**Empirical Test of Tax Loss Selling Hypothesis in Nigerian Stock Market: An Illusion or Reality?**

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**Abstract**

*The paper investigates the tax-loss selling hypothesis in the Nigerian stock market return using regression technique with the errors modelled by GARCH(1,1). The study employs Generalized error distributions for the errors of regression model. The pre-model estimation test shows that returns in Nigeria stock market are asymmetric and follows a nonlinear historical pattern.Thus, GARCH (1,1) estimation was conducted with potential tax-loss selling hypothesis and without tax-loss selling hypothesis in order to justify our finding. In this paper, we use daily data for all stocks listed on the Nigerian stock market and provide new and direct evidence consistent with the tax-loss selling hypothesis. We find that there is presence of month of the year effect as November larger positive and significant relationship with the aggregate return. Also, the study found that there is downward pressure on the aggregate return in December as shown by negative but insignificant relationship between December return and the aggregate return. However, when the study consider potential of tax-loss hypothesis the December return turns positive but insignificant and this effect translate to increased positive return in January. However, the result of the findings do not provide conclusive support of this tax-loss hypothesis because the January return does not really shows abnormal return in the Nigerian stock market. Thus, the study concludes that tax-loss selling hypothesis is nothing but a misleading impression of reality. In view of this, the study recommends that Investors and portfolio managers are advised to sell more stock in November since November return is the highest return and significant among the monthly return.*

**Keywords: Tax-loss Selling Hypothesis, GARCH, Month of the year Effect, Nigerian Stock Market.**

**1.0 Introduction**

The existence of seasonality in stock returns however violates an important hypothesis in finance that is efficient market hypothesis which is a central paradigm in finance and relates to how quickly and accurately the market reacts to new information and equity prices are no longer random and can be predicted based on past pattern.This corroborates with the view of Fama (1970), hat informational efficiency of financial market requires that price and rate of return are reflects all available information at any given time. However, contrary to this, opinion, several empirical studies have been documented contradicting the assumption of EMH and this was referred to market anomalies. One of these anomalies is Seasonality or calendar effect.Seasonality is a characteristic of a time series in which data experiences regular and predictable changes which recur in defined periods. It is a component of a time series which is a predictable movement around a trend line and is detected by measuring the quantity of interest for small time intervals such as days, weeks, months etc. The most popular among the seasonality or calendar is January effect which is attributed to a general increase in stock prices in January. It is a phenomenon that has been observed since 1925, and researchers have found that the anomaly has existed for more than half a century (Cataldo and Savage, 2000). This anomaly has attractedtremendous interest among researchers because it is difficult to reconcile with the efficient market hypothesis (EMH). Previous works on the January effect, especially those of an empirical nature, have found this anomaly to exist in many stock markets all over the world. In view of this, several reasons have been document for the cause of January effect, one of these reasons is tax-loss selling hypothesis.The tax-loss selling hypothesis states that individual investors tend to sell stocks that fall in price towards the end of the year to generate capital losses to offset and avoid tax on capital gains. Similarly, more volatile stocks also generate tax loss selling opportunities throughout the year. The selling pressure on these stocks subsides at the end of the year allowing these stocks to rebound during the first few trading days ofJanuary.

In the light of the above, several studies have tested the tax-loss selling explanation by examining the return patterns around the year-end but these results reviewed mixed findings and most of the studies were conducted outside Nigeria and this justify the importance of this study in Nigeria. Against this backdrop, the main objective of this study is to empirically examine tax-loss selling hypothesis in Nigerian stock market. In line with this objective, the research question is; doestax-loss selling hypothesis hold in Nigerian stock market? To answer this question the remaining part is structured thus: section two reviewed literature on tax-loss selling hypothesis, section three outlines the methodology adopted for the study. Data analysis and discussion were presented in section four while section five concludes the paper and proffer recommendations.

