
IMPACT OF MACROECONOMIC FORCES ON STOCK MARKET LIQUIDITY: EVIDENCE FROM NIGERIA

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Abstract

Changes in macroeconomic activities affect stock market behaviour and ultimately stock market liquidity. This study aimed to investigate the impact of macroeconomic forces on stock market liquidity in Nigeria. Data was collected from the Nigerian Stock Exchange and Central Bank of Nigeria statistical bulletins from first quarter 2010 to second quarter of 2017. A dynamic model and co-integration were used to establish the long and short run connection between the regress and regressors. The results showed that macroeconomic variables significantly affect stock market liquidity. Specifically, economic growth, lending rate, market size and inflation have negative and significant influence on stock market liquidity, while exchange rate positively and significantly impact stock market liquidity. This study therefore recommends that investors should pay careful attention to macroeconomic forces and that government prevail on commercial banks to reduce interest rate on credit as this will boost activities at the exchange and enhance stock market liquidity.

Keywords: *Co-integration, Dynamic model, Economic growth, ECM, Market liquidity, Time series data.*

INTRODUCTION

Changes in macroeconomic indicators influence the activities in the financial markets. Therefore, investors desirous of better return on investment must pay careful attention to changes in macroeconomic variables (Musilek, 1997 cited in Barakat, Elgazzar & Hanafy, 2016). The notion that activities in the macro-economic environment influence stock market performance has been investigated (see Nkechukwu, Onyeagba & Okoh, 2013; Chia & Lim, 2015).

However, the effect of macroeconomic forces on stock market liquidity is currently attracting investigation. Market liquidity is the ability to transact large volume of stock with least price shock, cost and delay. It is claim that liquidity is the life-wire of stock exchanges, and it is imperative for investors, market regulators and firms listed in the various stock markets (Kumar & Misra, 2015). Macro-economic factors include Gross Domestic Product (GDP), interest rate, exchange rate, the general price level(inflation) to mention but a few. Gross Domestic Product (GDP) is the totality of market worth of goods and services turned out in an economy at a given time. A rise in GDP is considered growth and used to assess

the growth of the economy and its performance (Mbah, Okoli & Amassona, 2017). As the economy grows and becomes stable, it will engender investors' confidence and attract both local and foreign investors into the market, stimulate trading activities, and ultimately influence stock market liquidity. Obadan (2012) defined exchange rate as the price of a local currency in terms of units of foreign currency. A rise in exchange rate increases the competitiveness of domestic firms because it attracts foreign investors to the domestic market and results in a positive effect (Khahid, 2017). Inflation is the rise in general price level measure at a point in time. For financial institutions like the deposit money banks, a rise in inflation is synonymous with a decrease in deposits (less savings) and ultimately a reduction in its ability to create loans (Oshaibat, 2016). This suggests that inflation may have a negative effect on stock liquidity. Interest rate is the cost paid for borrowing funds. It is the rate at which lending institutions give out loans to credit-worthy investors or the rate at which the Central Bank lends to financial institutions (Antwi, Zhao & Mills, 2013). It can also be described as the return on investment. From a firm-level perspective, an increase in interest rate pushes up the cost of doing business and reduces earnings. As the interest rate rises, investors will prefer fixed income securities to variable income securities, and this may result in a negative effect on stock prices and, in the end, stock market liquidity (Oshaibat, 2016). Also, an upward movement of interest rate in other countries may lead to repatriation of investment in the domestic stock market, which may have a negative effect on the liquidity of the market.

With increasing combination of financial markets and execution of various market transaction policies, the connection of macroeconomic forces with the stock market liquidity is gaining attention. It has been documented that liquidity of the stock market is influenced by government actions (see Wang, Tsai and Li, 2017). Nkechukwu, Onyeagba and Okoh, (2013) investigated macroeconomic variables and stock price in Nigeria from 1980 to 2013 using cointegration and Vector Error Correction Model Tests. The study used stock index and annual data. Antwi et al (2013) explore the association of macroeconomic policies with the stock market in Ghana using VECM from 1990 to 2010. The study was carried out in Ghana and the period of investigation is between 1990 and 2010. Rasmiah, A and Rasmiah, A.M. (2016) investigated the connection between macroeconomic variables and stock liquidity in Jordan for the period January 2012 to June 2016. Again, the study was done outside Nigeria and used monthly data. Paskevicius and Norkaitis (2011) x-ray what effect macroeconomic indices have on the liquidity of Baltic capital markets using correlation techniques for the period 2004 to 2010. But the study was carried out in Baltic stock markets and the outcome may be different from that done in Nigeria.

