The Reality of the Relationship between the Return and the Standard Deviation as a Risk

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Abstract-Financial management uses the standard deviation as a basic indicator to measure and evaluate the risk of the share or portfolio targeted for investment as one of the statistical dispersion measures adopted in this field. Standard deviation is also widely used in other financial indicators to assess the level of portfolio investment risk and performance. With all of these indicators, this type of investment is still subject to violent shocks, which result in financial crises and shocks that have negative effects on the performance of local, regional, and global financial markets. Here, the research seeks to check the validity of adopting the standard deviation index as a risk and the accuracy of the results that this statistical indicator gives to the investor in light of its wide use. The most important findings of the researcher have confirmed that there is a technique that can be followed to fix the fault that results from squaring the values. These values exist under the root which leads to the alteration of all return values into positive values and distorts the evaluation, we can do the process by separating positive returns from negative returns and then calculating the standard deviation of the return positive values as a safety indicator with a direct correlation. The rise of this indicator specifies a high percentage of profits that exceed its arithmetic average (average return). While another standard deviation depends on the negative return values (such as risk) because they show the level of losses that exceed its arithmetic mean. The higher the ratio is, the higher the risk will be, then compare them according to the client's level of risk and his level of profit-seeking. As for the most important recommendations acclaimed by the researcher are to adopt the standard deviation of negative observations only from the returns approved in the evaluation to calculate the risk among other indicators that adopt this indicator (the standard deviation) to reach wider indicators in use such as the ratio of Sharp and the calculation of systemic risk (beta) Add to the market deviation and variance.

Indexed Terms—Risk and Return, Stocks, Financial markets, Capital return.

I. INTRODUCTION

The relationship between the return and the risk is the focal and main points that are taken into consideration in the process of building the investment or financial portfolio whether this portfolio is made up of real assets or financial assets. As this relationship determines the components and the weights of the portfolio in addition to its impact on the type of portfolio that is held by the investor as an active or passive portfolio, depending on the level of investor's tendency to take risks. It is known that adopting the standard deviation to determine the irregular risk is not necessarily possible to give a real perception to the level of risk of the financial asset, despite being widely approved and common among the financial management community. Rather, the use of the standard deviation extends to determining specific ratios and indicators related to the evaluation of the components of the financial portfolio for ownership tools (shares) specifically such as Sharpe ratio and calculating the value of systemic risk (Beta) by employing market variance (б2m) to reach the value of this risk. Note that the prevailing idea of the nature of this relationship is the positive direction (a positive relationship) between them as a mutual relationship (Trade off). Current study is aimed to reveal the reality of this mutual relationship effectively to indicate the validity of using the standard deviation as a measure to calculate the irregular risk that extends its use as we pointed to the systemic risk. While working to reach the reality of the mutual relationship between the return and the risk, it was observed that the similarity of the standard deviation value for a number sequence of

ten numbers with a positive signal with the value of the standard deviation of the same numbers with a negative signal. This result is illogical since the first case represents the achievement of successive profits while the second case achieves successive losses. This illogical result requires reviewing that relationship to determine the accuracy of the results and the level of the possible dependence value of this widely used indicator. The first topic includes - the research methodology - while the second topic deals with return and risk in detail either the third topic will include the applied side and the most important conclusions and recommendations

II. FRAMWORK

First - the research problem

The research problem is focused on the question of the efficiency of the standard deviation as a certified measure to calculate the irregular risk of financial assets such as shares and even real assets. Besides it is revealing whether there is really a process of exchange between the return and the risk or is the relationship between them taking a trend (direction) other than the current trend that is approved in the fundamentals of the financial management that is represented by the direct relationship.

Second - the importance of research

The importance of the research revolves around the importance of the process of raising the investment portfolio and distributing its components through the weights allocated to each asset. Add to that the assets evaluation process and determining their level of risk based on the standard deviation, which in turn is reflected in the process of selecting the assets within the portfolio or excluding them. Also this is fully reflected on the performance of the financial market as a whole, also on the level of its competence in the process of trading and on evaluating of the financial and real tools in it that are representative of the various economic sectors in the country.

