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STOCK MARKET SIMULATIONS

An interactive Qualifying Project Report: Submitted to the Faculty of
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Degree of Bachelor of Science

By

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ABSTRACT

This project is an eight-week stock market simulation, four of those weeks simulated with a portfolio meant to be diversified, and the other four simulated under a narrow portfolio. This project utilized real world trends, as well as statistics and numbers focused obtained from several reliable sources linked to the stock market. Both stock simulators started out with a portfolio value of 100,000 dollars, with this money being invested into sectors based on the makeup of the S&P 500. In the end, the diversified strategy demonstrated greater success than that of the narrow portfolio, finishing up with a positive gain of 2.44% while the narrow portfolio finished with a loss of 0.25% which wasn't too significant, but still lags the diversified strategy. Overall, the project helps provide insight into how to invest in the stock market, as well as providing experience in stock trading.

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CHAPTER 1: Scope and Understanding of the Stock Market

1.1 Scope of IQP

The purpose of this IQP is to gain an understanding of the Stock Market through both research and practical application of the sources that can be found online and through books. While real money will not be used throughout this project, the purpose is to take a direct feeling of importance in what one invests in, a simulation will be utilized, and the money invested will be treated as if it was real. The idea is that one can see successful investments through careful observation of real-world events and trends, instead of blindly placing your money in stocks in a manner very akin to senseless gambling. Using an initial budget of 100,000 dollars, a portfolio will be created that will be diversified between many different sectors of the stock market. The simulation in total will last four weeks, and throughout it, the main focus will be long-term growth with consistent changes to the portfolio in order to minimize losses. The main purpose is to learn, and understand how to invest soundly and properly, and by the end of it hopefully I will be able to invest with real world money for profit.

1.2 Preliminary Research

The first step was to refer to sources which have a much finer grasp of the intricacies of stock market investments. Several key websites have been discovered in this endeavor. One of them is Zacks.com, a website that consistently updates and provides noteworthy information on stock market trends and how they relate to economic events. Every day they provide information on stocks of all manners, be it long-growth stocks, stocks to short-sell and stocks that are already at a moment of influx for growth. Forbes is also utilized in this capacity to understand better which events may influence stocks, and which stocks might demonstrate future growth. Finally, applications such as Merril Lynch also provide insightful information on which stocks prominent investors and backs are keeping an eye out for, through a simple emphasis of buying, holding and disappointing metrics. In this matter, websites dedicated to providing noteworthy information on current events also provide an avenue for understanding where to invest, since stocks are primarily motivated by the current status quo in society. People place the value of stocks depending on whether they believe a stock will rise, or if a stock will drop. For these purposes, newspapers such as the New York Times provide a more eagle-eyed view of what events may affect stocks, and then one can defer to the judgment of economists or my own understanding of current societal events to know where to invest. Overall, the predominant strategy for the future of this project is to use the most profitable stocks to establish two different portfolios with differing levels of diversity. One portfolio will use the stocks garnered from these resources to make a highly diversified portfolio, otherwise known as a diversified portfolio and the other will have a much smaller selection of companies within different sectors, known as a concentrated portfolio.

1.3 General Plan

The general plan throughout this IQP is to utilize technical analysis to find and take advantage of the best stocks within the market. Technical analysis refers to the notion that through careful study of statistical trends and events, one can have a notion of which stocks are the most profitable to buy. Through this process, several different stocks will be bought from differing stock sectors. The main comparison that will be made between two different accounts of the Investopedia account will be in how much diversification each sector should have. That is to say, if the notion of buying several stocks from several companies in one sector is better than buying a lot of stocks from only

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one or two companies. This paper seeks to compare the two in order to observe if investing stocks in several companies helps minimize loss, or if investing large chunks of money in a single company helps provide a more profitable outcome. Investments will be performed in seven different sectors, specifically those that have been observed to have the most impact on current events, as well as potentially providing the most profit according to professionals on stock market investment.

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Chapter 2: Methodology and Strategy

2.1 Stock Simulator

The stock simulator that will be used in this project is the one provided by Investopedia, which uses real-time moment to moment changes in the values of stock. This means that the way the stock market operates within is very similar to the way it would work in real life. The price of each stock within the simulation matches that of the real-world value of the stock under the same company, giving a very accurate representation of what it would be like to invest in the stock market. This does mean that the price of stocks will not change through the buying of stocks from other players within the simulator, and thus it only tracks the changes in price from people using real money to buy those stocks. Investopedia also provides a bountiful amount of information related to both strategies, tips and stock options to invest in the future, making it a great source of information for profitable investments.

2.2 In-Depth Strategy

There are several different sectors in which stocks are placed depending on the company that those stocks belong to. These sectors go as follows, communications, consumer discretionary, industry, energy, healthcare, consumer discretionary, financial and technology. The idea for this initial investment is to diversify the portfolio in a way that represents most of these sectors with several companies. In every sector there will be a minimum of 3-4 companies, to keep the total cash from the simulation in several different stocks to minimize losses. As such, there will be several different stocks from different companies for each sector, and in total seven different sectors will be used.

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These will be as follows, the technology sector, the healthcare sector, the financial sector, the consumer discretionary sector, the industrial sector, the communications sector, and the energy sector. Each sector represents different amounts of potential for growth, both rapid and slow, long-term, or short and stable and explosive. For example, the industrial market is characterized for its strong growth during economic booms, meanwhile the communication sector tends to demonstrate a more consistent growth due to the nature of the internet today… but it may still face failure in companies that can be made obsolete by new technologies. All these factors were observed to design a diversified portfolio with over 20 stock options, spread out through specific percentages between every sector. Specifically, what this means is that thirty percent of the portfolio will be made up of technology stock options, fifteen percent is composed of healthcare stock options, another fifteen percent is made up of financial stock options, ten percent are composed of consumer discretionary, another ten percent is composed of industrial stock options, fifteen percent are in communication stock options and finally five percent are energy stock centers. This statistical make up was composed through a notion of assessment of risk and potential growth, with technology stock options being the dominant due to being characterized by their general continued growth, with fewer drastic drops in costs. Meanwhile, the energy sector was deemed as the one with the least stock options because of its general chaotic nature, and general reliance on economic booms. At most, each company within a sector will have around 5,000 dollars invested into it, at minimum they will have 3,000 dollars. This is so that each sector will have a diverse multitude of company stocks, and thus there will be mitigation of loss through the diversification of these investments. At least this is the expectation, as for the first four weeks this form of diversified investing will be performed to observe the potential success of this strategy. After these studies are performed, a new account will be made under the Investopedia simulator with a different

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approach. This approach will consist of investing large amounts of money in a single or very few companies. Which companies will be invested in will still be done through technical trading, but larger amounts of money will be spent on the stock of specific companies. In this form of trading, I expect there to be a higher chance for realized earnings, as small increases in stock should result in larger amounts of profit. Overall, this is meant to represent the idea of having all your eggs in one basket, and observing whether this strategy is advantageous in breaking a profit, or if it only leads to much greater losses. The initial investments for week one under a diversified portfolio are under Chapter 4’s first week simulation, and when they were purchased as well as the amount that was invested into each company can be observed below. As one can observe, the value invested in each company’s stock is not one that exceeds even 0.5% of the total cash power in which this simulation was started. This is because when one invests under several different holdings, the losses are somewhat minimized. When you invest 20,000 dollars into a single stock, if it goes down by %1, you are 200 dollars less than what you started. If instead, one places 5,000 dollars into four different companies under the same sector, it is unlikely that all four of those companies will go down by %1, thus through diversification the risk is diminished. Of course, this also goes for the rewards, if 20,000 dollars into the stock of one company were to rise by 1%, you’d be earning 200 dollars; but, to win that same amount with the 20,000 dollars divided equally into 5,000 dollars into four companies, they’d all have to rise by 1%. The main strategy is to compare how this diversification in the portfolio may or may not be more profitable than simply investing most of your money into the stock of a single company. Overall, this simulation will take place with two different portfolios, a diversified and narrow portfolio that will run for four weeks. The company selection between the two portfolios will remain the same, but the simulations will be run at different times throughout the ongoing project to formulate different results amongst the

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two different portfolios. This is so that one portfolio will not be affected by the same monthly events as the other, to critique the success and failures of each portfolio by differing timelines instead of a simple analysis based on the amount of growth that can be experienced by differences in initial investment.

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CHAPTER 3: Stocks Chosen and Why

3.1 Stock Selection Layout

In this first week of the simulation, the main purpose was to find stocks that represented the highest potential for growth in each sector. For this purpose, many different websites were used, including Investopedia.com and Zacks.com to understand the current economic sphere afflicting the stock market. Throughout this research, several companies were chosen, to a total of 25. These were extrapolated from reports on what would be the most profitable growing stocks of the months of both May, June, and July. Stocks from several distinct sectors were gathered, with each sector having its own set percentage on how much money should be invested. These percentages have been taken from what each sector's representation within the S&P 500 Index is how many of the 500 leading companies in the US are technologically based, communications based, etc. This division goes as follows, roughly 30% of these 500 companies are based in technology, around 12% are based in healthcare, another 15% is based on the financial sector, 15% is based on the consumer discretionary sector, 8% are based on the industrial sector, 10% is based on the communications sector and 3% is based on the energy sector. These percentages were tweaked in slightly altering orders in, but they follow a similar layout obeyed by both the diversified portfolio and the concentrated portfolio, which will serve to keep both portfolios being affected similarly by trends in the stock market.

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3.2 Technological Sector Selections

First, this paper will begin with an explanation of some technological sector stocks that seemed to have the greatest effect within these two portfolios. All these choices were made with the expectation that they would lead to profitable gains, as all these names were derived from websites written by professionals in stock market investing. Investopedia's information on revenue growth, when to buy stock options and more helps facilitate these choices, as well as Zacks.com's weekly choices for companies to purchase. Not all my technological sector picks will receive information, as there would be too much ground to cover that would detract from the actual importance in the discussion of this paper. Furthermore, Tesla was incorporated into the technological sector despite serving as a consumer discretionary in the diversified portfolio due to its strange nature of being labeled as both, but more importantly serving as the single technological sector pick within the non-diversified portfolio.

3.2.1 Tesla (TSLA)

The technological sector represents the highest percentage within the S&P Index, as the most profitable companies seem to be located under this characterization, surely due in no small part to the rise of the internet. A total of five different companies were selected for the technological sector in the diversified portfolio. There is a certain technicality that is worth mentioning when it comes to the stock of a particular company, that being Tesla stock. In the diversified portfolio it is not considered a tech-company due to the basis that Tesla was originally considered a consumer discretionary thanks to its predominant business in the automobile industry, specifically making up about 83% of its total revenue based on a financial report made in January 2023. Yet, Investopedia classifies Tesla as a weird mix of both sectors, without a completely

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established sector due to its particular stock growth trends, its negative price to earnings ratio which is usual in most technological companies due to investors trust in its future earnings thanks to consistently emerging new technology [47]. Tesla's revenue growth is also an indicator of its more technologically leaning department, as it balloons much higher than the general low to medium revenue growth seen in other automobile companies. Tesla's revenue growth comparisons are observable in Figure 3.1 below.

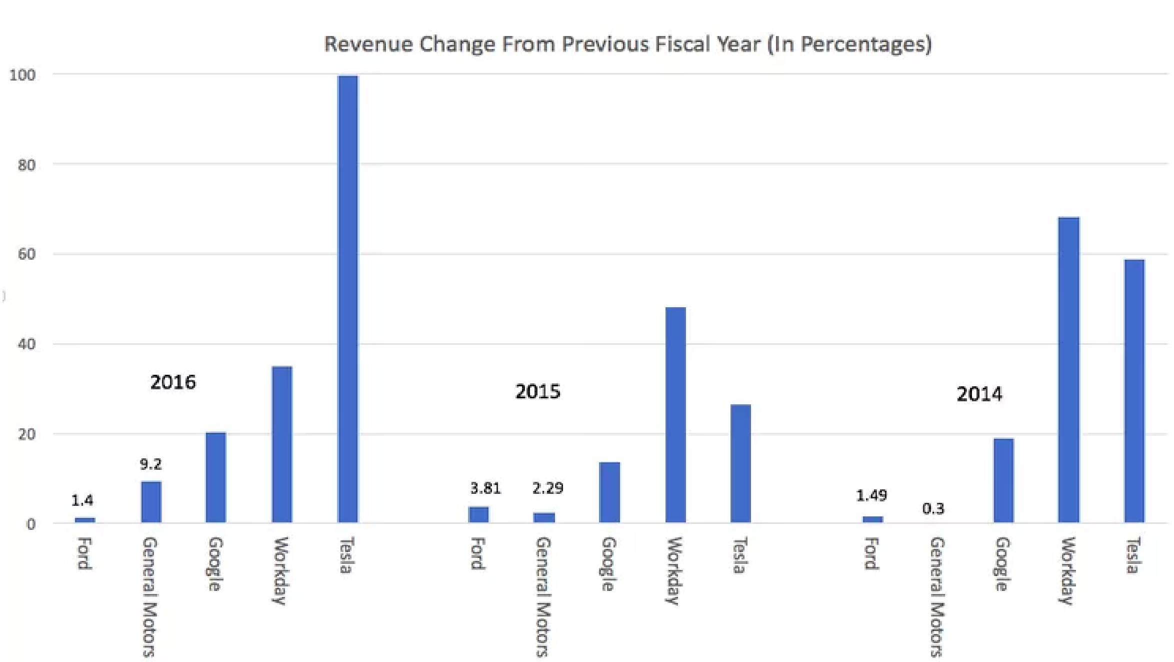

Figure 3.1: Tesla's Revenue Growth Compared to Automobile and Tech Companies

As demonstrated above, Tesla denotes exorbitantly higher revenue growths than other automobile companies and is generally much more in line with technological companies such as Google and Workday [49]. Overall, this demonstrates an enormous capacity for success for Tesla as a company in the future, which fills investors with trust despite how massively overvalued Tesla is today. While these metrics are old, there is another research which has shown that this revenue growth is still consistent, with a table demonstrating against Ford Motors and General Motors that Tesla's revenue growth is 8.4 times each stock sold, while for Ford and General Motors it is a measly 0.4x.

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This makes Tesla a very alluring stock which can satisfy the requirements for being labeled as both a consumer discretionary and technological company thanks to how technologically integrated their cars are, and their slight diversification of technological means to profit.

3.2.2 Nvidia (NVDA)

The NVDA stock belonging to the company Nvidia is at a prime moment to be bought due to circumstances that have occurred within the last few years. During the COVID pandemic in 2022, many factories had to close off due to the global situation, but what was particularly important was how this affected the computer chip industry. During this time, there was a sudden spike in worldwide demand for computer chips, particularly due to a spike in crypto mining. During this time, Nvidia was the greatest supplier of chips in a time where demand was skyrocketing, in the third quarter of 2022, Nvidia reported a record new high for their yearly revenue of 7.1 billion dollars [21]. The reason for this is that Nvidia does not create their own chips, as much as they design them, gaining them the label of a ‘fabless’ company. This demand continues to still be quite high even in our current year, despite the shortage being much more diminished, Nvidia has not been displaced in the leading design for computer chips. Most importantly, during this year a particularly important boom was recorded known as the “AI Boost”, particularly characterized by the release and development of ChatGPT, which has bolstered companies to make a greater effort in designing helpful and inventive AI [34]. In the last few months prior, Nvidia has seen a rise in its stock worth triple its value, giving a great incentive for it to be bought. This is observable during the months of December and June specifically, where this AI Boost occurred, and specifics can be seen in Figure 3.2 below.

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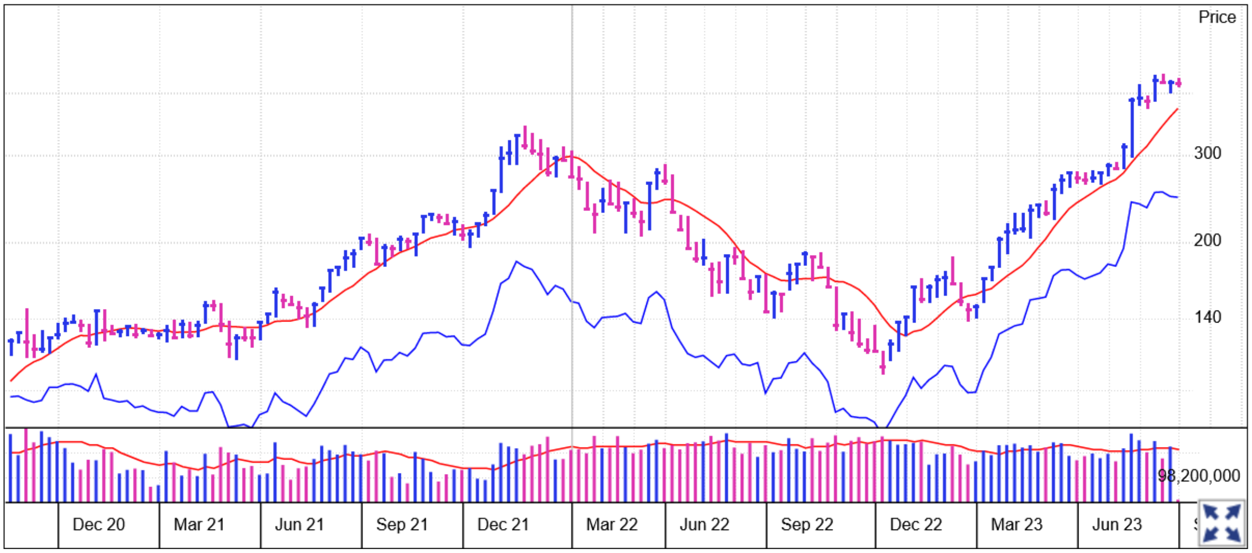

Figure 3.2: Nvidia Stock Growth due to AI Boost

3.2.3 Microsoft (MSFT)

Microsoft is one of the world's biggest technological companies, dealing with cloud-services, computing devices, and software. Originally created by Bill Gates in 1975, this company has played a major leadership role in the creation of computing devices as we know them today. Microsoft has been on the forefront of computer development, and thus has been a consistently healthy business pick for anyone wishing to invest in the stock market. While no stock is immune to the declines of the stock market, Microsoft is a tech giant that will not be going anywhere anytime soon. As such it has never seen a drop-off from which it cannot recover, and during this age of rising technological needs and new discoveries in the field of AI technology, Microsoft continues to be a strong and consistent pick. The yearly stock information is observable in Figure 3.3 below.