**2.0 Literature Review**

The tax-loss-selling hypothesis was first proposed by Wachtel in 1942. According to the hypothesis rational investors offsets taxable income against the capital losses to reduce their year-end tax liability by selling stocks that have experienced decline in price over the year. Under the existing tax law it help investors to realize the losses and use the losses as tax shield at the end of the tax year. This motivation causes huge selling pressure shortly before year end and causes significant price decline in year-end stocks. Several studies have been conducted which include both not limited to Starks, Yong and Zheng (2006) who gave evidence in support to the tax-loss selling hypothesis to explain January effect on the municipal bond closed-end funds. The study concluded that the year-end tax-loss selling behaviour of investors is the main cause for January effect. Bhabra, Dhillon and Ramirez (1999) established a unique and significant relationship between excess returns and the potential for tax loss selling after the Tax Reform Act (TRA) 1986 period. The study concluded their findings “November effect” after TRA period is explained by the tax-loss selling hypothesis. In contrast, several arguments have been put forward to counter the tax-loss-selling hypothesis as an explanation for January effect. Gultekin and Gultekin (1982) found the evidence of seasonality over 17 countries and concluded “the seasonality seems to be caused by the disproportionately large mean returns in the first month of the tax year in countries where capital gains from security holdings are taxed”. The study findings supported the tax-loss-selling hypothesis and attracted attention of international researchers.

Ray(2012) confirmed the evidence for a month-of-the-yeareffect on Indian stock markets. The result of the findingssupported the tax-loss selling hypothesis and Januaryeffect. Similarly, Debasish (2012) documented month-of-the-year effect mostly in September, August or February.The study concluded that returns on October and July were significant. In 2012, Verma and Sharma foundmonth of year effect in Indian stock market during post liberalization period. They concluded that Indian stock market was inefficient and does not follow Random Walk Theory. Raharjo et al. (2013) made use of descriptive statistics which revealed that December is the best month for investor to buy stock in Indonesia Stock Exchange. The average of return in December is 5.21%, which is the highest return and has lower risk -2.79% with deviation 4.74%. MainulAhsan(2013) empirically tests the tax-loss selling hypothesis in Dhaka Stock Exchange (DSE) in Bangladesh. The results of the study do not support the tax-loss selling hypothesis as an explanation for the high June return at the end of the tax year in Bangladesh.Efayena (2014) stressed that there is presence of January effect. He concluded that the study is consistent with the tax-loss selling hypothesis explanation in the manner of the December – January seasonality.Patel (2014) revealed that monthly barometer that can accurately predict the future direction of the stock market. Simbolon (2015) employed unconditional and conditional method to validate the claim of December effect. Friday and Bo (2015) also established the presence of December and Halloween effect in both the SET composite and SET50 indices. Mouselli and Al-Samman(2015) confirmed the existence of positive and significant returns during May compared to remaining months. Sarpong (2015) employed GARCH, EGARCH and GJR model and found no evidence of January effect or any other form of monthly seasonality in the first period, but the second period documented significant anomalous positive returns in the month of January, April, May andJune while the month of March and July also recorded statistically significant negative return.From the literature review, it was found that there is no consensus among researchers on the test of tax-loss selling hypothesis and justify further study in this area. Also most of these are not current studies, they have been conducted decades ago and this necessitates recent study in this area. More so, the study is conducted in order to contribute to scanty literature on this study in Nigeria context.

**3.0 Methodology**

The study aimed at empirical analysis of tax loss hypothesis on the Nigerian stock market returns. The study used quasi-experimental design and study focused on Nigerian stock market and uses daily All Share Index in the Nigeria Stock exchange to compute monthly returns and the aggregate return. The population of the study constitutes one hundred and eighty quoted companies on the Nigerian Stock Exchange (NSE) covering different sectors as at 2017. Accidental sampling technique, a non-probability sampling method was employed. The study covered the period of thirteen years from January 2005 to December 2017. This data is considered appropriate because Engle and Mezrich (1995) suggested that at least eight years of data should be used for proper GARCH estimation. This choice of this period is because there is lots of uncertainty in the market such as stock market crash that happened between 2008/2009 which affected not only the market but the Nigerian economy at large. Secondary source of data was used and the data were collected from central securities clearing system limited.