Third - research objectives

The research aims to achieve the following: -

1- Reaching the exact measure of the risk that is actually expressed to determine the level of fluctuation in the performance of the financial or real assets in the market.

2- Enabling the investor to reach the best and most accurate criteria that support him in the process of selecting assets in the financial market, according to his level of risk preference.

3- Access to the process of building and forming investment portfolios with high-level evaluation to maintain the stability of this important type of investment, which is directly reflected in the stability of the financial markets as a whole.

4- Correct some of indtheicators that adopted in the evaluation of assets in case that there is a defect in the process of building these indicators according to the achieved results.

5- Working to improve and develop some indicators that are used to evaluate the assets through finding better performance and high-precision evaluation indicators.

III. LITERATURE REVIEW

This topic deals with the concept of the return, the risk, and the common of each type which is approved in the evaluation of shares, how it is calculated, and the nature of the relationship between them to arrive an accurate description of them. This enables the investor to determine the desired share to be chosen according to the vision [1] that achieves a return that is higher than the average calculated return for the same share. This is what motivated the researcher to accurately indicate this type by depending on the description of the standard deviation that represents the amount of sample deviation from its arithmetic mean. The returns should be positive for achieving this description. Below is an illustration of each component of the evaluation[2].

1- The Return

1.1- concept

The return is defined as (net income that generated from the money investment process) and it represents (The difference between the investment value at the end of the period and the investment value at the beginning of the period)[3] ; it is also (The addition or the decrease depending on the cash outflow of the basic investment and the cash inflow after a certain period) [4] . It is known as (the difference between the outflow and the inflow of cash that does not appear matching with the value of the investment) . Thus the return reflects (the difference between the

wealth value net of the beginning and of the end of the investment period, either it was positive or negative, which expresses the loss in its negative state)[5]. Note that this loss does not appear when calculating the standard deviation of the return as a result of squaring the values, which makes them positive in overall.[6]

The return types of and the methods of calculating it

1.2-Types

The return is classified into three main types:

A-Revenue return - the realized return that the investor receives as a dividend [4] and is calculated by the following formula :

$R= Dt/ Pt$ …… (1)

Dt = the dividend paid for the period t

Pt = market share price for t

B- The capital return It is the return that results from the difference between the current purchase price and the sale price for a later period, and it is the return model approved by our current research in the applied side of it and calculated according to the following formula: -

$Ri=P1-P0/P0$ ….. (2)

As: - P0 = purchase price, P1 = sale price

C- Realized return It represents the ratio of net achieved income (income + capital) as a result of investing of a specific share divided by the purchase price

It is calculated according to the following formula

$Ri= D1+P1-P0/ P0$ …… (3)

2 – The risk

2.1- concept

The risk is defined as (the probability of the achieved return falling behind the expected return on the investment but in the case of a risk-free investment, the achieved return and the expected return are equal[7]. It is also (the variance or fluctuation in the expected returns); as confirmation of this concept the risk was defined as (the probability of fluctuation and variance in achieved returns about expected returns)[8]. Accordingly, the risk is expressed as (the fluctuation of the achieved return or the failure to exceed the expected return in light of the historical data of the asset depending on the dominant conditions of the market[9].

2.2- Classification and methods of calculating risk

The risk is generally categorized into three basic types, as follows:

2.2.1- Total risk

It is a risk that includes both regular and irregular risk. This type of risk is calculated based on the following [10]

Total risk = Systematic risk + Unsystematic risk...(4)

2.2.2-Unsystematic risk (diversification)

It is the risk that is caused by the elements of a single company or occurs within a specific economic sector, such as a workers strike, mismanagement of the company, and a high debt ratio. This type of risk can be avoided by diversification according to Markowitz's thesis (Modern Portfolio Theory) based on the correlation relationship [11] between each pair of financial instruments in the investment portfolio to calculate the return on investment for one period [12]

The irregular risk of returns is calculated by Standard deviation, which is approved to calculate the total risk before it is divided into two parts, as follows: - [11]