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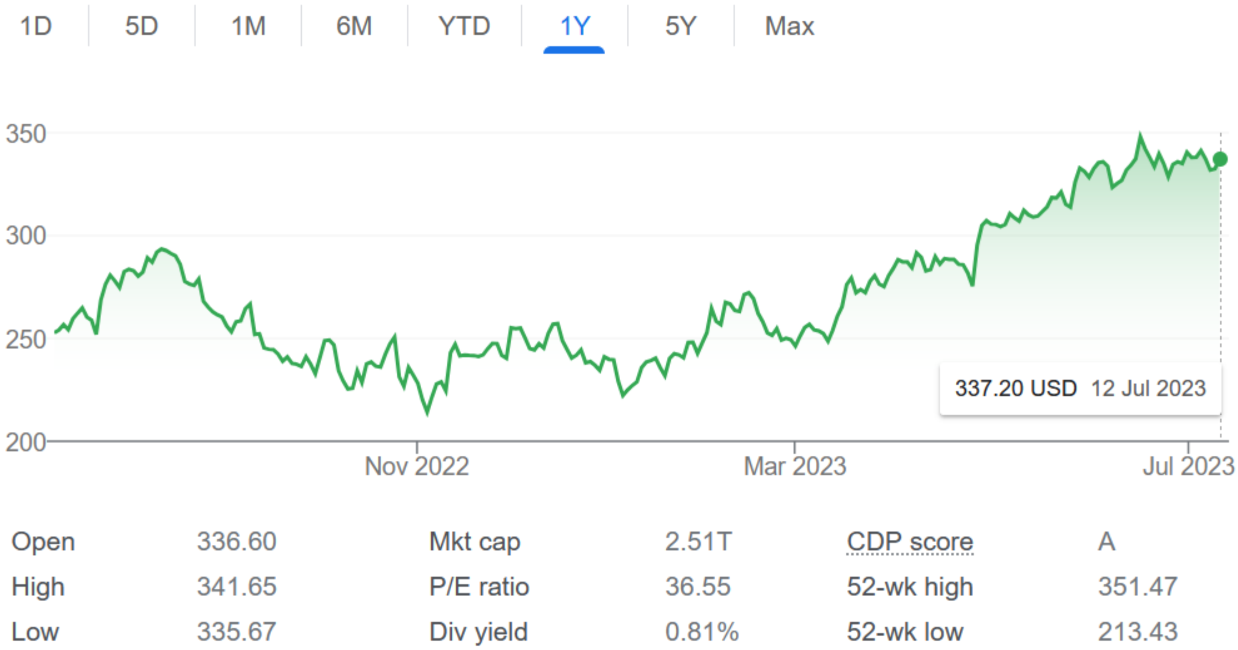

Figure 3.3: Microsoft Yearly Stock Information

3.3 Communications Sector Selections

The communications services sector is quite strongly linked with that of the technological sector, but with important distinctions that help establish it as its own characterization. The communication sector includes telecommunications companies, as well as those emphasizing in the entertainment industry. These include companies such as T-Mobile, Netflix, Disney and many more which have demonstrated somewhat consistent growth as the world becomes more prone towards digitization and online industries. This sector is generally characterized by significant growth thanks to the previously stated variables but does tend to result in some members of the sector lagging. Basically, it is important to choose communication companies ahead of the curve, as it is quite easy for companies within this sector to fall behind against their competitors if they are not consistently modernizing.

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3.3.1 Netflix

Netflix is a subscription-based company that has had a long-standing history in the communications sector. Netflix helped pioneer the streaming industry, and served as the first of its kind, serving as the inspiration for later services such as Hulu, Disney Plus, HBO Max and many more. During these last few years Netflix' stock has stowed, and at some moments downright dropped in value due to losing the rights to many tv-shows and movies thanks to the rise of many services such as itself. Many production companies that sold their rights to streaming to Netflix are now reclaiming these rights back and presenting them in their own streaming companies, resulting in a new drive in Netflix to try and find a way to compete. In the past, this was mainly done through Netflix originals, series, and movies which they owned the rights and distribution to, but these have always been somewhat hit or miss. While it is important to note that these factors make it seem as if Netflix is on its initial steps out, and especially after the year 2022 where its stock went down 35%, the company is anything but on the decline. Its revenue has been steadily growing, even after its stock's decline and has especially discovered an exciting new front which has bolstered trust in investors [40]. Specifically, it's their attempts to diversify their earnings and expand beyond the streaming industry. Recently they have been making an important push into the videogame industry, setting up a merger with the Finnish Mobile company. Overall, Netflix represents an entertainment company with a capacity for forward thinking. They have managed to stay above their competitors by cutting costs and expanding their operating margins, which compared to other competitors like Disney Plus, Showtime and Peacock this has not been the case, as many of these programs are at a moment where they are losing instead of earning from their streaming services. The stock charts speak for themselves, as Netflix in the last year has doubled the price of its stock, and right now it's hitting a new yearly peak as seen in figure 3.4 below.

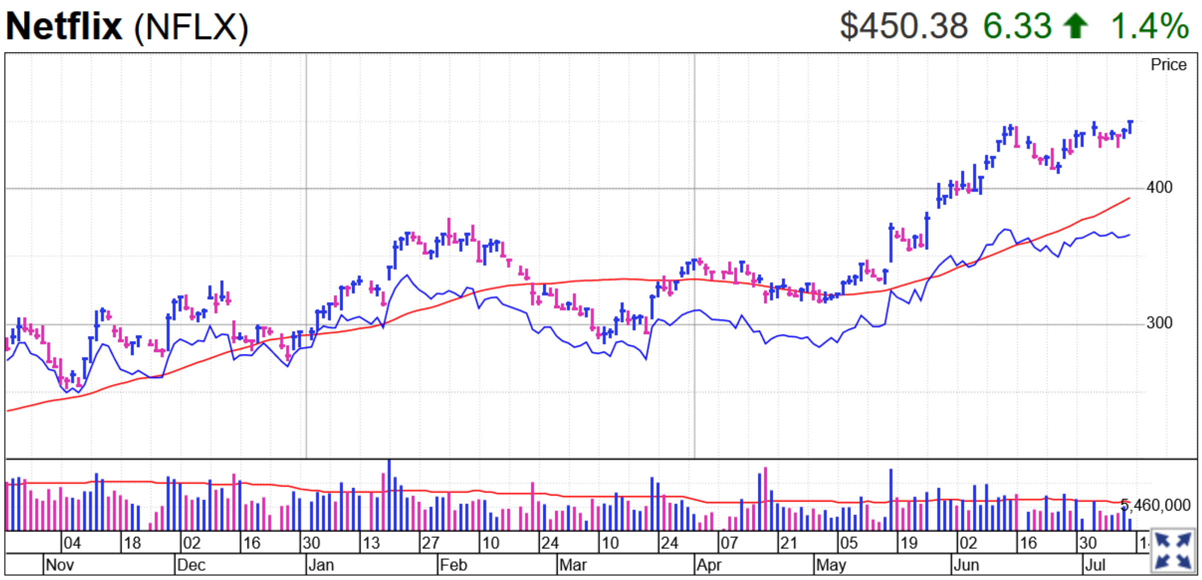

Figure 3.4: Netflix Stock Growth In the Year

The Walt Disney Corporation was founded in 1929 by the man known as Walt Disney. Originally a production company based on animation films, today the Disney Corporation has far expanded its resources and the markets which it occupies, being the proprietor of amusement parks, many blockbuster films, hotels and even a government district of their own. The reach this company has in everyday media is enormous, making it a permanently stable company in which to invest without ever facing any tremendous downturns in their stock's value. They have created a total of five movies with which they have broken 1 billion dollars grossed at the worldwide box office, which speaks volumes of their success within their industry [31]. Either way, lately they have not had the growth in their stock that the Disney corporation is known for, mostly due to the pandemic serving to close off a big portion of their revenues, through amusement parks and hotels. Fortunately, during this month of July, many of these previously closed resorts and parks are being opened by Disney throughout this project, opening an important part of their total revenue. Fundamentally Disney represents a stable stock with low risk, but also low reward, the expectation

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is that throughout this project Disney will provide continued stability within the diversified portfolio.

3.3.2 AT&T (T)

AT&T is a telecommunications company founded in 1983, once before being in the forefront of telephone services and communications in the US and Latin America, today this company's stock price is a far price from what it was before. Once one of the main figureheads in telecommunication services, they were also in charge of many entertainment services and wireless connections in Latin America which segmented as one of the main services within its sector of commerce. Today, and throughout the last decade, the stock has devalued by around 40% of what it used to be. In the last year the stock was also split, specifically by a multiple of 1.324 which has further decreased its total price for each individual stock. While it's important to reiterate that this stock has seen better years, its cheap price and still semi-strong foothold within its industry makes it a good moment for it to buy. They have made a decent push towards reducing their debt accumulated by quite a large margin, specifically by 69.8 billion dollars in a single year, which bodes well for a push towards an increase in stocks and regaining investor's trust in this company [2]. The exact level of improvement compared to the previous continuous increase in Long Term and Short-Term debt can be seen completely below in Figure 3.5.

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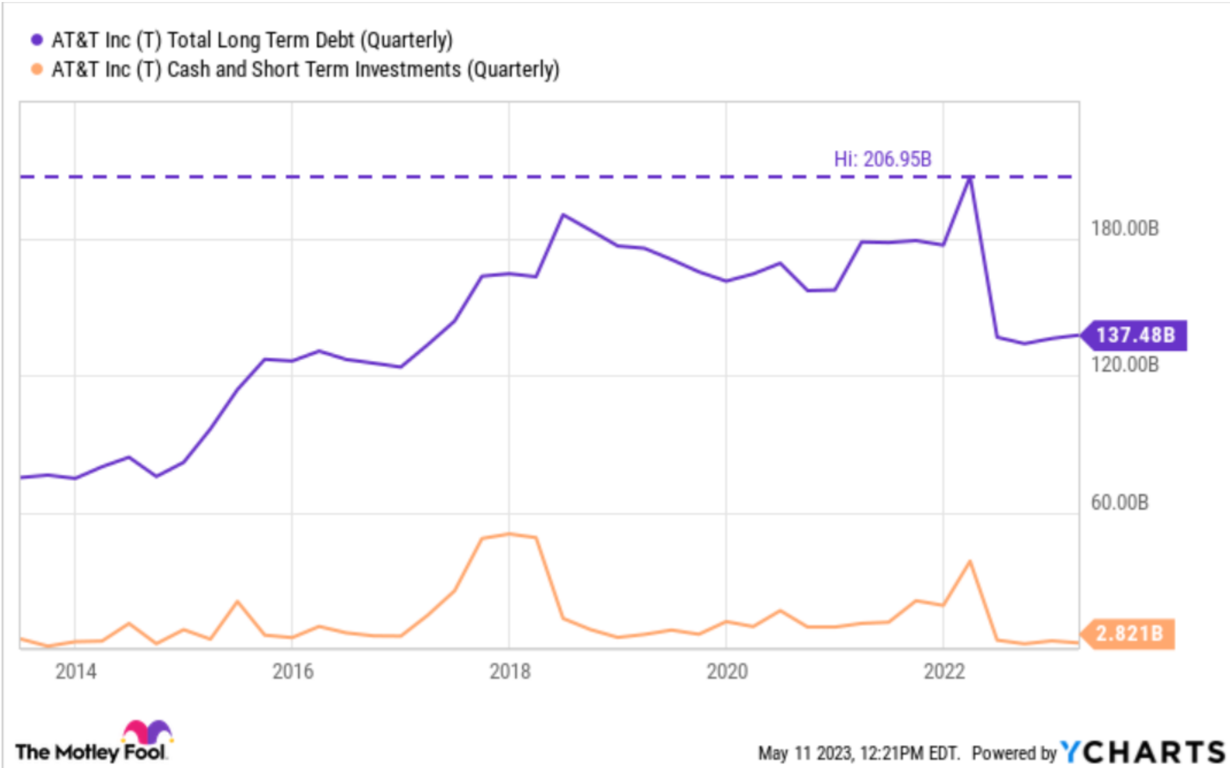

Figure 3.5: Graph of Long Term and Short-Term Debt belonging to AT&T

Overall, while there are better companies within the communications sector, AT&T represents a cheaper alternative to many others, as it's at a low point for its stock history while still showing signs of having a moderate chance at growth through new business management and a focalization into what they did best in the past, which is the wireless communication sector.

3.3.3 Roblox Corporation (RBLX)

The Roblox Corporation is a company focused on online web-browser entertainment, specifically marketed towards children as an open sandbox for creating 3D maps and minigames. The company was developed in 2004, and while they have had previous booms of success within the last decade, their yearly revenues haven't reached their all-time high until 2023. While the records for their yearly revenue for this year are not completed yet, they are estimated to almost double from a 2-billion-dollar revenue towards a 3.7-billion-dollar revenue, which bolsters great confidence in investors for its continued success [10]. The increase in Roblox' revenue across five years can be seen below, of particular importance is the effect the pandemic had on its profitability. These revenue growth and estimates are observable in Figure 3.6 below.

Figure 3.6: Roblox Revenue Growth and Estimate

Although, the company doesn't report a great profit to earnings ratio, with its last quarterly review of its P/E ratio being reported at a negative 0.44. It's important to note though that this is an improvement from its last quarterly review of negative 0.60, further giving credence to its potential value as a stock. Admittedly though, Roblox represents a chaotic stock that operates at a loss of profit despite its consistently improving cash flow, but this company is still in the middle of a significant growth which will decide whether this will make or break its future success. Roblox is also representative of a new age movement within development in the internet known as the Metaverse, which originally started as an idea by Mark Zuckerberg's Metaverse, with Roblox representing the most popular sphere in terms of school-aged customers.

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3.3.4 T-Mobile (TMUS)

The company known as T-Mobile US was established in 1994, originally known by the name Voice Stream Wireless, but it’s moment of true importance was when plurality vote was achieved by the global telecommunication company known as Deutsche Telekom in 2001, which finally made it be rebranded into the T-Mobile we know today. Today, T-Mobile is the second biggest wireless data and communication service, but in some aspects of its technology it still takes the cake. The top-of-the-line technology in wireless communication today is known as the 5G radio spectrum, of which the biggest owner of this technology and supplier currently being T-Mobile after its 2020 acquisition of Sprint. Since then, they started out with 546,000 5G radio spectrum subscribers, but in 2022 there were 2 million more subscribers added to this figure, which represented a tremendous growth for the company. In the first quarter of this year, T-Mobile added 538,000 postpaid phone subscribers, meanwhile AT&T added 432,000 postpaid phone subscribers. Not only that, the biggest telecommunication service in the US, Verizon lost 127,000 postpaid phone subscribers in that same year, which paints a very profitable picture for the future of T-Mobile and does wonders for establishing investor trust. Overall, T-Mobile is at a moment where it is rising above its competitors, with a customer base rising higher than both of them, without a fear of running out of potential supply due to its capacity to supply this service to up to 40 million US households. This is why T-Mobile has been added to both the diversified and narrow portfolio.

3.4 Healthcare Stocks

The Healthcare sector comprises several different and distinct services depending on the company’s focus, but what they all have in common is how their businesses revolve around the

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wellbeing of people within society. The range is bigger than one might think, ranging from pharmaceuticals to biomedical device companies such as those that create heartbeat sensors, to finally private hospitals that use a combination of those two. This does make the sector somewhat complex when one tries to find which companies one should invest in, as there are many variables that can affect the success and decline of a healthcare company's stock. While epidemics are terrible for society, they generally represent a moment of boom for companies within the Healthcare sector due to being the providers of the services needed to combat these afflictions. Events such as obesity and diabetes epidemics, diseases that affect societies globally such as the covid pandemic and moments of significant technological advances within this sector serve to greatly help an investor's gains within these sectors. Generally, though, this means that healthcare stocks are characterized by above-average growth, especially during moments as described above. These last few years, this has been the case, and currently the United States is being afflicted by a large growing case of diabetes, suggesting that there will be many more companies in the healthcare sectors that will captivate investor trust and bring upon profitable growths within their stocks.

3.4.1 Pfizer (PFE)

Pfizer is an American multinational pharmaceutical company established in 1849 by German entrepreneur Charles Pfizer. Most popularly known for their enormous role in dealing with the Coronavirus Pandemic, in which they designed and manufactured the Pfizer vaccine resulting in the health and safety of millions of people around the world. During this time, Pfizer saw the most lucrative year in its existence, as always, a key rule in the world of business is that with high supply and high demand, great profit will follow. As the world fought against the deadliest epidemic humanity has faced in a long time, Pfizer was in a very important position to

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supply the key to fighting this disease and helping the world heal from the great number of losses that it suffered from the Coronavirus. Last year, Pfizer had a record high revenue of 100.3 billion as the world started to leave the peak of the Covid pandemic, thanks to its huge part in supplying the vaccines that revolutionized the world. During this year though, as the world stabilizes from what occurred, so does Pfizer, no longer pulling the numbers it did before as this year they recorded a decline in sales of 29% by the end of the first quarter. Overall, while Pfizer is not at the best moment it has seen in its recent history, it is a moment in which its stock is particularly cheap for the potential and growth it represents, thus making it a good time to invest in it and expect some return in the investment.

