TOP 10 CANADIAN STOCKS DATA ANALYSIS

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Introduction

In the world of finance, knowledge is the ultimate currency, and our analysis is your gateway. This report meticulously scrutinized daily stock prices of the top 10 Canadian stocks since 2010 to present you with a curated insight into the top-performing Canadian stocks. With insightful data-driven analysis, this report offers you a roadmap to navigate the complexities of the stock market. Discover which stocks have the potential to elevate your investment portfolio and make informed decisions that can shape your financial future. The report is going to use the given data to gauge as much data analysis as possible through the report that can drive important business decisions.

Statistical Analysis

This report used Top 50 Canadian stocks data from www.kaggle.com to get valuable insights into the Canadian stock market's dynamics. In order to give a more thorough analysis, the report filtered the top 10 companies' stocks by their market capitalization among these 50 stocks using www.marketbeat.com. The top 10 companies that are analyzed are:

1. RY: Royal Bank of Canada
2. TD: Toronto-Dominion Bank
3. CNQ: Canadian Natural Resources
4. ENB: Enbridge
5. CP: Canadian Pacific Kansas City
6. SHOP: Shopify
7. BMO: Bank of Montreal
8. BNS: Bank of Nova Scotia
9. SU: Suncor Energy
10. CVE: Cenovus Energy

The given data is time series data and did some data wrangling by counting blanks at the end of each column and found out that the data is clean, except for Shopify stock, which its stock started trading on the Toronto Stock Exchange in Q2 2015. Also used color to fill missing values to improve visibility on Excel sheet.

In original data (Sheet 1 of Excel file: Top 10 Canadian stocks) stock prices were recorded daily basis and the report was converted on a quarterly basis using Pivot Tables in Excel (Sheets 2&3 of Excel file: Top 10 Canadian stocks) and consolidated prices in quarterly basis.