Calculation of risk based on historical data

$бi=\sqrt{(\sum(Ri-\bar{R})^2/ N)}$……(5)

Calculating of risk based on probability data

$бi =\sqrt{(\sum Pi\ (Ri-\bar{R}))^2}$…… (6)

The observation on the formula (2-4) related to the historical standard deviation is the calculation of the square of the difference between viewing and the mean of the total views, and this squaring made the results positive in total as a result the profits here are equal to the losses which makes the standard deviation an inaccurate measure to calculate the risk. Since the deviation of profits from its arithmetic mean represents the higher this value; the higher the safety ratio, this means a contrary relationship with the deviation that indicates a low risk. Contrary to the deviation of negative values from its arithmetic mean which represents the actual risk to which the returns can be exposed in the light of the historical data on which the evaluation process was conducted, the higher the value of this deviation, it must prepare two deviations for each sample. One for the positive values as a safety standard and another for the negative values as a risk standard and then compare them to the same share as well as to other shares.

2.2.3-Systematic risk (non-diversification)
It is that part of the risk that is caused by the elements that affect the market as a whole and their impact extends to the overall economy and cannot be disposed of through diversification. Among these elements – the inflation, profit rates and the financial and monetary policies [13]. It is calculated through the beta factor (B) As follows: -

As the amount of the variance in the return of the share represents a percentage of change in the return of the market index[14]. The process of calculating the risks of all kinds is a basic and important in assessing the possibilities of achieving the return or not, and the degree of deviation of this return from its calculation gives a clear assessment of the degree of risk. The investor can be exposed to with a direct relationship between the return and the risk according to what is currently followed in the models of calculating the risk, and here is the point of disagreement that will be addressed later.

IV. DATA & METHODOLOGY

The study collected data from the American financial market to provide its historical data accurately and for a long historical period. Also, the importance of this market performance and its reflection on the global economy. The research sample is the ownership market that is represented particularly by the market of the common share since it is the most dangerous circulating financial instrument in the financial market. As the level of economic performance is reflected in the prices of this asset significantly, two samples of shares were approved for leading companies in the relevant market General Electric Company (GE) and Apple Company. The research deals with US shares prices for (60) months, which is the period between 2014-2019

V. RESULTS & DISCUSSIONS

Before analyzing the share data, we will look at analyzing the default share prices of positive and negative returns that have been mentioned in the introduction to the research as shown in table (3-1) in which columns (1,2) represent default prices, while columns A, B, C, D, E) represent the returns of calculated shares (Ri) for the indicated columns. We note that column (A) with positive returns (Ri) completely about share prices in column (1) achieved a high standard deviation of (27.7%), noting that the observations have achieved continuous profits without achieving any loss. This means that there is no risk at all despite the low return, while the result of the standard deviation of negative values was the same as the positive values achieved (27.7%) with continuous losses achieved within the column (B) as fully negative returns i.e. high risk. This is an illogical result for the first case and acceptable to some extent in the second case, as column (C), which represents return prices for column (2) which is the price of the inverse of column (1). It has achieved a deviation of (13%) While the average return was below zero a lot as it reached (-20%), which requires achieving a greater deviation from its value to match the risk to which the return is exposed Either when calculating the standard deviation for both returns combined (A, B) within column (E) The standard deviation increased to (40%) without achieving an increase in the return, but the return faded to reach (0%). This means that the increase in the value of the standard deviation was not matched by an increase in returns, but the results were counterproductive, as the return was completely lost; whereas, the result of the standard deviation of the total returns (A, C) within column (D) with a value of (33%) for return (5%) only. This is not acceptable compared to the results of column (A), which gives a clear impression of the inaccuracy of the standard deviation as a standard for evaluating the risk as currently approved is the direct relationship between the return and the risk.

