Share Price Change: the Efficient Market Hypothesis and the whitenoise Hypothesis Dichotomy

Kehinde, S. James, PhD
Dept of accounting and finance
Lagos State University, Ojo
Lagos, Nigeria

Abstract

Over time market players have developed much interest in factors that bring about movement or change in share price in the stock market either upward movement or downward movement several issues have been adduced for this over the years, some of which are rational and some are said to be irrational factors. The efficient market hypothesis and the whitenoise hypothesis were examined to measure point of similarities and divergence between the two hypotheses in this study. The secondary source of data was used for the purpose of the analysis and a multiple regression analysis was adopted.　The model derived by the researcher shows that the whitenoise is equal to the error factor of the fist order of the regression. The regression model derived in the second order was tested and the result shows that the whitenoise(which measure the shock or　volatility) is a strong factor in the price determination of share traded　in the stock market. Also it revealed that it is not only market information that influence share price change as noted by the efficient market hypothesis　but also sporadic shock or volatility in the market measured by the whitenoise variable. It was recommended that with positive and negative coefficient of the whiteniose determined the absolute value of the share price could be determined with the information content and the shock factor determined.

Key words: share price, white-noise, dividend, interest rate, efficient market, shock.

1. Introduction

The movement in the price of share at the stock market most of the times has been an issue of concern to market players. The change in the price of share of quoted firms are said to be due to change in certain fundamental factors, this include the financial performance (measured by dividend paid by the firm, the earning made by the firm etc) and the macroeconomic variables(such as interest rate ruling , inflation rate etc) however, experience in the capital market have shown that there are other factors that are responsible for the change in share price but are not captured in these variables, such variable is the market noise this may arose as result of popular opinion on the stock but such opinion can be spurious at times, it can be baseless some times also it can be a calculated attempt by certain interested individuals ,financial analyst of repute or due to certain insider information that may not yet been known in the market. The fact that it is baseless may make the change in price expected to be worthless at the same times. At other times this insider information may end up being false, however, it would have force the price of the share up. Thus, any relationship established between share price change and the basic fundamentals have less or reduced value, such relationship may be necessary but not sufficient to predicting the behavior of share price in the capital market, this, hence, create a gap in research.

The efficient market hypothesis stated that change in value of share is as a result of information about the market, the weak form the semi strong form and the strong form are all based on the information about the market whether past information, (weak form) past and current information(semi strong form) , past information, current and inside information (strong form) all are based on information about the market, the whitenoise hypothesis tend to bridge the gap in the knowledge   while the efficient market hypothesis dictate that change in the value of the share price is a function of the market information, the whitenoise hypothesis tend to investigate other factors that influence the change in share price that may and may not be connected with information content of the share value, the gap created by the efficient market hypothesis tend to be covered or explained by the whitenoise hypothesis.

It also attempt to produce a model that summarized the white coefficient and the slop of the model, the study also attempt to measure the direction of the whitenoise coefficnt with the aid of a scatter diagram all this are the objectives of this study

The efficient market hypothesis summarized

The **efficient-market hypothesis** (**EMH**) asserts that in the financial markets there is absolute information such that the share price is a reflect of the total market information. That is, the market is "informationally efficient". In consequence of this, one cannot consistently achieve returns in excess of average market returns on a risk-adjusted basis, given the information available at the time the investment is made. There is the weak form, the semi strong form and the strong form of the efficient market hypothesis as proposed by Fama( )

Forms of efficient market Hypothesis
There are three major versions of the hypothesis: "weak", "semi-strong", and "strong"..

The weak-form efficiency,
The weak-form EMH claims that Prices on traded assets (*e.g.,* stocks, bonds, or property) already reflect all **past publicly available information**. Future prices cannot be predicted by analyzing prices from the past. Excess returns cannot be earned *in the long run* by using investment strategies based on historical share prices or other historical data. Technical analysis techniques will not be able to consistently produce excess returns, though some forms of fundamental analysis may still provide excess returns. Share prices exhibit no serial dependencies, meaning that there are no "patterns" to asset prices. This implies that future price movements are determined entirely by information not contained in the price series.

The semi-strong-form efficiency,
The semi-strong-form EMH claims that prices reflect all publicly available information and that prices instantly change to reflect new public information it is implied that share prices adjust to publicly available new information very rapidly and in an unbiased fashion, such that no excess returns can be earned by trading on that information. Semi-strong-form efficiency implies that neither fundamental analysis nor technical analysis techniques will be able to reliably produce excess returns. To test for semi-strong-form efficiency, the adjustments to previously unknown news must be of a reasonable size and must be instantaneous.