The report used a line graph to illustrate the top 10 stocks data better and to avoid clusters in graphs, companies were divided into sectors. Graph 1 shows that financial sector companies follow similar patterns in price changes. However, Graph 2 shows that energy companies don't follow similar patterns. The price of CP showed a steady increase since 2010 in Graph 4.
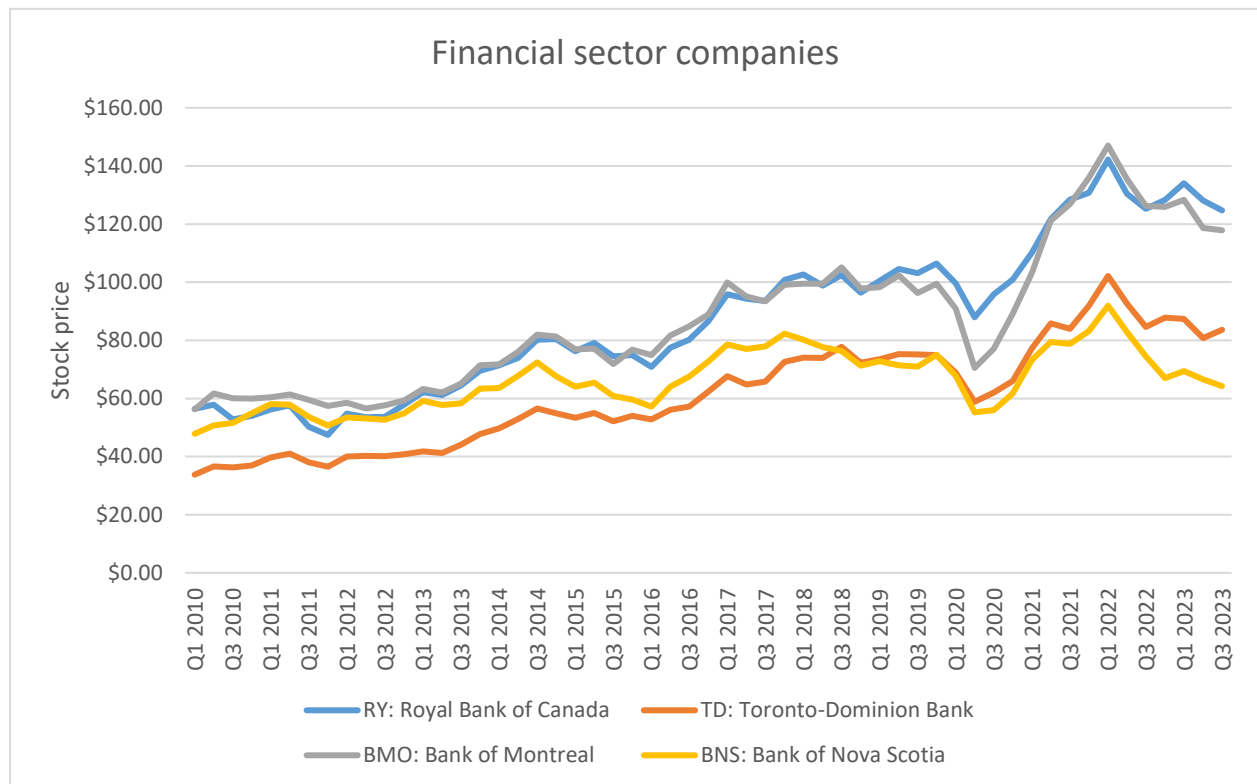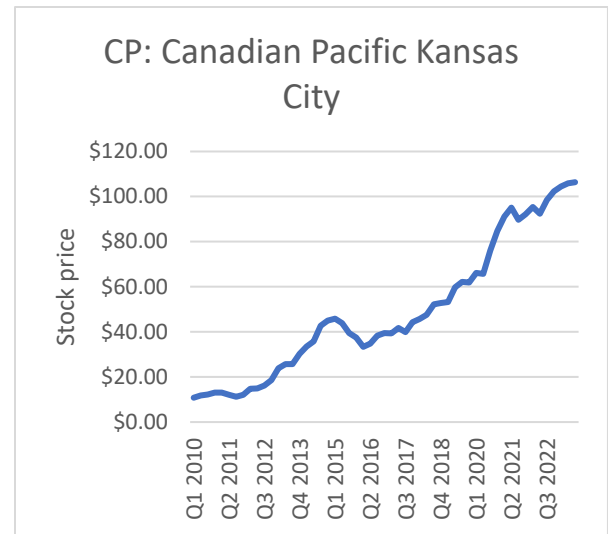
Graph 1: Financial sector stocks
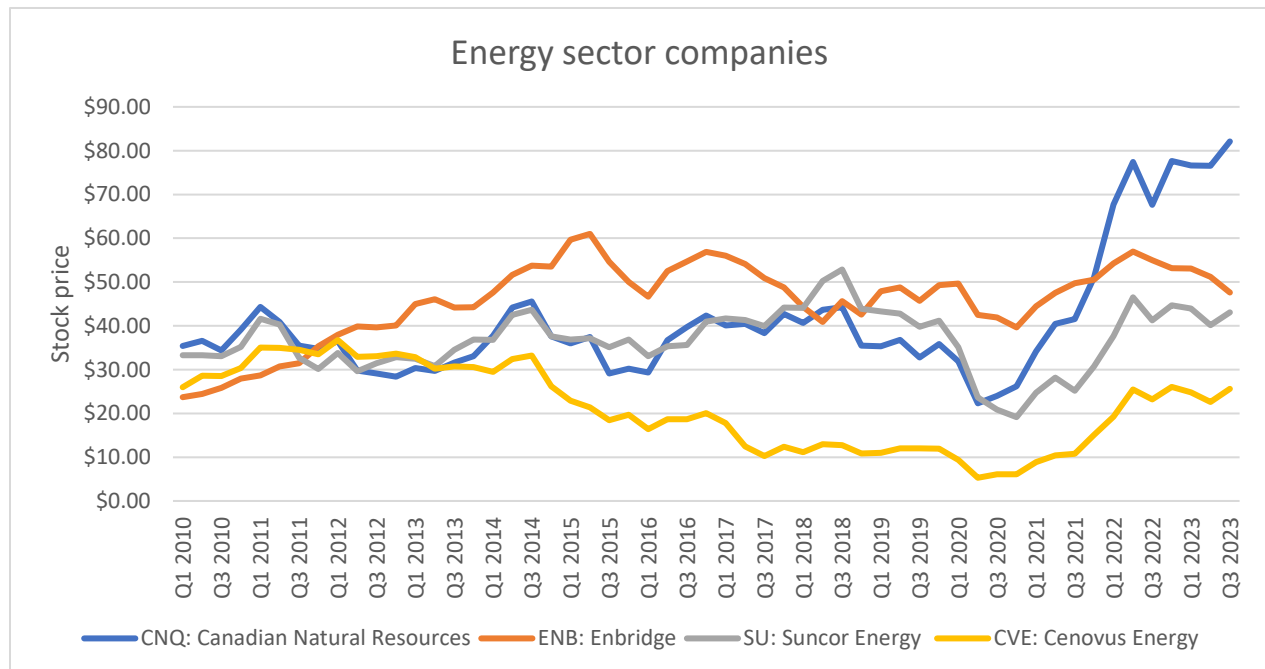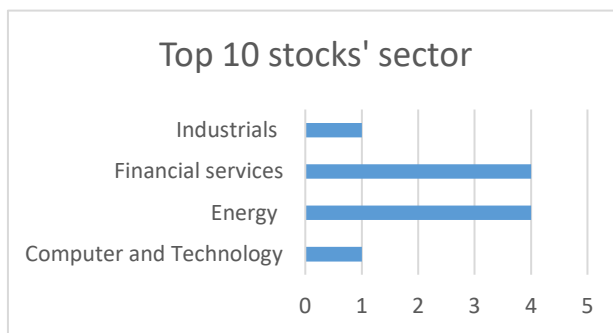

