STOCK MARKET INDICATORS AND ECONOMIC GROWTH: A CAUSALITY TEST FOR NIGERIA

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Abstract

The empirical relationship between stock market indicators and economic growth was tested in this paper by employing the Granger-causality test, co-integration test and vector Auto Regression analysis in the series used. It was found that causality runs from value of transaction to output and there is bi-directional causality between total market capitalisation and output. The result of the co-integration revealed two (2) co-integration equations. This suggests that there is long-run relationship among the variables. The VAR result equally, suggests close relationship between the stock market indicators and economic growth in Nigeria. It shows that stock market positively and significantly influences economic growth in Nigeria. The results suggest effective co-ordination of legal, regulatory and administrative systems of the stock market. The findings, equally suggest efficient and effective co-ordination of monetary and fiscal policies that encourage investors confidence and stock liquidity.

Key words: Stock market, Stock liquidity, Economic growth, Stock indicators

1.0 Introduction

Many profitable investments require a long-term commitment of capital. Stock markets usually offer such opportunities to investors seeking capital for investment. Stock markets may affect economic activity through the creation of liquidity. Liquid equity markets make investment less risky and more attractive because they allow savers to acquire an asset (equity) and to sell it quickly and cheaply if they need access to their savings or want to alter their portfolios (Levine, 1996). At the same time, companies enjoy permanent access to capital raised through equity issues. By facilitating longer-term, more profitable investment, liquid markets improve the allocation of capital and enhance prospects for long-term economic growth. Stock markets are expected to increase economic growth by increasing the liquidity of financial assets, make global and domestic risk diversification possible, promote wiser investment decisions, and influence corporate governance that is,

solving institutional problems by increasing share holders' interest value (Osei, 2005). Equally, stock markets are best indicator to forecast future economic activity and describe actual causal effect between future economic growth and stock prices.

Furthermore, stock markets play an important role in allocation of capital to corporate sector that, in turn, stimulate real economic activity (Shahbaz, 2008).

Finance could be regarded as the life-wire of any economy as blood is the life wire of human being. For this, financial sector growth and development cannot be over-looked in economic growth and development of any economy. Stock markets as part of financial sector and as engine that facilitates the allocation and re-allocation of capital to corporate sector need to be investigated upon. Therefore, this study sets out to determine the direction of causal relationship between stock market indicators and economic growth. To achieve this objective, this study is organised as follows sections 2 reviews the related literature; section 3 describes data set and methodology; section 4 presents and interpret the estimated results; and finally, section 5 provides conclusions and policy implications.

Literature Review

Stock markets may affect economic activity through the creation of liquidity, many profitable investments require a long-term commitment of capital, but investors are often reluctant to relinquish control of their savings for long periods. Liquid equity markets make investment less risky, and more attractive because they allow savers to acquire asset, i.e, equity, and to sell it quickly and cheaply if they need access to their savings or want to alter their portfolios (Levine, 1996:7). Stock markets offer opportunities primarily for trading risk and boosting liquidity. The liquidity theorists, stiglitz & Weiss, (1981); Cho, (1986); Mirakhor & Villanueva, (1990); Benchivenga, (1991); Levine (1996); Levine & Zervos (1998); Zingales, (1998); Mishkin, (2001); Caporale et al, (2004); and Osei(2005), believe that stock markets could increase economic growth by increasing the liquidity of financial assets, make global and domestic risk diversification possible, promote wiser investment decisions and influence corporate governance. They also, argue that efficient stock markets provide guidelines as a means to keep appropriate monetary policy through the issuance and repurchase of government securities in the liquid market, which is an important step towards financial liberalisation. Similarly, well-organised and active stock markets could modify the pattern of demand for money, and would help create liquidity that eventually enhances economic growth. They argue that more liquid markets can create long-term investment and hence economic growth through lower transaction cost. Also, they remarked that stock markets liquidity positively predicts aggregate economic growth.

