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Impact of Several Macroeconomic Variables on Stock Price Movement: A Study on Dhaka Stock Exchange.

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Abstract
This study examines the effects of macroeconomic variables on the movement of stock prices in Dhaka Stock Exchange. Here the author has tried to analyze both long-run and short-run dynamic relationship between the stock market index and four macroeconomic variables including deposit interest rate, money supply, consumer price index, and exchange rate based on monthly data from June 2012 to June 2018 using multivariate regression model, Johansen's multivariate co-integration test and vector error correction model (VECM). The research paper proclaims that there is co-integration between macroeconomic variables and stock prices in DSE indicating long-run relationship. Further tests indicate that, in the short-run, inflation and exchange rates matter in a great deal for share price movements in DSE.
The results of this empirical research help the reader to understand whether the movement of stock prices of Dhaka Stock Exchange is subject to some macroeconomic variables change. Moreover, investors will find this study as a helpful tool for them to identify some basic economic variables that they should focus on while investing in stock market and will have an improvement to make their own appropriate investment decisions.

Key Word: *DSE Index, Consumer Price Index, Exchange Rate, Interest Rate, , Money Supply, Co-integration, VECM,*

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I. Introduction

A stock exchange market is the center of a network of communication where buyers and sellers of securities meet at a particular price. Securities exchange assumes a key function in the preparation of capital in rising and created nations, prompting the development of industry and business of the nation, as an outcome of changed and globalized strategies received by generally rising and created government. Several factors can be a signal to stock market participants to expect a higher or lower return when investing in stock and one of these factors are macroeconomic variables. The change in macroeconomic factors can altogether affect stock value return.

The outcome of this empirical research will help the reader to understand whether the movement of stock prices of Dhaka Stock Exchange is subject to some macroeconomic variables alteration. Financial specialists will discover this examination as an accommodating instrument for them to recognize some fundamental monetary factors that they should focus on while investing in stock market and will have an advantage to make their own suitable investment decisions.

II. Objectives of the study

a) To verify the impact of CPI, IR, ER and MS on the stock price movement in DSE.
b) To discover the long-run relationship and the short-run dynamic relationship among the variables.

III. Literature Review

Macroeconomic variables affect the performance of the stock market greatly. Investors think about macroeconomic variables when they value stocks. In the way of time a number of researchers have fixated their exact examinations on the connection between stock price movement and macroeconomic variables and this has been seriously analyzed in both emerging and developed capital business sectors.

[1] Shows that Interest rate and inflation have significant influence on stock returns of Amman Stock Exchange. The result shows positive relationship between inflation and stocks return but negative relationship between interest rate and stocks return. [2] Concluded that Interest rate and inflation have insignificant impact on stock returns of KSE 100. It also has proven that exchange rate is negatively related to stock returns of KSE 100 index. Moreover, an increase in exchange rate causes decrease in stock returns of KSE 100 and the decrease in the stocks return is because when the foreign investors invest their money in the stocks. Again an increase in the exchange rate causes decrease in their income because they will get less amount of money in their own

currency because of increase in the exchange rates which is not a favorable for the foreign investors. [3] The study investigated the relationship between monetary policy instruments, in the form of expansive or restrictive policy or changes in money supply, and stock returns over the period 2004-2014 using both static and dynamic panel data framework. Analysis of the results showed that for the case of the random effect, both money supply and interest rate are important variables which explain fluctuation in stock return. [4] Says that the DSE stock market of Bangladesh is not informationally efficient with respect to M1, M2 and inflation rate. Specifically, it indicates that the stock prices respond to deviations from the long-run equilibrium path traced between the stock market and the three macroeconomic variables. [5] This paper finds that the Bangladesh stock market does not reflect macroeconomic effect on stock price indices. The co integration test and the vector error correction model illustrate that stock price indices are not co integrated with a set of macroeconomic variables like industrial production index, broad money supply and GDP growth. But interest rate change or T-bill growth rate may have some influence on the market return. [6] The paper revealed that there is a long-term relationship between the stock prices and macroeconomic variables. The deposit interest rate was negatively related with the stock prices; this was expected as higher the interest rates, theoretically, shift investors away from stocks and vice versa. The broad money supply is positively related with the stock prices which confirm that the corporate earnings effect leads to a boost in companies' cash flows and, hence, higher stock prices.