The gaps identified in previous investigations are scope and conceptual gaps. Scope is the place, period and methods used, while conceptual gap talks of the way the variables were defined and measured. This study intends to fill the gaps by investigating the impact of macroeconomic forces on stock market liquidity in Nigeria using quarterly data for the period 2010 to 2017. This is because to the best of my knowledge, studies in this area and

within this scope at the time of this report are scarce, and if accomplished it will be useful to investors, market regulators and listed firms in the various stock markets. The main objective is to examine the impact of macroeconomic forces on stock market liquidity in Nigeria.

To accomplish the above major objective, the following hypotheses are formulated:

H₀₁: Economic growth has no significant impact on stock market liquidity in Nigeria

H₀₂: Inflation has no significant impact on stock market liquidity in Nigeria

H₀₃: Interest rate has no significant impact on stock market liquidity in Nigeria

H₀₄: Exchange rate has no significant effect on stock market liquidity in Nigeria

EMPIRICAL REVIEW AND THEORETICAL FRAMEWORK

Economic growth and stock market liquidity

Economic growth is a boost on the ability of a country to produce goods and services measure at a particular period of time. It is measured in terms of gross domestic product (GDP) (www.investopedia.com/terms/e/economicgrowth). GDP is the total market worth of goods and services turned out in an economy at a given time. It helps to assess the variations in the economy and its performance (Mbah et al, 2017). As the economy improves, GDP will rise and it is expected that the increase in business activities associated with the growth will speed up stock market activities and eventually market liquidity. However, in a period of economic downturn, sentiment may arise and there are losses of confidence in the economy, which slow down investment and activities in the stock market. Paskevicius and Norkaitis (2011) x-rayed the link macroeconomic indices has with liquidity of Baltic(Lithuanian, Latvian and Estonian) markets, using correlation technique for the period 2001 to 2010. The result revealed macroeconomic variables especially GDP significantly correlate with market liquidity. Waweru (2014) looked into the effect of macroeconomic variables on liquidity of infrastructure bonds in Kenya from 2009 to 2014 using multiple regression. The outcome of the result indicated that GDP negatively influenced bond liquidity.

Interest rate and stock market liquidity

Rising oil and gas prices have only added to geopolitical instability in the world's oil and gas-producing regions. The experience is that the more oil flow, the more oil income, then more corruption, and social conflict. In its 2008 Report on Revenue, Transparency International, TI, highlights that "high revenues from the extractive industries have often fuelled corruption, social conflicts, economic stagnation and inequality in host communities. The over-dependence of several major African nation states on oil funded economy is unhealthy. The impact of the OPEC regulated fluctuations in the global oil business, the wars and instability in most of the Middle East and Gulf States, local and international terrorism, America and China's insatiable appetite for oil, corruption and public sector collapse, drags Nigeria by the tail which adversely affect social life in Nigeria.

Corruption and Weak Institutions

The abuse of political power for private gain deprives Nigeria vital public services, which oil income could fund if properly managed. There is favoritism in government decision-making even in allocating oil blocs, an insufficiently independent judiciary, and security costs associated with high levels of crime and corruption. Oil businesses in Nigeria are associated with uncertainties stemming from weak institutions, corruption and crime, favoritism, easily influenced judiciary and a weak property rights regime. Nigeria lacks genuine credibility and convincing acceptability by majority of the people. The private sector in Nigeria as in most African countries has serious misgivings about the independence of the judiciary and the administration of justice. Legal redress in Nigeria is not expeditious and not transparent. It is expensive and such environment cannot provide veritable business atmosphere for investors and government to utilize and consolidate oil revenues. Odozi explains that Nigeria is prone to corruption arising from the pressures and opportunities associated with the huge flows of revenue.

