

Applying Analytic Techniques to Business

Learner's Name

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Applied Business Analytics

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April, 2019

### **Microsoft Corporation**

Microsoft is one of the world's leading IT firms. With constant growth in its offerings, Microsoft currently develops and licenses computing software, services, devices, and solutions worldwide (Yahoo Finance, 2019). Some of Microsoft's prominent offerings include Microsoft Windows, which constitutes 35.5% of the market share for operating systems as of March 2019 (StatCounter, 2019), Office 365 Commercial Products and Services, available through cloud technology, and Microsoft Azure, a cloud platform for data storage and analysis (Yahoo Finance, 2019).

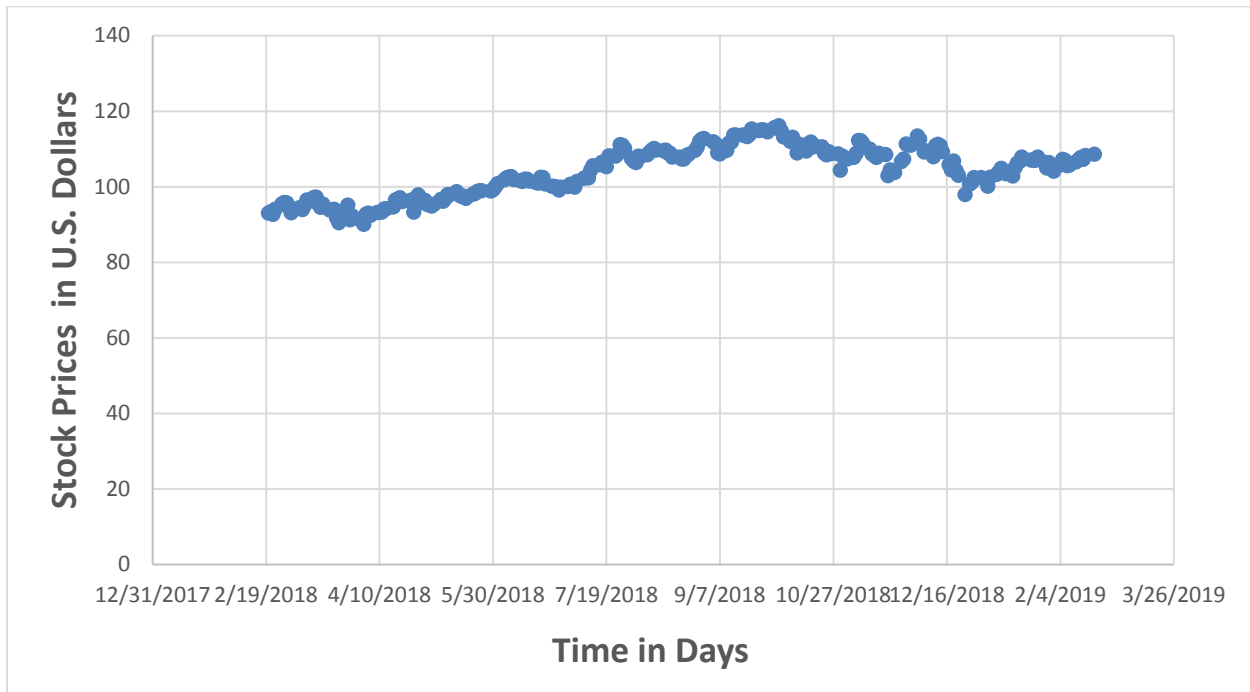
Although software has been the basis of Microsoft's success previously, in 2013, under the leadership of Steven Anthony Ballmer, the company announced a shift in focus toward the production of devices and services (Belanger, 2018). Consequently, there was an increased in production of phones, tablets, personal computers, and gaming hardware including as Xbox. This shift, however, was unsuccessful, largely because Microsoft's strategic acquisition of all of Nokia's Devices and Services business proved a significant failure (Belanger, 2018).

The change in leadership from Ballmer to Satya Nadella in 2014 redirected the company to profitable growth with a shift in focus toward business technological services and cloud computing (Belanger, 2018). The acquisition of LinkedIn, the development of Office 365, and the launch of Microsoft Azure generated significant profits for the company in the recent years (Belanger, 2018). For the past 5 years, Microsoft leadership has witnessed an average growth rate of 1.4%, and the company leaders are optimistic about generating a 7.5% increase in profits in 2020 (Simply Wall ST, 2019). What makes Microsoft's future really promising is its current standing; Microsoft generated a revenue of close to 32.5 billion U.S. dollars and a profit of 8.6

billion U.S. dollars owing to a 76% increase in the sales of Azure and a 39% increase in sales of surface tablets and laptops (Weise, 2019).

