

Task A

	S&P	Google	Yahoo	TNX
Date	Close Price(USD)	Close Price(USD)	Close Price(USD)	Close Price(USD)
01-06-2011	1320.640015	506.380035	15.04	3.158
01-07-2011	1292.280029	603.690002	13.1	2.805
01-08-2011	1218.890015	540.960022	13.61	2.218
01-09-2011	1131.420044	515.039978	13.17	1.924
01-10-2011	1253.300049	592.640015	15.64	2.175
01-11-2011	1246.959961	599.390015	15.71	2.068
01-12-2011	1257.599976	645.900024	16.129999	1.871
01-01-2012	1312.410034	580.109985	15.47	1.799
01-02-2012	1365.680054	618.250061	14.83	1.977
01-03-2012	1408.469971	641.240051	15.22	2.216
01-04-2012	1397.910034	604.849976	15.54	1.915
01-05-2012	1310.329956	580.860046	15.24	1.581
01-06-2012	1362.160034	580.070007	15.83	1.659
01-07-2012	1379.319946	632.969971	15.84	1.492
01-08-2012	1406.579956	685.089966	14.65	1.562
01-09-2012	1440.670044	754.5	15.98	1.637
01-10-2012	1412.160034	680.299988	16.84	1.686
01-11-2012	1416.180054	698.370056	18.77	1.606
01-12-2012	1426.189941	707.380005	19.9	1.756
01-01-2013	1498.109985	755.690063	19.629999	1.985
01-02-2013	1514.680054	801.200012	21.309999	1.888
01-03-2013	1569.189941	794.190002	23.530001	1.852
01-04-2013	1597.569946	824.570007	24.73	1.675
01-05-2013	1630.73999	871.220032	26.299999	2.164
01-06-2013	1606.280029	880.370056	25.129999	2.478
01-07-2013	1685.72998	887.75	28.09	2.593
01-08-2013	1632.969971	846.900024	27.120001	2.749
01-09-2013	1681.550049	875.910034	33.169998	2.615
01-10-2013	1756.540039	1030.579956	32.939999	2.542
01-11-2013	1805.810059	1059.589966	36.98	2.741
01-12-2013	1848.359985	1120.709961	40.439999	3.026
01-01-2014	1782.589966	1180.969971	36.009998	2.668
01-02-2014	1859.449951	1215.650024	38.669998	2.658
01-03-2014	1872.339966	1114.51001	35.900002	2.723
01-04-2014	1883.949951	1068.690308	35.950001	2.648
01-05-2014	1923.569946	571.650024	34.650002	2.457
01-06-2014	1960.22998	584.669983	35.130001	2.516

01-07-2014	1930.670044	579.549988	35.810001	2.556
01-08-2014	2003.369995	582.359985	38.509998	2.343
01-09-2014	1972.290039	588.409973	40.75	2.508
01-10-2014	2018.050049	567.869995	46.049999	2.335
01-11-2014	2067.560059	549.080017	51.740002	2.194
01-12-2014	2058.899902	530.659973	50.509998	2.17
01-01-2015	1994.98999	537.549988	43.990002	1.675
01-02-2015	2104.5	562.630005	44.279999	2.002
01-03-2015	2067.889893	554.700012	44.439999	1.934
01-04-2015	2085.51001	548.77002	42.57	2.046
01-05-2015	2107.389893	545.320007	42.939999	2.095
01-06-2015	2063.110107	540.039978	39.290001	2.335
01-07-2015	2103.840088	657.5	36.669998	2.205
01-08-2015	1972.180054	647.820007	33.689999	2.2
01-09-2015	1920.030029	638.369995	28.91	2.06
01-10-2015	2079.360107	737.390015	35.619999	2.151
01-11-2015	2080.409912	762.849976	33.810001	2.218
01-12-2015	2043.939941	778.01001	33.259998	2.269

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B-

Average return value of google is **0.795281**

Average return value of yahoo is **1.469708**

According to business leaders risk and average return relationship is defined as lower return associated with lower risk and higher return associated with higher risk. On the other hand it is also defined as the more variance will be there in return the more would be riskier the stock to invest and vice versa. Here, the average return value of google is lower than yahoo so risk associated with yahoo stock is higher than that of the google.