Ailing Economy and Policies

Interest rate is the cost paid for borrowing fund. It is the rate at which lending institutions give out loans to credit worthy investors or the rate at which Central bank lend to financial institutions (Antwi, et al 2013). It can also be described as the return on investment. As interest rate rises investors will prefer fixed income security to variable income security, and this may result in negative effect. Fernandez-Amador, Gacher, Larch and George (2013) investigated the effect of monetary policy on stock market liquidity in Euro zone from 1983 to 2012 using panel and vector auto regression models, and reported that monetary policy, particularly interest rate influence stock market liquidity. Similarly, Choi and Cook (2006) empirically assessed the link between macroeconomic factors and stock market liquidity for the period 1995 to 2001 applying VAR method and find that stock market liquidity in Japan is associated with macroeconomic factors. In particular, interest rate is robustly associated with stock market liquidity. He and Nasser (2003) examined the micro and macroeconomic factors that determine bond market liquidity in Thailand using multiple regression and monthly data from 1993 to 1997 and reported that interest rate among others significantly affect market liquidity. Chordia, Sarkar and Subrahmanyam (2003) investigated stock and bond market liquidity in New York using vector autoregressive method and daily data of over 1800 days. The result indicated that unexpected change in Federal fund rate increase liquidity. Rasmiah, A and Rasmiah, A.M.(2016) investigated the connection between macroeconomic variables and stock liquidity in Jordan for the period January 2012 to June 2016. The results showed that macroeconomic variables impact stock market liquidity. Specifically, time deposit interest rate negatively influenced liquidity ratios. Oshaibat (2016) inquired into the connection between inflation, interest rate and stock market behaviour in Jordan from 1980 to 2014 and reported negative effect of interest rate on stock liquidity. Chordia, Sarkar and Subrahmanyam (2001) examined common determinant of market liquidity in US using monthly data from June 1991 to Dec 1998. The

vector autoregression estimation result revealed that previous (lagged) interest rate influenced liquidity (changed in volume).

Inflation and Stock Market Liquidity

Inflation is the rise in general price level measure at a point in time. For financial institution like the deposit money banks, rise in inflation is synonymous with decrease in deposits (less savings) and ultimately reduction in its ability to grant loans. This means reduction in earnings, which may reduce stock performance of deposit institutions in the stock market. However, from non-bank organization perspective, inflation may result in increase in earnings because of the high price of goods and service, which may boost demand for its stock at the exchange (Oshaibat, 2016). This suggests that inflation may have positive (negative) effect on stock market. Antwi et al (2013) contends that consumer price index is the appropriate tool to proxy inflation. Jepkemei (2017) studied the impact of inflation on stock market liquidity in Kenya for the period 2002 to 2011 using least squares. It was reported that inflation negatively influenced stock market liquidity. Rasmiah, A and Rasmiah, A.M.(2016) investigated the connection between macroeconomic variables and stock liquidity in Jordan for the period January 2012 to June 2016 and reported negative link between consumer price index proxy for inflation and turnover ratio surrogate for stock liquidity. Goyenko, Subrahmanyam and Ukhov (2011) examined the determinants of bond market liquidity in U.S focusing on on-the-run and off-the-run using time-series monthly data and vector autoregression from 1967 to 2005. Result revealed that macroeconomic variables such as inflation significantly determine off-the-run bond market illiquidity. Lu and Glascock (2011) inquired into the effect of macroeconomic variables on real estate investment trusts(REITS) stocks liquidity in U.S using vector autocorrelation from January 1980 to December 2009 and reported macroeconomic variables especially inflation significantly influenced the liquidity of REITS stocks.

Exchange Rate and Stock Market Liquidity

Obadan (2012) defines exchange rate as the price of a local currency in terms of units of foreign currency. A rise in exchange rate representing reduction in the value of domestic currency vis-à-vis foreign currencies increase the competitiveness of domestic firms because it attract foreign investors to domestic market(Khahid, 2017). This suggests that currency depreciation attracts foreign investments in form of foreign portfolio investment and this may boost activities at the stock exchange and enhance stock liquidity. Indeed, Rasheed, Baloch and Irfanullah (2015) examined the effect of exchange rate on share turnover in Karachi Stock Exchange using daily data and regression technique from 2009 to 2013. The result revealed that exchange rate has significant influence on stock turnover proxy by trading volume. Waweru (2014) X-rayed the effect of macroeconomic variables on liquidity of bonds market in Kenya from 2009 to 2014 using multiple regression and reported a positive and significant link between exchange rate and liquidity. Nvongesa (2012) inquired into the factors that influence the liquidity of bond market in Kenya from

2001 to 2011 using multivariate ordinary least squares regression. The result revealed exchange rate impact bond market liquidity.