Graph 2: Energy sector stocks

Graph 3: Shopify stock (Sector: Computer and Technology

Graph 4: CP stock (Sector: Industrials)

To better illustrate their industries, the report used Histogram:

Graph 5: Histogram of sectors

Next, the report found a correlation between these stocks because correlation is a good measure that shows both the direction and strength of the two stocks. Also, conditional formatting to give better visualization of the data.

	RY	TD	CNQ	ENB	CP	SHOP	BMO	BNS	SU	CVE
RY: Royal Bank of Canada	1									
TD: Toronto-Dominion Bank	0.987019975	1								
CNQ: Canadian Natural Resources	0.654794962	0.624477392	1							
ENB: Enbridge	0.574739852	0.591967187	0.330623317	1						
CP: Canadian Pacific Kansas City	0.948054499	0.909601692	0.630017273	0.531200155	1					
SHOP: Shopify	0.523490527	0.550391537	0.013515974	0.673235563	0.665903677	1				
BMO: Bank of Montreal	0.9776042	0.980381747	0.712365103	0.57607025	0.893901432	0.526681048	1			
BNS: Bank of Nova Scotia	0.799080017	0.849460406	0.43829717	0.641868066	0.612012506	0.374814359	0.843757798	1		
SU: Suncor Energy	0.254080618	0.31807783	0.516416328	0.290410517	0.055564203	0.192275935	0.331461174	0.457685102	1	
CVE: Cenovus Energy	-0.599518614	-0.615647673	0.123218575	-0.332981654	-0.534751533	-0.638211435	-0.506913473	-0.541431412	0.069867378	1

Table 1: Correlation between stocks

Generally, the value of the correlation coefficient falls between -1 and 1. -1 means 2 stocks have a negative relationship, 0 means two stocks don't have a relationship, and 1 means that two stocks have a positive relationship. When the correlation coefficient is equal to -0.63 between **Shopify** and **Cenovus Energy**, it indicates a stronger negative linear relationship, whereas a correlation coefficient equal to 0.12 between **Cenovus Energy** and **Canadian Natural Resources** indicates a weak positive linear relationship. Correlation is important for choosing the right stocks in an investment portfolio. **RY**, **TD, BMO, and Canadian Pacific Kansas City** have almost perfect positive relationships, of which correlation coefficient is ranging from 0.97 to 0.98.