Stock markets can affect economic growth when they are internationally integrated. This enables greater risk-sharing. Because high return projects also tend to be comparatively risky. Stock market that facilitates risk diversification encourages shift of higher return projects (Obstfeld, 1994). The resultant effect is a boost in the economy, leading to growth through the shifting of the society's savings to higher return investments. Donwa and Odia (2010), argue that capital market is very vital to the growth, development and strength of any economy, because it supports government and corporate initiatives, finances the exploitation

of new ideas and facilitates the management of financial risk. Edo (1995), asserts that securities investment is a veritable medium of transforming savings into economic growth and development and a notable feature of economic growths in Nigeria since independence is the expansion of the trading in stock and shares. The proponents of positive relationship between stock market development and economic growth hinged their arguments on the fact that the stock market aids economic growth and development through the mobilisation and allocation of savings, risk diversification, liquidity creating ability and corporate improvement, among others.

Some analysts, that is, traditional growth theorists, argue that very liquid markets encourage investor myopia. Because liquid markets make stock easy for dissatisfied investors to sell quickly. Liquid markets may weaken investors' commitment and reduce investors' incentives to exert corporate control by overseeing managers and monitoring firm performance and potential. According to this view, enhanced stock market liquidity may actually hurt economic growth (Bhide, 1993; Comincioli, 1996; Singh, 1997; and Singh & Weiss, 1999).

Bahadur & Neupane (2006), suggests that stock markets fluctuations predicted the future growth of an economy and causality is found only in real variable. More specifically, the causality runs from market capitalisations to economic growth with significant feedback. Luintel & Khan (1999), found a bi-directional causality between financial development and economic growth. Similarly, Filer et al (1999); and Tuncer & Alovsat (2001), examined stock market-growth nexus and found positive causal correlation between stock market development and economic activity: Chen et al (2004), found that there is the nexus between stock returns and output growth and the rate of stock returns is a leading indicator of output growth. Also, Siliverstovs & Duong (2006), revealed that the accounting for expectations have represented by the economic sentiment indicator in which stock market has certain predictive content for the real economic activity. Shahbaz et al (2008), in their study; on "stock market development and economic growth: Ardl causality in Pakistan", investigates whether there is a relationship between stock market development and economic growth. They found out that there exists a very strong relationship between stock market development and economic growth in the long-run. Their study equally, suggests a bi-directional causality between stock market development and economic growth in the long-run but shows a one-way causality from stock market development to economic growth in the short-run.

Empirically, there have been conflicting reports on the relationship between stock markets and economic growth and development in Nigeria. Akinbohungbe (1996), Adebiyi,(2005); and Sule & Momoh (2009), argue that stock markets contribute to economic growth and development in Nigeria. While Nyong (1997), found that the capital market development is negatively and significantly correlated with the long-run growth in Nigeria. Similarly, Ariyo & Adelegan (2005); Ewan et al (2009); and Donwa & Odia (2010) found that stock markets have not contributed meaningfully to the economic growth in Nigeria.

The causal relationship between stock markets indicators and economic growth in Nigeria has not been established. This study sets out to employ some stock market indicators and determine the direction of their causal relationship to economic growth in Nigeria.

Econometric Methodology

(a) Model Specification

This paper uses a vector Auto regressive (VAR) and Granger causality test to identify the relationship between stock market indicators and economic growth in Nigeria. Based upon the review of literature in the previous section, the stock market indicators-economic growth hypothesis is tested according three variables which are built upon the following augmented function:

$GDP_t = f(TMC_t, VOT_t)$ ..... (1)

Where:

GDP_t = Economic Growth (proxy GDP)

TMC_t = Total Market Capitalisation

VOT_t = Value of Transaction.

In a more explicit and econometric form, equation (1) can be stated as

$GDP_t = \quad _o \quad _1 TMC_t \quad _2 VOT_t \quad _t$ .....(2)

$_t$ is the stochastic random term.

(b) Unit Root Test

We employed the Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test to check whether each data series is integrated and has a unit root. The ADF test is based on the following regressions.

$$Y_t \quad _0 \quad _1 Y_{it\ 1} \quad \sum_{i\ 1}^{n} \quad _1 \ Y_{it\ 1} \quad e_t \qquad (3)$$

$$Y_t \quad _0 \quad _1 Y_{it\ 1} \quad \sum_{i\ 1}^{n} \quad _1 \ Y_{it\ 1} \quad _1 \quad e_t \qquad (4)$$

Where:

Y_t is a time series; t is a linear time trend, is the first difference operator, $_0$ is a constant, n is the optimum number of lags on the dependent variable and ℓ is the random error term. The difference between equation (5) and (6) is that the first equation includes just drift. However, the second equation includes both drift and linear time trend. This study also employs the Phillips-Perron test due to Phillips (1987) and Phillips and Perron (1988), since the possibility of the presence of structural breaks makes the ADF test unreliable for testing stationarity. The presence of a structural break will tend to bias the ADF test towards non-rejection of the null hypothesis of a unit root. The regression equation for the PP test is given by $Y_t \qquad bY_{t\ 1} \quad \ell_t \qquad (5)$

(c) VAR Co-integration Test

The result of the integration test was pursued by co-integration tests. The existence of long-run equilibrium (stationary) relationships among economic variables is referred to in the literature as co-integration. The Johansen procedure was employed to examine the question of co-integration. It provides not only an estimation methodology but also explicit procedures for testing for the number of co-integrating vectors as well as for restrictions

suggested by economic theory in a multivariate setting. Engel and Granger (1987) pointed out that a linear combination of two or more non-stationary variables may be stationary if such a stationary combination exists. If such a stationary combination exists then the non-stationary time series are said to be co-integrated. The VAR based co-integration test using the methodology developed in Johansen (1991, 1995) was employed. Johansen's methodology takes its starting point in the vector Auto Regressive (VAR) of order P given by

$$Y_t \quad {}_tY_{t\ 1} \quad PY_{t\ p} \quad \ell_t \qquad (6)$$

Where:

Y_t is an n x 1 vector of variables that are integrated of order commonly denoted (1) and ℓ_t is an nx1 vector of innovations.

This VAR can be rewritten as

$$Y_t \quad y_{t\ 1} \quad \sum_{i\ 1}^{p\ 1} {}_i\ y_{t\ 1} \quad {}_t \qquad (7)$$

where

$$\sum_{i\ 1}^{p} A_{i\ 1} and\ {}_i \quad \sum_{j\ i\ 1}^{p} Aj$$

(d) VAR and Granger-Causality Test

Granger causality test was conducted to determine whether the current and lagged values of one variable affect another. One implication of Granger representation theorem is that if two variables, say Y_t and X_t are co-integrated and each is individually 1(1), then either X_t must Granger-cause Y_t or Y_t must Granger-cause X_t. This causality of co-integrated variables is captured in Vector Error Correction Model (VECM). In a VECM long and short-run parameters are separated. In the present study linear combinations of non-stationary variables some were found stationary, that is, some of the variables are co-integrated. In the presence of co-integration the restricted VAR in first difference is estimated, which take the following form:

$$Y_t \quad \sum_{i\ 1}^{n} b_{1t}\ \ Y_{t\ 1} \quad \sum_{i\ 1}^{n} c_{1t}\ \ X_{t\ 1} \quad \sum_{i\ 1}^{n} d_{1t}\ \ Z_{t\ 1} \quad e_{1t}$$

$$X_t \quad \sum_{i\ 1}^{n} b_{2t}\ \ Y_{t\ 1} \quad \sum_{i\ 1}^{n} c_{2t}\ \ X_{t\ 1} \quad \sum_{i\ 1}^{n} d_{2t}\ \ Z_{t\ 1} \quad e_{2t}$$

$$Z_t \quad \sum_{i\ 1}^{n} b_{3t}\ \ Y_{t\ 1} \quad \sum_{i\ 1}^{n} c_{3t}\ \ X_{t\ 1} \quad \sum_{i\ 1}^{n} d_{3t}\ \ Z_{t\ 1} \quad e_{3t}$$

Where is the first difference operator, e_{1t}, e_{2t} and e_{3t} are random disturbances and n is the number of the optimum lag length, which is determined empirically by Schwarz criterion (SC). For each equation in the above VAR, Wald ^{2} statistic is used to test the joint significance of each of the other lagged endogenous variables in that equation. For Y_t to be unaffected by X_t and Z_t, c_{1t} and d_{1t} respectively must not be significantly different from zero. Similar logic applies to (X_t and Z_t.

Sources of Data

We used annual time series data for the period 1970 to 2009. The data were collected from the Nigerian Stock Exchange (NSE), Securities and Exchange Commission (SEC) market bulletins and Fact Books, as well as the Central Bank of Nigeria (CBN) statistical bulletins of various issues.