### Graphical Representations of Data

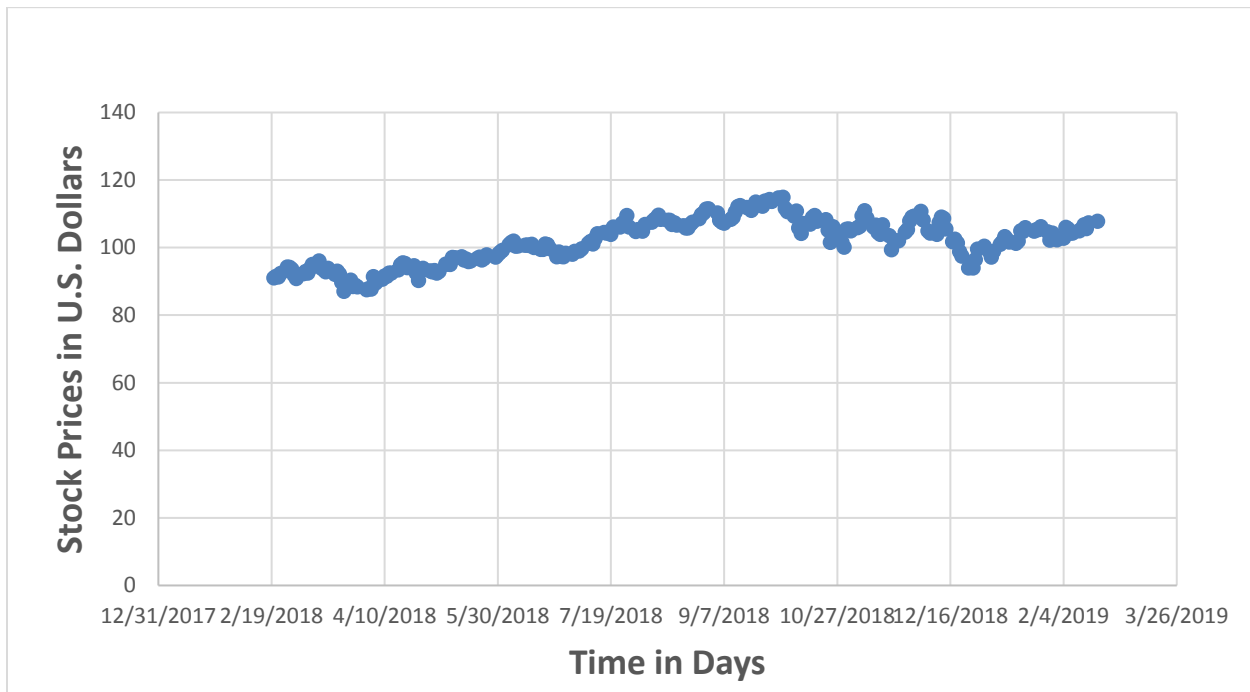
#### Interpreting the Scatterplots



*Figure 1.1.* Scatterplot of highest stock prices of Microsoft based on data from Yahoo Finance (2019)

Figure 1.1 depicts the trend in the highest stock prices of Microsoft from February 2018 to February 2019. The graph explains the relationship between two variables: highest stock prices (in U.S. dollars) on the y-axis, which is the dependent variable, and time (in days) on the x-axis, which is the independent variable. The scatterplot is linear: The highest stock prices show an approximately positive relationship with time in 2018. The highest stock prices for Microsoft increased in value in 2018. However, the relationship is moderately strong, as there is no significant increase in the value of the highest stock prices with time and there have been small

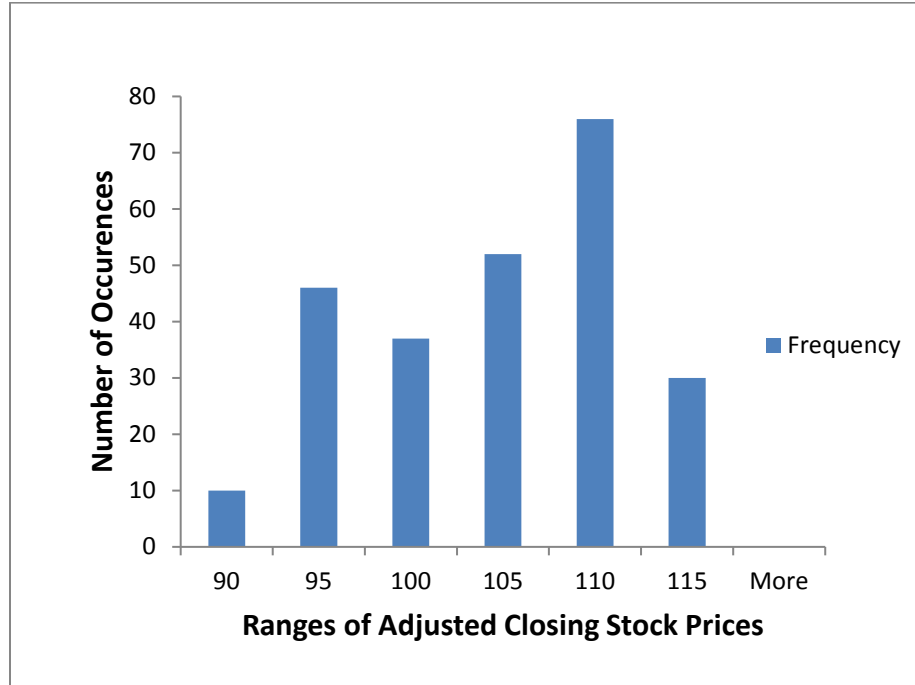
drops in prices toward the end of 2018 and subsequent rises in February 2019. There is a noticeable absence of significant outliers.