Next, the report found descriptive statistics of stock prices. Even though the underlying population is not evenly distributed (some negatively skewed and some positively skewed as shown in Table 2), when the number of observations is more than 30, we take the sampling distribution as a normal distribution. All 10 stocks are qualified to make inferences as normal distributions since the number of observations is 34 and 55. Through this information, we can make inferences about the population and make hypothesis testing.

RY: Royal Bank of Canada		TD: Toronto-Dominion Bank		CNQ: Canadian Natural Resources		ENB: Enbridge		CP: Canadian Pacific Kansas City	
Mean	87.69370327	Mean	61.329	Mean	41.073	Mean	45.8	Mean	49.127554
Median	86.53935512	Median	58.883	Median	36.755	Median	47.6	Median	42.694095
Mode	142.1970968	Mode	102.13	Mode	82.104	Mode	61	Mode	106.36419
Standard Deviation	26.44411977	Standard Deviation	18.129	Standard Deviation	14.356	Standard Deviation	9.03	Standard Deviation	29.944255
Kurtosis	-0.995472804	Kurtosis	-1.021	Kurtosis	2.1887	Kurtosis	0.21	Kurtosis	-0.858137
Skewness	0.289023388	Skewness	0.2196	Skewness	1.7018	Skewness	-0.8	Skewness	0.5477778
Range	94.75822572	Range	68.352	Range	59.803	Range	37.3	Range	95.572322
Minimum	47.43887108	Minimum	33.779	Minimum	22.3	Minimum	23.7	Minimum	10.791871
Maximum	142.1970968	Maximum	102.13	Maximum	82.104	Maximum	61	Maximum	106.36419
Count	55	Count	55	Count	55	Count	55	Count	55
Confidence Level(95%	7.148846788	Confidence Level(95%	4.901	Confidence Level(95%)	3.881	Confidence Level(95%	2.44	Confidence Level(95%)	8.0950659
Lower limit	80.54485648	Lower limit	56.428	Lower limit	37.192	Lower limit	43.4	Lower limit	41.032488
Upper limit	94.84255006	Upper limit	66.23	Upper limit	44.954	Upper limit	48.3	Upper limit	57.22262

Table 2: Stocks descriptive statistics, part 1

SHOP: Shopify		BMO: Bank of Montreal		BNS: Bank of Nova Scotia		SU: Suncor Energy		CVE: Cenovus Energy	
Mean	54.81	Mean	87.5393	Mean	66.261	Mean	36.7894	Mean	21.387
Median	39.58	Median	81.92952	Median	66.607	Median	36.853	Median	21.4
Mode	188.8	Mode	146.9973	Mode	91.901	Mode	52.8639	Mode	36.745
Standard Deviation	56.22	Standard Deviation	24.59118	Standard Deviation	10.348	Standard Deviation	6.92306	Standard Deviation	9.3733
Kurtosis	0.145	Kurtosis	-0.58953	Kurtosis	-0.7603	Kurtosis	0.24812	Kurtosis	-1.3677
Skewness	1.12	Skewness	0.580396	Skewness	0.2116	Skewness	-0.34606	Skewness	-0.0239
Range	185.5	Range	90.75919	Range	44.049	Range	33.7197	Range	31.447
Minimum	3.232	Minimum	56.23806	Minimum	47.852	Minimum	19.1441	Minimum	5.2984
Maximum	188.8	Maximum	146.9973	Maximum	91.901	Maximum	52.8639	Maximum	36.745
Count	34	Count	55	Count	55	Count	55	Count	55
Confidence Level(95%)	19.62	Confidence Level(95%	6.647926	Confidence Level(95%)	2.7973	Confidence Level(95%)	1.87157	Confidence Level(95%)	2.534
Lower limit	35.2	Lower limit	80.89138	Lower limit	63.463	Lower limit	34.9178	Lower limit	18.853
Upper limit	74.43	Upper limit	94.18723	Upper limit	69.058	Upper limit	38.661	Upper limit	23.921

