**Project One Report**

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**MATH 5230: Risk and Interest Rate Models**

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**INTRODUCTION**

This project is based on the study of ten individual stocks from five different sectors of the economy and one stock portfolio using Historical Data taken monthly from Yahoo finance for a period of 5 years from (October 2016- September 2021). The objective of this project is to apply the concepts of risk and return on these stocks and a stock portfolio.

The website marketbeat.com was instrumental in choosing the stocks used and two stocks were taken from Auto/Tires/Truck Sector, Medical Sector, Transportation Sector, Computer &Technology Sector and Utilities Sector each, summing up to a total of ten stocks.

The stocks used for this project under the various sectors are:

1. **Auto/Tires/Truck Sector** 
   1. Toyota Motor Corporation **TM**
   2. The Goodyear Tire & Rubber Company **GT**
2. **Medical Sector**
   1. Pfizer Inc. **PFE**
   2. Boston Scientific Corporation **BSX**
3. **Transportation Sector** 
   1. American Airlines Group **AAL**
   2. United Parcel Service **UPS**
4. **Computer &Technology Sector**
   1. Twitter **TWTR**
   2. Facebook Inc. **FB**
5. **Utilities Sector** 
   1. American Water Works. **AWK**
   2. Exelon Corporation. **EXC**

The following concepts were applied on the ten individual stocks using Excel software:

* Returns, which was gotten from the Adjusted Closing Prices using the formular – (Pt+1-Pt)/Pt
* Average and standard deviation of Monthly returns using inbuilt excel formulas
* Annual Average and standard deviation using the formula by multiplying the monthly values by 12 and the square root of 12 respectfully.

The same concepts were applied to an equally weighted portfolio of stocks which was created by averaging the ten individual stocks monthly. Then, we went further to create an Excel Plot with the standard deviation which is the volatility of the stocks on the x-axis and average return on the y-axis of the Annual Statistics of the equally weighted portfolio by first creating 3 columns on the worksheet, where the first column has the names of the chosen companies, the second column the annual standard deviation, and the third column the annual average return of the companies. Then we highlighted the second and the third column and used the Scatter Plot feature of Excel to create the plot.

**ANALYSIS**

The average annual return of the portfolio is 15.5% and on the individual stocks are, 10.1% for Toyota Motor, 2.6% for Goodyear Tire and rubber company, 21.8% for American Water Works, 13.1% for Exelon, 14.0% for Pfizer, 16.7% for Boston Scientific, -4.6% for American Airlines, 18.8% for UPS, 37.0% Twitter, 25.6% for Facebook.

The average annual return of the portfolio is 15.5% and five of the ten individual stocks gained annual returns that are below this, namely;

* Toyota Motor with 10.1%
* Goodyear Tire and rubber company with 2.6%
* Exelon with 13.1%
* Pfizer with 14.0%
* American Airlines with -4.6%

While the others gained annual returns above that of the portfolio.

We can also notice that the two companies from the Computer &Technology Sector did extremely well, turning over twice as much returns as that of the portfolio for Twitter and almost double for Facebook unlike the Transportation Sector where UPS did very well with returns of 18.8% while the second company chosen for that sector, American Airlines did very poorly. Not to go into extensive details, but with the way things has been the last year, with flights grounded all over the world, locally and internationally, we can deduce what could have been the cause or one of the causes for the poor performance of AAL.

A novice who isn’t well informed or knowledgeable about the concepts of risk and return may invest their money into the computer and technology sector or the utilities sector because these two sectors didn’t do bad at all in terms of returns turned over. However, to make proper and well calculated and informed decisions, we must look into the volatility of these companies.

Analyzing the volatility, we can see that the amount of volatility/ risks each individual stock carries is even more than the return. The highest earning stock which is UPS with returns of 37% has a volatility of 50.9% and it is followed closely by one of the lowest yielding stocks which is Goodyear Tire and rubber company with returns of 2.6% and volatility of 50.7% and then followed by the least earning stock, American Airlines with a loss of -4.6% and volatility of 43.4%.

It is unwise for an investor to invest in a stock with so little or no returns and very high volatility like Goodyear Tire and rubber company and American Airlines.

Even though the return on UPS is very high, the volatility is also a huge amount and it not advisable for an investor to invest in a stock with that amount of volatility.

However, we can see that the portfolio’s volatility is less compared to each individual stock except for AWK which has a volatility of 16.5% and a return of 21.8%. From this we can narrow the best investment decision would be to invest in either AWK as an individual stock or the portfolio. However, what happens when the utilities sector is not doing so well? This is why we have to think further beyond the excitement of making high profits, and adopt ways to reduce or mitigate risks, like risk diversification which is what the stock portfolio offers.

**CONCLUSION**

After studying the risks and returns of the individual stocks and the portfolio, we can conclude that an investment in AWK stocks will be a good and profitable one with lesser risks compared to the other stocks studied. Also, investing in the stock portfolio would be a good decision as in this case, when a particular sector or stock is not doing well the other stocks will complement the investors investment, thereby reducing the risks and mitigating absolute losses.

**Reference:**

<https://www.marketbeat.com/stocks/sectors/>

<https://finance.yahoo.com/>