Empirical Analysis

(a) Unit Root Test

We employ both the Augmented Dickey-fuller (ADF) and Phillips-Perron (PP) tests to find the existence of unit root in each of the time series. The results of both the ADF and PP tests are presented in tables 4.1.1 and 4.1.2.

Table 4.1.1 Unit Root test for stationarity at levels

Variables	ADF (Intercept)	ADF (Intercept & Trend)	PP (Intercept)	PP (Intercept & Trend)	lag
GDP	0.419448 (-3.6117) (-2.9399)	-1.217043 (-4..2165) (-3.5312)	-3.804821 (-3.6067) (-2.9378)	-6.114151 (-4.2092) (-3.5279)	1
TMC	0.338523 (-3.6117) (-2.9399)	-0.642298 (-4..2165) (-3.5312)	0.04517 (-3.6067) (-2.9378)	-1.02890 (-4.2092) (-3.5279)	1
VOT	-3.627756 (-3.6117) (-2.9399)	-4.300153 (-4..2165) (-3.5312)	-3.317635 (-3.6067) (-2.9378)	-3.643940 (-4.2092) (-3.5279)	1

Note: Figures within parenthesis indicate critical values at 1% and 5% levels of significance. Mackinnon (1991) critical value for rejection of hypothesis of unit root applied.

Source: Author's Estimation using E-views package.

The result in table 4.1.1 shows that only VOT is stationary in ADF and PP with intercept and Trend at only 5% level of significance. While only the GDP is stationary in PP at both 1% and 5% levels of significance. The TMC is not stationary at both ADF and PP tests statistic at levels. This can be seen by comparing the observed values (in absolute terms) of both the ADF and PP tests statistic with the critical values in parenthesis (also in absolute terms) of the tests statistic at the 1% and 5% levels of significance. The result in table 4.1.1 provides weak evidence of non-stationarity. Therefore, the null hypothesis is rejected and we could conclude that there is partial absence of unit root in the variables at levels. Following from the above result, all the variables were differenced once and both the ADF and PP tests were conducted on them; the result is presented in table 4.1.2.

Table 4.1.1: Unit Root test for stationarity at 1st Difference

Variables	ADF (Intercept)	ADF (Intercept & Trend)	PP (Intercept)	PP (Intercept & Trend)	lag
GDP	-5.054467 (-3.6171) (-2.9422)	-5.36585 (-4.2242) (-3.5348)	-20.05947 (-3.6117) (-2.9399)	-20.70455 (-4.2165) (-3.5312)	1
TMC	-4.32650 (-3.6171) (-2.9422)	-4.94622 (-4.2242) (-3.5348)	-7.034685 (-3.6117) (-2.9399)	-7.452496 (-4.2165) (-3.5312)	1
VOT	-7.218520 (-3.6171) (-2.9422)	-7.135013 (-4.2242) -3.5348)	-5.989857 (-3.6117) (-2.9399)	-5.913061 (-4.2165) (-3.5312)	1

Note: Figures within parenthesis indicate critical values at 1% and 5% levels of significance. Mackinnon (1991) critical value for rejection of hypothesis of unit root applied.
Source: Author's Estimation using E-view package.

The above table shows that all the variables were stationary at first difference. This can be observed by comparing the computed values (in absolute terms) of both the ADF and PP tests statistic with the critical values in parenthesis (also in absolute terms) of the tests statistic at the 1% and 5% levels of significance. The result in table 4.1.2 provides strong evidence of stationarity at first difference. Therefore, the null hypothesis of non-stationarity is rejected and we can conclude that the variables are stationary. This implies that the variables are integrated of order one, i.e., 1 (1).

(b) Co-integration Test Result

Having established the stationarity of the variables at 1 (1), we proceed to examine the presence or non-presence of co-integration among the variables. When a co-integration relationship is present, it means that the variables or some of the variables share a common trend and long-run equilibrium. To find out the number of co-integrating vectors, we applied the approach of Johansen and Juselius (1990) that contains likelihood ratio test of statistic, the maximum Eigen value and the trace statistic. Empirical evidence has shown that Johansen co-integration test is a more robust test than Engel Granger (EG) in testing for co-integrating relationship. The co-integrating relationship was estimated under the assumption of linear deterministic trend. The result is shown in table 4.2.1.