Many other early studies of Lintner (1973), Jaffe and Mandelker (1977) and Fama and Schwert (1977) examine the relationship between inflation and stock prices. Most of these studies test the Fisher hypothesis which predicts a positive relationship between expected nominal returns and expected inflation and their findings are incompatible with the Fisher hypothesis. They all report a negative correlation between stock returns and inflation.

IV. Methodology

IV.1 Data collection and analysis

Depending on the nature of the study, the researcher has used only secondary data to conduct the study. The relevant secondary data are used in moderate scale and have been collected from Bangladesh bank's website and Dhaka Stock Exchange's monthly economic trends. The study examines monthly data from June 2012 to June 2018 for all the variables. Computer software for statistics namely Eviews has been used to analyze the data that are used in the log form.

IV.2 Variable specifications

In this study, stock price index (DSEI) is considered as the dependent variable. On the other hand, four macro-economic variables namely Consumer Price Index (CPI), Deposit Interest Rate (IR), Exchange Rate (ER) and Money Supply (MS) are used as predictor variables. Here the DSE Index is market value weighted index of numerous stocks that have the largest trading volume on the Dhaka Stock Exchange.

IV.3 Model specifications

Several econometric models have been conducted in this study. As a prerequisite of the co-integration test, the author here starts with the unit root test for all the variables to be stationary under the study using Augmented Dickey-Fuller (ADF) test. Because if the data is non-stationary, then the time series data analysis will generate the problem of spurious regression, resulting in unreliable results of the models constructed. If the test shows that the data is non-stationary, then the first difference of the variables will be employed before applying the OLS method.

Following the stationary test, the author has conducted further test to justify the co-integration between the dependent and the explanatory variables. The presence of co-integration is tested with the Johansen Co-integration Test.

Vector Error Correction Model (VECM) is used to see both the long run and short run dynamic relationship among the variables.

Ordinary Least Squared (OLS) method has been applied to test the relationship between the macroeconomic variables and the stock price index (DSEI) and some diagnostic test have also been conducted for analysis purpose. However, the multivariate regression model is developed in the following equation:

$$Dlog(DSEI)t = \alpha + \beta 1Dlog(CPI)t + \beta 2Dlog(IR)t + \beta 3Dlog(ER)t$$
$$+\beta 4Dlog(MS) + \varepsilon it$$

Where,

α = Intercept of DSE general index which is constant.

$\beta 1$, $\beta 2$, $\beta 3$ and $\beta 4$ = Beta coefficients of CPI, IR, ER and MS respectively.

εit = Error term

At first, all the variables under study are transformed into the logarithmic form. Then, the first difference of logarithm of all the variables should be conducted because of the existence of a unit root in all the variables data series except money supply. Data has been analyzed by statistical software namely Eviews.

V. Empirical Analysis

V.1 Augmented Dickey-Fuller unit root test statistic

When dealing with time series data, it is important to examine whether the data are stationary or non-stationary because non-stationary process generates the problem of spurious regression between variables. To do that the author has conducted Augmented Dickey-Fuller (ADF) test. The null and alternative hypotheses are as follows:

H_o*: Variable has Unit root [Variable is not stationary]*
H_1*: Variable has no unit root [Variable is stationary]*

Table 2: LN Consumer Price Index (CPI)

Null Hypothesis: LNCPI has a unit root			Null Hypothesis: D(LNCPI) has a unit root		
	t-Statistic	Prob.*		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.211085	0.2045	Augmented Dickey-Fuller test statistic	-6.62857	0.0000

At 5 percent level of significance, this time series data is non-stationary at level, but stationary after first difference.

Table 3: LN Interest Rate (IR)

Null Hypothesis: LNDIR has a unit root			Null Hypothesis: D(LNIR) has a unit root		
	t-Statistic	Prob.*		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.947027	0.7676	Augmented Dickey-Fuller test statistic	-7.90120	0.0000

At 5 percent level of significance, this time series data is non-stationary at level, but stationary after first difference.