Theoretical Insight

Theories on stock market liquidity are evolving, but theories on stock market exist. One of these theories is the efficient market hypothesis.

Fama (1970) is recognized as one who led the way as far as efficient market hypothesis is concern. In an efficient market price adjust rapidly to new information and the current price incorporate all available information. This tends to suggest that external factors have no influence on price movement. However, Grossman and Stiglitz (1980) disagree with the submission that stock market is efficient information-wise on the ground that, if it true investors would not spend time and resources looking for and analyzing information. Grossman and Stiglitz (1980) posit that the informed market participants performed better than ignorant investors, therefore have the motivation to obtain information even at a very high cost. Kumar and Misra (2015) posit that price fluctuate more in an efficient market than in liquid market with the arrival of new information.

In reality stock market is not perfect, there are infractions. Market frictions such as transaction cost (financial cost), information inefficiency affect investment decisions. Indeed, Hellwig (1980) documents that price do not incorporate information completely; hence market traders employ both price and private signals (information) when making investment decisions. Stock market activities are influenced by economic fundamentals and government policies, and investors desirous of better return on investment must pay careful attention to changes in macroeconomic variables (Musilek, 1997 cited in Barakat, Elgazzar & Hanafy, 2016). Chordia, Sarkar and Subrahmyam (2001) assert that lag of market returns, lag interest rate among others are predictor of variations in volume at the stock exchange.

METHODOLOGY

This study employs longitudinal research design in examining the effect of macroeconomic forces on stock market liquidity. Data was obtained from Central Bank of Nigeria Statistical Bulletins and the Nigerian Stock Exchange for the period March, 2010 to June, 2017. A dynamic model regression was applied on the date set.

The connection between stock liquidity and economic factors was modeled following Chordia et al (2001), who expressed the relationship thus:

$$X_t = \sum_{j=1}^N (a_{ij}X_{t-1}) + \dots + \sum_{j=1}^N (b_{ij}K_t) + E_t \dots \dots \dots (1)$$

Where X_t stand for stock liquidity, X_{t-1} is previous stock liquidity and K_t represents other explanatory variables such as dummy variable for GDP and consumer price index (CPI). However, in this study aggregate data was used, therefore the above model was modified to take the following form:

$$X_t = b_0 + b_1 (X_{t-1}) + c(K_t) + E_t \dots \dots \dots (2)$$

Where: X_t present stock market liquidity (dependent variable), X_{t-1} stands for previous stock market liquidity, and K_t stands explanatory variables. The relationship in equation (2) above is stated in regression form thus:

$$TOR_t = b_0 + b_1TOR_{t-1} + b_2GDPG_t + b_3MKS_t + b_4CPIR_t + b_5LRR_t + b_6EXRR_t + E_t \dots\dots\dots (3)$$

Where:

TOR_t = Stock market liquidity at time t proxy by Turnover ratio (which is the dependent variable in this study),

$GDPG_t$ = Gross domestic product growth rate at time t proxy for economic growth (independent variable),

$CPIR_t$ = Ratio of Consumer price index time t used to inspect the influence of inflation on stock market activities in this study,

LRR_t = Ratio of lending rate at time t surrogate for interest rate in this study,

$EXRR$ = Ratio of exchange rate to value traded at time t to account for the influence of exchange on stock market liquidity, TOR_{t-1} previous market liquidity at time t

MKS_t = Market size at time t (used in this study as control variable),

E_t = error term, b_1 - b_6 are coefficient of the regression.

Operationalization of Variables

Turnover Ratio (TOR):

Turnover ratio surrogate for stock market liquidity was measured in this study as total value of stock traded divided by market capitalization multiplied 100 (see Alajekwu & Achugbu, 2011; Rasmiah, A. & Rasmiah, M. 2016).

Gross Domestic Product Growth Rate (GDPG):

Gross domestic product growth rate was estimated in this study as percentage change in grossdomestic product ($GDP_2 - GDP_1 / GDP_1 * 100$) and used as independent variable.