3.4.2 Humana Incorporated (HUM)

Humana Incorporated is a for-profit American healthcare company founded in 1961. This company is one of the most profitable health-care sector companies in the S&P 500, specifically being the fourth largest healthcare insurance company in the United States. Lately, Humana has had a string of victories which has given it a bright outlook in the eyes of investors. This is specifically due to its currently expanding healthcare plan coverages and increasing number of healthcare plan members due to reporting high customer satisfaction across their entire Medicare Advantage programs. Recently, they have been experiencing a set of important tailwinds, allowing them the construction of a new primary senior healthcare facility in Dallas, Texas and marking it as their 250th establishment, with plans to make 30-50 more per year up until 2025 [25]. They have also had the fortune of establishing an important state contract dealing with Oklahoma, specifically in treating their Medicaid programs in state and helping service a rather large population of seniors in that area while finally bringing to affect a similar state-based contract that they had established with Ohio, which went live in February 2023. Furthermore, they exited their first quarter of 2023

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with cash and cash equivalents of 13.8 billion dollars, a huge contrast to their previous year number of 5.1 billion dollars at the end of 2022's first quarter. Overall, this company is one that is representing tremendous growth for itself and establishing good investor trust due to its continued success and business savvy decisions, making it a great investment at the time of writing.

3.4.3 Intuitive Surgical Incorporated (ISRG)

The company known as Intuitive Surgical Incorporated is the type of company that looks towards the future, whose products seem more in the realm of sci-fi than the real world we exist in right now. What this means is that they focus on cutting edge technology based on healthcare, including the da Vinci robotic surgical suite, a surgeon-controlled set of robotic arms that perform surgeries with unmatched precision. The main importance of ISRG is the fact of how durable this company is in its capability to continue to endure economically. During the pandemic, while a good time for companies specifically linked to the healthcare of individuals affected by Covid, it wasn't the greatest of times for companies dedicated to healthcare technology and research due to the global focus to develop a vaccine for Covid. Many companies focused on research did not have the resources or proper establishments to engage in this potential economic boom and fell apart from the lack of demand for their own innovations. Intuitive Surgical Inc. was a company that neither faltered nor profited from Covid, but fortunately this isn't a bad thing. As a company, ISRG has taken on no debt across its lifespan, its current net income grew by 123% to 355 million since last year, and it has 4.7 billion dollars to the value of its name, bolstering confidence in its continued success. Furthermore, despite the futuristic nature of their technology, their da Vinci systems have been consistently growing in treatment of patients since 2019 at an annual rate of 15%, a metric which has not slowed in recent years. The company has even stated that pandemic afflictions and focuses on Covid have slowed the metric at which their technology has been

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accepted in the US, but this is contrasted by an impressive growth of 26% in it's usage during the end of its first quarter compared to that of 2022, implying that they would be demonstrating growth at a more impressive rate were it not for the global affliction of the Covid-19 virus. This represents a stock capable of incredible growth, especially at the rate at which the company operates, and while it's profit to earnings ratio of 73 might represent a level of risk when compared to that of its market average of 25, since it implies that the stock is at an expensive moment, the future of this company only seems to imply that it will continue to exhibit growth at a significant rate. Overall, ISRG now is an expensive stock that still demonstrates a continued successful future, especially as a growth stock, but for the rates at which it demonstrates, it is expected for it to continue to show a stable and consistent growth that will benefit the portfolio for the remainder of this project.

3.4.4 Philip Morris International Inc. (PM)

Philip Morris International Inc. is an American multinational tobacco company, with products sold in over 180 countries. The most recognized and best-selling product of the company is Marlboro. Philip Morris International is often referred to as one of the companies comprising Big Tobacco; however, they have made the decision to go smoke-free [9]. They are looking for less harmful, yet satisfying, alternatives to smoking which thanks to the inventiveness and perseverance of their scientists and thousands of others at PMI and an investment to date of over USD 10.5 billion in science-based innovation-they have done exactly that, developing breakthrough products that are smoke-free and enjoyable. Approximately 25 million adults worldwide have already switched to their smoke-free products and given up cigarettes completely, and this is just the beginning. Additionally, even NYSE labeled Philip Morris in the healthcare sector due to their large investments in healthcare and their mentioned smoke-free products. In fact, the company's primary growth driver is its smoke-free products, with a 25% increase in units

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sold in Europe last year. Their stock also offers a hefty dividend payment and a fair valuation. Moreover, Philip Morris's revenues have been flat over the last decade, with a tiny increase of 2.3% in 10 years. However, the $16B acquisition of Swedish Match projects that in the future, Philip Morris is expected to keep growing sales at an annual rate of ~8.5% in the medium term. Furthermore, since 2018, the company has reported a 34% increase in their earnings per share as well as an impressive current dividend yield of 5.1%. This Philip Morris EPS Percentage Change is observable in Figure 3.7 below.

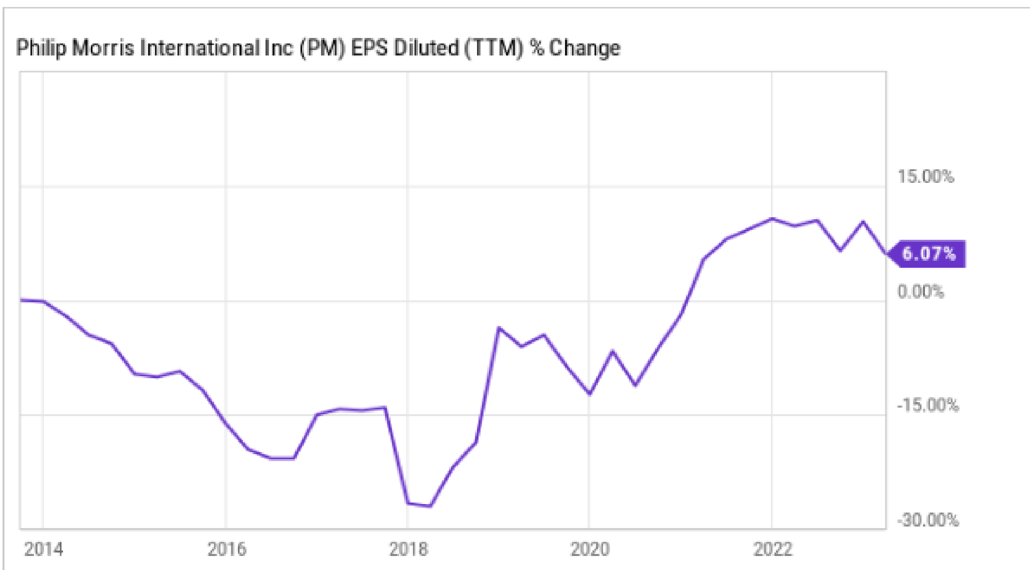

Figure 3.7: Philip Morris EPS Percentage Change

3.5 Financial Sector Stocks

The Financial Sector is formulated by companies that are in some way related to the conservation, investment, or management of money. Examples of what this entails is the banking business, brokerage firms as well as those that revolve around insurance. Any form of monetary manipulation is most likely a company within the financial sector. Generally, this means that companies within the financial sector are affected by how the US currency is at a certain moment,

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generally this means by interest rates of the US dollar. According to Investopedia, a large portion of the revenue of companies within the financial sector is mostly from mortgages and loans, and that generally the health of the economy is directly linked to the success companies within the financial sector demonstrate. These companies and their stocks do well when interest rates are at a moderate rise, when the government decides to cut back on regulations on companies, particularly on their earnings or control over their investments, and finally when consumer debt is lower than average, leaving people with money to hold and invest within banks and brokerages. In opposition to this, when interest rates are rapidly increasing, or when the government instead decides to regulate companies and their earnings more firmly, companies within the financial sector tend to suffer. Overall, companies within the financial sector tend to represent the wellbeing of a country's economy, and their success, especially in stocks, tends to represent the success of the economy and the wellbeing of the country's population.

3.5.1 Citigroup Incorporated (C)

Citigroup Incorporated is one of the largest multinational banks in the United States, specifically ranked as the third largest, in the same league as other large American banks such as JP Morgan Chase, Wells Fargo and Bank of America. Colloquially it is referred to as a bank that is 'too big to fail', which means that financially the amount of money that it holds to its name, as well as controls and helps manage has made it a systematically extremely important bank in the basis of the global economy. There is one thing that Citigroup holds above its competitors, and it's particularly linked to the potential profit in investing in this company's stock. The popularity in Citigroup's stock is predominantly based on its high amount of payout in dividends for each stock owned, specifically Citigroup is characterized by a dividend yield of 4.1%, which at the time that the article recorded this phenomenon, April 21, 2023, was the highest among its competitors [4].

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While the paying of dividends is not part of the Investopedia simulator, or the testing of this project, it still helps bolster the popularity of the stock and the probabilities that others will buy it in bulk, which in the end helps increase the value of the stock itself. Furthermore, Citigroup also represents a small modicum of success that most others within its competitive sector do not. Specifically, what this means is that the SPDR S&P Bank ETF, which is a program meant to represent the results of investments within the S&P Bank Industry Index and their total returns, has gone down by 12% when compared to the previous year to date [5]. This SPDR S&P Bank ETF information is observable in the graph denoted as Figure 3.8 below.

Figure 3.8: Yearly Graph Comparison of SPDR S&P Bank ETF, demonstrating 12% year less than the year before

Meanwhile, Citigroup has demonstrated a growth of 1% year to date, which while not an impressive numerical growth, does show that the company's stock has had much more stability than its rivals, and thus making it even more tantalizing as an option for investing [8]. Overall, Citigroup is not a company that has demonstrated much growth across its last two years, but it does show a level of strong stability at moments where other members of the financial sector seem to not be doing as well, and thus it was chosen as a stock within the diversified portfolio.

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3.5.2 Wells Fargo and Co. (WFC)

Wells Fargo and Company is another multinational financial services company based primarily in the United States and part of a group known as the “Big Four Banks” of America, the other three which have been named before as including Citigroup, JP Morgan Chase and the Bank of America. Originally founded as just Wells Fargo in 1852 as a banking company, Wells Fargo and Company didn’t become the company that it is today until it merged with the Norwest Corporation in 1998, but it didn’t truly reach its country and international reach until 2008, where it finally became a coast-to-coast bank with the acquisition of Wachovia, which at the time was the 4th largest bank in the US according to assets owned. As stated before, the biggest amount of revenue that banks generally have represented in their data sheets is the income earned from loans and securities, which they fund through the usage of assets and deposits. This particular metric is known as bank’s ‘Net Interest Income’ or abbreviated as NII, and as of late, NII has been under extreme pressure across most banks in the United States, due to the high interest rate environment the United States is currently finding itself in. Due to this, this has resulted in the US population relying more on the US treasury through seeking out treasury yields, which in simple terms is the money that the treasury department of the government pays you for letting them borrow your money for a specific amount of time [12]. During high interest rate environments, borrowing money becomes more expensive, and thus using banks as a form of investment by borrowing money to gain your own increase in money becomes riskier, but in times of high interest, treasury government yields increase due to it becoming harder for the US treasury to pay back its debts thanks to a higher interest rate, thus by letting them borrow your money, you supply them with a way to pay back their debt for some time, until they pay you back with an interest rate, which is in this case the treasury yield [18]. Now, this treasury yield is at around 5%, which is significantly

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higher than it has been in the last two years, and thus generally represents a decline of NII in most banks. The importance of discussing all of this is that Wells Fargo's CEO announced in April that the company's NII would grow 10% more than what it did last year. This is an almost bold claim that is backed by the fact that they have experienced a large growth in their reserves for loan losses by around 643 million dollars, a metric which the current CEO of Wells Fargo claims to be approaching almost 1 billion dollars in value, thus giving them a very soft cushion for any catastrophes that may arise from any point of failure in their NII. Overall, Wells Fargo is succeeding, or at least stabilizing in a climate that is generally unfriendly to one of the biggest sections for revenue in banks, while also having a good stable emergency reserve for if the loans they supplied stop properly earning the revenues they continue to expect from them, thus making its choice as a stock a rather beneficial one, with high expectations for its continued growth.

3.6 Consumer Discretionary Stocks

The sector known as consumer discretionary consists of companies that supply services and goods that are not essential, but that consumers with the salary to justify it still find them sufficiently desirable to pay for it. Generally, this includes companies that sell automobiles, leisure activities, high end apparel and durable goods, and anything else efficient and enjoyable that is not necessary for living. The growth or decline of consumer discretionary sector companies are a decent representation of the wellbeing of the economy, as they consist of purchases that people only make when they have a certain level of surplus in their savings or earnings. That is to say, the growth of these companies represents an ability to spend on more than necessities, and the declines of these companies represent a consumer's inability to spend in little more than what they need. This tends to mean that the consumer discretionary stocks tend to be very receptive to the current

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economic state of the country, and thus can represent great investment opportunities during times where disposable income is readily available and great risk in times where the average person isn't earning enough to justify frivolous spending. Another important factor that helps decide the success companies within this sector may see is based on a metric known as the Consumer Confidence Index, which basically entails the confidence a consumer has in companies and how worthwhile the purchases they make are. This is extremely important in a sector that is basically carried by how eager your consumers are to buy your products, without any intrinsic motivation such as need or extreme useability. Overall, during the Covid Pandemic, this sector received a somewhat strong blow to its stocks as people focused on conserving their money during times of limited work availability and an emphasis on conserving important resources such as food, toilet paper and water which is part of the consumer staples sector, but during these times, as the economy recovers, this sector is now on the rise. The Federal Bank of St. Louis states that since its Pre-Crisis score, the consumer discretionary sector is at a 30% higher than it was before the Covid Pandemic, specifically the date of Feb. 19, 2020, demonstrating a good recovery and a moment of coming boom for this industry.

3.6.1 Amazon Inc. (AMZN)

A worldwide technology business based in the United States, Amazon.com, Inc. is heavily invested in digital streaming, cloud computing, online advertising, and artificial intelligence. The business has 126 offices and retail locations spread all around the United States and is headquartered in Seattle, Washington. Jeff Bezos launched Amazon from his garage in Bellevue, Washington on July 5th, 1994. It began as an online bookstore but has since evolved into a wide range of product categories, earning the nickname "The Everything Store." It now employs over 1,600,000 people worldwide, with 950,000 of them in the US. Now, Amazon has 185 fulfillment

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facilities worldwide and 110 in the US. The Amazon FBA program makes use of the company's warehouse space for product storage and shipment. The business will take care of your inventory, simplifying and improving the selling procedure. At over 4.1 million square feet, the five-story Amazon warehouse being constructed this year near Ontario, California, will be the largest Amazon warehouse in the whole globe. The business has seen exponential growth as the pioneer in online retail and has turned into one of the most popular services in the current retail industry. Every day, the business enables more than $1.4 billion in sales. Additionally, the business has only increased its presence in the consumer market. The business has expanded into areas like entertainment and physical shopping, not only internet retailers. The business bought Whole Foods, expanding its physical retail network, and launching Amazon Prime at the same time. The latter faces out against some of the most well-established streaming providers available. Since its earnings are expected to rise soon and stock prices often follow the trajectory of its earnings, its success has only grown over time. For instance, Amazon's operational cash flow for the trailing 12 months ended March 31, 2023, increased 38% year over year because of cost-cutting by the firm, demonstrating good management. As a result, its retail operating margins have already improved. Additionally, the established Prime membership options encourage even greater value for its customers. Consequently, opportunities to attract more clients and boost their involvement in the shop are created. The fact that e-commerce sales are anticipated to increase further is the main advantage of this. Online sales are expected to grow 13.6% yearly to $15 trillion in value by 2030, according to projections [50]. Amazon is well-positioned to gain a lot from this rise. Amazon also gains from its advancements in the field of cloud computing. The market for cloud infrastructure and platform services has mostly been controlled by its Amazon Web Services offering. In Q4 of the previous year, Amazon specifically held 32% of total expenditure in that

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sector. Microsoft Azure is now positioned behind Amazon, whose capabilities and industry advancements are widely regarded as cutting-edge. Once more, there is no question that cloud computing will advance. Amazon might afterwards benefit from the 14.1% growth rate. Additionally, it had a thin operating margin of 28.5% during the previous year. Additionally, thanks to Amazon's use of artificial intelligence to make sure customers receive relevant advertisements, its advertising services revenue increased 23% year over year in the first quarter. Additionally, it makes it easier for advertisers to calculate their return on investment. Amazon is now the world's fourth-largest digital advertising company, after only Alphabet, Google, and Meta. However, the gap between Amazon and its rivals has gotten smaller over time. Amazon’s Q4 ad income increased by 19% in the previous year, while it decreased for Google and Meta. Finally, the inevitable trend of businesses migrating to the cloud has only been accelerated by quick advances in AI. Although its growth has slowed, Amazon Web Services (AWS), a division of the company, continues to be the industry leader in cloud hosting.

3.6.2 McDonald's Corporation (MCD)

McDonald’s is one of the best-known fast-food chains in not only the United States, but also the world, representing possibly the biggest of its kind in terms of the fast-food industry. The first McDonald’s was built in 1940, by Maurice and Richard McDonald, but it wouldn’t be until 1948 that the restaurant built by these two brothers would hold even a semblance of the ionic characteristics it carries today. During that year, the brothers would completely revamp the model for the food they sold, and how they sold it, cutting out most of the items in their menu until they only had burgers, shakes and fries within them. That wouldn’t be the only change, in fact the most important of them would be the creation of the Speedee Service System, which not only resulted in quick delivery of foodstuffs, but also a much cheaper cost for the price of these burgers at 15

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cents a burger, half of what any other competitor could offer. In 1954, Ray Kroc would come onto the scene as a franchising agent, having met the brothers after selling them 8 milkshake makers, a number that was way above the norm. This led to the partnership that would result in the McDonald's Corporation, culminating with Ray Kroc buying out the brothers in 1961. Since then, this company has only grown immensely, and in recent years it has been in a state of restructuring in order to increase profit margins. Previously during the pandemic, McDonald's had focused more on sending on their products, the cuts of their food and the modernity of their machinations. Recently, this has changed into a focus on experiences, hiring better managers, better human resources and advert-based workers that know how to appeal to McDonald's customers. A boost in customer satisfaction thanks to quicker order times, and greater customer service lead to a significant increase in their profit margin, which before was recorded at an already high 40% which seemed to be already at its cap, but in the last year this has risen to an even higher 45%. This places it squarely above its competitors, such as Chipotle and Burger King's owner, Restaurant Brands International, who have 15.17% and 29.94% operating profit margins respectively [23]. A side-by-side comparison of the growth and declines of these trends can be observed in Figure 3.9 below.