Table 4: LN Exchange Rate (ER)

Null Hypothesis: LNER has a unit root			Null Hypothesis: D(LNER) has a unit root		
	t-Statistic	Prob.*		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.453449	0.5513	Augmented Dickey-Fuller test statistic	-6.84702	0.0000

At 5 percent level of significance, this time series data is non-stationary at level, but stationary after first difference

Table 5: LN Money Supply (MS)

Null Hypothesis: LNMS has a unit root			Null Hypothesis: D(LNMS) has a unit root		
	t-Statistic	Prob.*		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.154881	0.0270	Augmented Dickey-Fuller test statistic	-12.0357	0.0001

At 5 percent level of significance, this time series data is stationary at level and also stationary after first difference.

V.2 Johansen Cointegration Test

In Johansen cointegration test the researcher has tried to see whether there exist any long run relationships among the variables. If there is any long run relationship among variables then it is suggested to conduct VECM and if there is no such type of relation, unrestricted VAR model is suggested. Here the lag selection criteria suggest taking 6 as maximum lag. The null and alternative hypothesis is given below:

H_o*: Series are not cointegrated in long run.*
H_1*: Series are cointegrated in long run.*

Table 6: Johansen Co-integration Test

Sample (adjusted): 2012M06 2018M06
Included observations: 72 after adjustments
Trend assumption: Linear deterministic trend
Series: LNDSEI LNCPI LNDIR LNMS LNER
Lags interval (in first differences): 1 to 6

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.513922	118.1966	69.81889	0.0000
At most 1 *	0.419119	70.58517	47.85613	0.0001
At most 2 *	0.259032	34.73334	29.79707	0.0125
At most 3	0.178054	14.94667	15.49471	0.0603

At most 4	0.029927	2.005312	3.841466	0.1567

Trace test indicates 3 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.513922	47.61144	33.87687	0.0007
At most 1 *	0.419119	35.85183	27.58434	0.0035
At most 2	0.259032	19.78667	21.13162	0.0762
At most 3	0.178054	12.94136	14.26460	0.0800
At most 4	0.029927	2.005312	3.841466	0.1567

Max-eigenvalue test indicates 2 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

We have two tests namely trace statistic and maximum Eigenvalue test. Here the hypothesis “none” indicates that there is no cointegration among the variables. The hypothesis “at most 1” indicates that there is cointegration among variables, or there is one cointegrating equation in the model. According to trace statistic test, the “none” hypothesis suggest that there is no cointegration among variables since trace statistic value (118.1966) is higher than critical value (69.81889) and there are three co integrating equations at 5% level of significance. So the decision according to the trace statistic value is that the variables are co integrated and there are three cointegrated equations to correct the error.

The maximum Eigenvalue test indicates that the variables are cointegrated and there exist two cointegrating equations to correct the error at 5% level of significance. So the two results show that all the variables are cointegrated in the long run. Now we should conduct the VECM.

V.3 Vector Error Correction Model (VECM) test

From the previous calculation, (Johansen Cointegration Test) it has seen that all the variables are cointegrated in the long run. So now the Victor Error Correction Model shall be developing to see both the long run as well as short run dynamic relationship among the variables. Here the author’s target is to find out whether the four independent variables (i.e CPI, IR, ER & MS) can affect DSE index in the long run. Here the researcher has used 6 as maximum lag because the lag selection criteria suggest using this value as maximum lag.

Table 7: Vector Error Correction Model (VECM)

Vector Error Correction Estimates
Date: 08/07/2020 Time: 04:54
Sample (adjusted): 2012M06 2018M06
Included observations: 72 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
LNDSEI(-1)	1.000000	0.000000
LNCPI(-1)	0.000000	1.000000
LNDIR(-1)	0.523408	0.017124
	(0.21814)	(0.01094)
	[2.39943]	[1.56547]
LNER(-1)	1.177399	-0.036457
	(0.82760)	(0.04150)
	[1.42266]	[-0.87850]