Table 3: Stocks descriptive statistics, part 2

Using these descriptive statistics, we can get many insights. For example, we can see the minimum and maximum prices of the stocks. Skewness shows how the population is distributed. If skewness is negative, the price has been recently increased to its highest and if the skewness is positive, the price has been declining after some increase in prices. For instance, **Royal Bank, TD, Canadian Natural Resources, Canadian Pacific Kansas City, Shopify, Bank of Montreal, and Bank of Nova Scotia** prices have steadily dropped and haven't increased much since their highest prices. On the other hand, **Cenovus Energy, Suncor Energy, and Enbridge's** prices have been increased recently.

Higher standard deviation means it is riskier compared to others and at the same time, it is more rewarding. Shopify has the highest standard deviation, followed by **Canadian Pacific Kansas City, Royal Bank of Canada, and Bank of Montreal**.

Through the confidence level interval of 95 percent, we can assume the future average price of the stock. For example, the Royal Bank of Canada's average price in the future can fall between 80.54 (Mean-Confidence level 95%) and 94.84 CAD (Mean+Confidence level 95%) with 95 percent confidence. Depending on what price you're planning to buy a stock, this is a good estimate of the future average price.

Probability that Shopify price will reach more than 200 CAD per share:

Many hypotheses testing can be done using the information that we have on Excel sheet.

The price recorded as of September 2023 of Shopify is 74.14 CAD. Let's say that the probability that Shopify stock will reach more than 200 CAD. Using the Norm.dist function at Excel, it has a 0.5 percent probability that it will be over 200 in the future. The probability that it will be over 100 is 21.07%. Depending on which price you're buying the price this probability can be calculated on Sheet 6 of Excel Sheet: Top 10 Canadian stocks.

Next, the report found quarterly returns of stocks and to increase visualization, used conditional formatting to show price drops and ups. Next, the report found its mean and standard deviation, and with these findings, many inferences and hypothesis testing can be made. A higher standard deviation shows the stock has a higher risk and also has a chance of a higher return on investment. **Shopify, CNQ, CVE, and SU** have higher standard deviations based on returns estimates.

It also found its Sharpe ratio and a higher Sharpe ratio means the better the investment compensates its investors for risk. According to Table 4, **Shopify** gives better compensation for relative risks.