**3.1 Model specification**

The returns are computed for weekly returns using continuous compounding formula. The formula is specified below:



Where Rt is the return in period t, Pt and Pt-1 are the stock price on the (t) day and (t-1) day respectively .This method of computing return has been used by many researchers among are; Umar (2013), Oyedeko and Zubairu (2017) and so on.





Where: Rtis the log return of the market index at day t, DJt-DDtrepresents the monthly return series from January to December, θ1- θ12represent the co-efficients which measure the sign and size of the monthly returns. Rt-1 is the lag value of the endogenous variable which captures the dynamic process, it eliminates the possibility of having autocorrelated errors. htis a conditional variance of εt(error term) in period t, ao is the mean which capture the weighted long-run variance, a1 represents the long run persistence coefficient, a2 represents the news coefficient and news about shock from the immediate previous periods taken as the lag of the squared error from the mean equation and ht-1 is the forecast volatility at period t-1 (GARCH term). However, the model is estimated in two ways. First we do not consider tax-loss selling hypothesis and secondly we considered potential tax loss selling hypothesis and this done by subtracting the last five trading days from the December and also deducting the first trading days from the January trading period.

**4.Result and Discussion**

This section presents the result of the analysis and discussion of findings in order to verify the objectives of the study. It starts with descriptive statistics of the return series, pre-model estimation test, and post-model estimation or diagnostic tests.

**4.1 Descriptive Statistics**

The study employs mean, maximum, minimum, and standard deviation statistics to examine the shapes of the distribution of these data and to check whether the data series follow a Gaussian process. Table 1, below gives the result of the statistical method.

**Table 1: Descriptive Statistics**

Variable obs min mean max std.dev

RETURN 3199 -0.01903 6.3789e-005 0.034635 0.0044757

JAN 262 -0.01857 -0.00064276 0.016669 0.0053232

FEB 259 -0.01204 0.00040433 0.020217 0.004265

MAR 275 -0.01307 -7.5874e-005 0.009679 0.0036947

APR 253 -0.01181 0.00060215 0.034635 0.0042912

MAY 261 -0.01903 0.0013965 0.01611 0.0046943

JUN 278 -0.01717 -8.6059e-006 0.016392 0.0051093

JULY 279 -0.01271 -1.6485e-005 0.017395 0.0039222

AUG 280 -0.01617 -0.0004442 0.016626 0.0051341

SEP 267 -0.01314 8.8904e-005 0.012729 0.0038581

OCT 264 -0.01569 -0.00035197 0.012942 0.0037748

NOV 271 -0.01804 -0.0005481 0.011359 0.0040508

DEC 254 -0.01567 0.00050039 0.021234 0.0047496

Source: Authors’ Computation

Table 1, shows the mean, standard deviation, minimum and maximum values of returns across the months of the year examined in the study for the period of 2005 to 2017. We observe that the mean values for the January, March, June, July, August, October and November are negative while the mean return of February, April, May, September, and December are positives. Since the mean value represent the average return, our findings revealed that May has the largest return of 0.14%, among the month of the years while lowest was found on June. However, the return on January appears to be the most volatile in the Nigerian stock market since it has the highest values of standard deviation while the march return is found to be the less volatile over the study period.

**4.2 Pre-Model Estimation Test**

This section present the normality test, ARCH effect test, RUN test, variance ratio test and the unit roots. Table 2 and Table 3 summarise the result of the tests.