LNMS(-1)	-0.024434	-0.450705			
	(0.17933)	(0.00899)			
	[-0.13625]	[-50.1213]			
C	-14.08366	8.542052			
Error Correction:	D(LNDSEI)	D(LNCPI)	D(LNDIR)	D(LNER)	D(LNMS)
CointEq1	-0.481822	0.008982	0.108629	0.029252	-0.005094
	(0.11019)	(0.01074)	(0.06640)	(0.01922)	(0.01343)
	[-4.37259]	[0.83629]	[1.63592]	[1.52162]	[-0.37927]
CointEq2	-2.558128	-0.695234	1.447622	0.544059	-0.444767
	(1.84664)	(0.17999)	(1.11279)	(0.32217)	(0.22509)
	[-1.38529]	[-3.86272]	[1.30089]	[1.68873]	[-1.97594]
D(LNDSEI(-1))	0.045412	-0.019743	0.024996	-0.008787	0.002536
	(0.13858)	(0.01351)	(0.08351)	(0.02418)	(0.01689)
	[0.32768]	[-1.46165]	[0.29931]	[-0.36342]	[0.15013]
D(LNDSEI(-2))	0.125343	-0.012566	0.028735	0.003512	-0.009865
	(0.11908)	(0.01161)	(0.07176)	(0.02077)	(0.01451)
	[1.05261]	[-1.08274]	[0.40044]	[0.16907]	[-0.67966]
D(LNDSEI(-3))	-0.161596	0.005381	0.156237	-0.008781	-0.006724
	(0.12021)	(0.01172)	(0.07244)	(0.02097)	(0.01465)
	[-1.34426]	[0.45923]	[2.15676]	[-0.41868]	[-0.45890]
D(LNDSEI(-4))	-0.090982	0.004681	-0.117490	-0.027782	0.010126
	(0.11182)	(0.01090)	(0.06738)	(0.01951)	(0.01363)
	[-0.81368]	[0.42948]	[-1.74368]	[-1.42415]	[0.74293]
D(LNDSEI(-5))	-0.027927	-0.006508	0.191364	0.029971	0.032736
	(0.11638)	(0.01134)	(0.07013)	(0.02030)	(0.01419)
	[-0.23997]	[-0.57379]	[2.72874]	[1.47615]	[2.30775]
D(LNDSEI(-6))	0.082409	-0.009036	0.082960	0.040060	-0.000435
	(0.11618)	(0.01132)	(0.07001)	(0.02027)	(0.01416)
	[0.70935]	[-0.79805]	[1.18502]	[1.97648]	[-0.03073]
D(LNCPI(-1))	1.733971	0.432825	-0.726845	-0.704022	-0.271048
	(1.81711)	(0.17711)	(1.09500)	(0.31702)	(0.22149)
	[0.95425]	[2.44386]	[-0.66379]	[-2.22077]	[-1.22374]
D(LNCPI(-2))	-0.123703	0.483490	-0.461642	-0.203701	-0.028448
	(2.05672)	(0.20046)	(1.23939)	(0.35882)	(0.25070)
	[-0.06015]	[2.41189]	[-0.37247]	[-0.56770]	[-0.11347]
D(LNCPI(-3))	2.199433	0.098287	0.808476	-0.552956	0.163793
	(1.71709)	(0.16736)	(1.03473)	(0.29957)	(0.20930)
	[1.28091]	[0.58728]	[0.78134]	[-1.84585]	[0.78258]
D(LNCPI(-4))	1.390423	0.148128	-0.471562	0.220425	0.105547
	(1.78536)	(0.17401)	(1.07587)	(0.31148)	(0.21762)
	[0.77879]	[0.85125]	[-0.43831]	[0.70768]	[0.48500]
D(LNCPI(-5))	1.751624	0.180587	0.420997	-0.147357	-0.184773
	(1.71539)	(0.16719)	(1.03370)	(0.29927)	(0.20909)
	[1.02112]	[1.08011]	[0.40727]	[-0.49238]	[-0.88369]
D(LNCPI(-6))	-0.862856	0.355946	-1.113873	-0.460147	0.046883