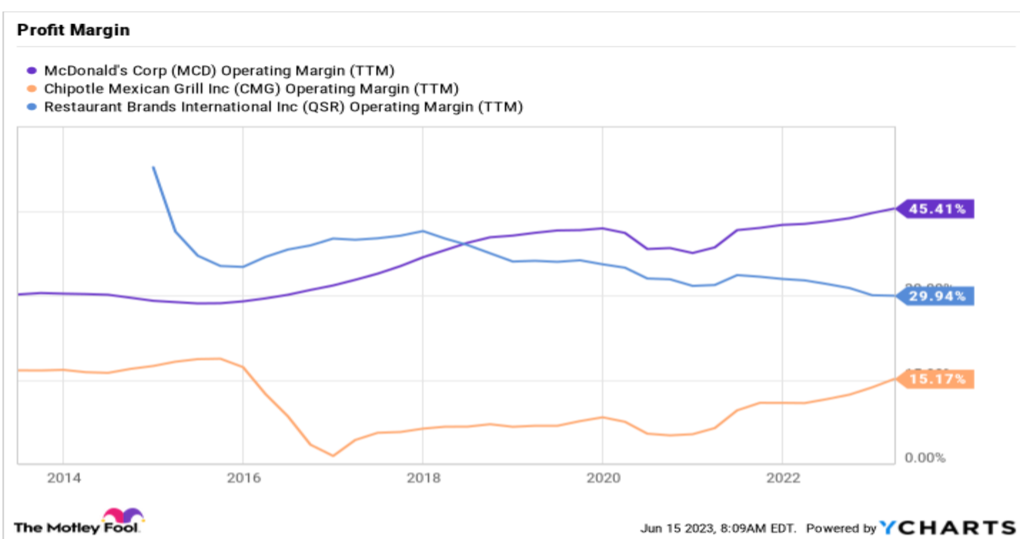

Figure 3.9: Profit Margins for McDonalds and its Competitors

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As we can see, McDonald’s impressive operating margin has not declined save for a small drop during the Pandemic, but even then, this loss was recovered and then grown from it.

3.6 Industrial Sector Stocks

This sector is sometimes known as the Industrial Goods sector, and it includes a wide variety of companies and businesses that delve into several different forms of commerce. In a generalist overview, the industrial sector involves companies that specialize in capital goods used in manufacturing, resource extraction and construction as stated by Investopedia, which means that this sector encompasses a wide variety of business to the extent that having it follow a singular type of trend is quite rare. Overall, this just means that what companies within the industrial sector sell are what other companies require to generate their products or gather the resources necessary to manufacture those products, making it a vitally important sector and linked to most other sectors within the NASDAQ. This also means that when other sectors or companies are having a moment of growth, companies within the industrial sector experience growth too, as they are the ones that supply those companies with the capabilities to expand their own businesses. This also means the sector doesn’t quite grow by itself, and when the economy isn’t doing as well companies are instead trying to operate within their profit margins without expanding, then the industrial sector suffers greatly. Overall, this sector is big enough to encompass a wide variety of different companies, which means that even in times of economic recession, where most companies would be focusing on keeping their current stability instead of expanding, the diversity of the overall sector means that there will always be some industrial sector company profiting and thus having its stock grow in a meaningful way.

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3.6.1 Cummings Inc. (CMI)

Cummings Incorporated is a company primarily based in the design, manufacturing and export of engines and other similar products based on the concept of providing power into machinery. Originally this company was started under the name of The Cummings Engine Company in Columbus Indiana, 1919 by a mechanic and a banker known as Clessie Cummins and William Glanton Irwin respectively. Their focus back in that date was on the development and improvement of the diesel engine, which had been created twenty years earlier. Their main source of income and rise to fame came from the widespread adoption of the Model N Cummings Engine, which rose to become the industry standard starting by the year 1952, adopted by over-half of all heavy-duty trucks in America. Since then, the company has continued to work, with their engines being used in all sorts of products and machinery, not just trucks, but also generators, railroad switches and both marine and agricultural applications. This means that Cummings Inc. has a stake in most facets of public business and private businesses, as the business of power generation is required in all manners of development, including construction, off-highway applications, and industrial development. Now, the stock was purchased at a price of 226, which compared to the stock forecast provided by CNN Money, puts it close to the lowest it should reach within a 12-month period, which is said to be at 216 [7]. This is coupled with a recorded profit to earnings ratio of 12.8 on June 12, 2023, which is below the industry standard of 15, and while not a huge margin of difference, this means that people are not willing to pay as much for the stock, meaning that it is somewhat cheaper than it generally is [57]. The company continues to expect growth in its profits, specifically over the next few years it expects a consistent growth of 11% on its profits, which as a company of its magnitude, this form of growth represents good health for its economic status. Overall, this is a company that is now trading close to the lowest that it’s expected to be,

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with a decent expectation for it to continue to grow, in particular to reach its forecasted high estimate of 290 by CNN Money, by the end of the year. More importantly, this would put the estimated stock value at the end of the project around the median, which is at 261, which would represent a quite important growth in the value of stock during these two months. Cummings is currently a good company to invest into its stocks in order to see a good return in money, and with a decent dividend yield of 2.56%, this further incentives the purchase of the stock to other people, meaning that even if the growth in its stock value is overestimated, it is unlikely that the stock will go down and result in any form of actual important monetary loss.

3.6.2 General Dynamics Corporation (GD)

General Dynamics is a company based in the aerospace and defense industries, basically making it a defense contractor, and the fifth largest of its kind in the United States. General Dynamics is also a fortune 100 company, having been ranked as the 94th in the list of top 100 most successful companies in the United States in 2022. This company started out in 1954, resulting from the merging of two different defense contractor companies. One of them was the company known as Electric Boat, founded in 1899 and responsible for selling the US Navy its first modern submarine. The other was known as 'Canadair', which was an aircraft manufacturer for both civil and military purposes based in Canada and founded in 1944. Together, these two companies merged to form the company we know today, which now consists of eight other subsidiary companies to amount into the large and successful company that it represents today. Yet this doesn't necessarily mean that it would make a good current investment as a stock, fortunately several sources have denominated various reasons as to why it just may be a good place to put money into. According to Yahoo Finance, and the estimates performed by 'Simply Wall St' on June 9, 2023, their valuation model shows that the intrinsic value of the company should be at

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306.40 dollars, but currently the stock is trading at 214 dollars, making it seem that the stock is immensely cheap. In terms of a more concrete metric, the growth estimates of General Dynamics look extremely beneficial to the company, which is presumably what helps set it up as an undervalued stock due to its potential for long-term growth. Yahoo Finance posted a chart detailing the growth analyst forecasters expect from General Dynamics to denote it as expanding by 28% by the year 2025. This chart is observable in figure 3.10 below.

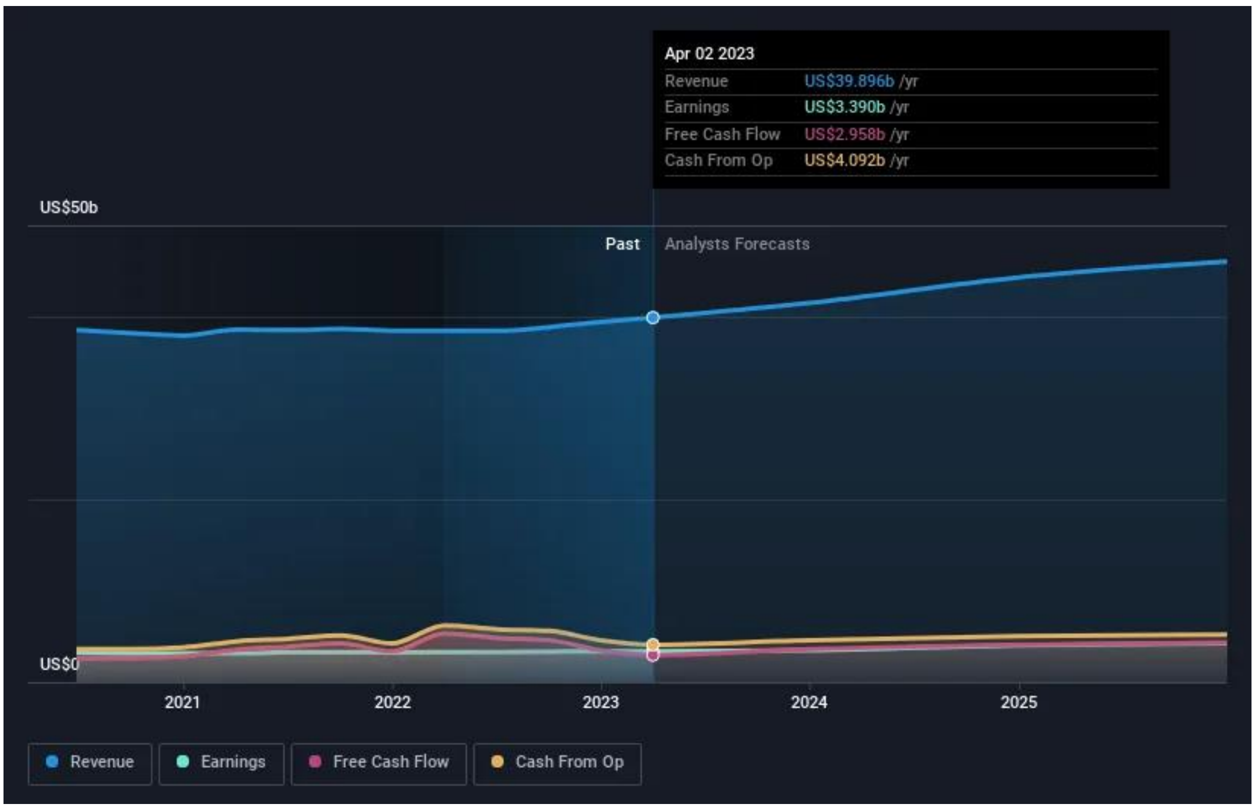

Figure 3.10: Overall estimates of Growth for Revenue for General Dynamics in the Next Two Years

In an article comparing the potential of General Dynamic's stock to that of its biggest competitor, Lockheed Martin, demonstrates that while Lockheed may present a greater operating margin and returns on invested capital than General Dynamics, their overall growth estimate percentages tell a different story. Despite the difference in operating margins and returns on

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invested capital, General Dynamics reports a P/E ratio almost exactly the same as that of Lockheed Martin in May 30, 2023, which consisted of a 16, similar to the industry average of 15. This is because while some of their current monetary earnings lack behind that of Lockheed Martin, their quarterly year to year revenue growth rates is significantly higher than that of Lockheed Martin, as well as their EPS growth estimates for the future, being at 5.21% and 9.95% for those metrics respectively for General Dynamics [37]. A comparison between those two metrics for the companies can be observed in the following graph in Figure 3.11.

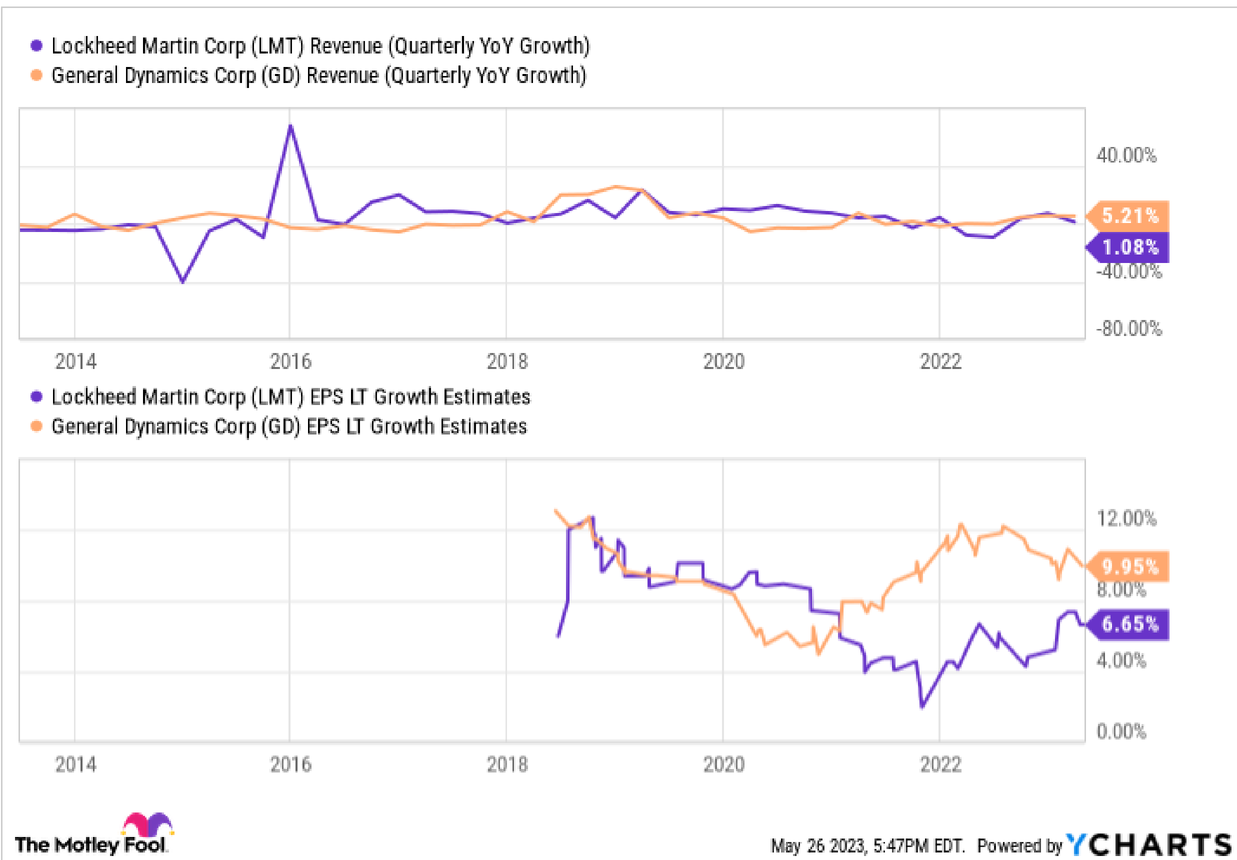

Figure 3.11: Lockheed and General Dynamic Gross Estimate and Revenue Comparisons

Overall, while Lockheed Martin may seem as a more successful competitor to invest in at the current time, what truly helps the growth of stocks is that of consumer confidence for growth, and

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in that metric General Dynamics demonstrates much more fruitful numbers that instill confidence in its continued growth and expansion.

3.6.3 Valvoline Inc. (VVV)

Valvoline is a company described as a retail automotive services company founded in 1866 under the name "Continuous Oil Refining Company" by Dr. John Ellis who invented a petroleum lubricant for use in steam powered engines. Since then, they moved on over to the business of oil changes and lubrication for modern vehicles, specifically cars as well as their maintenance and repair through national centers designed for car care. This company can be considered as an industrial sector company de to their focus on chemical manufacturing, particularly in the refining of oil, which at the meantime almost 50% of the oil they generate is through the use of recycled oil obtained from previously used and discarded oil, meanwhile their products still hold a guarantee of 100% Valvoline protection, which refers to the chemical design they have for their oil refining process. The process of refining this oil and their manufacturing of chemicals in order to treat and use crude oil is what can label them as an industrial sector company, as they provide the means for distributing an important part of usage in other products, but the fact that they also sell this already treated oil and services meant to help repair and take care of cars means that they also satisfy the requirements for filling as a consumer discretionary company, thus both labels can function for the purpose of this stock. The most popular product that Valvoline offers is their brand of motor oil used for the lubrication of the internal engines of vehicles, which has been used to great acclaim by Ford in their racing vehicles since the late 19th century. Today, the company has proved to currently be at the top of its competitors as stated by InvestorsObservers.com, a company that works on comparing and contrasting stocks within their sector and in other sectors. The website gave the company stock a value of 68 when compared to all the other stocks on the NYSE, which means that it is above 68% of all other stocks in value and opportunity for growth. More importantly, the website stated that it carried a score of 88 in Oil and Gas Refining Market, which means that as a traded stock it stands to be a better investment than 88% of all other stocks within the sector, thus adding credibility to its future success [1]. While the exact details of how this score is obtained aren't given directly, it is known that it is a combination of the value of the stock, its P/E ratio, and the companies reported future quarterly earnings, revenue and operating cash margins. According to SimplyWallSt, a website that provides graphs and information on a company's future predicted growths in revenue, free cash flow, earnings and more, Valvoline is expected to experience a rather positive growth in revenue [11]. The following graph in Figure 3.12, demonstrates the exact growth that is expected to be gained by Valvoline, and it demonstrates a significant yet moderate growth, one that perhaps can even be eclipsed as shown by previous yearly data showing much higher peaks for the revenue.