Market Size (MKS):

Market size in this study was calculated as market capitalization divided by value of stock traded (used in this study as control variable).

Consumer Price Index Ratio (CPIR):

This variable was estimated in this study as consumer price index divided by value of stock traded. This variable is included to account for the influence of the general price level on stock market liquidity. The link consumer price index has with stock market liquidity is reflected in the value traded.

Lending rate ratio (LRR):

This variable is added to capture the influence of interest rate on activities at the floor of the exchange. It is estimated in this study as lending rate divided by value of stock traded. The variation in lending rate may have positive or negative impact on the value of

transaction. It has been documented that macro-economic variables affect stock market performance (Osamwonyi et al, 2012).

Exchange Rate Ratio (EXRR):

It is evidence from previous study that exchange rate affect stock price (Ajao and Oseyomon, 2010). It is believed in this study that exchange rate pass through value traded to stock market liquidity therefore exchange rate ratio was estimated in this work as exchange rate divided by value of stock traded.

DATA ANALYSIS AND INTERPRETATION

The study explores the effect of macroeconomic indicators on stock market liquidity in Nigeria.

First, the long-run and short-run relationship between the regressand-Turnover Ratio (TOR) and the explanatory variables were explored. To avoid spurious regression estimation and to know the order of integration, the unit root test was conduct on the variables. To achieve this, the Augmented Dickson Fuller (ADF) was applied on the data-set at levels. The outcome is as presented in the table below:

Table 1: ADF Unit Root on Variables at Levels

Variables	ADF T-Statistic	Probability	Remark
TOR	-4.4063*	0.0016	Stationary
GDPG	-2.2735	0.1874	Not Stationary
MKS	-1.8075	0.3696	Not Stationary
LRR	-3.3646*	0.0209	Stationary
CPIR	-2.9638	0.0504	Not stationary
EXRR	-2.6138	0.1018	Not stationary

* Stationary at 0.05

Researcher's computation

The result displayed in table 1 shows that only two of the variables are stationary at levels, therefore the test was repeated on the variables at their first difference. The variables were all stationary. The result is as depicted in table 2 below.

Table 2: ADF on Variables at First Difference

Variables	ADFT-Statistic	Probability	Remark
TOR	-5.69183*	0.0000	Stationary
GDPG	-22.1799*	0.0001	Stationary
MKS	-4.7981*	0.0000	Stationary
LRR	-6.8091*	0.0006	Stationary
CPIR	-6.5044*	0.0000	Stationary
EXRR	-5.9177*	0.0000	Stationary

* Stationary at 0.05

Researcher's computation

As shown in table 2 above, all the variables were stationary at first difference, suggesting they are integrated of order 1(I), and that the variables have no trend element in them. Therefore, the data were transformed to the first difference.

Co-integration Test

The idea behind co-integration is to determine the long-run association amongst the variables used. Although two different entities may not be stationary individually on their own, they may do so when put together in linear form (Komolafe, 1996) cited in Isede and Izilein (2014). To test for co-integration, the Johansen co-integration rank test was applied on the data-set at their first difference. The outcome of the co-integration test is depicted in table 3 below:

Table 3: Co-integration Rank Test (Trace)

No. of rank Coefficient	Trace Statistic	Critical Value at 0.05	Probability
R= 0 *	124.75*	95.75	0.0001
R= 1*	78.80*	69.81	0.0081
R= 2	39.31	47.85	0.2480
R= 3	19.80	29.79	0.4365
R= 4	5.58	15.49	0.7435
R= 5	0.79	3.84	0.3716

* Reject hypothesis at 0.05 level.

Researcher's compilation

The trace statistic in table 6.3 above expose there is two co-integrating equations in the data series, suggesting that long-run equilibrium association exist amidst the variables. Therefore, the null hypothesis that no long-run relationship exist among the variables is rejected.