	(1.59684)	(0.15564)	(0.96227)	(0.27859)	(0.19464)
	[-0.54035]	[2.28700]	[-1.15755]	[-1.65170]	[0.24087]
D(LNDIR(-1))	-0.908357	-0.027706	-0.065108	-0.019653	-0.005318
	(0.30993)	(0.03021)	(0.18677)	(0.05407)	(0.03778)
	[-2.93082]	[-0.91719]	[-0.34861]	[-0.36346]	[-0.14076]
D(LNDIR(-2))	0.421443	-0.060576	0.168570	-0.012589	0.007520
	(0.30140)	(0.02938)	(0.18162)	(0.05258)	(0.03674)
	[1.39830]	[-2.06211]	[0.92813]	[-0.23941]	[0.20468]
D(LNDIR(-3))	0.650607	-0.013497	0.221766	-0.022256	0.001616
	(0.27737)	(0.02703)	(0.16715)	(0.04839)	(0.03381)
	[2.34561]	[-0.49925]	[1.32678]	[-0.45991]	[0.04779]
D(LNDIR(-4))	0.096542	0.017788	0.083557	-0.048955	0.042234
	(0.29283)	(0.02854)	(0.17646)	(0.05109)	(0.03569)
	[0.32968]	[0.62323]	[0.47351]	[-0.95825]	[1.18322]
D(LNDIR(-5))	0.041194	0.003762	-0.212788	-0.085473	0.054752
	(0.28138)	(0.02742)	(0.16956)	(0.04909)	(0.03430)
	[0.14640]	[0.13717]	[-1.25495]	[-1.74115]	[1.59637]
D(LNDIR(-6))	0.623155	-0.003363	-0.172709	0.049205	0.079960
	(0.27674)	(0.02697)	(0.16676)	(0.04828)	(0.03373)
	[2.25181]	[-0.12469]	[-1.03566]	[1.01915]	[2.37045]
D(LNER(-1))	-0.088593	0.182203	0.485586	0.176574	0.216357
	(0.95859)	(0.09343)	(0.57765)	(0.16724)	(0.11685)
	[-0.09242]	[1.95014]	[0.84062]	[1.05582]	[1.85165]
D(LNER(-2))	2.124964	-0.041075	-0.239683	-0.221797	0.017571
	(0.97052)	(0.09459)	(0.58484)	(0.16932)	(0.11830)
	[2.18952]	[-0.43423]	[-0.40983]	[-1.30994]	[0.14853]
D(LNER(-3))	1.888559	0.163838	1.082697	0.293108	0.277963
	(1.03945)	(0.10131)	(0.62638)	(0.18134)	(0.12670)
	[1.81689]	[1.61718]	[1.72851]	[1.61630]	[2.19386]
D(LNER(-4))	1.756735	0.028552	-1.584077	-0.251282	-0.249666
	(1.15192)	(0.11227)	(0.69416)	(0.20097)	(0.14041)
	[1.52504]	[0.25430]	[-2.28202]	[-1.25036]	[-1.77811]
D(LNER(-5))	0.138584	0.082352	-0.319824	-0.045403	0.154740
	(1.24329)	(0.12118)	(0.74921)	(0.21691)	(0.15155)
	[0.11147]	[0.67959]	[-0.42688]	[-0.20932]	[1.02107]
D(LNER(-6))	-0.313840	-0.139604	0.170053	0.006601	-0.103775
	(0.99763)	(0.09724)	(0.60118)	(0.17405)	(0.12160)
	[-0.31459]	[-1.43573]	[0.28287]	[0.03792]	[-0.85339]
D(LNMS(-1))	-0.230205	-0.026765	1.561292	0.433227	-0.723310
	(1.61825)	(0.15773)	(0.97517)	(0.28232)	(0.19725)
	[-0.14226]	[-0.16969]	[1.60105]	[1.53450]	[-3.66693]
D(LNMS(-2))	0.192262	-0.093634	1.475637	0.107386	-0.167556
	(1.58785)	(0.15476)	(0.95685)	(0.27702)	(0.19355)
	[0.12108]	[-0.60502]	[1.54219]	[0.38765]	[-0.86571]
D(LNMS(-3))	1.537300	0.088558	0.101006	0.295759	0.140508
	(1.37314)	(0.13383)	(0.82746)	(0.23956)	(0.16737)