C- Perform the Jarque-Berra test of normally distributed returns for each of Yahoo, Google and S&P

For S&P

Jarque-Berra test= $n \left[\frac{\{(skewness)^2\} + \{(kurtosis)^2\}}{6} \right]$

Where n= sample size which is 55

Calculated skewness in spread sheet= -0.15018

Calculated kurtosis in spreadsheet= 0.587669

JB TEST STATS= 3.3725

For Google

$$\text{Jarque-Berra test} = n \left[\frac{\{(\text{skewness})^2\} + \{(\text{kurtosis})^2\}}{6} \right]$$

Where n = sample size which is 55

$$\text{Calculated skewness in spread sheet} = -3.490814797$$

$$\text{Calculated kurtosis in spreadsheet} = 20.55058$$

$$\text{JB TEST STATS} = 3983.0281$$

For yahoo

$$\text{Jarque-Berra test} = n \left[\frac{\{(\text{skewness})^2\} + \{(\text{kurtosis})^2\}}{6} \right]$$

Where n = sample size which is 55

$$\text{Calculated skewness in spread sheet} = 0.191657437$$

$$\text{Calculated kurtosis in spreadsheet} = -0.0498$$

$$\text{JB TEST STATS} = 0.359448365$$

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B-

For google

$$N = 36$$

$$\text{Probability (Z)} = \frac{(\text{Probable value} - \text{sample mean})}{\text{standard deviation}}$$

$$\text{Probable value} = 4\% \text{ of average return} = 0.031811$$

$$\text{Sample mean of population distribution} = \text{sample mean of sampling distribution} = 1.85$$

$$\text{Standard deviation} = \frac{6.90}{6} = 1.15$$

$$Z = \frac{(0.031 - 1.85)}{1.15} = -1.58$$

$$P(z \geq -1.58)$$

For Yahoo

N=36

Probability (Z) = (Probable value- sample mean)/ standard deviation

Probable value = 4% of average return= 0.058788303

Sample mean of population distribution = sample mean of sampling distribution= 1.30

Standard deviation= 8.02/6= 1.33

Z= (0.058-1.30)/1.33= -0.933

P (z>= -0.933)

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Hypotheses test

ARV (Average return value)

Null hypotheses H⁰= ARV of both the stocks are not same

Alternate hypotheses H¹ = ARV of both the stocks are different

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Date	Excess return of google (yt)	Excess Market Return(xt)	S&P 500Returns	Google stock Returns	10-year T-Bill rate
01-06-2011	NA	NA	NA	NA	3.158
01-07-2011	14.77233798	-4.975835635	2.170835635	17.57733798	2.805
01-08-2011	-13.18954448	-8.064750175	5.846750175	-10.97154448	2.218
01-09-2011	-6.834085479	-9.370710096	7.446710096	-4.910085479	1.924
01-10-2011	11.85926325	8.055659186	10.23065919	14.03426325	2.175
01-11-2011	-0.935466091	-2.575155381	0.507155381	1.132533909	2.068
01-12-2011	5.602223378	-1.021343431	0.849656569	7.473223378	1.871

01-01-2012	-12.54170153	2.4670044	4.2660044	-10.74270153	1.799
01-02-2012	4.390529019	2.001734502	3.978734502	6.367529019	1.977
01-03-2012	1.435087629	0.869147563	3.085147563	3.651087629	2.216
01-04-2012	-7.757342763	-2.667569988	0.752569988	-5.842342763	1.915
01-05-2012	-5.628061057	-8.050930807	6.469930807	-4.047061057	1.581
01-06-2012	-1.795104517	2.220271978	3.879271978	-0.136104517	1.659
01-07-2012	7.235418386	-0.240111514	1.251888486	8.727418386	1.492
01-08-2012	6.350718502	0.395060987	1.957060987	7.912718502	1.562
01-09-2012	8.013511134	0.757711887	2.394711887	9.650511134	1.637
01-10-2012	-12.03814185	-3.684784252	1.998784252	-10.35214185	1.686
01-11-2012	1.015526875	-1.321732721	0.284267279	2.621526875	1.606
01-12-2012	-0.474111757	-1.051663239	0.704336761	1.281888243	1.756
01-01-2013	4.621331165	2.934779205	4.919779205	6.606331165	1.985
01-02-2013	3.959929623	-0.788007245	1.099992755	5.847929623	1.888
01-03-2013	-2.730788892	1.683529388	3.535529388	-0.878788892	1.852
01-04-2013	2.078931698	0.117416591	1.792416591	3.753931698	1.675
01-05-2013	3.33925181	-0.108979758	2.055020242	5.50325181	2.164
01-06-2013	-1.433222767	-3.989292881	1.511292881	1.044777233	2.478
01-07-2013	-1.758216544	2.234772796	4.827772796	0.834783456	2.593
01-08-2013	-7.459751956	-5.928826758	3.179826758	-4.710751956	2.749
01-09-2013	0.753073248	0.316559129	2.931559129	3.368073248	2.615
01-10-2013	13.71936021	1.820997098	4.362997098	16.26136021	2.542
01-11-2013	0.03503009	0.025329003	2.766329003	2.77603009	2.741
01-12-2013	2.582036947	-0.697052593	2.328947407	5.608036947	3.026
01-01-	2.56937319	-6.291140749	-	5.23737319	2.668