The strong-form efficiency,
The strong-form EMH additionally claims that prices instantly reflect even hidden or "insider" information. Share prices reflect all information, public and private, and no one can earn excess returns. If there are legal barriers to private information becoming public, as with insider trading laws, strong-form efficiency is impossible, except in the case where the laws are universally ignored. To test for strong-form efficiency, a market needs to exist where investors cannot consistently earn excess returns over a long period of time.

There are three major versions of the hypothesis: "weak", "semi-strong", and "strong". The weak-form EMH claims that prices on traded assets (*e.g.,* stocks, bonds, or property) already reflect all past publicly available information. The semi-strong-form EMH claims both that prices reflect all publicly available information and that prices instantly change to reflect new public information. The strong-form EMH additionally claims that prices instantly reflect even hidden or "insider" informations

Amol Agrawal(2011) stated that Probably the most important factor that determines the price of a stock is its earnings. In essence, earnings are the profit that a company makes, and no matter how good a company is, if it does not make positive earnings at some point it can't survive. Companies that are traded on the stock market report their earnings four times a year, or once each quarter. Another important factor is the analyst reports(Karel, 2007).

Ricky Schmidt (2011) noted, however, that no market operates in a vacuum. In a borderless and interconnected world like the stock market, the slightest rumor or threat of war, rising oil prices or interest rate hikes for instance, can detonate a reaction on world markets which then react speedy and unpredictable. To make matters worse, markets also react to less alarming news and events like a slip of the tongue. One wrong word said by mistake by an analyst or politician can cause a chain reaction and panic sending the markets into red territory. . (Afrinvest, 2011)

Basically the price of any valuable is determined by the force of demand and supply. In a market economy.   The higher the demand for particular shares the greater the price would increase and vice versa. These forces do not however always remain the same. The same shares do not always have the same amount of demand on any given day. The demand for shares may change with the reputation of the company, political climate and several other internal and external factors. Rise in oil prices, risk of the economy collapsing and even threat of war could cause serious fluctuation in market share prices that are often quite unpredictable(Hot Copper, 2011)

When viewed over long periods, the share price is directly related to the earnings and dividends of the firm. (Robert D. Coleman, 2011) Over short periods, especially for younger or smaller firms, the relationship between share price and dividends can be quite unmatched.

2. Research Method

The white-noise hypothesis stated noise stated that changes in the price movement that is not due to macroeconomics changes and performance of the organization but due to insider information, uncoordinated market impulse and irrational choice, insider trading etc this is called the white-noise factor. The white-noise model try to isolate these factors and produce a generally acceptable model tested and that could be used to generate a coefficient and value could be used for test of these variables this is done as below. The white-noise (U_1) is the attempt to produce a known value for the hitherto unknown U_1 of U in the share price model.

6.0 Model specification

Pshare = F(div, intrate,)

Where
Pshare(P) = market price of the share
Div = dividend (representing the financial performance of firms)

Intrate = interest rate (representing the macroeconomics variable)

$$P = a_0 + a_1 div + a_2 intrate + U_0 \ldots\ldots\ldots\ldots (1)$$

Where U is the unknown error term of the equation

$$P = a_0 + a_1 div + a_2 intrate + U_1 \quad \ldots\ldots\ldots\ldots(2)$$

$$\text{Change in } U = U_0 - U_1$$

Squre both side

$$P^2 = a_0 + a_1 div^2 + a_2 intrate^2 + (U_0 - U_1)^2$$

Sum up the changes
$$EP^2 = a_0 + a_1 Ediv^2 + a_2 Eintrate^2 + E (U_0 - U_1)^2$$

Factorise the $E (U_0 - U_1)^2$

$$EP^2 = a_0 + a_1 Ediv^2 + a_2 Eintrate^2 + E U_0^2 -2 U_0 U_1 + U_1^2$$

Get the marginal change in the equation and hence compute the white-noise variable.
Differentiate the equation thus

$$\frac{dEP^2}{du} = a_0 + \frac{a_{1d}Ediv^2}{du} + a_{2d}\frac{Eintrate^2}{du} + \frac{Ed U_0^2}{du} - \frac{2 dU_0 U_1}{du} + \frac{d U_1^2}{du}$$

$$\frac{dEP^2}{du} = -2EU_o + 2EU_1$$

$$\frac{dEP^2}{du} = 0$$

$$EU_o = EU_1$$

From the above it goes to say that changes in the white-noise (U_1) will equal the total change in the unknown variable (the basic error term of the organization model) at the equilibrium point of change.