	[1.11955]	[0.66170]	[0.12207]	[1.23459]	[0.83948]
D(LNMS(-4))	0.438216	0.124470	-0.621460	0.493037	0.037462
	(1.38547)	(0.13504)	(0.83489)	(0.24171)	(0.16888)
	[0.31629]	[0.92175]	[-0.74436]	[2.03976]	[0.22183]
D(LNMS(-5))	1.512833	-0.086141	-0.989548	0.121252	0.054289
	(1.40581)	(0.13702)	(0.84715)	(0.24526)	(0.17136)
	[1.07613]	[-0.62868]	[-1.16809]	[0.49437]	[0.31682]
D(LNMS(-6))	1.430827	-0.042454	-0.729514	-0.052676	0.172364
	(1.22139)	(0.11904)	(0.73602)	(0.21309)	(0.14888)
	[1.17147]	[-0.35662]	[-0.99116]	[-0.24720]	[1.15775]
C	-0.112791	-0.004159	0.000761	-0.005863	0.019415
	(0.04976)	(0.00485)	(0.02998)	(0.00868)	(0.00607)
	[-2.26681]	[-0.85753]	[0.02538]	[-0.67534]	[3.20118]
R-squared	0.764257	0.754091	0.647473	0.573249	0.713377
Adj. R-squared	0.535658	0.515634	0.305629	0.159430	0.435441
Sum sq. resids	0.112114	0.001065	0.040712	0.003412	0.001666
S.E. equation	0.058287	0.005681	0.035124	0.010169	0.007105
Log likelihood	116.8205	270.4848	150.2490	232.0594	255.7252
Akaike AIC	-2.540016	-7.196508	-3.552999	-6.032103	-6.749249
Schwarz SC	-1.445189	-6.101680	-2.458172	-4.937276	-5.654422
Mean dependent	0.000158	0.005649	0.002889	0.001742	0.013264
S.D. dependent	0.085537	0.008163	0.042151	0.011091	0.009456
F-statistic	3.343224	3.162378	1.894058	1.385265	2.566688
Prob. (F-statistic)	0.000435				

Determinant resid covariance (dof adj.)	4.51E-19
Determinant resid covariance	1.41E-20
Log likelihood	1040.110
Akaike information criterion	-26.21546
Schwarz criterion	-20.40956

From the above table it can be seen the data automatically has been converted into first difference. Here only the value of 2nd column that is dependent variable (LNDSEI) should be considered. The value within the 1st bracket show the value of standard error, the 3nd bracket show the value of t-statistic and C represents the constant term.

Here the R-square is .764257. It means that all of the independent variables can explain 76.43% percent of the total variations of the dependent variable. It is a good sign of the model.

Again, the p-value of F-statistic is less than 5% hence the null hypothesis can be rejected that indicates that there exist combined significant relationship among variables.

V.4 OLS regression analysis.

By using this model the researcher has tried to find the long run and short run dynamic relationship between the dependent and independent variables.

Table: 8 Regression Model

Dependent Variable: D(LNDSEI)
Method: Least Squares
Date: 09/07/2020 Time: 05:11
Sample (adjusted): 2012M06 2018 M06
Included observations: 72 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.481822	0.110191	-4.372589	0.0001
C(2)	-2.558128	1.846637	-1.385290	0.1753

C(3)	0.045412	0.138585	0.327682	0.7452
C(4)	0.125343	0.119078	1.052608	0.3002
C(5)	-0.161596	0.120212	-1.344256	0.1880
C(6)	-0.090982	0.111816	-0.813679	0.4217
C(7)	-0.027927	0.116376	-0.239975	0.8118
C(8)	0.082409	0.116175	0.709353	0.4831
C(9)	1.733971	1.817107	0.954248	0.3469
C(10)	-0.123703	2.056721	-0.060146	0.9524
C(11)	2.199433	1.717086	1.280910	0.2092
C(12)	1.390423	1.785356	0.778793	0.4417
C(13)	1.751624	1.715389	1.021124	0.3146
C(14)	-0.862856	1.596843	-0.540351	0.5926
C(15)	-0.908357	0.309932	-2.930822	0.0061
C(16)	0.421443	0.301396	1.398304	0.1713
C(17)	0.650607	0.277372	2.345608	0.0252
C(18)	0.096542	0.292831	0.329685	0.7437
C(19)	0.041194	0.281376	0.146402	0.8845
C(20)	0.623155	0.276736	2.251807	0.0311
C(21)	-0.088593	0.958592	-0.092420	0.9269
C(22)	2.124964	0.970516	2.189521	0.0357
C(23)	1.888559	1.039447	1.816889	0.0783
C(24)	1.756735	1.151924	1.525044	0.1368
C(25)	0.138584	1.243289	0.111466	0.9119
C(26)	-0.313840	0.997630	-0.314586	0.7551
C(27)	-0.230205	1.618248	-0.142255	0.8877
C(28)	0.192262	1.587845	0.121084	0.9044
C(29)	1.537300	1.373135	1.119555	0.2710
C(30)	0.438216	1.385467	0.316295	0.7538
C(31)	1.512833	1.405815	1.076125	0.2897
C(32)	1.430827	1.221390	1.171474	0.2498
C(33)	-0.112791	0.049758	-2.266812	0.0301

