	Positive
Independent Variables	Investor Sentiment	❖ Investor misevaluation of stock prices	❖ Trading Volume in millions	Positive

2.3 Data Sources

The researcher obtained Kenyatta university graduate school approval letter from the university, which was used to obtain a research permit from National Commission of Science and Innovation (NACOSTI) allowing the researcher conduct research in Nairobi, County. Monthly secondary data on market capitalization was obtained from the aggregated figures provided by the Capital Markets Authority and the Nairobi Securities Exchange. Monthly secondary data on investor sentiment was obtained from the Capital Market Authority's website, reports and handbooks

2.4 Data Analysis and Presentation

Descriptive and inferential statistics were used to elaborate the data and facilitate deduction assisted by STATA 13. Diagnostic tests were conducted first to avoid violation of the classical linear regression model. Stationarity test for unit root was used to determine the analysis model for the data. If all variables were stationary, then OLS or VAR models was to be used. However, if not all are stationary or mixed then Johansen or ARDL model was to be used for analysis. In addition, in order to test for cointegration, the ARDL bounds test was conducted to determine the existence of a long run relationship between the macro risk factors, investor sentiment and performance of equity market.

Furthermore, the study decomposed the independent variables into positive and negative values in order to test for asymmetric effects or nonlinearity using Nonlinear Autoregressive Distributed Lag model (NARDL). The ARDL model was recommended by Pesaran, Smith and Shin (2001) and used by Shahbaz, Ahmed, & Ali, (2008) and Shahbaz, Rehman and Afza(2015). The NARDL model was adapted from Shin, Yu and Greenwood-Nimmo (2014). The study's findings are presented in tables, graphs and figures.

3. RESULTS AND DISCUSSION

3.1 Descriptive statistics

Descriptive statistics including minimum and maximum value, standard deviation and mean were determined. The mean was the preferred measure of central tendency because it is more representative, uses all the scores in a distribution and is closely related to variance and standard deviation, which are the most common measures of variability (Gravetter, Wallnau, & Forzano, 2016). The standard deviation was selected because it is less affected by fluctuations of sample size compared to other measures of variation and it is also used for comparing correlation and skewness (Sharma, 2018). The descriptive statistics results are presented in table 4.1.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
MC	132	1627139	616745.5	834170	2817360
IF	132	8.308712	4.565504	3.18	19.72

Source: Study Data (2008-2018)

(KEY: MC; Market Capitalization, FEF; Foreign Equity flows, DS; Domestic Savings, PSC; Private Sector Credit, IF; Inflation, IS; investor Sentiment, IO; Institutional Ownership)

Table 2 shows that market capitalization has a mean value of KES. 1627139 million with a standard deviation of 616745.5 million indicating a high degree of variation evidenced by a maximum value of 2817360 million against a minimum value of 834170. Table 4.1 shows that Inflation measured by the consumer price index has a mean value of 8.308712 with a standard deviation of 4.565504 and maximum value of 19.72 and minimum value of 3.18, a big variation in inflation during the period.

3.2 Long Run ARDL Model Coefficients

After confirmation of Cointegration, ARDL with an error correction model (ARDL ECM) was conducted. The sign and magnitude of the coefficients of the error correction model indicate the long run coefficients. The magnitude is represented by the coefficient of the lagged error correction model, which indicates the speed of adjustment towards the long run equilibrium. The sign of the adjustment term should be negative and significant to show convergence in the long run (Akanni and Isah, 2018; Pesaran, 2018). The results of the ARDL ECM model coefficients are presented in table 4.10. The lag length selected was 2 based on the AIC criterion. The model was estimated under the joint null hypothesis that all the coefficients of the macro risk factors and investor sentiment were equivalent to zero.