*Figure 1.2.* Scatterplot of lowest stock prices of Microsoft based on data from Yahoo Finance (2019)

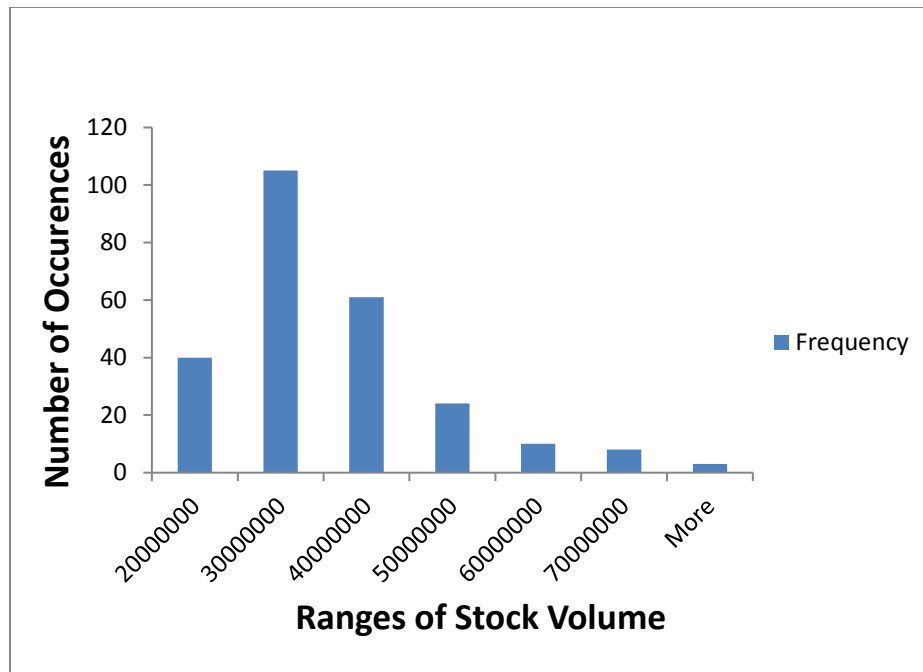
Figure 1.2 presents the trends in Microsoft's lowest stock prices from February 2018 to February 2019. The graph depicts the relationship between lowest stock prices (in U.S. dollars) on the y-axis, the dependent variable, and time (in days) on the x-axis, the independent variable. The scatterplot presents a moderately positive relationship between the lowest stock prices and time. The value of the lowest stock prices increased for approximately seven months from March to October, with small drops and recoveries between October and December. The scatterplot takes a positive linear form with a small slope, indicating low volatility in the lowest stock prices. The scatterplot also helps us understand that there are no significant outliers, which confirms the stability of Microsoft's market shares.

## Interpreting the Histograms



*Figure 2.1.* Histogram of adjusted closing stock prices of Microsoft based on data from Yahoo Finance (2019)

Figure 2.1 presents the number of occurrences of daily adjusted closing stock prices falling within equally distributed continuous data ranges. The ranges of adjusted closing stock prices are marked on the x-axis, and the number of occurrences of prices falling within the ranges of adjusted closing stock prices is marked on the y-axis. The histogram is skewed to the left; that is, a majority of the data points fall within the higher ranges of daily adjusted closing stock prices. This indicates that the histogram is negatively skewed with the median being greater than the mean, indicating volatility in the adjusted closing stock prices of Microsoft in the market.