R-squared	0.764257	Mean dependent var	0.000158
Adjusted R-squared	0.535658	S.D. dependent var	0.085537
S.E. of regression	0.058287	Akaike info criterion	-2.540016
Sum squared resid	0.112114	Schwarz criterion	-1.445189
Log likelihood	116.8205	Hannan-Quinn criter.	-2.107398
F-statistic	3.343224	Durbin-Watson stat	2.055425
Prob(F-statistic)	0.000435		

From the table above it can be concluded that C (1) and C (2) shows the long run relationship. They are also called the coefficient of co integration model. The others except these two shows short run dynamic relationship among variables. They are the coefficient of particular independent variables in the model. Here C (33) is the constant term. Here the first correction model, that is C(1) has negative coefficient which is -0.481822. The negative sign of that the error correction coefficient indicates the speed of adjustment toward equilibrium. So here in the model the speed of adjustment is 0.481822 or 48.18% and it is quite first.

Again its p-value is less than 5% which is .0001 hence it can be said that it is statistically significant meaning that there exists significant relationship among the variables. So the researcher should be happy about the model.

The second model, that is C(2) has no statistically significant relation since the p -value is more than 5%. From the above table it can also be seen that only 4 coefficients (i.e. C(15), C(17),C(20), & C(22) have statistically significant relationship with the dependent variables and the others has no significant relation.

Again here the R-square is .7643 or 76.43% which is more than 60%. So it is a good sign for this model. It indicates that the four independent variables can explain about 76.43% variability of dependent variable i.e. DSE Index. But the adjusted R-square is below 60% which is not a good sign at all.

T-statistic shows the individual effect of independent variables on dependent variables. Here the table also shows that among 33 coefficients, only one C(1) is statistically significant in the long run and only four coefficient (i.e. C(15), C(17),C(20), & C(22))is statistically significant in the short run. It is not a good sign.

Because it is known that at least 50% of the independent variables should be statistically significant with dependent variable.

F-statistic shows the combined effect of independent variables on dependent variables. Here from the table it is seen that even if the variable's individual performance is not so good there combined effect is much better. Because the p-value of F-statistic is less than 5% that indicates the variables have combined significant relationship among variables.

Now, to check out the viability of the model it is necessary to conduct some diagnostic test in the following way.

V.5 Residual diagnostic test

V.5.1. Serial correlations LM test

At first serial correlation LM test will be conducted to see whether there is any autocorrelation between the variables. The presence of serial correlation is examined by Breusch-Godfrey Serial Correlation LM Test. Residuals for OLS output is tested for serial correlation, using the following hypothesis:

H_o*: There is no auto-correlation among the variables.*
H_1*: There is auto-correlation among the variables.*

Table 9: Breusch-Godfrey Serial Correlation LM Test

F-statistic	*0.121986*	*Prob. F(2,31)*	*0.8856*
*Obs*R-squared*	*0.515367*	*Prob. Chi-Square(2)*	*0.7728*

Here the p-value is 77.28% which is more than critical value, 5%.So the author cannot reject the null hypothesis indicating no existence of autocorrelation. Or it can be said that the data are not serially correlated. This is obviously a good sign for this model.

V.5.2. Heteroskedasticity test

In any regression model Heteroskedasticity is not desirable. The reason behind the statement is that if a regression model includes Heteroskedastic data, it will represent spurious regression model. So homoscedasticity of data is so important. Now the researcher should conduct the required test to confirm the robustness of the OLS output. The hypotheses are:

H_o*: Data has no heteroscedasticity*
H_1*: Data has heteroscedasticity.*

Table 10: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	*0.652200*	*Prob. F(35,30)*	*0.8881*
*Obs*R-squared*	*28.51917*	*Prob. Chi-Square(35)*	*0.7725*
Scaled explained SS	*10.86401*	*Prob. Chi-Square(35)*	*1.0000*

Table 10 summarizes the Eviews output from the Heteroscedasticity test. At 5% level of significance, the null hypothesis can't be rejected. Hence it can conclude that there is no heteroscedasticity problem in the model indicating that the variables are homoscedastic. This is desirable for a regression model to be a good one.