As for the application side, two US shares were chosen, namely General Electric Company (GE) and Apple Company (APPL), for the accuracy of the data that provided by this market, as the actual risk level was tested (based on the negative and the positive views separately) The previously adopted risk level (based on views as a whole).The results showed the clear difference in the accuracy of the analysis and its results when the standard deviation is adopted as a risk for negative views, while the same standard (the standard deviation) is valid to measure the profitability of the positive views of the same sample. Besides, this idea is the philosophy adopted in share risk analysis through this research to accurately determine a new concept in the process of using

standard deviation to measure the risk and the level of safety via using the same standard. GE share was tested for views covering five-year between (2014-2019), excluding the months in which the closing price of the share did not appear and the results were different and more accurate according to the new entry depending on the values shown in the table (3-2) As the work was done in a way different from the traditional method of calculating and assessing the total return and risk using the standard deviation. Here, two values were adopted for the standard deviation, we will address them for use later, but in the beginning, the values were read for the total arithmetic mean and standard deviation that was achieved, and its value had reached (8.17) with arithmetic mean reached (20.21)

This means a very high standard deviation value for the share market value. In order to reach a greater accuracy of the deviation value. The prices were calculated based on the logarithmic root for approximation of the values together, consequently the value was more logical as it reached (19.4%) with an average mean value of (1.29). As for the results of calculating these values are based on the average return (Ri), the average total return value has a very low negative value (-0.01) with a deviation level of (8.9%)

This value represents the standard deviation of the sum of negative and positive returns and here the problem lies as the positive return values represent the state of profitability. It is a positive case whenever the value of the deviation increases, as it indicates that the share is achieving fully positive returns that exceed the average total return (Ri) of -1% for the negative values. The high of its standard deviation indicates that the share achieves losses greater than the average that the negative returns achieved, but rather higher than the average total return despite its negative value, and this represents the actual risk that the investor must take into consideration and in light of the above. The positive returns have been separated that represents profitability from the negative returns that represent losses and here we note that the average value of positive and negative views was identical with the value (6%) (- 6%), respectively. This indicates a balanced average return between profit and loss, but when we return to the level of the risk represented by the standard deviation, thus the results were more distinguishable. The value of the deviation of the positive (positive) returns was (7.4%), while the negative values achieved a deviation of (5.8%). Here, we get to the core of the topic as these values indicate that the returns to the share tend to achieve profits greater than its tendency towards losses because the positive deviation is greater than the negative deviation. This indicates its preference in the selection process as an investment tool in comparison with another share whose positive deviation is less than the negative deviation.

As for the analysis of the shares returns of (Apple) that appear in Table (3-1), the views with negative returns (-Ri) representing the state of the loss (loss) of the share price have been separated from the observations with positive returns (+ Ri) that represent the achieved profitability value of the share price, as in the case with the previous sample. The results were more realistic and accurate since the average value of the share price in its entirety amounted was (155.79) with a standard deviation of (47.64). These results with high values are not dependable while the results of the logarithmic root of the price is more stable. Thus the average price was (2.17), with a deviation of (12.8%), the average return (Ri) has achieved (2 %(. This return represents the difference as the average profit between positive returns and negative returns through what we observe from the average negative returns that reached (-5%) and the positive average return reached (7%), but this difference, which achieved a standard deviation (risk), reached (7.7%). It represents the deviation of the total values (winning and losing) from its arithmetic mean, and this reflects the result of an inaccurate risk as we indicated earlier. Here, the observations (negative from positive) were separated to find more accurate details about the performance of the share as it followed with the (GE) share. As the number of profit observations greater to reach (31) times, while the loss was observed (23) times, and these numbers themselves do not resolve the matter about the performance of the share. The focal point which the research revolves around is the value of the standard deviation for (profit and loss) separately. The value of the standard deviation of positive returns is the weighted for valuation. It represents the

level of realized profit (safety) that exceeds the arithmetic mean, and the higher it is, the better the performance of the share compared to other shares using the same measure and this means that the level of deviation of these values whenever it is high. The investor is granted a higher safety ratio to outperform the average return, while the value of the deviation of negative returns that represents the level of real risk that reveals the level of losses achieved by more than its arithmetic mean and the value was (4.6%). It has a value that is completely below the total average return (Ri) being negative values and here this ratio is the actual indicator of the risk that should be used for comparison with the risk of other share returns provided. It is used side by side in comparison with the safety index and the level verified at the same time. Consequently to choose the share according. The high value of the positive standard deviation indicates a high level of safety and a lower risk (contrary relationship), opposed to the deviation value of the negative returns that represent the risk (direct relationship) with the level of risk. Consequently, this detailed analysis gives the investor (according to his level of tendency to risk) greater flexibility and higher accuracy in the process of selecting the best financial instrument (share) for investment.