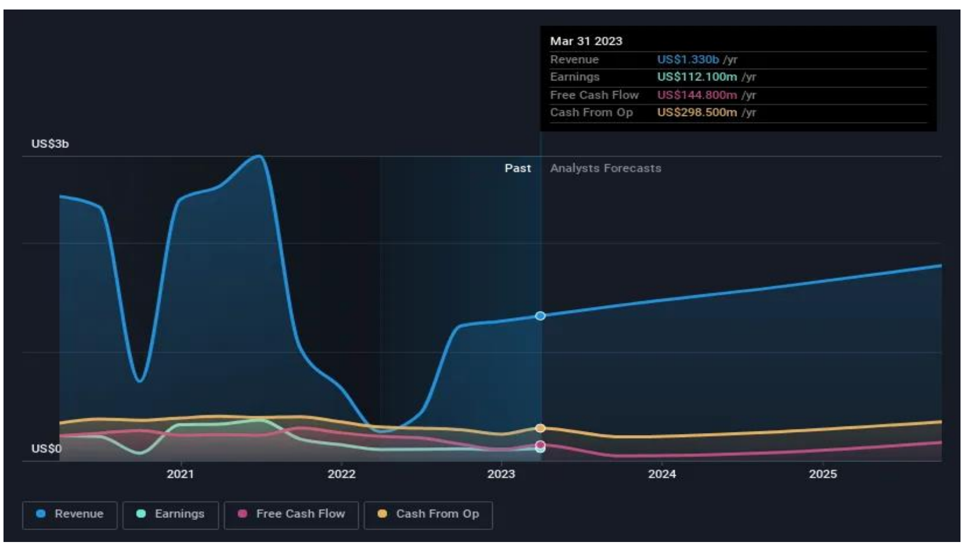

Figure 3.12: Revenue, Earnings, Free Cash Flow and Cash from Op Past and Forecasts for Valvoline.

Overall, Valvoline had to suffer in the past due to the lack of car usage during the pandemic, as Covid kept everyone segregated and kept within their homes to stop its spread. Yet, now it

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represents the pinnacle of the Oil refining sector, and one of the most successful companies within this business, thus it is expected to make the best recovery out of most other companies within the sector and represents the last investment within the Industrial sector for this project.

3.7 Energy Sector Stock

The energy sector represents the smallest portion of the S&P 500 and is made up of companies based on oil and gas drilling and supply, particularly the type of oil used for providing energy to cars, machinery and other engines that may require its use. While these make up most of the business within the S&P 500, other examples of the types of energy and fuels sold within this sector are coal, nuclear, hydropower, biofuels, solar power and wind power. Generally, companies are classified into whether they are renewable and non-renewable, and thus these two types of companies are affected differently by changes in the political atmosphere. The energy sector tends to be affected the most by what current political decisions are being made in government, and how bills and international tensions can affect the way they distribute, gather or process the energy, this is true specifically of fossil fuels. According to a study in 2021 provided by Investopedia, the consumption of energy in the United States goes as follows, 36% of it is in the form of petroleum, then natural gas with 32%, renewable energy is 12%, coal is 11% and nuclear electric is 8% [6]. As demonstrated, petroleum and natural gas make up the largest percentages, which also tends to be what the most successful companies within the energy sector tend to focus on. Which is why the singular pick for this sector is Shell, one of the largest oil companies in the United States and beyond.

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3.7.1 Shell (SHEL)

The main American subsidiary of Royal Dutch Shell PLC, a massive oil business with its headquarters in The Hague, the Netherlands, is Shell Oil business (SOC), a significant U.S. oil firm. Marcus Samuel decided to expand his London business in 1833, which laid the groundwork for an import-export company that would eventually become one of the world's leading energy companies. Today, Shell is a leading global integrated energy company with a presence in more than 70 countries. With a history spanning more than 185 years, Shell has continued to be an active participant in the change of the energy sector and has embraced and adapted to the search for cleaner energy sources and lower-carbon energy systems. There are many reasons to purchase this stock since chief executive Wael Sawan announced on June 13 that the FTSE 100 firm intends to maintain oil production until the end of the decade, a change from its previously announced target to cut output 1%-2% annually for the rest of the decade. The business claims that this objective was, however, already accomplished in 2021 as a result of the $9.5 billion sale of its part in an oil project in Texas' Permian Basin. The quantity of oil it produced was significantly reduced because of that disposal. The company's management also disclosed that it was selling off underperforming assets. This includes its operations in Pakistan, where Shell has been present for 75 years, and a gas project in Australia. The energy behemoth will increase its shareholder payouts because of all this. It boosted the dividend by 15%, and over the cycle, payouts would reach 30%–40% of operating cash flow [3]. This is an increase from the prior 20%–30%. Additionally, it intends to cut back on capital expenditures in 2024 and 2025 and buy back at least $5 billion worth of shares in the second part of this year. Additionally, Shell declared that from 2023 to 2025, it will spend between $10 billion and $15 billion on low-carbon programs. Building additional electric vehicle (EV) charging stations is one area it is focusing on. Since there are currently 46,000 gas stations

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worldwide, this looks to be a low-hanging fruit. It only needs to put chargers in the same high-traffic areas where it sells petrol. The firm claims that its EV charging clients use its charging stations twice as frequently as its refilling customers use gas stations in China, which has the world's largest and most developed EV market. The cause appears to be that a large portion of Chinese citizens' lives in high-rise structures rather than in residences with a personal charging system. Therefore, the corporation may be able to profit from this in the long run. A dividend yield of more than 4% may be anticipated by investors purchasing the stock right now. Additionally, record historic revenues more than fund the anticipated dividends over the following few years. The revenue prospects in the short term thus seem quite promising. Additionally, present, and upcoming buybacks ought to sustain the share price throughout the medium run. In addition, the business is growing as a result of rising energy prices. Analysts predict that the oil giant will have a net profit of $39 billion in 2022, up from $20.1 billion in 2021. The company is also giving a lot of money back to shareholders. Shell declared a $0.25 dividend distribution for the third quarter of 2022. However, it declared that it intended to 15% up its Q4 2022 payout. This results in a respectable trailing yield of roughly 3.5%. In addition to paying dividends, the company is also buying back shares to give money to investors. It announced the start of a new share repurchase program in its Q3 results, which will result in an extra $4 billion in payouts. By the time it releases its Q4 2022 financial results in February, it intends to have finished these buybacks. Additionally, it is improving its balance sheet. Shell's net debt was lowered by almost $2 billion in Q3 to $48.3 billion. The shares are also inexpensive. Analysts predict that the company will report $5.27 in earnings per share for 2022. That results in a price-to-earnings (P/E) ratio of under six at the present share price and currency rate. That's less than half the average for the FTSE 100. It is also considerably lower than the P/E ratios of the main US energy companies. For instance, Chevron

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now has a P/E ratio of around 9.5. Thus, on a relative basis, Shell stock appears to be cheap right now. Shell, one of the biggest energy producers in the world, generates around three million barrels of oil equivalent per day, comparable to Chevron's output. With $9.1 billion in net profits in the first quarter, minus nearly $4 billion in costs connected to Russian assets, Shell outperformed both Exxon and Chevron. With an overall score of 78, Shell PLC (SHEL) is the firm with the highest overall rating in the Oil & Gas Integrated sector. SHEL has increased by 25.21% so far this year. On July 19, 2023, the firm ended at a price of $61.73. The overall score compares SHEL to 78% of the market and evaluates the company's performance based on both short- and long-term factors. The specifics of changes in Shell stock price are observable in Figure 3.13 below.

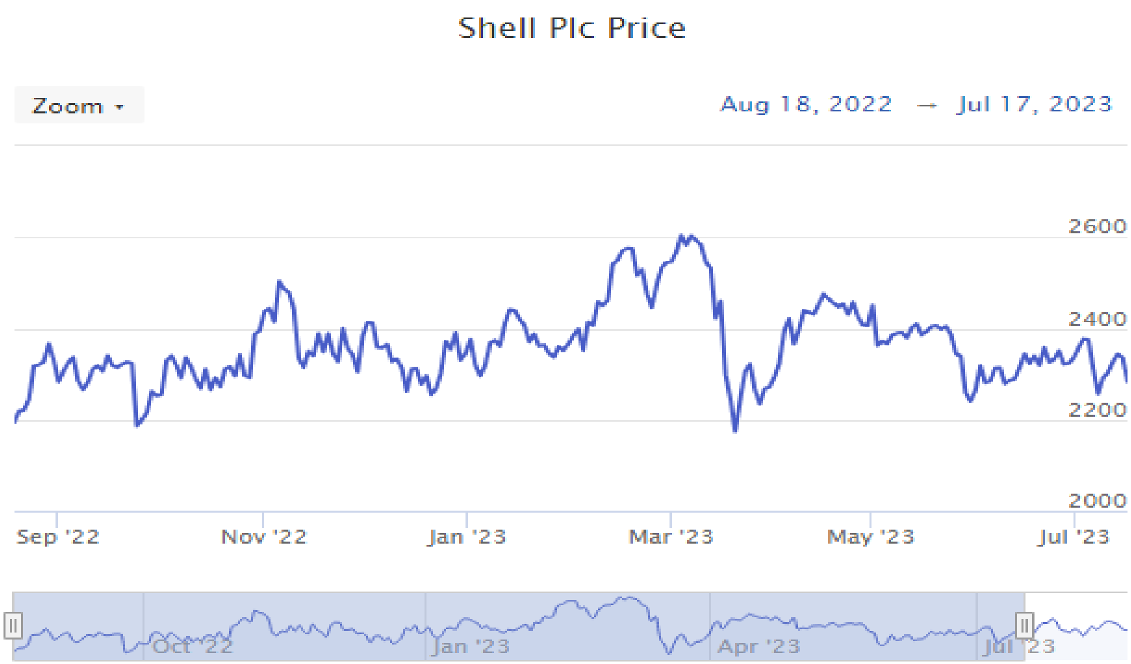

Figure 3.13: Shell Stock Trend Over the Past Year

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Chapter 4: Diversified Stock Portfolio Simulation

4.1 Week One

4.1.1 Technology Sector Results for Week One

The Technology sector experienced a rather profitable first week, having had a total asset increase of 893.9 dollars, most of which came from a stock value increase of 9.72% for Nvidia, which amounted to a weekly gain of 491.79 dollars. Microsoft had the second highest stock value increase, with it being 5.68% higher than its initial purchase value and amounting to a weekly gain of 275.85 dollars. Workday also had a significant increase of 4.17%, and a total weekly gain of 178.2 dollars. Finally, the two weakest performers were Allegro Microsystems, with a weekly gain of 46.56 dollars and a percentage increase of 1.21% and TTM Technologies, who was the only company's stock to decrease in value, specifically by an impactful 4.64%, which was a weekly loss of 99.75 dollars. Overall, though, this was a profitable week for the Technology sector, the specifics of which can be seen below on Table 4.2.1 and demonstrates the specifics of how this sector's weekly gain resulted in an overall increase in the net cost of all the stocks combined of 4.42% in value.

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Table 4.1.1: Week One Table for the Technological Sector within the Diversified Portfolio.

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price	Asset This Friday	Week Gain/Loss	Total Asset Change
6/16/2023	**NVDA**	**389.09**	**13**	**5058.17**	**389.09**	**426.92**	**5549.96**	**+491.79**	**+491.79**
6/16/2023	**WDAY**	**213.49**	**20**	**4269.8**	**213.49**	**222.40**	**4448.00**	**+178.2**	**+178.2**
6/16/2023	**ALGM**	**39.68**	**97**	**3848.96**	**39.68**	**40.16**	**3895.52**	**+46.56**	**+46.56**
6/16/2023	**TTMI**	**14.33**	**150**	**2148.75**	**14.33**	**13.66**	**2049.00**	**-99.75**	**-99.75**
6/16/2023	**MSFT**	**323.94**	**15**	**4859.1**	**323.94**	**342.33**	**5134.95**	**+275.85**	**+275.85**
TOTAL				**20184.79**			**21077.43**	**+892.65**	**+892.65**

4.1.2 Communications Sector Results for Week One

The communications Sector of the stock market within this portfolio also saw a rather profitable weekly gain, and while not nearly as significant as that in the technology sector, it is nothing to scoff at. The most significant stock growth was experienced by AT&T, who had a weekly gain of 182.50 dollars, which was a 4.76% increase in stock value. Meanwhile, T-Mobile, a competitor, saw a weekly loss of 27.82 dollars, and a barely noticeable decrease in stock value of 0.81%. Netflix saw a weekly gain of 131.52 dollars, which translated to a 3.96% increase in its stock value, while Disney saw an insignificant increase in its stock of 0.13%, or a weekly gain of 3.96 dollars. Finally, Roblox saw an increase in its value of 3.80%, and a weekly gain of 114.75 dollars. Overall, this signified a total weekly gain of 404.91 dollars, and an increase in the total sector's value of 2.44%, meaning that it was a profitable week in this sector as well. The specifics of this change can be seen in the table below, known as Table 4.2.2, which compares the first purchases of these stocks to their new weekly values.

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Table 4.1.2: Week One Results for the Communication Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/16/2023	**NFLX**	**415.52**	**8**	**3324.16**	**415.52**	**431.96**	**3455.68**	**+131.52**	**+131.52**
6/16/2023	**DIS**	**91.20**	**33**	**3009.6**	**91.20**	**91.32**	**3013.56**	**+3.96**	**+3.96**
6/16/2023	**T**	**15.33**	**250**	**3832.5**	**15.33**	**16.06**	**4015.00**	**+182.50**	**+182.50**
6/16/2023	**RBLX**	**40.27**	**75**	**3020.25**	**40.27**	**41.80**	**3135.00**	**+114.75**	**+114.75**
6/16/2023	**TMUS**	**132**	**26**	**3432**	**132**	**130.93**	**3404.18**	**-27.82**	**-27.82**
TOTAL				**16618.51**			**17023.42**	**+404.91**	**+404.91**

4.1.3 Healthcare Sector Results for Week One

The healthcare sector had an interesting time this week, particularly in what happened to the company Humana Inc. which is based on healthcare insurance. Reportedly, this week they announced that their medical loss ratio would increase, which basically increases when they have to pay out more claims towards their customers, supposedly this is because the cost of surgery and demand for them has been on a significant rise. Overall, Humana had a weekly loss of 549.43, and a drop in its stock value of 14.98 percent, a significant loss. Meanwhile, other companies, particularly those in the supply and development of surgery and research increased. Pfizer had a weekly gain of 158 dollars, and an increase in its stock value of 4.11%. Intuitive Surgical, based entirely on the development of technology for surgeries obtained a weekly gain of 257.27 dollars, and an increase in stock of 6.39%. Finally, Philip Morris Inc. saw an increase in its stock value of 2.92% and weekly gain of 115.67 dollars. Overall, this sector had a decrease in its total value of 0.60% and a total weekly loss of 18.49 dollars, the specifics of which can be seen below in Table 4.2.3.

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Table 4.1.3: Week One Results for the Healthcare Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/16/2023	PFE	38.48	100	3848	38.48	40.06	4006	+158.00	+158.00
6/16/2023	HUM	524.14	7	3668.98	524.14	445.65	3119.55	-549.43	-549.43
6/16/2023	ISRG	309.57	13	4024.41	309.57	329.36	4281.68	+257.27	+257.27
6/16/2023	PM	92.20	43	3964.6	92.20	94.89	4080.27	+115.67	+115.67
TOTAL				15505.99			15487.5	-18.49	-18.49

4.1.4 Financial Sector Results for Week One

The Financial Sector represented a rather boring sector for this week, possibly due to an announcement given upon by the Federal Open Market Committee on June 14. This committee oversees regulating the open market, partly by affecting interest rates in order to combat inflation. While they have been increasing interest rates at a monthly rate, this month represented the first in several months that they decided not to increase the rate, instead keeping it at what it was before. Wells Fargo saw an insignificant weekly gain of 50.04 dollars, and an increase in its stock value of 1.68%. Citigroup also saw an insignificant increase in its stock value of 0.65%, and a weekly gain of 19.53 dollars. Finally, J.P Morgan saw the greatest increase in its stock value, by 2.81%, which amounted to a weekly gain of 86.24 dollars. Overall, this was an okay week for this sector, with an increase in its value of 155.81 dollars, the specifics of which can be seen in table 4.2.4 below.

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Table 4.1.4: Week One Results for the Financial Sector within the Diversified Portfolio

Date	Symbol	Original Price	Share s	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/16/2023	C	47.88	**63**	**3016.44**	**47.88**	**48.19**	**3035.97**	**+19.53**	**+19.53**
6/16/2023	**WFC**	**41.49**	**72**	**2987.28**	**41.49**	**42.185**	**3037.32**	**+50.04**	**+50.04**
6/16/2023	**JPM**	**139.34**	**22**	**3065.26**	**139.34**	**143.26**	**3151.72**	**+86.24**	**+86.24**
TOTAL				**9069.2**			**9225.01**	**+155.81**	**+155.81**

4.1.5 Consumer Discretionary Sector Results for Week One

This sector was the second most profitable of this week, generating a significant growth in its value. Firstly, Amazon experienced a weekly gain of 101.68 dollars, with an increase in its stock value of 2.02%. Meanwhile, McDonalds experienced a similar weekly gain of 101.64 dollars, with an increase in its stock value of 2.97%. The most significant effect on this sector was that of Tesla, which at the time of its initial purchase was in a record setting streak of growth, the peak of which was surpassed this exact Friday, ending the week with a gain of 494.46 dollars, and an increase in its stock value of 11.79% even after announcing this week that they were going to be increasing the cost of their vehicles due to an increase in the cost to manufacture them. Overall, this sector ended up with a total weekly gain of 697.78 dollars, and an increase in its sector value of 5.51%, meaning it was a very profitable week, the specifics of which can be seen in the table 4.2.5 below.

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Table 4.1.5: Week One Results for the Consumer Discretionary Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/16/2023	AMZN	123.01	**41**	**5043.41**	**123.01**	**125.49**	**5145.09**	**+101.68**	**+101.68**
6/16/2023	**MCD**	**285.23**	**12**	**3422.76**	**285.23**	**293.70**	**3524.40**	**+101.64**	**+101.64**
6/16/2023	**TSLA**	**233.07**	**18**	**4195.26**	**233.07**	**260.54**	**4689.72**	**+494.46**	**+494.46**
TOTAL				**12661.43**			**13359.21**	**+697.78**	**+697.78**

4.1.6 Industrial Sector Results Week One

The Industrial Sector did not move much throughout this week, experiencing some growth in one stock, and some decline in another. Cummings Inc. experienced the greatest growth within this section, having a weekly gain of 118.17 dollars, and a growth in its stock value of 4.01%. Meanwhile, Valvoline experienced a weekly loss of 147.42, as well as a decrease in its stock value of 4.93%. Finally, General Dynamics experienced a weekly gain of 48.30 dollars, which translated into a growth of 1.61% in its stock's value. Overall, this translated to a measly weekly gain of 19.05 dollars within the sector, as well as a 0.22% increase in the sector's overall value. Table 4.2.6 provides more insight and information as well as comparisons to initial stock purchases.