*Figure 2.2.* Histogram of stock volume of Microsoft based on data from Yahoo Finance (2019)

Figure 2.2 presents the number of occurrences of Microsoft's daily stock volumes being bought or sold within continuous data ranges. The ranges of stock volume are marked on the x-axis, and the number of occurrences of stock volumes falling within the ranges is marked on the y-axis. The histogram is skewed to the right, indicating that a majority of the daily stock volume data points fall within the lower ranges of the stock volume. This indicates that the histogram is positively skewed with the mean being greater than the median. With 80% of the data points falling within the lower ranges of stock volume, the histogram is strongly skewed to the right, indicating unequal distribution and difficulty in speculating the daily stock volume of Microsoft.

### **Descriptive Statistics**

#### **Mean, Median, and Standard Deviation of Adjusted Closing Stock Prices**

The mean, or the average value of a data set, of Microsoft's adjusted closing stock prices is 101.939 U.S. dollars, indicating the healthy market standing of Microsoft's stock. It is indicative of the company's stable growth in revenue and profits throughout the year.

While mean is the average value of a data set, median is the data point that corresponds to the middle value in the data set. The median for Microsoft's adjusted closing stock prices is 103.249 U.S. dollars, which is greater than the mean, indicating the presence of outliers on the lower side of the stock prices; this highlights the prevalence of fluctuations in Microsoft's stock value. This difference in mean and median also indicates asymmetry in the distribution of values for adjusted closing prices. The standard deviation for the adjusted closing stock prices is 6.953 U.S. dollars; considering that the average stock price is 101.939 U.S. dollars, the volatility is 6.7%. The standard deviation is representative of the volatility in the stock pricing and, therefore, helps understand the level of risk involved in investing in a stock. The standard deviation suggests the prevalence of moderate risk in purchasing Microsoft's shares.

### **Mean, Median, and Standard Deviation of Daily Traded Stock Volume**

The mean of Microsoft's daily traded stock volume from February 2018 to February 2019 is 31,210,598, which is indicative of the high liquidity of the company's stock (Seth, 2018). Considering that a stock that is traded at fewer than 10,000 shares each day is deemed a low-volume stock (Seth, 2018), Microsoft's daily traded stock volume is representative of a large number of prospective buyers and, therefore, a highly valuable publicly traded firm. The median for the stock volume is 28,123,200, which is less than the mean. This indicates the presence of outliers on the higher side of the data set and, therefore, shows that the company has significant spikes in its daily tradable stock volume. The standard deviation is found to be 12,909,909.8, which is equivalent to 41.3% of the mean for stock volume. A standard deviation of 12,909,909.8 is representative of high volatility in the data set, which shows a considerable lack of consistency in the volume of Microsoft's stock.

### Conclusion

The graphical representations and statistical calculations of Microsoft's stock history gives valuable insights that could help management make decisions about the launch of new products and expansion. Some important trends that leaders should be aware of are as follows:

- While there is a gradual rise in the highest and lowest stock prices for the second and third quarter, the fourth quarter is characterized by moderate falls and recoveries in the highest and lowest stock prices;
- More than one fourth of the adjusted closing stock prices fell within the high-value range of 105 to 110, which is a signal of high demand;
- A volatility of 41.3% for daily traded stock volume indicates great unpredictability in the exchange rate of Microsoft's stock. High volatility in stock volume usually indicates unexpected earnings by a firm or the dissemination of good or bad news about the firm/industry in the market (Morah, 2018).

Awareness of trends in stock prices may help management decide to launch products or upgrade offerings in the early and later parts of the year, which may create hype and push sales during these periods; this may facilitate a further increase in gross revenue and profits during the stable periods of the third and fourth quarters. The histogram for adjusted closing stock prices shows that a large number of data points fall within the high-value range of 105 and 110 U.S. dollars with significant stock volume exchanged daily. This may inspire management to double stock volume by halving stock prices, which may help increase the demand for the stock and, therefore, improve market capitalization for the company.

The scatterplots for the highest and lowest daily stock prices indicate a positive linear correlation between time and stock value, which helps understand the impact of the improved



growth in Microsoft's revenue in 2018 compared with preceding years. The scatterplots also indicate better valuation of prices in the start of 2019 than in 2018; this demonstrates the impact of the company's quarterly performance, namely generating 32.5 billion U.S. dollars in revenue, on its market valuation at the start of 2019. Interpreting the histograms helps understand that while the median for adjusted closing stock prices was relatively on the higher range of the data set, the median for stock volume was on the lower range of the data set, reflecting high demand for Microsoft's stocks and, at the same time, a reservation on the part of Microsoft's shareholders to sell. This trend coincides with the fact that Microsoft, during the period, improved in its distribution of dividends (Weise, 2019), which could be why the rate of change in Microsoft's traded volume was lower than the rate of change in its stock pricing.

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