VI. CONCLUSIONS & RECOMMANDATIONS

A. Conclusions

1- The calculation of the standard deviation of returns in their total form (negative and positive) is not accurate and undependable as a risk indicator because the largest deviation of positive returns is preferred, and it represents a higher level of profitability than the average returns calculated in contrast to the deviation of negative returns.

2- The standard deviation of negative returns should be used only as a risk indicator because it represents the amount of the level of losses above its arithmetic mean to avoid evaluation based on the traditional standard deviation.

3- Adopting the average of the positive returns (Profit) as a tool compared with the average of the negative returns (Loss) in the process of choosing the target shares for investment and adopting the first scale only (Profit). That gives more accurate detailed results in light of the results achieved in the applied aspect in light of the vision (Elton et al)

4-This analysis enhances the investor's preferences according to his level of risk appetite, and then the investor can enhance the safety level of his chosen financial instruments.

5- The standard deviation of positive returns is characterized by an inverse relationship with risk, as it represents the level of safety, while the standard deviation of negative returns represents the reciprocal relationship (Trade off).

B. Recommendations

1-Adopting this technology more broadly in future research to reach the best results in multiple financial markets to test a multiple investment environment by separating positive returns from negative returns.

2-Avoid adopting the standard deviation in its currently adopted form, as it gets rid of negative values by squaring them that leads to unintended misleading in the results.

3-It is preferable to adopt the standard deviation of negative returns only as a way to measure the total risk per share.

4-Working to provide more detailed indicators for investors to maintain and stabilize the investment environment.

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APPENDIXES

Appendix .1

Table (3-1) analyzes the standard deviation of positive and negative values (profits andlosses) as default share prices.

1	A	B	2	C	D	E
1	*Ri*	*Ri*	11	*Ri*	*Ri(A,C)*	*Ri(A,B)*
2	1.00	-1.00	10	-0.09	1.00	1.00
3	0.50	-0.50	9	-0.10	0.50	0.50
4	0.33	-0.33	8	-0.11	0.33	0.33
5	0.25	-0.25	7	-0.13	0.25	0.25
6	0.20	-0.20	6	-0.14	0.20	0.20
7	0.17	-0.17	5	-0.17	0.17	0.17
8	0.14	-0.14	4	-0.20	0.14	0.14
9	0.13	-0.13	3	-0.25	0.13	0.13
10	0.11	-0.11	2	-0.33	0.11	0.11
11	0.10	-0.10	1	-0.50	0.10	0.10
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					-0.10	-0.50
					-0.11	-0.33
					-0.13	-0.25
					-0.14	-0.20
					-0.17	-0.17
					-0.20	-0.14
					-0.25	-0.13
					-0.33	-0.11
					-0.50	-0.10
Average	0.293	-0.293		-0.20	0.05	0
б	0.277	0.277		0.13	0.33	0.40

Source: - Preparing by the researcher using (Excel,2013)

Appendix .2

Table (3-2) Analysis of the return and risk of General Electric Company (GE) for the period (2015-2019)