Quarter/Year	Returns RY	Returns TD	Returns CNQ	Returns ENB	Returns CP	Returns Shopify	Returns BMO	Returns BNS	Returns SU	Returns CVE
Q1 2010										
Q2 2010	2.56%	8.35%	3.29%	3.16%	8.67%		9.79%	5.93%	0.02%	10.10%
Q3 2010	-8.74%	-0.76%	-5.98%	5.74%	4.65%		-2.65%	1.66%	-0.62%	-0.14%
Q4 2010	2.44%	1.74%	13.69%	8.04%	6.69%		-0.27%	6.57%	6.39%	6.25%
Q1 2011	4.04%	7.42%	13.33%	2.61%	-0.38%		0.76%	5.82%	18.28%	15.47%
Q2 2011	2.54%	3.20%	-7.74%	7.27%	-7.23%		1.68%	-0.37%	-3.33%	-0.33%
Q3 2011	-12.77%	-7.10%	-13.22%	2.34%	-7.47%		-3.09%	-7.32%	-18.82%	-1.09%
Q4 2011	-5.68%	-4.10%	-2.02%	12.33%	8.43%		-3.58%	-5.55%	-7.87%	-3.14%
Q1 2012	15.53%	9.58%	5.06%	7.38%	21.43%		2.03%	5.42%	12.32%	9.79%
Q2 2012	-2.21%	0.53%	-18.46%	4.98%	1.56%		-3.53%	-0.57%	-12.43%	-10.43%
Q3 2012	0.05%	-0.04%	-2.25%	-0.46%	7.90%		2.11%	-0.75%	6.16%	0.35%
Q4 2012	7.84%	1.51%	-2.47%	1.05%	14.83%		2.80%	4.11%	4.51%	1.89%
Q1 2013	7.54%	2.57%	6.91%	12.15%	28.23%		6.72%	7.71%	-1.24%	-2.34%
Q2 2013	-1.74%	-1.53%	-2.21%	2.56%	8.18%		-2.03%	-2.26%	-5.09%	-8.09%
Q3 2013	5.49%	7.10%	6.41%	-4.14%	-0.33%		5.08%	0.90%	12.14%	1.67%
Q4 2013	7.91%	8.20%	4.55%	0.08%	18.07%		9.66%	8.66%	6.70%	-0.50%
Q1 2014	2.60%	4.20%	14.34%	7.70%	10.57%		0.38%	0.33%	-0.24%	-3.56%
Q2 2014	3.64%	6.43%	17.01%	8.40%	6.74%		6.01%	6.62%	15.50%	10.02%
Q3 2014	8.38%	6.72%	3.02%	4.13%	19.45%		7.77%	6.76%	2.84%	2.45%
Q4 2014	0.29%	-2.89%	-17.41%	-0.49%	5.50%		-0.71%	-6.58%	-13.99%	-21.24%
Q1 2015	-5.10%	-2.85%	-4.34%	11.56%	1.70%		-5.42%	-5.35%	-1.80%	-12.42%
Q2 2015	3.73%	3.25%	4.21%	2.19%	-4.20%		0.26%	2.35%	0.69%	-6.59%
Q3 2015	-5.91%	-5.33%	-22.32%	-10.50%	-10.18%	7.20%	-6.91%	-7.08%	-5.52%	-13.81%
Q4 2015	0.58%	3.73%	3.78%	-8.41%	-4.98%	-5.16%	6.94%	-2.03%	4.97%	6.61%
Q1 2016	-5.37%	-2.38%	-2.82%	-6.62%	-11.01%	-17.48%	-2.45%	-4.16%	-10.32%	-16.65%
Q2 2016	9.24%	6.30%	25.08%	12.40%	4.29%	16.58%	9.00%	12.00%	6.98%	13.81%
Q3 2016	3.63%	1.97%	8.14%	4.27%	10.24%	32.43%	3.85%	5.48%	0.90%	-0.04%
Q4 2016	7.85%	9.09%	6.56%	4.01%	2.90%	12.36%	4.90%	7.80%	14.78%	7.70%
Q1 2017	10.79%	8.36%	-5.31%	-1.62%	-0.32%	35.77%	12.34%	7.97%	1.87%	-11.33%
Q2 2017	-1.67%	-4.09%	0.91%	-3.33%	6.11%	49.61%	-4.82%	-1.96%	-0.85%	-29.87%
Q3 2017	-0.84%	1.43%	-5.29%	-5.92%	-4.39%	12.22%	-1.77%	1.08%	-3.43%	-18.09%
Q4 2017	7.82%	10.46%	11.48%	-4.16%	11.08%	2.08%	6.08%	5.75%	10.59%	20.85%
Q1 2018	1.86%	1.87%	-4.73%	-9.23%	3.07%	25.41%	0.41%	-2.58%	-0.11%	-9.62%
Q2 2018	-3.80%	-0.15%	7.31%	-7.74%	4.03%	11.79%	-0.09%	-3.12%	13.99%	16.21%
Q3 2018	3.73%	5.31%	1.32%	11.60%	10.05%	8.96%	5.72%	-1.79%	5.16%	-1.81%
Q4 2018	-5.96%	-7.16%	-19.83%	-6.70%	1.10%	-6.59%	-6.95%	-6.65%	-17.06%	-15.04%
Q1 2019	4.30%	1.65%	-0.39%	12.56%	0.83%	25.86%	0.48%	2.22%	-1.31%	1.78%
Q2 2019	4.03%	2.48%	4.03%	1.78%	12.11%	48.71%	4.16%	-1.89%	-1.09%	9.28%
Q3 2019	-1.35%	-0.23%	-10.84%	-6.26%	4.08%	30.03%	-5.95%	-0.69%	-7.06%	-0.35%
Q4 2019	3.16%	-0.25%	9.32%	7.88%	-0.47%	-1.84%	3.28%	5.74%	3.55%	-0.40%
Q1 2020	-6.39%	-8.09%	-11.06%	0.78%	6.79%	36.30%	-8.59%	-9.67%	-14.84%	-21.81%