Table 3: Long Run ARDL model coefficients

```
. ardl LNMC_d1 LNFEF LNDS_d1 LNPSC_d1 LNIF_d1 LNIS_d1,lags(1,2,2,2,2,2) ec

ARDL(1,2,2,2,2,2) regression

Sample:     April 2008 - September 2016, but with gapsNumber of obs=        40
                                              R-squared     =    0.9843
                                              Adj R-squared =    0.9734
Log likelihood =  117.78811                   Root MSE      =    0.0168

------------------------------------------------------------------------------
   D.LNMC_d1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
ADJ          |
   LNMC_d1   |
        L1.  |  -1.435157   .1098073   -13.07   0.000    -1.66231   -1.208003
-------------+----------------------------------------------------------------
LR           |
      LNFEF  |   -.006104   .0027125    -2.25   0.034   -.0117152   -.0004927
   LNDS_d1   |  -.1672053   .0506439    -3.30   0.003   -.2719703   -.0624404
   LNPSC_d1  |   1.203043   .4022386     2.99   0.007    .3709492    2.035137
   LNIF_d1   |   -.133085   .0265239    -5.02   0.000   -.1879538   -.0782163
   LNIS_d1   |   .3707643   .0264472    14.02   0.000    .316054     .4254745
-------------+----------------------------------------------------------------
SR           |
     LNFEF   |
        D1.  |   .0019414   .0039483     0.49   0.628   -.0062264    .0101091
        LD.  |  -.0070077   .0033415    -2.10   0.047     -.01392   -.0000953
             |
   LNDS_d1   |
        D1.  |   -.020608   .0611192    -0.34   0.739   -.1470428    .1058268
        LD.  |  -.0733619   .0315285    -2.33   0.029   -.1385836   -.0081402
             |
   LNPSC_d1  |
        D1.  |  -1.255573   .4714329    -2.66   0.014   -2.230807   -.2803403
        LD.  |  -.7159472   .3443536    -2.08   0.049   -1.428297   -.0035975
             |
   LNIF_d1   |
        D1.  |   .1639376   .0355487     4.61   0.000    .0903996    .2374757
        LD.  |   .1443805   .0320917     4.50   0.000    .0779937    .2107674
             |
   LNIS_d1   |
        D1.  |  -.2390522   .0338593    -7.06   0.000   -.3090954    -.169009
        LD.  |  -.0449417   .0085839    -5.24   0.000    -.062699   -.0271845
             |
       _cons |   .0206705      .0256     0.81   0.428   -.0322871    .0736281
------------------------------------------------------------------------------
```

Source: Study data (2008-2018)

From table 4.10 the coefficient of the lagged ECM adjustment term is negative and significant at 5 percent significance level with a value of -1.435157 with a P value of 0.000 indicating that in the short run, performance of equity market tend to adjust to long run equilibrium given disturbances resulting from changes in macro risk factors and investor sentiment. The adjustment term -1.435157 indicates that 100 percent of the disequilibrium in performance of equity market from the previous period shock will converge back to the long run equilibrium in the current period.

Table 4.10 also indicates that in the long run, inflation had a coefficient of -0.133085 with P values of 0.000 which was less than 0.05. This means that the null hypothesis had to be rejected at 5 percent significance level leading to the conclusion that inflation had negative significant effect on market capitalisation. The findings were in agreement with Jamaludin, Ismail and Manaf (2017) , Chauque and Rayappan (2018), Udi and Ohwofasa (2018), Ramzan (2016), Onundu (2016), Qamri, Haq and Akram (2015), Khumalo (2013), Mutuku and Ngeny(2014), Njogo, Inim and Ohiaeri (2018), Silva (2016) who found that inflation negatively affected stock returns and performance of equity market . In addition, the findings also disagreed with Elly and Oriwo(2013) in kenya ; Dengke(2015) in China; Oshaibat (2016) in Oman; who found that inflation positively affected performance of stock market. The findings also disagreed with Kaur (2016); Megaravalli, Sampagnaro and Murray (2017) and Ahmadi (2016), Limpanithiwat and Rungsombudpornkul (2010) in Thailand, Sokpo, Iorember and Usar (2017) in Nigeria who found that inflation had no effect on performance of equity market and stock returns.

Findings in Table 4.10 were in disagreement with Fishers hypothesis, which claims that inflation positively affects performance of stock market. The findings indicate a significant negative effect of inflation on performance of equity market in NSE, Kenya.