GE	Close	price log	Ri	Loss	Profit
Dec, 2019	11.16	1.047664195	-0.010	-0.010	
Oct, 2019	11.27	1.051923916	0.129		0.129
Sep , 2019	9.98	0.999130541	0.116		0.116
Aug , 2019	8.94	0.951337519	0.084		0.084
Jul , 2019	8.25	0.916453949	-0.211	-0.211	
Jun , 2019	10.45	1.01911629	-0.005	-0.005	
May , 2019	10.5	1.021189299	0.112		0.112
Apr , 2019	9.44	0.974971994	-0.072	-0.072	
Mar , 2019	10.17	1.007320953	0.018		0.018
Mar, 2019	9.99	0.999565488	-0.038	-0.038	
Feb , 2019	10.39	1.016615548	0.063		0.063
Jan , 2019	9.77	0.989894564	0.342		0.342
Dec, 2018	7.28	0.862131379	0.010		0.010
Oct , 2018	7.21	0.857935265	-0.257	-0.257	
Sep , 2018	9.71	0.98721923	-0.106	-0.106	
Aug , 2018	10.86	1.035829825	-0.127	-0.127	
Jul , 2018	12.44	1.09482038	-0.051	-0.051	
Jun , 2018	13.11	1.117602692	0.002		0.002
May , 2018	13.09	1.116939647	-0.033	-0.033	
Apr , 2018	13.54	1.131618664	0.001		0.001
Mar , 2018	13.53	1.131297797	0.044		0.044
Mar , 2018	12.96	1.112605002	-0.045	-0.045	
Feb , 2018	13.57	1.132579848	-0.127	-0.127	
Jan , 2018	15.55	1.191730393	-0.073	-0.073	
Dec , 2017	16.78	1.224791956	-0.046	-0.046	
Oct , 2017	17.59	1.245265839	-0.092	-0.092	
Sep , 2017	19.38	1.287353773	-0.166	-0.166	
Aug , 2017	23.25	1.366422957	-0.015	-0.015	
Jul , 2017	23.61	1.373095987	-0.041	-0.041	
Jun , 2017	24.63	1.391464412	-0.052	-0.052	
May, 2017	25.97	1.41447195	-0.014	-0.014	
Apr , 2017	26.33	1.420450859	-0.056	-0.056	
Mar , 2017	27.88	1.445292769	-0.027	-0.027	
Feb , 2017	28.66	1.457276186	0.004		0.004
Jan , 2017	28.56	1.455758203	-0.060	-0.060	
Dec , 2016	30.38	1.48258777	0.027		0.027
Oct , 2016	29.58	1.47099817	0.057		0.057
Sep , 2016	27.98	1.44684771	-0.018	-0.018	
Aug , 2016	28.48	1.454539985	-0.052	-0.052	
Jul , 2016	30.04	1.477699928	0.003		0.003
Jun , 2016	29.94	1.476251796	-0.011	-0.011	
May , 2016	30.27	1.481012421	0.041		0.041

Apr , 2016	29.07	1.463445032	-0.017	-0.017	
Mar , 2016	29.57	1.470851325	-0.033	-0.033	
Mar , 2016	30.57	1.485295439	0.091		0.091
Feb , 2016	28.02	1.447468131	0.001		0.001
Jan , 2016	27.98	1.44684771	-0.066	-0.066	
Dec , 2015	29.95	1.476396827	0.040		0.040
Oct , 2015	28.79	1.459241665	0.035		0.035
Sep , 2015	27.81	1.444200989	0.147		0.147
Aug , 2015	24.25	1.384711743	-0.030	-0.030	
Jul, 2015	25.01	1.398113692	-0.004	-0.004	
Jun , 2015	25.1	1.399673721	-0.018	-0.018	
May , 2015	25.55	1.407390904	-0.026	-0.026	
Apr , 2015	26.22	1.418632687	0.007		0.007
Mar , 2015	26.04	1.41564098	0.091		0.091
Mar , 2015	23.86	1.377670439	-0.045	-0.045	
Feb , 2015	24.99	1.397766256	0.088		0.088
Jan , 2015	22.97	1.361160995	-0.055	-0.055	
Dec,2014	24.3	1.385606274			
Average	20.21	1.26	-0.01	-0.06	0.06
б	8.17	0.204	0.089	0.058	0.074

Source:- Preparing by the researcher using (Excel, 2013) according to data of http://finance.yahoo.com/quote/GE

Appendix .3

Table (3-3) Analysis of the return and risk of General Electric Company (Appl) for the period (2015-2019)