Thus to get the white-noise coefficient a_n the method is to run the regression of the first equation

$$P = a_0 + a_1 div + a_2 intrate + U_0 \dots\dots\dots\dots. (1)$$

Having obtained the equation of the initial equation we then run the second regression equation thus

$$P = a_0 + a_1 div + a_2 intrate + a_n U_1 + U \dots\dots\dots\dots. (2)$$

Where U_1 is the white-noise variable and a_n is the coefficient

3. Method of data collection

To test the white-noise hypothesis we use data sourced from the Businessday(2011)
The data is the quarterly result of 30 most capitalized firms in the Nigeria capital market for the fist quarter of 2011(December 06/ 2010 to April 06 / 2011) the data was primarily used by the businessday/ Afrinvest 30 index as at April 06 2011. The 30 firms form the times series data used for this study. The average earning, interest rate and price of shares for the quarter stands for a unit of data while the 30 firms the longitudinal data for the study. The analysis was done using the spss16.0 and multiple linear anlysis

Result of analysis
$$P = -1.021 -6.242 \, intrate + 17.436 div + U \dots\dots\dots\dots\dots. (1)$$

$R = 0.918$

$R^2 = .843$
Adjusted R^2 .831
F statistic = 72.287
F statistic sign = 0.000

$$P_2 = -8.496 + 10.255 intrate + 18.886 div -113 wn + U \dots\dots\dots. (2)$$

$R^2 = 0.902$
Adjusted $R^2 = 0.891$
F statistic = 79.701
F statistic sign = 0.000

The above reveal the result of the regression analysis pre and post white-noise value.

6he pre white-noise regression an adjusted R^2 of 0.831 while the white-noise adjusted regression (P_2) shows an adjusted R^2 of 0.891 .this shows that 89% of the influence on the market share exist when the white-noise (market noise) factor is included . This is an improve measure of influence and have a more reliable relationship inferred by the inclusion of the white-noise factor.

The individual coefficient or slope of interest variables, earning variable are higher with the inclusion of the white-noise variable than without it as shown in the regression model P_2. Without the white noise the slope of the variable were -6.242 and 17.436 in (P_1) while in P_2 they were 10.255 and 18.886 for interest and dividend respectively

The error term of the regression also dropped from 10.009 (in P1) to 8.795 (in P_2) this shows that post white-noise models are significant at 95% confidence level having an F-Statistic significant value of 0..0 for both models (P_2 and P_1) thus both regression models are good measure of the relationship between financial performance(measured by dividend) and macroeconomic variable (measured by interest rate) on the market value (price) of ordinary share at the stock market .

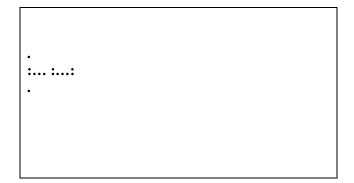### 3.1 The whitenoise slop coefficient determination
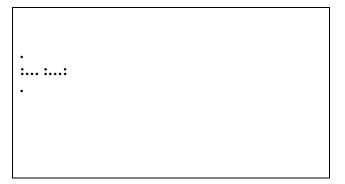
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Table 1

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Table2

4. Interpretation

In the scatter diagram above which represent the various points in the whitenoise plotted scatter diagram, when the slop flow downward from the left to the right to form a downward slop as in table1 above then the coefficient of the slop of the straight line is negative(-). Also in table2 above where the flow of the scatter diagram is toward the right from the left then the coefficient of the gradient or slop is positive (-)

5. Summation

Scenario1
Where the coefficient of the slop is negative the whitenoise value is positive when inserted into the main equation,
Scenario2
Conversely, when the coefficient of the slop is negative the value of the whitenoise will be negative when inserted into the main equation this is demonstrated as below

P_2 = -8.496 + 10.255intrate + 18.886div -113wn + U………. (2)

Scenario1

$P_2 = -8.496 + 10.255intrate + 18.886div -113wn + U$………. (2)

  Wn= -1

$P_2 = -8.496 + 10.255intrate + 18.886div -113wn + U$………. (2)

Scenario2

Wn = +1

5.1 Interpretation

Once the value of the whitenoise coefficient has been determined the various value of the variables in the whitenoise equation (P) can be determined and the solution can be determined

Thus, the value of p can be determined and market decision could be made

5.2 Conclusion and recommendations

1 where as the efficient market hypothesis stated that the changes in market value of shares traded in the stock market is due the information at various levels, that is, the share price is a perfect reflect all market information . The whitenoise hypothesis stated that the changes in price of share is not due to only market information but due also to market shock or risk or volatility which is measured by the whitenoise

Secondly the coefficient of the whitenoise have been determined either positive or negative in scenario1 and scenario2 above, once the coefficient of the whitenoise variable have been determined the value of the share could be determined with the inclusion of value of the other variable values.

It is recommended that the individual can determine the value of share or stock traded in the stock market using various variables to represent the macroeconomics (interest rate, inflation rate etc) variables and intrinsic (dividend, earning etc) variables of the market and the inputing the coefficient of the whitenoise variable the real value of stock can be determined in the stock market .

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