Table 4.2.1 Series: GDP, TMC, VOT Lags interval: 1 to 1

Eigen value	Likelihood Ratio	5% critical value	1% critical value	Hypothesized No. of CE (s)
0.971636	206.1576	29.68	35.65	None**
0.829996	70.77735	15.41	20.04	At most 1**
0.086640	3.443770	3.76	6.65	At most 2

Note: * (**) denotes rejection of the hypothesis at 5% (1%) significance level. L.R. test indicates 2 co-integrating equation(s) at 5% significance level.
Source: Author's Estimation using E-views package

The result in table 4.2.1 indicates two (2) co-integrating equations at both 1% and 5% levels of significance, having likelihood ratio values of 206.1576 and 70.77735 higher than 35.65 and 20.04 for 1% critical value and 29.68 and 15.41 for 5% critical value respectively. Therefore, the result suggests that there is presence of co-integration or long-run relations between two of the variables so tested.

4.3 Granger Causality Test Result

Table 4.3.1 (a): Pair-wise Granger Causality test between GDP and TMC

Null hypothesis	Obs	F-statistic	Probability	Lag
TMC does not Granger cause GDP	39	12.9383	0.00096	1
GDP does not Granger cause TMC		43.4290	1.1E-07	

Source: Author's estimation using E-views package

According to the result obtained from the Granger causality test in table 4.3.1(a) Gross Domestic Product (GDP) Granger cause total market capitalisation (TMC) and TMC also Granger cause GDP. This indicates a bi-directional causality between GDP and TMC. The model was estimated using one lag for the variable. The result suggests rejection of both null hypotheses.

Table 4.3.1(b)

Null hypothesis:	Obs	F-statistic	Probability	Lag
TMC does not Granger cause GDP	38	0.69627	0.50562	2
GDP does not Granger cause TMC		38.9111	2.1E ¯09	

Source: Author's estimation using E-views package

The result in table 4.3.1(b) shows that GDP Granger cause TMC, while TMC does not Granger cause GDP in Nigeria. When the model was estimated using two lags for the variables, it indicates that causality only runs from output (GDP) to total market capitalisation. The result suggests that TMC only enters into the current account of the output, while the outputs of previous years contribute to the total market capitalisation (TMC).

Table 4.3.2 (a)

Null hypothesis:	Obs	F-statistic	Probability	Lag
VOT does not Granger cause GDP	39	16.2988	0.00027	
GDP does not Granger cause VOT		0.12766	0.72296	1

Source: Author's estimation using E-views package

The result in table 4.3.2 (a) shows that value of transaction Granger cause Gross Domestic Product. This indicates that causality runs from value of transaction to GDP, while GDP does not Granger cause VOT. The model was estimated using one lag for the variables. To further determine the direction of causality between the variables, we conducted estimation using two lags for the variables. The result is presented in table 4.3.2 (b).

Table 4.3.2 (b)

Null hypothesis:	Obs	F-statistic	Probability	Lag
VOT does not Granger cause GDP	38	31.1106	2.5E-08	1
GDP does not Granger cause VOT		1.91284	0.16368	

Source: Author's estimation using E-views package

The result in table 4.3.2 (b) confirms that value of transaction Granger cause the GDP. So, causality runs from VOT to GDP in Nigeria. It is observed from the result in tables 4.3.2 (a) and 4.3.2 (b) that F-statistic in table 4.3.2 (a) is less than F-statistic in table 4.3.2 (b). This can be seen in both tables. The result suggests that value of transaction in the stock market significantly determines or causes the output to change in Nigeria both in the current and previous years.

Table 4.3.3 (a)

Null hypothesis	Obs	F-statistic	Probability	Lag
VOT does not Granger cause TMC	39	4.42604	0.04244	1
TMC does not Granger cause VOT		0.03037	0.86263	

Source: Author's estimation using E-views package

According to the result obtained from Granger causality test as shown in table 4.3.3 (a), Value of Transaction granger cause Total Market Capitalisation while Total Market capitalisation does not granger cause Value of Transaction. This indicates that causality runs from VOT to TMC. On further estimation of the direction of causality, two lags were applied in the model and the result obtained is shown in table 4.3.3 (b).