2014			3.623140749		
01-02-2014	0.236282277	1.563337488	4.221337488	2.894282277	2.658
01-03-2014	-11.40940775	-2.032175138	0.690824862	-8.68640775	2.723
01-04-2014	-6.846096786	-2.029835682	0.618164318	-4.198096786	2.648
01-05-2014	-65.02322086	-0.375780405	2.081219595	-62.56622086	2.457
01-06-2014	-0.263940155	-0.628100338	1.887899662	2.252059845	2.516
01-07-2014	-3.43556368	-4.075468737	1.519468737	-0.87956368	2.556
01-08-2014	-1.859313218	1.353364432	3.696364432	0.483686782	2.343
01-09-2014	-1.474484951	-4.071543608	1.563543608	1.033515049	2.508
01-10-2014	-5.888142746	-0.041360105	2.293639895	-3.553142746	2.335
01-11-2014	-5.558832914	0.229747367	2.423747367	-3.364832914	2.194
01-12-2014	-5.582271738	-2.589738458	0.419738458	-3.412271738	2.17
01-01-2015	-0.384970736	-4.828277922	3.153277922	1.290029264	1.675
01-02-2015	2.558047077	3.341887644	5.343887644	4.560047077	2.002
01-03-2015	-3.353477868	-3.688919723	1.754919723	-1.419477868	1.934
01-04-2015	-3.120800205	-1.197527755	0.848472245	-1.074800205	2.046
01-05-2015	-2.725665549	-1.051327024	1.043672976	-0.630665549	2.095
01-06-2015	-3.3079621	-4.458555928	2.123555928	-0.9729621	2.335
01-07-2015	17.47515939	-0.250031675	1.954968325	19.68015939	2.205
01-08-2015	-3.683187326	-8.66247309	-6.46247309	-1.483187326	2.2
01-09-2015	-3.529484607	-4.739873126	2.679873126	-1.469484607	2.06
01-10-2015	12.26889002	5.82093795	7.97193795	14.41989002	2.151
01-11-2015	1.176444321	-2.167525814	0.050474186	3.394444321	2.218
01-12-2015	-0.301199768	-4.037565854	1.768565854	1.967800232	2.269

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a- CAPM stands for Capital Asset Pricing Model.

According to CAPM

$$r_t - r_{f,t} = \beta_M (r_{M,t} - r_{f,t})$$

Where, r_t = rate of return of preferred stock,

$r_{f,t}$ = risk free rate and $r_{M,t}$ = rate of return of market (S&P500)

$\beta_M = 0.762405951$ (calculated through CAPM formula in excel sheet)

b- Value of beta is 0.76 that means if the market falls down by 2% then the stock would fall down by $2 * 0.76 = 1.52\%$. The value of stock return will depend on beta value.

The profitability of the stock would be depend on market rise and fall and beta value as

Let assume if market is in the profit of 5% then the profitability of stock would be $0.76 * 5 = 3.8\%$.

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- If the value of beta is lower than 1 then it would be a defensive stock
- If the value of beta is equal 1 then it would neutral stock
- If the value of beta is greater than 1 then it would be aggressive stock

For neutral stock beta should be = 1

Therefore

Hypothesis testing

H^0 = null hypotheses = $\beta = 1$

H^1 = alternate hypotheses = $\beta \neq 1$

Confidence level = 95% (given already)

Level of significance $\alpha = 0.05$

The null hypotheses in this case would be neglected because the value of beta is not lying between interval of CI=95%.

So the stock would not be neutral.

Samples

Source:

<https://www.evestment.com/resources/investment-statistics-guide/jarque-bera/>

<http://finance.yahoo.com/quote%5egspc/history?p=gspc>

<https://finance.yahoo.com/quote/GOOGL?p=GOOGL>

<http://finance.yahoo.com/quote/YHOO/>

<http://finance.yahoo.com/quote/%5ETNX/>

Samples