3.3 Nonlinear ARDL Model For Asymmetric Effects

The nonlinear Autoregressive distributed lag model (NARDL) simultaneously evaluates asymmetric short run and long run effects. The results from the bounds test indicated the presence of cointegration indicating that long run relationship exists between macro risk factors and investor sentiment and performance of equity market in NSE, Kenya. The study used Nonlinear ARDL to test for asymmetry in the long run relationship between the dependent and independent variables.

Asymmetric effects are present if the effects of positive and negative shocks in the independent variables are not of same magnitude on the dependent variable (Rocher, 2017). Table 4.12 presents the NARDL regression and the asymmetry statistics comprising of coefficients of decomposed long run positive values and long run negative values of the macro risk factors and investor sentiment. The asymmetry statistics also present the long run asymmetry statistics and short run asymmetry statistics in the same model. The model was estimated under the null hypothesis of no asymmetry.

Table 4: NARDL Model Test for Asymmetric Effects

```
Asymmetry statistics:
-----------------------------------------------------------------------------
           |        Long-run effect [+] |        Long-run effect [-]
Exog. var. |    coef.    F-stat    P>F |    coef.    F-stat    P>F
-----------+-----------------------------------------------------------------
      LNFEF |  -0.000    13.72    0.006    0.000    23.49    0.001
    LNDS_d1 |   0.001    7.141    0.028    0.000        .        .
   LNPSC_d1 |   0.007    10.42    0.012   -0.005    1.698    0.229
    LNIF_d1 |   0.000   .05348    0.823   -0.000   .07477    0.791
       LNIS |  -0.000    2.779    0.134   -0.002    292.5    0.000
-----------+-----------------------------------------------------------------
           |        Long-run asymmetry |        Short-run asymmetry
           |        F-stat    P>F |        F-stat    P>F
-----------+-----------------------------------------------------------------
      LNFEF |         21.97    0.002             3.639    0.093
    LNDS_d1 |         7.141    0.028             336.8    0.000
   LNPSC_d1 |          1.34    0.280             15.86    0.004
    LNIF_d1 |        .04014    0.846             1.526    0.252
       LNIS |         275.1    0.000             28732    0.000
-----------------------------------------------------------------------------
Note: Long-run effect [-] refers to a permanent change in exog. var. by -1

   Cointegration test statistics:    t_BDM =   -1080.4716
                                     F_PSS =  990576.8133

   Model diagnostics                            stat.    p-value
   ------------------------------------------------------------------
   Portmanteau test up to lag  18 (chi2)        21.46     0.2570
   Breusch/Pagan heteroskedasticity test (chi2) .002212   0.9625
   Ramsey RESET test (F)                           .         .
   Jarque-Bera test on normality (chi2)          1.265     0.5312
```

The study determined the asymmetric effect of inflation on performance of equity market. To achieve this, the study employed wald tests for asymmetry. The tests were conducted under the null hypothesis of no asymmetry. Table 4.12 presents the asymmetry statistics, which are explained below.

The upper part of asymmetry statistics in Table 4. decomposes the inflation into positive and negative values and presents their long run effects on performance of equity market. Further, positive inflation has a coefficient of 0.000 with P value 0.823 which is statistically insignificant since it is greater than 0.05 at 5% significance level, while negative inflation has a P value of -0.000 with P value 0.791 which is statistically insignificant since it is greater than 0.05 at 5% significance level indicating that inflation has no asymmetric effect on performance of equity market.

The lower part of asymmetry statistics in Table 4. summarizes long run asymmetry and short run asymmetry for inflation. From the long run asymmetry statistics, inflation has an F statistic of 0.04014 with a P value of 0.846, which is greater than 0.05 thus insignificant leading to the conclusion of no asymmetric effects for inflation on performance of equity market meaning that their effects on performance of equity market were identical irrespective of appreciation or

depreciation. According to the nonlinear ARDL model, when long run relationship exists, it is asymmetrical in nature (Shin, Yu, & Greenwood-Nimmo, 2014). The findings were in agreement with Sokpo, Iorember and Usar (2017) reported no asymmetrical effects of inflation on performance of equity market in NSE. The P values of inflation are greater than 0.05 meaning that the null hypothesis for no asymmetry could not be rejected leading to the conclusion that foreign equity flows and inflation did not have short run asymmetric effects on performance of equity market.