**Table 2 Pre-Model estimation Test**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Normality Test | ARCH Effect | VRT | RUNS |
|  | Skewnes | Kurtosis | J-B | 1-2 Test | 1-5 Test | 1-10 Test |  |  |
| Return | 0.41(0.007) | 2.3(0.00) | 65.38(0.00) | 40.75 [0.00] | 20.54 [0.00] | 10.50 [0.00] | 2.11(0.00) | -2.50 [0.01] |
| Jan | -0.73(0.00) | 1.75(0.00) | 55.29(0.00) | 37.58[0. 00] | 20.23 [0.00] | 10.06 [0.00] | 2.49(0.00) | -4.90 [0.00] |
| feb | 0.44(0.00) | 1.82(0.00) | 43.3(0.00) | 8.43[0.00] | 8.15[0.00] | 4.98 [0.00] | 1.64(0.00) | 3.87[0.00] |
| Mar. | -0.10(0.48) | 1.05(0.00) | 12.05(0.00) | 7.11[0.00] | 2.91 [0.01] | 1.61[0.10]  | 2.03(0.00) | -5.54[0.00] |
| April | 2.10(0.00) | 15.76(0.00) | 2795.1(0.00) | 6.20[0.00] | 2.53[0.02] | 1.23[0.27] | 1.36(0.166) | -2.56[0.01] |
| May | 0.61(0.00) | 2.48(0.00) | 81.13(0.00) | 24.46[0.00] | 11.13[0.00] | 6.82[0.00] | 1.73(0.00) | -3.50[0.00] |
| June | -0.04(0.76) | 1.57(0.00) | 26.25(0.00) | 29.16[0.00] | 11.80[0.00] | 7.90[0.00] | 1.59(0.00) |  |
| July | 0.18(0.21) | 2.75(0.00) | 80.93(0.00) | 76.7[0.00] | 36.19[0.00] | 23.03[0.00] | 2.37(0.00) | -5.92[0.00] |
| Aug | 0.33(0.02) | 1.3(0.00) | 22.92(0.00) | 42.25 [0.00] | 20.46[0.00] | 14.16[0.00] | 2.16(0.00) | -4.67[0.00] |
| Sep | 0.24(0.11) | 1.7(0.00) | 32.94(0.00) | 5.96[0.00] | 2.16 [0.05] | 0.91[0.51] | 1.34(0.05) | -3.54[0.00] |
| Oct | -0.34(0.02) | 2.79(0.00) | 87.30(0.00) | 72.19[0.00] | 29.21[0.00] | 17.01[0.00] | 1.82(0.00) | -4.60[0.00] |
| Nov | -0.70(0.00) | 2.96(0.00) | 113.3(0.00) | 49.51[0.00] | 21.96[0.00] | 11.16[0.00] | 2.17(0.00) | -3.66[0.00] |
| Dec. | 0.53(0.00) | 3.15(0.00) | 116.1(0.00) | 48.64[0.00] | 20.44[0.00] | 11.49[0.00] | 2.08(0.00) | -3.28[0.00] |

Source: Authors’ Computation

From the table 2, it was revealed that the preposition of normality is rejected by Jarque-Bera, tests since all the p-value of the aggregate return and monthly returns are lower than 5 percent. The excess kurtosis is positive and significant, giving evidence of pickness or leptokurtic distribution in all the returns. The coefficients of skewness reveal that some of the returns are negatively skewed and some are positively skewed. Thus, from this analysis, we can draw our conclusion that the returns are asymmetric and follows a nonlinear historical pattern. To corroborate this, we conduct ARCH effects test at different lags. It is prettily apparent that the returns series exhibits ARCH effects at lags 2, 5, and 10 respectively. Also, a pre-test of random movement of returns was examined and it was found that the P-value of RUN TEST is less than the 5 percent. Therefore, we cannot reject the known null hypothesis that the series of returns do not move randomly. This in order words means that the stock market return cannot be said not to have memory since there is no observed runs in the market.

**4.3 Stationary or Unit root Test of the Return Series**

The table below presents stationarity test or unit root test using the ADF test, the null hypothesis is that the time series has a unit root against the alternative that no unit root.

**Table 3, Unit Root Test**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables  | ADF Statistics | 1% | 5% | 10% | Decision |
| Return | -8.01824 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| Jan | -6.33309 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| Feb | -8.30223 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| Mar | -7.27949 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| Apr | -8.77841 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| May | -7.4991 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| Jun | -8.64256 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| July | -7.30238 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| Aug | -9.03717 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| Sep | -9.75123 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| Oct. | -7.68133 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| Nov | -8.23827 | -2.56572 | -1.94093 | -1.61663 | Stationary |
| Dec | -7.01489 | -2.56572 | -1.94093 | -1.61663 | Stationary |

Source: Authors’ Computation

From the table 3, it was revealed that the absolute value of ADF-statistics are greater than the 5% critical value even at 1 percent and this implies that the returns series are not characterized with unit root. From the pre-model estimation above, there results of the supported violation the homoscedasticity assumption which suggests that innovations in the weekly returns are heteroscedastic, and these tests allow the return series to be modelled on GARCH-type which assume that the variance of the errors is not constant.

