MFNCE205 Financial Lab Task brief & rubrics

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**1.About company.**

I choose American Tower Corporation for analyze as I am interested in the position of the real estate market right now. American Tower Corporation is a publicly traded real estate investment trust (REIT) that specializes in owning, leasing, and managing communications sites. American Tower owns and operates over 186,000 communications sites in more than 20 countries around the world. The company's primary source of revenue comes from leasing space on its communications sites to its customers. American Tower has long-term contracts with most of its customers, providing a stable source of income for the company. American Tower has a strong track record of financial performance, with steady revenue and earnings growth over the years. Now about the financial position of the company. In the fiscal year ending in 2022, the company generated a total revenue of US$10.7 billion, representing a 14% increase from the previous year.

However, the company's net income for the year was US$1.77 billion, which was down 31% from the previous year's figure. This decline in net income was likely due to higher expenses incurred by the company in the year.The profit margin for the year was 17%, which is a significant decrease from the 27% profit margin recorded in the previous year. This decline in profit margin can be attributed to the higher expenses incurred by the company, which likely impacted its ability to generate a higher profit margin. Furthermore, the company's earnings per share (EPS) for the year were US$3.83, which is a decrease from the US$5.69 EPS recorded in the previous year.

**2. Interpretation of min, max and range.**

Min shows the worst day in two years for the company. ATC lost -6,65% per one day. So, investors should be ready to face with similar amount of investment if the have a long term strategy. The best day is when the price of the share increased by 9,42%. The difference between the best and the worst day is 16,07.

|  |  |
| --- | --- |
| min | -6,65 % |
| max | 9,42 % |
| range | 16,07 |

**3. Plot histogram.**

I can say that histogram is symmetrical, the level of skewness is low. I can see longer right tail than left one. It means that more extreme events relate to positive returns. Distribution is not normal as data are unsymmetrically distributed with skewness. Mean and median are not equal.

**4. Mean, standard deviation, variance, median, skewness, excess kurtosis, quartiles, IQR**

|  |  |
| --- | --- |
| MEAN | 0,002641960 |
| SD | 1,697588014 |
| Variance | 2,881805065 |
| MEDIAN | 0,038307335 |
| MODE | - |
| SKEWNESS | 0,136831743 |
| EXC. KURTOSIS | 2,391892645 |
| Q25 | -0,95332502 |
| Q75 | 1,031147726 |

IQR = 1,031147726 – (-0,95332502) = 1,984472746

Interpretation

Smaller standard deviation indicates that the data points (returns) are closer to the mean, which suggests that the data is more consistent or has less variability.

ATC has standard deviation 1,6976 %. Standard deviation is expressed in the same units as the original data and provides a quantitative measure of how much the data points deviate from the mean. So, mean is 0,002642 % - average return per day for the company and in most cases daily return will be by 1,6976% more or less. Standard deviation for ATC is small and price for the share isn’t volatile = not risky.

One key difference between median and mean is how they are affected by extreme values or outliers. The median is not affected by extreme values, as it only considers the middle value of the dataset. In contrast, the mean is affected by extreme values, as it takes into account the value of each data point. The median for the company is 0,038307335. Median is bigger than mean, so histogram will have flatter right tail and more extreme values at the positive side. In this case, average return per day for the company is 0,0383 % if I want to not affect my average return by extreme events.

Mode is a measure of central tendency that represents the most frequently occurring value in a dataset. I do not have similar numbers in the table.

Skewness helps understand how data is asymmetry from the normal distribution. Skewness > 0.5 – significant level. For ATC skewness is normal. ATC has positively skewed tail on the histogram.

Kurtosis is a measure of the shape of the probability distribution of a random variable. It measures the degree to which a distribution is more or less peaked and/or heavy-tailed than the normal distribution. ATC has 2, 39 Kurtosis. It is less than 3, so ATCs’ kurtosis is platykurtic (kurtosis < 3.0). Platykurtic distribution is considered relatively stable. ATC historically experienced fewer extreme price movements than other companies. As a result, company is associated with a moderate level of risk.

Q25 represents the value at which 25 % of the data is below it, while Q75 represents the value at which 75 % of the data is below it. The IQR, on the other hand, is a measure of the range of the middle 50% of the data and is calculated as the difference between the third quartile (Q3) and the first quartile (Q1). 25% of the returns are lower than -0,95% and 75% of the days have return less than 1

**5.Value-at-Risk and Jarque-Berra test**

|  |  |  |
| --- | --- | --- |
| JARQUE-BERA STATISTIC | 9,319882847 |  |
| VaR 99%, 1 day | -4,35006035 | my daily loss will not exceed -4,35 % with propapility 99% |
| Chi squared critical | 9,210340372 | For 1% |
| Quantile | -1,644853627 |  |

The Jarque-Bera test is a statistical test that is used to check whether a given dataset has a normal distribution or not. It is based on the skewness and kurtosis of the dataset and tests the null hypothesis that the data is normally distributed. Critical value which separete 99% and 1%is 9,21.

JB stat> JB crit (9,31>9,21). I reject H0 and distribution is not normal.

Value-at-Risk (VaR) is a statistical measure used to estimate the potential loss that an investment or portfolio of investments may experience over a specified time horizon, with a given level of confidence. It is a measure of risk that is commonly used by financial institutions, such as banks and hedge funds, to manage their exposure to market risk.

Valued-Risk analyze has helped to understand that daily loss of ATC will not exceed -4,35% with propapility 99%.

**Overall conclusion.**

* Daily loss will not exceed -4,35% with propapility 99%
* Reject H0 for JARQUE-BERA STATISTIC TEST and understand that data is not normally distributed
* Min -6,65 %– the worst return in two years (per 1 day), investors should be ready to face with that amount of loses.
* Positive skewness (extreme events relieve to positive returns in most of the cases), median return 0,03830 % per day (average return (not affected by extreme events)), company experienced fewer extreme price movements (kurtosis less than 3)
* Deviation from the mean return per day is 1,69758 %
* Company is not risky, and its returns are stable and consistent

**Additional**

Kolmogorov-Smirnov Test

It is another alternative to determine if the data is normally distributed. Level of significance for the test 1%.

I have calculated mean, standard deviation, find ranking for the data. Critical value for Kolmogorov-Smirnov Test with 1% significance and 503 data points is 0,07267811. Max Difference is more than critical value – distribution is not normal.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Rank | (Rank-1)/N | Normal Distribution | Difference | KS | KS (normal) |
|  |  |  |  | for the company | 0,01 |
| 1 | 0 | 1,68456E-25 | 1,68456E-25 | 1,68456E-25 | 0,07267811 |

**Reference**

Yahoo Finance. (n.d.). American Tower Corporation (REIT) (AMT). [online] Available at: https://finance.yahoo.com/quote/AMT?p=AMT&.tsrc=fin-srch [Accessed 10 March 2023].