3.4 Granger Causality Analysis

The existence of Cointegration proved the existence of granger causality at least in one direction. Granger causality test (1987) was carried out to establish the direction of the causal link between investor sentiment and performance of equity market in NSE, Kenya. The null hypothesis was that granger investor sentiment do not granger cause performance of equity market in NSE, Kenya. The results for granger causality are presented in table 5.

Table 5: Granger Causality Wald Tests Results

```
Granger causality Wald tests
+---------------------------------------------------------------+
|        Equation        Excluded |   chi2    df Prob > chi2 |
|---------------------------------+-----------------------------|
|        LNMC_d1            LNFEF | 4.3646     2     0.113   |
|        LNMC_d1          LNDS_d1 | 2.7761     2     0.250   |
|        LNMC_d1         LNPSC_d1 | 1.2796     2     0.527   |
|        LNMC_d1          LNIF_d1 | 21.176     2     0.000   |
|        LNMC_d1          LNIS_d1 | 3.547      2     0.170   |
|        LNMC_d1             ALL | 23.174    10     0.010   |
|---------------------------------+-----------------------------|
|          LNFEF          LNMC_d1 | .37938     2     0.827   |
|          LNFEF          LNDS_d1 | 1.3722     2     0.504   |
|          LNFEF         LNPSC_d1 | 7.4231     2     0.024   |
|          LNFEF          LNIF_d1 | 3.6709     2     0.160   |
|          LNFEF          LNIS_d1 | 5.5864     2     0.061   |
|          LNFEF             ALL | 16.654    10     0.082   |
|---------------------------------+-----------------------------|
|        LNDS_d1          LNMC_d1 | 1.366      2     0.505   |
|        LNDS_d1            LNFEF | 5.1648     2     0.076   |
|        LNDS_d1         LNPSC_d1 | 1.3221     2     0.516   |
|        LNDS_d1          LNIF_d1 | 12.282     2     0.002   |
|        LNDS_d1          LNIS_d1 | 2.2555     2     0.324   |
|        LNDS_d1             ALL | 13.839    10     0.180   |
|---------------------------------+-----------------------------|
|       LNPSC_d1          LNMC_d1 | 1.4472     2     0.485   |
|       LNPSC_d1            LNFEF | 3.209      2     0.201   |
|       LNPSC_d1          LNDS_d1 | .53027     2     0.767   |
|       LNPSC_d1          LNIF_d1 | 6.2072     2     0.045   |
|       LNPSC_d1          LNIS_d1 | 1.3719     2     0.504   |
|       LNPSC_d1             ALL | 10.575    10     0.392   |
|---------------------------------+-----------------------------|
|        LNIF_d1          LNMC_d1 | 3.7232     2     0.155   |
|        LNIF_d1            LNFEF | 1.3798     2     0.502   |
|        LNIF_d1          LNDS_d1 | 1.4866     2     0.476   |
|        LNIF_d1         LNPSC_d1 | 2.4624     2     0.292   |
|        LNIF_d1          LNIS_d1 | 6.6224     2     0.036   |
|        LNIF_d1             ALL | 22.974    10     0.011   |
|---------------------------------+-----------------------------|
|        LNIS_d1          LNMC_d1 | 4.1418     2     0.126   |
|        LNIS_d1            LNFEF | 1.0311     2     0.597   |
|        LNIS_d1          LNDS_d1 | 1.9885     2     0.370   |
|        LNIS_d1         LNPSC_d1 | .18383     2     0.912   |
|        LNIS_d1          LNIF_d1 | 10.738     2     0.005   |
|        LNIS_d1             ALL | 13.464    10     0.199   |
+---------------------------------------------------------------+
```

Source: Study data (2008-2018)

Granger causality wald test was conducted for all the equations. From table 4.15, First equation for market capitalization indicates that inflation granger causes market capitalization with a P value of 0.000 for the coefficient of inflation, which was less than 0.05 leading to rejection of null hypothesis of no granger causality. The joint chi statistic for the first equation for market capitalization is 23.174 with a P value of 0.010 which is less than 0.05 meaning that the null hypothesis that foreign equity flows, domestic savings, private sector credit, inflation and investor sentiment do not granger cause market capitalization is rejected.