Table 4.1.6: Week One Results for the Industrial Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/16/2023	CMI	226.72	**13**	**2947.36**	**226.62**	**235.81**	**3065.53**	**+118.17**	**+118.17**
6/16/2023	**GD**	**213.89**	**14**	**2994.46**	**213.89**	**217.34**	**3042.76**	**+48.30**	**+48.30**
6/16/2023	**VVV**	**38.34**	**78**	**2990.52**	**38.34**	**36.45**	**2843.10**	**-147.42**	**-147.42**
TOTAL				**8932.34**			**8951.39**	**+19.05**	**+19.05**

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4.1.7 Energy Sector Results Week One

The energy sector is represented by only one company within both portfolios, and in this week, it experienced a small weekly gain of 73 dollars, and an increase in its stock value of 2.48%, thus meaning that this sector is on the rise in this particular week. The singular slotted table of 4.2.7 can be observed below comparing the initial purchasing value of this stock, with that of June 16, 2023.

Table 4.1.7: Week One Results for the Energy Sector within the Diversified Portfolio

Date	**Symbol**	**Original Price**	**Share s**	**Net Cost Proceeds**	**Price Last Friday**	**Hold Price Friday**	**Asset This Friday**	**Week Gain/Loss**	**Total Asset Change**
6/16/2023	SHEL	58.89	**50**	**2944.5**	**58.89**	**60.35**	**3017.50**	**+73**	**+73**

4.2 Week Two

4.2.1 Technology Sector Results for Week Two

This week the technology sector resulted in an overall weekly loss of 111.71 dollars, which only really had a minimal impact on the overall profitable total asset change accumulated over the last two weeks. The overall total asset change recorded after two weeks of testing is a positive change of 782.19 dollars, mostly kept afloat by the large amount of total asset change of Nvidia, despite it dropping throughout this week. Nvidia had a weekly loss of 62.79 dollars, which represented a 1.24% decrease in the stock’s value. Workday this week saw very little change to its previous week’s momentum, keeping its significant total asset change after having a weekly loss of 3 dollars, which represented a measly decrease in the stock’s value of 0.07%. Meanwhile, Allegro Microsystems had a much more significant positive trend in this week compared to the

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last, resulting in a weekly gain of 105.73 dollars, represented as a 2.74% growth in the stock's value. Finally, the last two stocks, TTM Technologies and Microsoft's, both experienced a downward trend in their value, having weekly losses of 42 and 109.65 dollars respectively. This translated to a 1.96% and 2.26% decrease in the stock's values respectively. For TTM Technologies this meant a continued downward trend, and for Microsoft this was a steep drop in what used to be consistent growth in its stock's value.

Table 4.2.1: Week Two Results for the Technology Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/23/2023	NVDA	389.09	13	5058.17	426.92	422.09	5487.17	-62.79	+429
6/23/2023	WDAY	213.49	20	4269.8	222.40	222.25	4445.00	-3.00	+175.2
6/23/2023	ALGM	39.68	97	3848.96	40.16	41.25	4001.25	+105.73	+152.29
6/23/2023	TTMI	14.33	150	2148.75	13.66	13.38	2007.00	-42	-141.75
6/23/2023	MSFT	323.94	15	4859.1	342.33	335.02	5025.3	-109.65	+166.2
TOTAL				20184.79			20965.72	-111.71	+780.94

4.2.2 Communications Sector Results for Week Two

The communications sector had a terrible week in the second week of this simulation. The biggest disappointment being that of the drop in value of the Roblox Company's stock, which decreased by a whopping 9.81% by Friday, June 23 which resulted in an overall loss in value in money invested of 296.25 dollars. The second greatest drop in value was that of AT&T, which had a decrease in the value of its stock of 5.05% which translated to a weekly loss of 152.5 dollars, almost undoing the upward trend it experienced by the end of the week before. Disney also experienced a significant downward trend this week, ending at a weekly loss of 106.26 dollars, and a 3.53% drop in the stock's value since the time of its purchase. Netflix experienced the least

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loss, one that almost halved the total asset change gained the week before, specifically it had a weekly loss of 63.52 dollars and a percentage drop in its stock value of 1.91%. The only stock that experienced a profitable growth in its value was T-Mobile, which had a 48.62 weekly gain, and a 1.42% increase in the stock's value. Overall, this translated to a steep drop in the overall value of the sector, with an overall weekly loss of 569.91 dollars, which dropped the total asset value by a devastating 569.1 dollars, undoing the very profitable trend it had the week prior.

Table 4.2.2: Week Two Results for the Communications Sector within the Diversified Portfolio

Date	**Symbol**	**Original Price**	**Shares**	**Net Cost Proceeds**	**Price Last Friday**	**Hold Price Friday**	**Asset This Friday**	**Week Gain/Loss**	**Total Asset Change**
6/23/2023	NFLX	415.52	**8**	**3324.16**	**431.96**	**424.02**	**3392.16**	**-63.52**	**+68**
6/23/2023	**DIS**	**91.20**	**33**	**3009.6**	**91.32**	**88.10**	**2907.3**	**-106.26**	**-102.3**
6/23/2023	**T**	**15.33**	**250**	**3832.5**	**16.06**	**15.45**	**3862.5**	**-152.5**	**+30**
6/23/2023	**RBLX**	**40.27**	**75**	**3020.25**	**41.80**	**37.85**	**2838.75**	**-296.25**	**-181.5**
6/23/2023	**TMUS**	**132**	**26**	**3432**	**130.93**	**132.80**	**3452.8**	**+48.62**	**+20.8**
TOTAL				**16618.51**			**16453.51**	**-569.91**	**-165**

4.2.3 Healthcare Sector Results for Week Two

The healthcare stock also experienced a downward trend throughout most of the stocks that make it up. The biggest decrease in individual stock value belonged to Pfizer Inc. this week, which had a weekly loss of 176 dollars, which translated to a decrease in the stock's value of 4.57% since it was purchased, this almost set back the total asset change to zero for the stock. Fortunately, Humana, who holds the record within the sector for the greatest drop in its value, did not continue to drop at the rate it did last week, staying almost still at a weekly gain of 2.1 dollars, which was a negligible increase in the stock's value of 0.06%. Meanwhile Intuitive Surgical Inc had an insignificant weekly loss of 27.3 dollars, which was just a drop in the stock's value of 0.68%. The

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only truly significant growth in stock was that of Philip Morris, which had a weekly gain of 60.63 dollars, which was a steady increase in the stock of 1.53%, being the only noticeable gain within the sector for the week. Overall, while there were some stocks that exhibited little change, Pfizer's drop in value set the tone for the sector this week, which summed up to a weekly loss of 140.57 dollars, further exacerbating a loss within the sector as represented below, observable in the total asset change.

Table 4.2.3: Week Two Results for the Healthcare Sector within the Diversified Portfolio

Date	**Symbol**	**Original Price**	**Share s**	**Net Cost Proceeds**	**Price Last Friday**	**Hold Price Friday**	**Asset This Friday**	**Week Gain/Loss**	**Total Asset Change**
6/23/2023	PFE	38.48	**100**	**3848**	**40.06**	**38.30**	**3830**	**-176**	**-18**
6/23/2023	**HUM**	**524.14**	**7**	**3668.98**	**445.65**	**445.95**	**3121.65**	**+2.1**	**-547.33**
6/23/2023	**ISRG**	**309.57**	**13**	**4024.41**	**329.36**	**327.26**	**4254.38**	**-27.3**	**+229.97**
6/23/2023	**PM**	**92.20**	**43**	**3964.6**	**94.89**	**96.30**	**4140.9**	**+60.63**	**+176.3**
TOTAL				**15505.99**			**15346.93**	**-140.57**	**-159.06**

4.2.4 Financial Sector Results for Week Two

The financial sector also experienced a significant drop in its overall weekly loss, resulting in a drop of 346.77 dollars, offsetting what was previously a respectable total asset change, and dropping it to a 190.96 drop in the sector's overall value. All companies within this sector somewhat dropped at the same rate, implying a trend within the sector during this week that was unfavorable. The most significant weekly loss was observed in Citigroup Inc, which had a weekly loss of 136.71 dollars, representing 4.53% in the value of the stock. Followed by this was that of Wells Fargo company, which showed a similar weekly loss of 113.04 dollars, which is a 3.78% drop in the stock's value since it was purchased. Finally, the least significant drop was in JP Morgan, but not by a margin significant enough to take as a victory. The weekly loss of this stock

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was 97.02 dollars, which almost equated to the previous weekly gain, bringing the total asset change to a disappointing, but not terrible loss of 10.78 dollars. The specifics and comparisons to the values of the previous week are observable in Table 4.3.4 below.

Table 4.2.4: Week Two Results for the Financial Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/23/2023	C	47.88	**63**	**3016.44**	**48.19**	**46.02**	**2899.26**	**-136.71**	**-117.18**
6/23/2023	**WFC**	**41.49**	**72**	**2987.28**	**42.18**	**40.615**	**2924.28**	**-113.04**	**-63**
6/23/2023	**JPM**	**139.34**	**22**	**3065.26**	**143.26**	**138.85**	**3054.7**	**-97.02**	**-10.78**
TOTAL				**9069.2**			**8878.24**	**-346.77**	**-190.96**

4.2.5 Consumer Discretionary Sector Results for Week Two

While this week was not a very profitable week for the sector, it resulted in no overall loss within the sector itself and served to increase the total asset change of the sector by a small margin. Amazon was the only company this week to generate a weekly gain, specifically a rather profitable week that resulted in 157.44 dollars, or a 3.12% increase in the value of the stock since it was purchased. Meanwhile, McDonalds had a small weekly loss of 45.48 dollars, which is a drop in the stock's value of 1.33%. Tesla also experienced a rather small loss in its value, resulting in a weekly loss of 70.92 dollars, or a drop in stock value of 1.69%, which is a small percentage loss compared to the previous week's increase in price. Finally, McDonalds also experienced a rather small drop in its value, resulting in a weekly loss of 45.48 dollars, which is a 1.32% drop in the stock's value. These small drops were not enough to offset the weekly gain of Amazon, which all together resulted in a sector weekly gain of 41.04 dollars, continuing the rather positive trend this sector has been following, ending up with a total asset change for the sector of 738.82 dollars.

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Table 4.2.5: Week Two Results for the Consumer Discretionary Sector within the Diversified Portfolio

Date	Symbol	Original Price	Share s	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/23/2023	AMZN	123.01	**41**	**5043.41**	**125.49**	**129.33**	**5302.53**	**+157.44**	**+259.12**
6/23/2023	**MCD**	**285.23**	**12**	**3422.76**	**293.70**	**289.91**	**3478.92**	**-45.48**	**+56.16**
6/23/2023	**TSLA**	**233.07**	**18**	**4195.26**	**260.54**	**256.60**	**4618.80**	**-70.92**	**+423.54**
TOTAL				**12661.43**			**13400.25**	**+41.04**	**+738.82**

4.2.6 Industrial Sector Results for Week Two

The industrial sector this week had its first significant trend, but not a positive one. This week, the greatest loss was observable within General Dynamics, who had a weekly loss of 69.3 dollars, representing a drop of 2.31% in the stock's value. Cummings was the follow up in losses, having had weekly loss of 49.27 dollars during this time, which represented a 1.67% decrease in value for the stock. The most acceptable loss was in Valvoline, but it hasn't had a good track record since the project started, it had a weekly loss of 30.42 dollars, which represented a 1.02% drop in the stock's value. Overall, it was very unprofitable for the industrial sector, which is disappointing considering the previous week's negligible increase. The weekly loss of this sector this week was a combined total of 148.99 dollars, with the asset change being very similar at a negative change of 129.94 dollars.

Table 4.2.6: Week Two Results for the Industrial Sector within the Diversified Portfolio

Date	Symbol	Original Price	Share s	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/23/2023	CMI	226.72	**13**	**2947.36**	**235.81**	**232.02**	**3016.26**	**-49.27**	**+68.9**
6/23/2023	**GD**	**213.89**	**14**	**2994.46**	**217.34**	**212.39**	**2973.46**	**-69.3**	**-21**
6/23/2023	**VVV**	**38.34**	**78**	**2990.52**	**36.45**	**36.06**	**2812.68**	**-30.42**	**-177.84**
TOTAL				**8932.34**			**8802.4**	**-148.99**	**-129.94**

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4.2.7 Energy Sector Results for Week Two

Once more, the energy sector consists only of Shell, which experienced an insignificant but negative change throughout this week. Overall, it had a small weekly loss of 37.5 dollars, which consisted of an increase in stock of 1.20%. This resulted in a total asset change of a positive 35.5. This week it was demonstrated that there was little in the way of change within this sector, at the moment there is little to stimulate the energy-based market, thus it is not much of a surprise.

Table 4.2.7: Week Two Results for the Energy Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/23/2023	SHEL	58.89	**50**	**2944.5**	**60.35**	**59.60**	**2980**	**-37.5**	**+35.5**

4.3 Week Three

4.3.1 Technology Sector Results for Week Three

The technology sector during this week experienced a significant upward trend, mostly originating from very profitable growth from Allegro Microsystems, while most other stocks stuck around the value, they had the week prior, or had a median growth rate. Firstly, addressing the growth of Allegro Microsystems is what is most important to speak of, having experienced a weekly gain of 377.33 dollars, which represented a significant growth in the stock's value of 9.80% resulting in a total asset percentage change of 13.76% becoming one of the most profitable stocks in the portfolio. Nvidia continues an upward trend since initial investment, despite having a very slow trend this week with only a measly weekly gain of 12.09 dollars, representing a 0.24% growth in the stock's value, which is better than a decline in its growth. The rest of the stocks within the

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sector experienced somewhat similar weekly gains, with Workday, TTM Technologies and Microsoft having weekly gains of 72.8, 78 and 82.8 dollars respectively. This represented a growth of 1.70% for Workday's stock, a significant growth of 3.63% for TTM Technologies and another 1.70% growth for Microsoft. Overall, this was an immensely profitable week for the technological sector, with a weekly gain of 623.02 dollars, to an almost double total asset change of 1403.96 dollars.

Table 4.3.1: Week Three Results for the Technological Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/30/2023	**NVDA**	**389.09**	**13**	**5058.17**	**422.09**	**423.02**	**5499.26**	**+12.09**	**+441.09**
6/30/2023	**WDAY**	**213.49**	**20**	**4269.8**	**222.25**	**225.89**	**4517.80**	**+72.8**	**+248**
6/30/2023	**ALGM**	**39.68**	**97**	**3848.96**	**41.25**	**45.14**	**4378.58**	**+377.33**	**+529.62**
6/30/2023	**TTMI**	**14.33**	**150**	**2148.75**	**13.38**	**13.90**	**2085**	**+78**	**-63.75**
6/30/2023	**MSFT**	**323.94**	**15**	**4859.1**	**335.02**	**340.54**	**5108.1**	**+82.8**	**+249**
TOTAL				**20184.79**			**21588.76**	**+623.02**	**+1403.96**

4.3.2 Communication Sector Results for Week Three

Fortunately, the communications sector followed an almost equally profitable week, a trend that will be demonstrated by most other sectors throughout this week. The largest rise in stock value this week was observed within the value of Roblox' stock, which had a weekly gain of 183.75 dollars, representing a 6.08% increase in the stock's value, a quite significant increase. This was followed by a similar weekly gain of 158.6 dollars by T-Mobile, which specifically represented an increase of 4.62% for the company's stock. Furthermore, this positive trend was followed by Netflix with a weekly gain of 131.76 dollars, or a 3.96% increase in its stock value,

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as well as AT&T who had a weekly gain of 125 dollars, which is represented as a 4.15% increase in value. Finally, the most mediocre growth was experienced by Disney, which only had a weekly gain of 38.94 dollars, or specifically a 1.29% increase in the stock's value. Overall, it is important to reiterate that this was an immensely profitable week within the communications sector, amassing a total weekly gain of 638.05 dollars, bringing the total asset change by the end of this week to 473.05 dollars.