**4.4 Estimation Result of GARCH MODEL**

This section presents the estimated result of the GARCH MODEL specified in the methodology section of this study.

**Table 4: Estimation Result GARCH MODEL**

|  |  |  |
| --- | --- | --- |
| Variables  | Estimated Result | Estimated Result WPTLS |
| Coefficients | Prob | Coefficients | Prob |
| January | 0.016894 | 0.5728 | 0.018736 | 0.6730 |
| February | 0.021043 | 0.6151 | 0.036525 | 0.5899 |
| March | 0.020332 | 0.6062 | 0.052120 | 0.2861 |
| April | 0.000271 | 0.9934 | -0.014630 | 0.7840 |
| May | -0.057827 | 0.1225 | -0.044154 | 0.2953 |
| June | 0.018182 | 0.5470 | 0.010619 | 0.7762 |
| July | 0.042480  | 0.3525 | 0.023119 | 0.6955 |
| Aug | 0.012294 | 0.7358 | 0.036307 | 0.4077 |
| Sep | 0.051483 | 0.1790 | 0.008037 | 0.8705 |
| Oct | 0.020782 | 0.6183 | 0.024535 | 0.6983 |
| NOV | 0.110447 | 0.0260 | 0.148186 | 0.0190 |
| Dec | -0.000501 | 0.9869 | 0.002753 | 0.9650 |
| AR(1) | 0.435364 | 0.0003 | 0.422997 | 0.0015 |
| MA(1) | 0.014006 | 0.9149 | 0.020065 | 0.8748 |
| α | 0.163534 | 0.0249 | 0.339562 | 0.1948 |
| β | 0.646714 | 0.0001 | 0.069281 | 0.8872 |

Source: Authors’ Computation

From the result presented in the table 4, it reveals that the coefficient of November return is significant and others are insignificant at 5percent, and this implies the existence of month of the year effect in the Nigerian stock return. The coefficients of both the ARCH and GARCH terms represented in the results as Alpha and Beta are strongly significant at 5% level of significance and the result shows that the sum of both the ARCH and GARCH terms is less than 1, indicating appropriateness of the model. Also, the result of the model without potential tax-loss hypothesis reveal that all the returns of the months are positive except May and December while under tax-loss selling hypothesis reveals that April and May returns have negative but insignificant effect on the aggregate return in the Nigeria stock market.

**4.5 Diagnostic Test of the Residuals of GARCH (1,1)**

**Table 5 Diagnostic Test**

|  |  |  |
| --- | --- | --- |
|  | Estimated Result | Estimated Result WPTLS |
| Normality Test |
|  | Statistics | P-value | Statistics | P-value |
| Skewness | 0.13157 | 0.39105 | -0.20609 | 0.25377 |
| Kurtosis | 0.32261 | 0.29115 | -0.024617 | 0.94537 |
| Jarque-B | 1.8198 | 0.40256 | 1.2858 | 0.52576 |
| Serial Correlation Test (Q-Statistics on Standardized Residuals) |
| Q( 5) | 1.40259 | 0.7049267 | 3.50469 | 0.3201542 |
| Q( 10) | 7.14186 | 0.5214069 | 10.9394 | 0.2051583 |
| Q( 20) | 11.5127  | 0.8713481 | 16.5327 | 0.5554227 |
| Q( 50) | 37.0908 | 0.8731900 | 37.0423 | 0.8744099 |
| Serial Correlation Test (Q-Statistics on Squared Standardized Residuals) |
| Q( 5) | 1.66584 | 0.6445557 | 2.72961 | 0.4352196 |
| Q( 10) | 4.32312 | 0.8268576 | 8.44443 | 0.3913029 |
| Q( 20) | 21.8512 | 0.2386605 | 22.4170 | 0.2139983 |
| Q( 50) |  | 0.3130001 | 50.6034 | 0.3711298 |
| Arch Effect |
| ARCH 1-2 | 0.37848 | 0.6853 | 0.44830 | 0.6395 |
| ARCH 1-5 | 0.30631 | 0.9089 | 0.48344 | 0.7883 |
| ARCH 1-10 | 0.39198 | 0.9494 | 0.6252 |  |