Secondly, in the second equation for foreign equity flows, Private sector credit granger causes foreign equity flows with a P value of 0.024 for the coefficient of private sector credit that was less than 0.05 leading to the rejection of the null hypothesis of no granger causality. The joint chi statistic for the second equation for foreign equity flows is 16.654 with a P value of 0.082 which is greater than 0.05 meaning that the null joint hypothesis that market capitalization, domestic savings, private sector credit, inflation and investor sentiment do not granger cause foreign equity flows cannot be rejected.

The third equation for domestic savings indicates that inflation granger causes domestic savings with a P value of 0.002 for coefficient of inflation, which was less than 0.05 leading to the rejection of the null hypothesis of no granger causality. The joint statistic is 13.839 with a P value of 0.180, which is greater than 0.05 meaning that the null hypothesis that market capitalization, foreign equity flows, private sector credit, inflation and investor sentiment do not granger cause domestic savings cannot be rejected.

The fourth equation for private sector credit indicates that Inflation granger causes private sector credit with a P value of 0.045 for the coefficient of inflation, which was less than 0.05 leading to the rejection of null hypothesis of no granger causality. The joint chi statistic has a coefficient of 10.575 with P value 0.392, which is greater than 0.05 meaning that the null hypothesis that market capitalization, foreign equity flows, domestic savings, inflation and investor sentiment do not cause inflation cannot be rejected.

Further, the fifth equation for inflation indicates that investor sentiment granger causes inflation with a P value of 0.036 for coefficient of investor sentiment, which is less than 0.05 leading to the rejection of the null hypothesis of no granger causality. The joint chi statistic is 22.974 with P value of 0.011 which is less than 0.05 meaning that the null hypothesis that market capitalization, foreign equity flows, Domestic savings, private sector credit and investor sentiment do not granger cause inflation is rejected at 5% significance level.

Lastly, the sixth equation for investor sentiment indicates that inflation granger causes investor sentiment with a P value of 0.005 for the coefficient of inflation, which is less than 0.05 leading to the rejection of the null hypothesis of no granger causality. The joint chi statistic is 13.464 with P value of 0.199 which is greater than 0.05 meaning that the null hypothesis that market capitalization, foreign equity flows, Domestic savings, private sector credit and inflation do not granger cause investor sentiment cannot be rejected. The findings were in agreement with Gachanja and Kosimbei, 2018; Makoni and Marozva, 2018; Bayar, 2016; Sapian and Auzairy, 2015; Ramzan, 2016; Faisal, Muhammad, and Tursoy, 2017; Dengke, 2015 and in disagreement with De and Chakraborty (2015).

4. CONCLUSIONS AND RECOMMENDATIONS

The fourth objective was to establish the effect of inflation on performance of equity market in NSE, Kenya. Consumer price index was used to measure inflation. ARDL model was used for analysis and the study found that inflation had a significant negative effect on market capitalization. The fifth objective was to determine the effect of investor's sentiment on performance of equity market in NSE, Kenya. Trading volume was used as a proxy for investor sentiment. ARDL model was used for analysis. The findings indicate that investor sentiment had a positive significant effect on market capitalization.

In addition, the study concluded that inflation measured by consumer price index had negative significant effect on performance of equity market measured by market capitalization in both short and long run. This meant that inflation was hampering firm performance due to high cost of inputs, which reduced profitability and consequently affected equity market performance in the NSE, Kenya. This was in disagreement with Fisher's hypothesis, which links inflation to increase in stock values due to substitution of financial assets to real assets to hedge against inflation.

The study concluded that inflation had significant negative effect on performance of equity market. This implies that a favorable inflation rate was generally good for firms. The central bank should monitor inflation and keep it within acceptable levels to avoid increase in cost of doing business, which negatively affects the general economy and the equity market.

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