Apple	Close	price log	Ri	Loss	Profit
Dec, 2019	293.65	2.468	0.09878391		0.09878391
Oct , 2019	267.25	2.427	0.07432867		0.07432867
Sep, 2019	248.76	2.396	0.110684467		0.110684467
Aug , 2019	223.97	2.350	0.072961579		0.072961579
Jul , 2019	208.74	2.320	-0.020184	-0.020184	
Jun , 2019	213.04	2.328	0.076394503		0.076394503
May, 2019	197.92	2.296	0.130519221		0.130519221
Apr, 2019	175.07	2.243	-0.12757263	-0.12757263	
Mar, 2019	200.67	2.302	0.158937338		0.158937338
Feb , 2019	173.15	2.238	0.040314828		0.040314828
Jan, 2019	166.44	2.221	0.055154051		0.055154051
Dec, 2018	157.74	2.198	-0.1166984	-0.1166984	
Oct, 2018	178.58	2.252	-0.18404459	-0.18404459	
Sep , 2018	218.86	2.340	-0.03047754	-0.03047754	
Aug , 2018	225.74	2.354	-0.00830295	-0.00830295	
Jul , 2018	227.63	2.357	0.196226812		0.196226812
Jun , 2018	190.29	2.279	0.027983361		0.027983361
May, 2018	185.11	2.267	-0.00941831	-0.00941831	
Apr, 2018	186.87	2.272	0.130763645		0.130763645
Mar, 2018	165.26	2.218	-0.07219852	-0.07219852	
Feb , 2018	178.12	2.251	0.063847578		0.063847578
Jan, 2018	167.43	2.224	-0.01063641	-0.01063641	
Dec , 2017	169.23	2.228	-0.01524585	-0.01524585	
Oct , 2017	171.85	2.235	0.016623284		0.016623284
Sep , 2017	169.04	2.228	0.096807682		0.096807682
Aug , 2017	154.12	2.188	-0.0602439	-0.0602439	
Jul , 2017	164	2.215	0.102669266		0.102669266
Jun , 2017	148.73	2.172	0.032703791		0.032703791
May , 2017	144.02	2.158	-0.05721393	-0.05721393	
Apr , 2017	152.76	2.184	0.06341803		0.06341803
Mar , 2017	143.65	2.157	0.048616687		0.048616687
Feb, 2017	136.99	2.137	0.128883395		0.128883395
Jan, 2017	121.35	2.084	0.047746503		0.047746503
Dec , 2016	115.82	2.064	0.047955121		0.047955121
Oct, 2016	110.52	2.043	-0.02659856	-0.02659856	
Sep , 2016	113.54	2.055	0.004334365		0.004334365
Aug, 2016	113.05	2.053	0.065504241		0.065504241
Jul , 2016	106.1	2.026	0.018136455		0.018136455
Jun , 2016	104.21	2.018	0.090062762		0.090062762
May, 2016	95.6	1.980	-0.04265972	-0.04265972	
Apr , 2016	99.86	1.999	0.065286964		0.065286964
Mar , 2016	93.74	1.972	-0.03050988	-0.03050988	
Feb , 2016	96.69	1.985	-0.00667762	-0.00667762	
Jan , 2016	97.34	1.988	-0.07524226	-0.07524226	

Dec , 2015	105.26	2.022	-0.11022823	-0.11022823	
Oct , 2015	118.3	2.073	-0.01004184	-0.01004184	
Sep , 2015	119.5	2.077	0.083408885		0.083408885
Aug , 2015	110.3	2.043	-0.02320227	-0.02320227	
Jul , 2015	112.92	2.053	-0.06908491	-0.06908491	
Jun, 2015	121.3	2.084	-0.03292673	-0.03292673	
May , 2015	125.43	2.098	-0.03722751	-0.03722751	
Apr , 2015	130.28	2.115	0.040990811		0.040990811
Mar , 2015	125.15	2.097	0.068197337		0.068197337
Jan , 2015	117.16	2.069	0.061424171		0.061424171
Dec , 2014	110.38	2.043			
Average	155.79	2.17	0.02	-0.05	0.07
б	47.64	0.128	0.077	0.046	0.043

Source:- Preparing by the researcher using (Excel, 2013) according to data http://finance.yahoo.com/quote/Appl