V.5.3. Normality test

Normality test has been conducted here to see whether the residuals are normally distributed because for a valid regression model, the normality among the residuals is required. The null and alternative hypotheses are:

H_o*: Residuals are normally distributed.*
H_1*: Residuals are not normally distributed.*

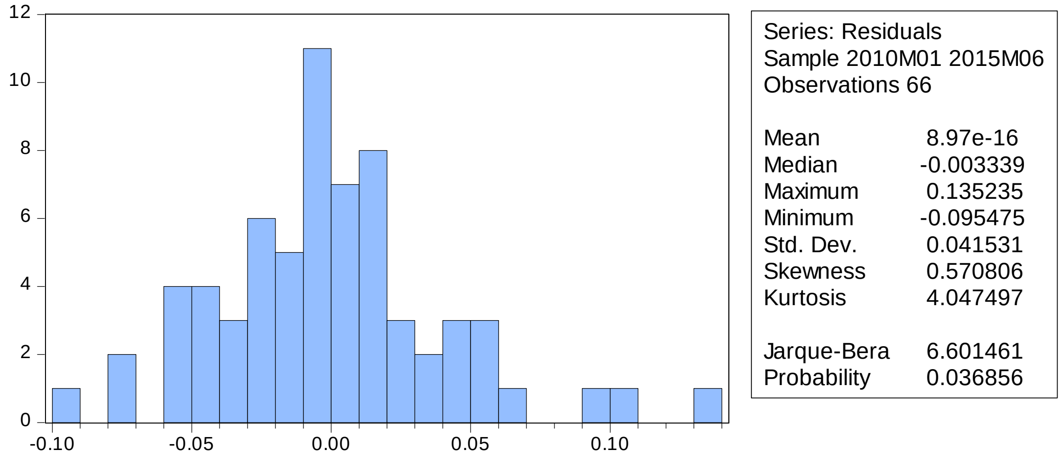

Fig 1: Normality test.

From the above chart and table it can be concluded that the p-value is 3.68% which is less than critical value, 5%. So the author now can reject the null hypothesis which indicates that the residuals are not normally distributed. This is not desirable for a regression model.

VI. Conclusion

The objective of the current study is to find out the relationship between four macro-economic variables namely Consumer Price Index (CPI), Interest Rate (IR), Exchange Rate (ER) and Money Supply (MS) as well as DSE General Index. For the analysis purpose the researcher has used monthly data from June 2012 to June 2018. The data has been gathered from Bangladesh bank and Dhaka Stock Exchange's monthly economic trends. A number of models have been used to find out the target result.

Augmented Dickey-Fuller (ADF) test has been conducted first to check out whether the data are stationary at level because if it contains non-stationary data, it will result spurious regression between unrelated variables. The result shows the only one variable (i.e. Money Supply) contains stationary data at 5% level of significance and the other three have non-stationary data at level but stationary after first difference.

According to the decision of The VECM and Johansen Co integration Test statistics, the variables are co integrated and have combined significant relationship in the long run. The deposit interest rate and stock prices are negatively related to each other whereas money supply has positive impact on stock. The study also shows that the individual effect of independent variables on dependent variables is not so satisfactory but there combined effect is much better.

VECM further referred that around 48.1822% of the disequilibrium in the long-run model is corrected every month as DSE General Index reverts back to its equilibrium. It is also notable that the DSE General Index and macroeconomic variables were insignificant at most lags in the VECM specification for DSE General Index in the short run.

When conducting diagnostic test, Serial correlations LM test shows that data are not serially correlated and heteroskedasticity test results that there is no heteroskedastic problem meaning that the variables are homoscedastic in nature. It is obviously a good sign for a model although normality test shows that the data are not normally distributed.

However, the author suggests further research on the topics that should include some other important macroeconomic variables that are commonly used in research to explain changes in stock prices but have been excluded from the present study namely Industrial Production, and Foreign Exchange Reserves. They are important economic indicators and may significantly influence the stock prices. The exclusion of the Industrial Production was due to the lack of consistent data for the study period. However, the Foreign Exchange Reserves variable was negative and insignificant when included in the regression model and there was not previous research to attest to this finding of negative relationship between foreign exchange reserves and stock prices. Based on that, foreign exchange reserves variable was excluded from the model and its exclusion did not affect the regression and the residual diagnostic testing results.

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