Q2 2020	-11.69%	-14.47%	-30.02%	-14.41%	-0.59%	58.75%	-22.35%	-18.47%	-32.54%	-43.33%
Q3 2020	8.92%	5.41%	7.66%	-1.42%	15.77%	37.39%	9.36%	1.22%	-11.86%	15.40%
Q4 2020	5.29%	6.34%	9.09%	-5.45%	11.45%	3.08%	15.51%	10.28%	-8.21%	-0.76%
Q1 2021	9.20%	17.01%	30.43%	12.25%	7.53%	12.22%	15.75%	18.81%	29.34%	46.21%
Q2 2021	10.49%	11.18%	18.34%	6.77%	4.35%	-1.12%	17.46%	8.39%	13.63%	17.24%
Q3 2021	5.55%	-2.16%	2.69%	4.68%	-5.62%	24.85%	4.70%	-0.77%	-10.41%	3.51%
Q4 2021	1.82%	9.40%	22.91%	1.56%	2.72%	-2.09%	7.11%	5.60%	21.98%	40.26%
Q1 2022	8.72%	11.13%	32.63%	7.48%	3.47%	-44.18%	8.16%	10.42%	22.45%	27.57%
Q2 2022	-8.26%	-9.31%	14.43%	4.88%	-3.18%	-47.45%	-7.84%	-9.90%	23.54%	32.06%
Q3 2022	-4.00%	-8.69%	-12.70%	-3.38%	6.71%	-18.24%	-6.83%	-10.00%	-11.39%	-8.85%
Q4 2022	2.49%	3.85%	14.88%	-3.34%	3.81%	5.05%	-0.27%	-10.04%	8.44%	12.39%
Q1 2023	4.40%	-0.51%	-1.41%	-0.17%	2.09%	27.51%	1.93%	3.46%	-1.63%	-4.73%
Q2 2023	-4.45%	-7.63%	-0.02%	-3.61%	1.38%	27.97%	-7.56%	-3.97%	-8.67%	-8.93%
Q3 2023	-2.64%	3.55%	7.23%	-6.97%	0.46%	7.07%	-0.66%	-3.54%	7.29%	13.39%
Mean	1.66%	1.88%	2.36%	1.52%	4.60%	12.58%	1.63%	0.78%	1.17%	1.24%
Standard deviation	0.061328852	0.062262233	0.126604003	0.0676678	0.0774439	0.240392359	0.070776271	0.068415274	0.118262741	0.159807086
Number of observations	54	54	54	54	54	33	54	54	54	54
Treasury bill rate	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%
Sharpe ratio	-0.1883515	-0.150767036	-0.036605547	-0.1917153	0.2304476	0.405877899	-0.16850828	-0.298484344	-0.13934593	-0.09884522

Table 4: Stock returns and related statistics

Summary of findings

Summarizing daily stock price data to quarterly data has given us clean and shorter data to work on, where many graphs can be illustrated, and many probabilities of future stock price and hypothesis tests can be tested using this data.

The line graph gives us an insight into their relationships, and the sectors' histogram gives us a better idea of what companies are successful in the Canadian stock exchange and the overall economy.

Correlation between stocks gives a clear understanding of their correlations, so a better investment portfolio can be made using their correlation coefficients. In an investment portfolio, the correlation between stocks plays a big role, suggesting buying stocks that are less correlated to each other in order to minimize investment risks.

Descriptive statistics of stocks gave us an even better illustration of stock data and prediction of where the average price would be in the future.

Understanding which stocks have higher risks involved is easily displayed through the report by seeing standard deviations. Sharpe ratio was also analyzed to give insight into which stock gives higher reward compared to its risks.

Having these averages, standard deviation, expected value, confidence interval information, probabilities of certain values, and other hypothesis testing can continually be tested and evaluated using what the report found.

I hope this report will be insightful to guide your investment decision.