Since the variables co-integrate and were stationary at first difference, the study went further to implement Error Correction Mechanism (ECM). When two entities are co-integrated, the relationship existing between them can be expressed as Error Correction Mechanism (Granger & Engel, 1987). The error correction model is a technique which shows the temporary behavior of the dependent variable given the short-run variations in the independent variables. To estimate the ECM in this study, the dynamic model was employed. The dynamic model is invoked when a regression equation contains one or two lagged values of the dependent variable (Gujarati, 2009). Bhargava and Sargan (1983) speculates that it is practical to handle country specific data as arbitrarily distributed variables and analyse the parameters of a dynamic model. To accomplish this, the initial model was reformulated thus:

$$\Delta TOR = b_0 + b_1(TOR_{-1}) + b_2\Delta(GDPG) + b_3\Delta(MKS) + b_4\Delta(CPIR) + b_5\Delta(LRR) + b_6\Delta(EXRR) + ECM_{-1} + U_t \dots \dots \dots (4)$$

Where Δ stands for change, ECM is the short form of Error Correction Mechanism, the variables are as stated earlier in equation 3.

The outcomes of the regression results with DTOR as dependent variable are highlighted below:

Table 4: Regression Estimation Result

Independent Variables	Coefficient	T-Statistic	Probability
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DTOR ₋₂	-0.6206	-2.7913*	0.0125
DGDPG	-0.0127	-2.1180**	0.0492
DMKS	-0.3153	-3.8799*	0.0012
DLRR ₋₂	-0.2295	-2.2294**	0.0396
DEXRR	0.2628	2.2904**	0.0351
DCPIR	-0.7822	-4.6248*	0.0002
DCPIR ₋₃	0.00616	1.1147	0.2805
ECM	-0.4709	-1.8196***	0.0865
R ² = 0.8052			
F. Statistic = 8.7838*			
Significance of F. Statistic = 0.0000			
DW = 2.1145			

* = 0.01, ** = 0.05, *** = 0.10 significance levels.

The regression estimation in table 6.3 above revealed that previous liquidity of the stock market (DTOR-2) has negative and influence on the current liquidity and the result is significance at 1% level. This is in line with Chordia, et al (2001) that the lagged value of dependent variables contributes to the current performance. Economic-growth proxy by GDPG significantly and negatively affect stock market liquidity (DTOR), indicating that a rise in growth rate of the Nigerian economy led to reduction in stock liquidity by about 1.27%.

The hypothesis of no significance impact could not be accepted. This result collaborates Paskevicius and Norkaitis (2011); Waweru (2014) which reported that gross domestic product (GDP) predict stock market liquidity. Similarly, market size (DMKS) has significant influence on stock market liquidity.

DISCUSSION OF RESULT

The summary outcome of the regression estimation indicates that macroeconomic forces influence market liquidity in Nigeria. In particular, economic growth has a negative and significant effect on stock market liquidity. The implication is that growth in the economy has the tendency of stimulating activities at the stock exchange and enhances stock market liquidity. The negative sign is probably due to the prevailing economic conditions in the country which may be having adverse effect on investors and the performance of firms in the country and the fact that Nigeria is a mono-economy deriving its revenue majorly from oil exports, therefore the growth may not emanate from the private sector of the economy. It is also evidence in the result that lending rate reduce stock market liquidity. This is because a rise in lending rate increases the cost of doing business and discourages investment. Besides, the negative effect may be due to repatriation of fund by foreign investors as a result of rising interest rate at home. Also implied in the result is the fact that exchange rate stimulate stock market liquidity. This is due to the fact that as the economy grows, confidence is boosted, attracts both the local and foreign investors, especially equity investment into the market. The negative connection between consumer price index and stock market liquidity is occasion by the fact that drastic rise in general price level lower purchasing power and hinders saving and investment. Overall, the results

provide support for Choi and Cook (2006) that stock market liquidity is associated with macroeconomic factors.

CONCLUSION AND POLICY RECOMMENDATIONS

This study investigated the impact of macroeconomic forces on stock market liquidity in Nigeria from January, 2010 to June, 2017. A dynamic model was employed to establish the association between the regressed and regressors. The result shows that macroeconomic forces have significant effect on stock market liquidity in Nigeria. Indeed, economic growth, market size, inflation (consumer price index), interest rate negatively and significantly impact stock market liquidity, while exchange rate positively and significantly accounted for stock market liquidity. The study concludes that macroeconomic forces impact stock market liquidity in Nigeria for the period investigated.

This study therefore recommends that investors pay careful attention to macroeconomic forces and that government should prevail on commercial banks to reduce interest rate on credit as this will boost activities at the exchange and enhances stock market liquidity.

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