Table 4.3.3 (b)

Null Hypothesis	Obs	F-statistic	Probability	Lag
VOT does not Granger cause TMC	38	67.3249	2.3e-12	2
TMC does not Granger cause VOT		0.19894	0.82058	

Source: Author's estimation using E-views package.

The result in table 4.3.3 (b) confirms that Value of Transaction granger Total Market Capitalisation. This indicates a close relationship between VOT and TMC as well as shows that VOT causes TMC to change in Nigeria in the current and previous years.

4.4 The result of the VAR model

We equally estimated the unrestricted VAR model with the time series data in order to further investigate the nature of the relationship between the variables. The result is presented in the following tables:

Table 4.4.1: Gross Domestic Product (GDP)

Variables	Coefficients	Std. Errors	t-statistic
GDP (-1)	-0.810334	0.31934	-2.53751
GDP (-2)	2.134262	0.51316	4.15903
TMC (-1)	-0.018681	0.01105	-1.69097
TMC (-2)	0.024153	0.01245	1.94039
VOT (-1)	50.49329	8.10613	6.22902
VOT (-2)	-40.60557	11 .9574	-3.39585

Source: Author's estimation using E-views package.

In table 4.4.1, it shows that Gross Domestic Product is positively and significantly influenced by the Value of Transaction of the previous year and the GDP of the previous two years by having t-statistic values of 6.22902 and 4.15903, respectively. While the GDP is negatively and significantly influenced by VOT of the previous two years and GDP of the previous year by having t-statistic values of -3.39585 and -2.53751 respectively.

Table 4.4.2: Total market capitalisation (TMC)

Variables	Coefficients	Std. Errors	t-statistic
GDP (-1)	57.83697	7.69053	7.52054
GDP (-2)	-53.31012	12.3582	-4.31375
TMC (-1)	1.904524	0.26604	7.15869
TMC (-2)	-1.1560535	0.29977	-5.20585
VOT (-1)	-1174.79 0	195.215	-6.01793
VOT (-2)	1888.133	287.963	6.55686

Source: Author's estimation using E-views package

In table 4.4.2, it shows that the Total Market Capitalisation is positively and significantly influenced by VOT of the previous two years, GDP of the previous year and TMC of the previous year by having t-statistic values of 6.55686, 7.52054 and 7.15869 respectively. While, the TMC is negatively and significantly influenced by VOT of the previous year, GDP of the previous two years and TMC of the previous two years by having t-statistic values of -6.01793, -4.31375 and -5.20585, respectively.

Table 4.4.3: value of transaction (VOT)

Variables	Coefficients	Std. Errors	t-statistic
GDP (-1)	0.024524	0.00593	4.13783
TMC (-1)	0.000285	0.00021	1.38871
TMC (-2)	-0.000637	0.00023	-2.75642
VOT (-1)	0.215557	0.15045	1.43278
VOT (-2)	-1.319748	0.22192	-5.94684

Source: Author's estimation using E-views package

It can be observed from table 4.4.3 that the value of transaction (VOT) is positively and significantly influenced by GDP of the previous year by having t-statistic value of 4.13783 while TMC and VOT of the previous two years negatively and significantly influence value of transaction by having t-statistic values of -2.75642 and -5.94684 respectively.

In all the VAR result reveals that there is close relationship between the stock market indicators and the output in Nigeria.

Conclusions and Policy Implications

The paper has empirically attempted to investigate the causal relationship between the stock market indicators and Economic growth in Nigeria by employing the Granger-causality tests, co-integration test and Vector Auto Regression Analysis, using annual time series data for the period 1970-2009. The Granger-causality test shows that causality runs from Value of Transaction to Gross Domestic Product and that there is bi-directional causality between Total Market Capitalisation and Gross Domestic Product, when the model was estimated using one lag for the variables.

The Johansen multivariate co-integration test indicates two (2) co-integrating equations among the variables. The result of the vector Auto Regression analysis shows that there is close relationship between the stock market indicators and output growth in Nigeria.

The findings of this paper suggest that there is need for development of stock market in Nigeria. This can be done by effective co-ordination of legal, regulatory and administrative systems of the stock market. The findings equally suggest efficient and effective co-ordination of monetary and fiscal policies that encourage stock liquidity and investors' confidence.

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