Source: Authors’ Computation

In testing the fitness Garch(1,1)model the following null hypotheses were tested in respect of the residuals computed from the model under three hypotheses.The first null hypothesis of ‘there is no serial correlation in the residuals’ was tested for significance using the ‘correlogram square residuals test’. The second null hypothesis of ‘there is no ARCH effect in the residuals’ was tested for significance using the ‘ARCH test’. The third null hypothesis of ‘residuals are normally distributed’ will be tested using the ‘Jacque-Bera statistic’. The study examined the correlation between the successive residual factors at different lags strengths up to lag 10 in order to ascertain robustness of results. The result of this test is presented in table 5. The residuals from the GARCH (1,1) model on the return series for serial correlation using the correlogram square residual test was conducted on up to 50 lags of the series, and the table above shows the Q-Statistics on Standardized Residuals and Q-Statistics on Squared Standardized Residuals and their respective probability values of every lag. The p-values of all the 5, 10, 20, and 50 lags are greater than 5percent which prevent the rejection of null hypothesis and therefore it can be concluded that there is no serial correlation in the residuals. This means the series depend upon one another and not independent.The probability (chi-square(1)) of the observed R-square in the table is based on a 5% significance level to reject or accept the null hypothesis of the ARCH effect. Thus, in each level of Arch test the p-values larger than 5percentand this means that the residuals from GARCH (1,1) of the Nigerian stock market returns have no ARCH effect. This is a good sign for the model because of the compliance with its assumption. The study used Jarque-Bera statistic to determine the rejection or acceptance of the null hypothesis based on a significance level of 5percent. The null hypothesis that ‘residuals are normally distributed’ is to be rejected if p-value is less than 5percent and accepted if the p-value is greater than 5%. The assumption for the best fit GARCH (1,1) model is for the residuals to be normally distributed, which allows acceptance of the null hypothesis when the p-value is greater than 5%. However, the results from the GARCH (1,1) model in this study indicate the p-values from the Jacque- Bera statistic are larger than 5% and thus highly significant, allowing rejection of the null hypothesis. Hence, the residuals are normally distributed. The result of the diagnostic tests above have shown that residuals from the model have indicated the non-existence of serial correlation, no ARCH effect after the ARCH test was conducted.

**4.6 Discussion of Findings**

The study found weak evidence tax loss hypothesis in the Nigerian stock market since the January return exhibit positive but insignificant effect on the aggregate return in Nigerian stock market. This contradicts the findings of MainulAhsan, (2013). The study also found November effect which conforms to the finding of Dhillon and Ramirez (1999).

**5. Conclusion and Recommendation**

The paper investigates the tax-loss selling hypothesis in the Nigerian stock market return using regression technique with the errors modelled by GARCH (1,1). The study employs Generalized error distributions for the errors of regression model. The pre-model estimation test shows that returns in Nigeria stock market are asymmetric and follows a nonlinear historical pattern.Thus, GARCH (1,1) estimation was conducted with potential tax-loss hypothesis and without tax-loss selling hypothesis in order to justify our finding. In this paper, we use daily data for all stocks listed on the Nigerian stock market and provide new and direct evidence consistent with the tax-loss selling hypothesis. We find that there is presence of month of the year effect as November larger positive and significant relationship with the aggregate return. Also, the study found that there is downward pressure on the aggregate return in December as shown by negative but insignificant relationship between December return and the aggregate return. However, when the study consider potential of tax-loss hypothesis the December return turns positive but insignificant and this effect translate to increased positive return in January. However, the result of the findings do not provide conclusive support of this tax-loss hypothesis because the January return does not really shows abnormal return in the Nigerian stock market.Thus, the study conclude that tax-loss selling hypothesis is nothing but a misleading impression of reality. In view of this, the study recommends that Investors and portfolio managers are advised to sell more stock in November since November return is the highest return and significant among the monthly return.

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