Table 4.3.2: Week Three Results for the Communication Sector within the Diversified Portfolio

Date	**Symbol**	**Original Price**	**Shares**	**Net Cost Proceeds**	**Price Last Friday**	**Hold Price Friday**	**Asset This Friday**	**Week Gain/Loss**	**Total Asset Change**
6/30/2023	**NFLX**	**415.52**	**8**	**3324.16**	**424.02**	**440.49**	**3523.92**	**+131.76**	**+199.76**
6/30/2023	**DIS**	**91.20**	**33**	**3009.6**	**88.10**	**89.28**	**2946.24**	**+38.94**	**-63.36**
6/30/2023	**T**	**15.33**	**250**	**3832.5**	**15.45**	**15.95**	**3987.5**	**+125**	**+155**
6/30/2023	**RBLX**	**40.27**	**75**	**3020.25**	**37.85**	**40.30**	**3022.5**	**+183.75**	**+2.25**
6/30/2023	**TMUS**	**132**	**26**	**3432**	**132.80**	**138.90**	**3611.4**	**+158.6**	**+179.4**
TOTAL				**16618.51**			**17091.56**	**+638.05**	**+473.05**

4.3.3 Healthcare Sector Results for Week Three

Unfortunately, the healthcare sector did not have the same upward trend in overall value as the last two sectors did this week. This overall weekly gain for the sector was mostly offset by Pfizer, which experienced a significant downward trend throughout this week, specifically resulting in a weekly loss of 162 dollars, or a decrease of 4.21% in the stock's value. The only true competition this week in offsetting this significant loss was Intuitive Surgical Inc. which continued in the upward trend it has been experiencing for the last three weeks, this time having a weekly gain of 190.84 dollars, which is a 4.74% increase in the stock's value. Fortunately, Humana Inc. this week did not continue its rather strong negative trend, instead somewhat stabilizing by the end

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of week three into a very minimal weekly gain of 8.26 dollars, or a small increase of 0.23% in the stock's value. Philip Morris also continued its upward trend, at a somewhat similar scale at which it has been experiencing growth in the last three weeks, specifically at a weekly gain of 56.76 dollars, which was a moderate stock growth of 1.43%. Overall, this week was somewhat disappointing for the Healthcare sector, but it did do better as a whole than it has been doing throughout this simulation. The total weekly loss was kept decently low thanks to Intuitive Surgical Inc.'s continued growth, demonstrating how diversification can help mitigate losses. The weekly loss was finalized at a gain of 93.86 dollars but kept the total asset change at a negative point of 65.2 dollars. The

Table 4.3.3: Week Three Results for the Healthcare Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/30/2023	**PFE**	**38.48**	**100**	**3848**	**38.30**	**36.68**	**3668**	**-162**	**-180**
6/30/2023	**HUM**	**524.14**	**7**	**3668.98**	**445.95**	**447.13**	**3129.91**	**+8.26**	**-539.07**
6/30/2023	**ISRG**	**309.57**	**13**	**4024.41**	**327.26**	**341.94**	**4445.22**	**+190.84**	**+420.81**
6/30/2023	**PM**	**92.20**	**43**	**3964.6**	**96.30**	**97.62**	**4197.66**	**+56.76**	**+233.06**
TOTAL				**15505.99**			**15440.79**	**+93.86**	**-65.2**

4.3.4 Financial Sector Results for Week Three

The financial sector finally recovered from the previous week's downfall, having a significant rebound which resulted in a very profitable week. The highest weekly gain came from Wells Fargo, specifically a gain of 149.04 dollars, which represented a 4.99% increase in the stock's value. This was almost equal to the weekly gain of JP Morgan, which was specifically an amount of 144.98 dollars, or an increase within the stock of 4.73%. Finally, Citigroup Inc. did not

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at least continue in its downward trend, staying mostly stable at the value it had by the end of the last week, specifically experiencing a gain of 1.26 dollars, or a 0.04% increase in the stock's value. This resulted in a very bountiful total weekly gain of 295.28 dollars, which managed to completely turn around the previous week's total asset change, bringing it to 104.32 dollars over the original net cost. The specifics of the results are in Table 4.4.4.

Table 4.3.4: Week Three Results for the Financial Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/30/2023	**C**	**47.88**	**63**	**3016.44**	**46.02**	**46.04**	**2900.52**	**+1.26**	**-115.92**
6/30/2023	**WFC**	**41.49**	**72**	**2987.28**	**40.61**	**42.685**	**3073.32**	**+149.04**	**+86.04**
6/30/2023	**JPM**	**139.34**	**22**	**3065.48**	**138.85**	**145.44**	**3199.68**	**+144.98**	**+134.2**
TOTAL				**9069.2**			**9173.52**	**+295.28**	**+104.32**

4.3.5 Consumer Discretionary Sector Results for Week Three

Throughout the entire simulation, the consumer discretionary sector has been the sector that has been performing success most consistently, with none of the stocks bought within this sector losing more than 100 dollars in a single week. While the stocks within this sector did not experience as significant gains as they have in the last few weeks, they remain consistent in their upward trends. McDonalds had the most significant weekly gain by the end of the third week, resulting in 102 dollars, or an increase of 2.98% by the end of Friday. Tesla experienced a similar weekly gain of 93.06 dollars, which was a similar percentage growth of the stock of 2.22%, adding to the significant total weekly gain experienced. Finally, Amazon also experienced a decent weekly gain, although at a less significant rate than the other two stocks within the sector. The weekly gain of this company was 42.23 dollars, which was a small 0.84% growth in the stock's value. Overall, this was another extremely profitable week for the consumer discretionary sector, ending at a total

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weekly gain of 237.29 dollars, amounting to a total asset change by the end of Friday of positive 976.08 dollars, the second highest within this simulation by this point. The changes and comparisons between now and previous values can be observed in Table 4.4.5 below.

Table 4.3.5: Week Three Results for the Consumer Discretionary Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/30/2023	**AMZN**	**123.01**	**41**	**5043.41**	**129.33**	**130.36**	**5344.76**	**+42.23**	**+301.35**
6/30/2023	**MCD**	**285.23**	**12**	**3422.76**	**289.91**	**298.41**	**3580.92**	**+102**	**+158.16**
6/30/2023	**TSLA**	**233.07**	**18**	**4195.26**	**256.60**	**261.77**	**4711.86**	**+93.06**	**+516.6**
TOTAL				**12661.43**			**13637.51**	**+237.29**	**+976.08**

4.3.6 Industrial Sector Results for Week Three

The industrial sector had a very profitable week by the end of this Friday, with stocks from all companies gaining an increase in their value. The highest profit was observed in Cummings Inc.'s stock, which experienced a weekly gain of 170.82 dollars, representing a 5.80% increase in the stock's value, a significant profit in value. At the same time, Valvoline managed to finally shift towards a positive trend, generating a weekly gain of 113.1 dollars, which is a 3.78% increase in the stock's value since originally bought. Finally, General Dynamics kept its mostly non-impactful trend of hovering around its original price, this time though, at least there was a minimal weekly gain of 38.64 dollars, which was an increase of 1.29% in the value of the stock. Overall, this weekly gain was very profitable thanks to significant increases in the value of both Cummings and Valvoline's stock, resulting in a total weekly gain of 322.56 dollars, and bringing the total asset change to a decent 192.62 dollars by the end of this week's Friday. The specific changes can be observed in Table 4.4.6.

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Table 4.3.6: Week Three Results for the Industrial Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/30/2023	CMI	226.72	**13**	**2947.36**	**232.02**	**245.16**	**3187.08**	**+170.82**	**+239.72**
6/30/2023	**GD**	**213.89**	**14**	**2994.46**	**212.39**	**215.15**	**3012.1**	**+38.64**	**+17.64**
6/30/2023	**VVV**	**38.34**	**78**	**2990.52**	**36.06**	**37.51**	**2925.78**	**+113.1**	**-64.74**
TOTAL				**8932.34**			**9124.96**	**+322.56**	**+192.62**

4.3.7 Energy Sector Results for Week Three

The energy sector once more is solely composed of the oil company Shell, and has performed at a very mediocre pace, continuing to barely change in price, shifting in only small margins. This week, Shell experienced another small weekly gain, like the one experienced in the first week, resulting in a weekly gain of 39 dollars, and summing to a total asset change of 74.5 dollars. The comparisons for previous values and present values can be observed in Table 4.4.7 below.

Table 4.3.7: Week Three Results for the Energy Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
6/30/2023	**SHEL**	58.89	**50**	**2944.5**	**59.60**	**60.38**	**3019**	**+39**	**+74.5**

4.4 Week Four

4.4.1 Technology Sector Results for Week Four

This week the technology sector experienced a rather detrimental loss in value by the end of Friday. This was due to a throughout the board loss in value for most of the stocks within this

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sector, with the only growth in value being a rather small weekly gain. This growth was experienced by Nvidia, who had a weekly gain of 26.13 dollars, which represented a very meek increase of 0.52% in the stock's value. From then on, only loss is observed through the other stocks, with the most significant being Workday's weekly loss of 143.2 dollars, which represented a 3.35% decrease in the stock's value, offsetting a large amount of the previously accumulated total asset change. Allegro Microsystems made the second most significant loss this week, resulting in a weekly loss of 112.52 dollars, or a total 2.92% decrease in the stock's value. The final two stocks also had a weekly loss, but not as heavy as the two mentioned prior. TTM Technologies had a weekly loss of 51 dollars, exacerbating the only negative total asset change within this sector with a 2.37% drop in value. Finally, the lowest drop in total value was Microsoft, which had a weekly loss of 49.8 dollars, or specifically a 1.02% drop in value. Overall, this week hurt the total asset change of this sector significantly, with a weekly loss of 330.39 dollars, amounting to a total asset change of 1074.9 by the end of this week. These values are all observable in the Table 4.5.1 below.

Table 4.4.1: Week Four Results for the Technology Sector within the Diversified Portfolio

Date	**Symbol**	**Original Price**	**Shares**	**Net Cost Proceeds**	**Price Last Friday**	**Hold Price Friday**	**Asset This Friday**	**Week Gain/Loss**	**Total Asset Change**
7/7/2023	NVDA	389.09	**13**	**5058.18**	**423.03**	**425.03**	**5525.39**	**+26.13**	**+467.22**
7/7/2023	**WDAY**	**213.49**	**20**	**4269.8**	**225.89**	**218.73**	**4374.6**	**-143.2**	**+104.8**
7/7/2023	**ALGM**	**39.68**	**97**	**3848.96**	**45.14**	**43.98**	**4266.06**	**-112.52**	**+417.1**
7/7/2023	**TTMI**	**14.32**	**150**	**2147.50**	**13.90**	**13.56**	**2034**	**-51**	**-113.5**
7/7/2023	**MSFT**	**323.94**	**15**	**4859.1**	**340.54**	**337.22**	**5058.3**	**-49.8**	**+199.28**
TOTAL				**20183.53**			**21258.35**	**-330.39**	**+1074.9**

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4.4.2 Communications Sector Results for Week Four

The communications sector also experienced a rather low week, but not nearly as much of a downtrend as the technology sector had. This overall weekly loss of 59.67 dollars was the result of mostly minimal changes in stock value since the last week, with the most significant being that of AT&T. AT&T experienced a weekly loss of 85 dollars, which was a 2.82% drop in value in the stock by the end of Friday of this week. On the other side, Roblox experienced the most significant, if only real gain in value this week, finalizing with a weekly gain of 63.75 dollars, which was a 2.11% gain in the stock's value, which helped somewhat offset the losses within the sector. The rest were very minimal changes in stock values, with Netflix having a weekly loss of 19.12 dollars which was a 0.58% drop in its value. This was followed by an even more minimal change with T-Mobile having an insignificant weekly gain of 1.82 dollars, which is a 0.05% increase in its stock value. Finally, Disney also experienced a minimal weekly loss, resulting in 21.12 dollars less in its value, which represented a 0.70% decrease. Overall, this all culminated into a very minimal loss which didn't have much of an impact on its profitable total asset change. The specifics and comparisons are observable in table 4.5.2 below.

Table 4.4.2: Week Four Results for the Communications Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
7/7/2023	NFLX	415.52	**8**	**3324.16**	**440.49**	**438.10**	**3504.8**	**-19.12**	**+180.64**
7/7/2023	**DIS**	**91.20**	**33**	**3009.6**	**89.28**	**88.64**	**2925.12**	**-21.12**	**-84.48**
7/7/2023	**T**	**15.33**	**250**	**3832.5**	**15.95**	**15.61**	**3902.5**	**-85**	**+70**
7/7/2023	**RBLX**	**40.27**	**75**	**3020.25**	**40.30**	**41.15**	**3086.25**	**+63.75**	**+66**
7/7/2023	**TMUS**	**132**	**26**	**3432**	**138.90**	**138.97**	**3613.22**	**+1.82**	**+181.22**
TOTAL				**16618.51**			**17031.89**	**-59.67**	**+413.38**

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4.4.3 Healthcare Sector Results for Week Four

The healthcare sector experienced the most significant loss this week, representing the greatest sector loss this week. This was mostly characterized by Intuitive Surgical metaphorical ‘fall from grace’, in which the stock experienced a weekly loss of 138.45 dollars, which was a drop in the stock’s value of 3.44%, dropping the previously very lucrative total asset change significantly. This was also the most significant drop in value within the sector, but it was followed closely by both Pfizer and Humana’s own losses. Pfizer experienced a weekly loss of 115 dollars, which represents a 3.24% drop in its value. Humana had a similar weekly loss, continuing its trend of a very disappointing total asset change, in total the weekly loss was 118.93 marking a 3.24% drop in value. Finally, Philip Morris was the only stock to demonstrate any form of positivity this week, with a very negligible weekly gain of 3.44 dollars, or a 0.09% increase in the stock. Overall, this resulted in a weekly loss of 368.94 dollars, further dropping a total asset change that was previously manageable but became completely disappointing by the end of this week. The changes within the Healthcare sector are observable in Table 4.5.3 below.

Table 4.4.3: Week Four Results for the Healthcare Sector within the Diversified Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
7/7/2023	PFE	38.48	**100**	**3848**	**36.68**	**35.53**	**3553**	**-115**	**-295**
7/7/2023	**HUM**	**524.14**	**7**	**3668.98**	**447.13**	**430.14**	**3010.98**	**-118.93**	**-658**
7/7/2023	**ISRG**	**309.57**	**13**	**4024.41**	**341.94**	**331.29**	**4306.77**	**-138.45**	**+282.36**
7/7/2023	**PM**	**92.20**	**43**	**3964.6**	**97.62**	**97.70**	**4201.1**	**+3.44**	**+236.5**
TOTAL				**15505.99**			**15071.85**	**-368.94**	**-434.14**

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4.4.4 Financial Sector Results for Week Four

The financial sector followed a similar negative trend with the other sectors demonstrated before, but at a much less impactful scale. Wells Fargo was the only company that experienced any form of growth this week, with a very small weekly gain of 6.12 dollars, which was an increase in the value's stock of 0.20%. This was followed by Citigroup having a weekly loss of 18.9 dollars, or a drop of 0.63% which also demonstrated little impact. JPM reported the greatest weekly loss within this sector, but was still mostly un-impactful, with a small loss of 24.2 dollars, and a drop of 0.79% in the stock's value. Overall, this sector had a very small weekly loss of 36.98 dollars, which didn't help the total asset change, but at least did not exacerbate a loss within the sector too much. Table 4.5.4 demonstrates these changes below.

Table 4.4.4: Week Four Results for the Financial Sector within the Diversified Portfolio

Date	**Symbol**	**Original Price**	**Shares**	**Net Cost Proceeds**	**Price Last Friday**	**Hold Price Friday**	**Asset This Friday**	**Week Gain/Loss**	**Total Asset Change**
7/7/2023	C	47.88	**63**	**3016.44**	**46.04**	**45.74**	**2881.62**	**-18.9**	**-134.82**
7/7/2023	**WFC**	**41.49**	**72**	**2987.28**	**42.685**	**42.77**	**3079.44**	**+6.12**	**+92.16**
7/7/2023	**JPM**	**139.34**	**22**	**3065.48**	**145.44**	**144.34**	**3175.48**	**-24.2**	**+110**
TOTAL				**9069.2**			**9136.54**	**-36.98**	**-67.34**

4.4.5Consumer Discretionary Sector Results for Week Four

The consumer discretionary stock was the only profitable sector this week, having been the only one that grew, pretty much only because of Tesla's continued growth. Tesla experienced a weekly gain of 227.88 dollars, which represented another formidable 5.43% increase in the stock's value, following Tesla's trend of consistent growth. Unfortunately, the same could not be said of both Amazon and McDonald's. McDonald's had a weekly loss of 75.72 by the end of Friday,

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which is a 2.21% drop in the stock's value. Meanwhile, Amazon had the most insignificant change within its value, having only had a weekly loss of 23.78 dollars, which is only a 0.47% decrease in value. Overall, this sector experienced a decently profitable weekly gain of 128.38 dollars, which pushed this sector into having the highest total asset change by the end of Friday, adding up towards a growth of 1104.49 dollars. This demonstrated Tesla's continued trend of growth was continuing to set the pace for the sector, enabling it to grow despite the two stocks showing a decrease in their values. These changes in values are observable in Table 4.5.5 below.

Table 4.4.5: Week Four Results for the Consumer Discretionary Sector within the Diversified Portfolio

Date	Symbol	Original Price	Share s	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
7/72023	AMZN	123.01	**41**	**5043.41**	**130.36**	**129.78**	**5320.98**	**-23.78**	**+277.57**
7/7/2023	**MCD**	**285.23**	**12**	**3422.76**	**298.41**	**292.10**	**3505.2**	**-75.72**	**+82.44**
7/7/2023	**TSLA**	**233.07**	**18**	**4195.26**	**261.77**	**274.43**	**4939.74**	**+227.88**	**+744.48**
TOTAL				**12661.43**			**13765.92**	**+128.38**	**+1104.49**

4.4.6 Industrial Sector Results for Week Four

The industrial sector experienced very small insignificant changes in all the value of the stocks within the sector. Cummings Inc had the only positive weekly gain within this sector, but it was very minimal, adding 8.32 dollars to the stock's value, which is only a 0.28% growth for the stock. In contrast, Valvoline experienced a weekly loss similar in value to Cumming's weekly gain, resulting in a drop of 9.36 dollars, which is a 0.31% drop in the stock's value. Finally, General Dynamics also experienced a weekly loss similar in value to that of Valvoline, resulting in a loss of 14 dollars, or a 0.47% drop in the stock's value. Overall, this resulted in a very minimal weekly loss of 15.04, which barely affected the total asset change, keeping it at an overall positive value of 177.58 dollars. This week was still very slow for the Industrial sector, experiencing very little

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change, which is better than having a significant loss as experienced by other sectors during this week. This stability tends to be a benefit of this sector, as it is diversified by the different focuses in production and businesses in companies within the Industrial sector. The specifics can be observed in Table 4.5.6 below.

Table 4.4.6: Week Four Results for the Industrial Sector within the Diversified Portfolio

Date	**Symbol**	**Original Price**	**Share s**	**Net Cost Proceeds**	**Price Last Friday**	**Hold Price Friday**	**Asset This Friday**	**Week Gain/Loss**	**Total Asset Change**
7/7/2023	CMI	226.72	**13**	**2947.36**	**245.16**	**245.80**	**3195.4**	**+8.32**	**+248.04**
7/7/2023	**GD**	**213.89**	**14**	**2994.46**	**215.15**	**214.15**	**2998.1**	**-14**	**+3.64**
7/7/2023	**VVV**	**38.34**	**78**	**2990.52**	**37.51**	**37.39**	**2916.42**	**-9.36**	**-74.1**
TOTAL				**8932.34**			**9109.92**	**-15.04**	**+177.58**

4.4.7 Energy Sector Results for Week Four

The energy sector once more is always characterized by how Shell is affected during this study. By the end of this week, Shell experienced another small, similar change to the one experienced last week, with a weekly loss of 36.5 dollars. This represented a 1.24% decrease in the stock's value, and while disappointing, the change was minimal and did not completely offset the total asset change. The specific comparisons can be observed in Table 4.5.7 below.

Table 4.4.7: Week Four Results for the Technology Sector within the Diversified Portfolio

Date	**Symbol**	**Original Price**	**Share s**	**Net Cost Proceeds**	**Price Last Friday**	**Hold Price Friday**	**Asset This Friday**	**Week Gain/Loss**	**Total Asset Change**
7/7/2023	SHEL	58.89	**50**	**2944.5**	**60.38**	**59.65**	**2982.5**	**-36.5**	**+38**

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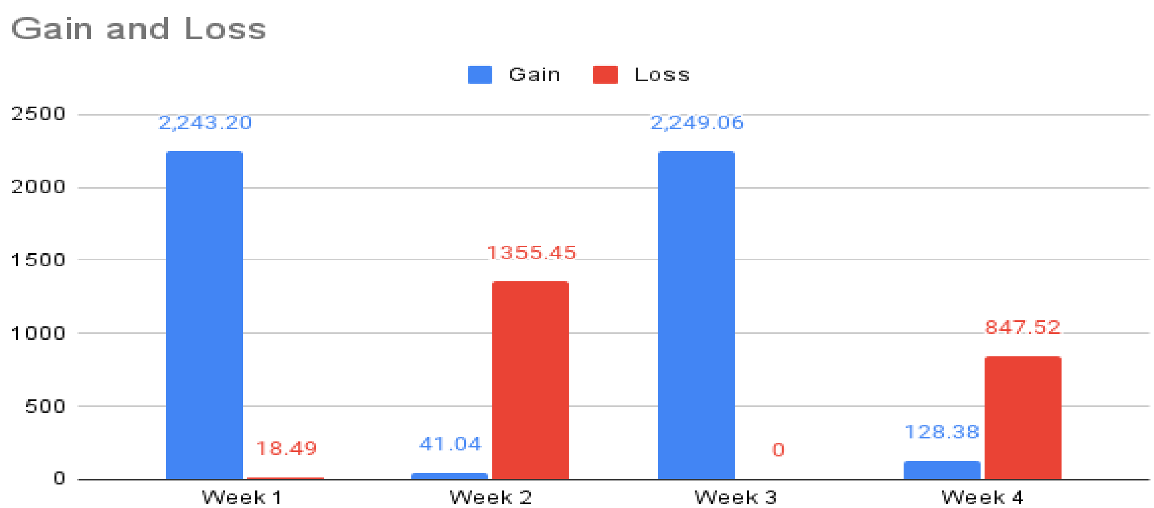
4.5 Total Results

The finalized results of simulation of the diversified portfolio were a grand total profit of 2,441.47 dollars, in no small part thanks to some significant gains during the first and third week of the simulation. The changes in gain and losses were quite chaotic, with some weeks there being large gains of around 2,000 dollars, with minimum losses, with other times there being a much more significant amount of loss across the board. The specific weekly gains and losses accumulated together can be observed in the Figure below. As observable in Figure 4.1, within Week One there was a reported weekly gain of 2,243.20, with a very minimal loss of 18.49 dollars.

Figure 4.1: Weekly Results of Gains and Losses within the Diversified Portfolio



This weekly loss in week one is of particular interest, due to how much larger it could've been but how this deeply negative value is offset by the diversification of the portfolio. The reported loss was of 18.49$, this was almost solely caused by the decrease in value of the Humana stock, specifically an asset loss of 549.43$, which would have been much more significant, but the

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other Healthcare stocks grew in value, adding up to a total of a 530.94$ gain. This is important to note because it shows how investing in several different companies within a sector can offset losses. Humana had a very large loss of 14.98% which was offset by reasonable gains for the rest of the companies, which is 6.39% for ISRG, 2.92% for PM and 4.11% for PFE. This helps show how diversification can help stop extreme losses in individual stocks, and while you do require multiple stocks to succeed to offset this large decline, they don't have to succeed at the same extreme rate at which Humana declined, making it easier to offset losses. This strategy helped maintain a profitable growth in the total value of the portfolio. The total portfolio's value was kept positive throughout the whole simulation, even at its worst the portfolio was valued a bit less than 1,000 dollars above the initial cost. The specifics of the values of the portfolio as the simulation goes along are observable in Figure 4.2.

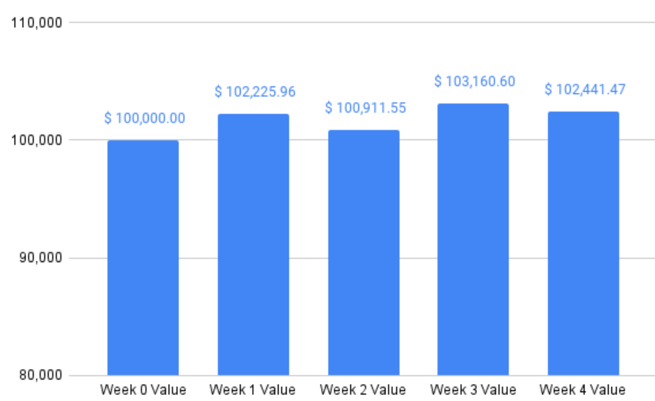

Figure 4.2: Total Diversified Portfolio Value at the end of each Week.

These were somewhat small gains, even at their highest, but considering the small timespan this simulation occupies, a 2-3% increase in the portfolio's value is quite significant. These specific gains and losses can be observed, the losses experienced throughout the simulation never rivaling the gains observed. The specifics of which can be observed in Figure 4.3, which demonstrates the weekly profit or losses that the portfolio experienced throughout the simulation.

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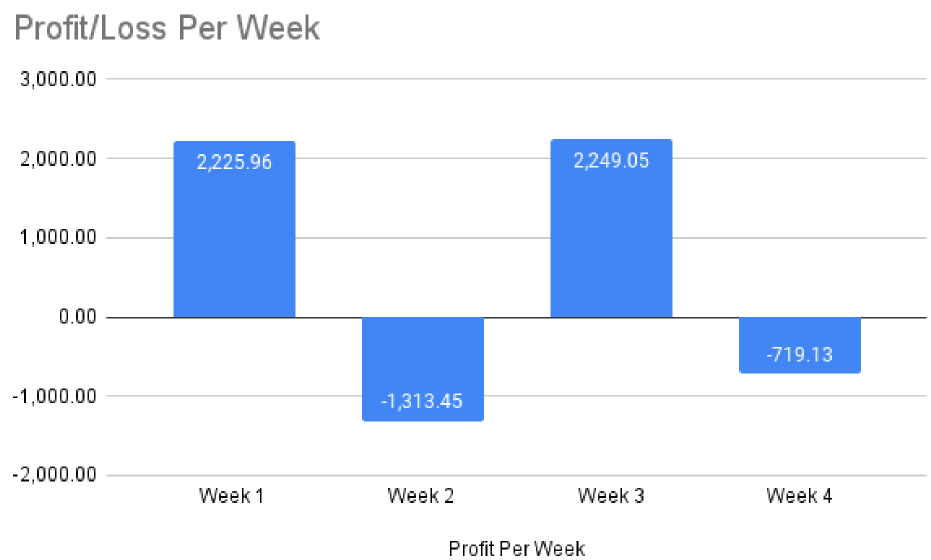

Figure 4.3: Profit/Loss Per Week of the Diversified Portfolio

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Chapter 5: "Narrow" Stock Portfolio Simulation

5.1 Week One Results

The first week of this simulation was notoriously unprofitable, with a decline in the price of each individual stock within the portfolio. It is of note that most of these drops in stock prices are quite small, with the most significant weekly loss being seen in Tesla, but not by an enormous percentage. Tesla, which represents the technology sector, experienced a weekly loss of 582.12, which at first seems like a significant percentage drop in the stock's value, but it's interesting to note that it has a drop in value of 1.93% which isn't much to lose by sheer percentage alone. Pfizer was the next company to experience a somewhat significant weekly loss, which was that of 458.08, representing a higher percentage than Tesla, but a lower total monetary loss at 3.06%. Wells Fargo also experienced a rather large weekly loss, similar in percentage to that of Tesla, but with almost half the weekly loss. This was specifically a weekly loss of 217.98 dollars, which represented a percentage drop in the stock's value of 1.47%. After that, McDonald's had a somewhat significant weekly loss at 93.16 dollars, which was a 0.93% drop in value, which isn't as terrible as some of the other drops in value. General Dynamics performed in a similar way, experiencing a weekly loss of 76.61 dollars, which was a 0.76% drop in value for the stock. T-Mobile experienced the least significant drop in value within this week, having a weekly loss of 38.88 dollars, which was a very small drop in value, specifically a 0.26% decrease in the stock's value. Finally, Shell also experienced a rather small weekly loss, specifically a 72.1 drop, which while a low amount to lose in dollars, the stock dropped in value by 1.70%, like that of Tesla. Overall, this represents a total weekly loss of 1538.93 dollars, due to the accumulation of each stock experiencing a series of losses. This also represents the total asset change, as this is the first week of the simulation. It's a

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terrible way for a simulation to start, but hopefully this will change as the simulation goes on. The specific changes in price for each stock can be observed in Table 5.1 below.

Table 5.1: Week One Results for Narrow Portfolio Simulation

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
7/7/2023	TSLA	279.82	108	30220.56	279.82	274.43	29638.44	-582.12	-582.12
7/7/2023	PFE	36.65	409	14989.85	36.65	35.53	14531.77	-458.08	-458.08
7/7/2023	WFC	43.40	346	15016.4	43.40	42.77	14798.42	-217.98	-217.98
7/7/2023	MCD	294.84	34	10024.56	294.84	292.10	9931.4	-93.16	-93.16
7/7/2023	GD	215.78	47	10141.66	215.78	214.15	10065.05	-76.61	-76.61
7/7/2023	TMUS	139.33	108	15047.64	139.33	138.97	15008.76	-38.88	-38.88
7/7/2023	SHEL	60.68	70	4247.6	60.68	59.65	4175.5	-72.1	-72.1
TOTAL				99688.27			98149.34	-1538.93	-1538.93

5.2 Week Two Results

This week resulted in a much more positive trend for all the stocks within the portfolio. Once more, the stock with the most significant change in value being once more from the Tesla stock. Specifically, Tesla as a stock experienced a weekly loss of 750.6 dollars, which was a 2.48% increase in the stock's value since the previous week was recorded. This was followed by another significant weekly gain by Pfizer's stock, resulting in a weekly gain of 323.11 dollars, which translated to a 2.16% increase in the stock. A similar weekly gain was experienced by Wells Fargo, which was at 273.34 dollars, representing a 1.82% increase in the stock's value. The next few stocks didn't experience as much of a weekly gain as the previous ones, but they were significant enough to mostly offset the previous week's loss of these stocks. McDonald's had a decent weekly gain of 96.56 dollars, which represented a 0.96% increase in the stock's value. General Dynamics

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performed similarly but at a lower level, which was a weekly gain of 54.99 dollars, or a 0.54% increase in the stock's value since it was purchased. T-Mobile performed somewhat better than General Dynamics, specifically a weekly gain of 76.68 dollars, which was a 0.51% increase in the stock's value. Finally, Shell finished at exactly the price it had when it was originally bought, experiencing a weekly gain of 72.1 dollars, which is a 1.70% increase in stock, which completely offsets the previous week's loss to a total asset change of 0 by the end of Week two. Overall, this was a very profitable week for the portfolio as the whole, finishing up at a total weekly gain of 1575.28 dollars. This helped offset the previous loss from Week One and finished on Friday with a total asset change for the portfolio of 108.45 dollars. The specific details and comparisons between Week One's finishing price and Week Two's finishing price can be observed in Table 5.2 demonstrated below.

Table 5.2: Week Two Results for the Narrow Portfolio

Date	Symbol	Original Price	Shares	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
7/14/2023	TSLA	279.82	**108**	**30220.56**	**274.43**	**281.38**	**30389.04**	**+750.6**	**+168.48**
7/142023	**PFE**	**36.65**	**409**	**14989.85**	**35.53**	**36.32**	**14854.88**	**+323.11**	**-134.97**
7/14/2023	**WFC**	**43.40**	**346**	**15016.4**	**42.77**	**43.56**	**15071.76**	**+273.34**	**+55.36**
7/14/2023	**MCD**	**294.84**	**34**	**10024.56**	**292.10**	**294.94**	**10027.96**	**+96.56**	**+3.40**
7/14/2023	**GD**	**215.78**	**47**	**10141.66**	**214.15**	**215.32**	**10120.04**	**+54.99**	**-21.62**
7/14/2023	**TMUS**	**139.33**	**108**	**15047.64**	**138.97**	**139.68**	**15085.44**	**+76.68**	**+37.80**
7/14/2023	**SHEL**	**60.68**	**70**	**4247.6**	**59.65**	**60.68**	**4247.60**	**+72.1**	**0**
TOTAL				**99688.27**			**99796.72**	**+1647.38**	**+108.45**

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5.3 Week Three Results

This week was, unfortunately, a mostly negative drop in the portfolio's value, mostly caused by a very significant drop in Tesla's stock value. This was specifically a weekly loss by the end of Friday of 2306.88 dollars, which represented a drop of 7.63% in the stock's value. This was the bulk of the loss this week, in fact it was the only stock to drop in value, but due to the significant initial investment in the stock, a 7.63% drop outweighs most potential for gains in other stocks, which seems to be a common risk within the narrow portfolio. The most significant gain in stock, that helped offset this large drop in value came from Wells Fargo, which was a weekly gain of 830.4 dollars, representing a 5.53% gain in the stock. The second most significant weekly gain was experienced by Pfizer, which resulted in a total gain of 441.72 dollars, which is a 2.95% gain in the stock's value compared to its net cost. Shell also experienced a significant increase in its stock, but due to its much lower net costs compared to other stocks, it didn't generate as much weekly gain. Specifically, Shell had a weekly gain of 160.3 dollars, which represented an increase in the stock of 3.77%, a noticeable gain in overall investment, but not enough to truly help offset losses observed in Tesla. T-Mobile also experienced an acceptable weekly gain, specifically an amount of 131.76 dollars, which was a very small increase in the stock's value of 0.88%. The next stocks experienced the least gain in the entire portfolio this week. McDonald's experienced a measly weekly gain of 22.78 dollars, which was a very low increase of 0.23% in the original value of the stock. This was still a better performance than the very meek gain of 7.05 dollars, which was a very low increase in the original stock's value of 0.07%. Overall, this resulted in a summed up weekly loss of 712.87 dollars, once more mostly caused by the very high drop in value within the Tesla stock, due to it consisting of the highest investment placed within. This brought down

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the total asset change within the portfolio to 604.42 dollars, which is not as terrible as it could be based on the series of weeks experienced up to this moment. The changes experienced this week, alongside the original cost of these stocks and how they compare to each other, can be observed in Table 5.3 below.

Table 5.3: Week Three Results for the Narrow Portfolio

Date	**Symbol**	**Original Price**	**Shares**	**Net Cost Proceeds**	**Price Last Friday**	**Hold Price Friday**	**Asset This Friday**	**Week Gain/Loss**	**Total Asset Change**
7/21/2023	TSLA	279.82	**108**	**30220.56**	**281.38**	**260.02**	**28082.16**	**-2306.88**	**-2138.4**
7/21/2023	**PFE**	**36.65**	**409**	**14989.85**	**36.32**	**37.40**	**15296.6**	**+441.72**	**+306.75**
7/21/2023	**WFC**	**43.40**	**346**	**15016.4**	**43.56**	**45.96**	**15902.16**	**+830.4**	**+885.76**
7/21/2023	**MCD**	**294.84**	**34**	**10024.56**	**294.94**	**295.61**	**10050.74**	**+22.78**	**+26.18**
7/21/2023	**GD**	**215.78**	**47**	**10141.66**	**215.32**	**215.47**	**10127.09**	**+7.05**	**-14.57**
7/21/2023	**TMUS**	**139.33**	**108**	**15047.64**	**139.68**	**140.90**	**15217.2**	**+131.76**	**+169.56**
7/21/2023	**SHEL**	**60.68**	**70**	**4247.6**	**60.68**	**62.97**	**4407.9**	**+160.3**	**+160.3**
TOTAL				**99688.27**			**99083.85**	**-712.87**	**-604.42**

5.4 Week Four Results

The last week of the narrow portfolio simulation was, while a positive one in terms of growth, not enough to justify a successful end to it. By the end of this week, the total asset change remained at a negative value, but not at a terrible loss. This is mostly due to the level of loss Tesla experienced during the simulation, and within the last few weeks, despite the growth it experienced by the end of this week. Tesla was fortunate enough to experience a decent weekly gain of 693.36 dollars, which represented a 2.29% increase in the stock's value across the week. It is important to note

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that this stock experienced a lot of losses throughout the week, dropping to 255.71 dollars per price of stock, which would've meant a drop of 469.8. Fortunately, on Friday alone, Tesla experienced a growth in stock of 4.20%, which is a gain of 1158.84 dollars in a single day. Unfortunately, this in-a-day turnaround by Tesla was offset by Pfizer, which had a weekly loss of 543.97 dollars, which was a 3.63% drop in the stock's value by the end of Friday the 28th of July. General Dynamics also had a weekly gain of 336.99 dollars, which helped bring upon greater earnings for the portfolio. This weekly gain represented a 3.32% increase in the original total cost of the stock. The rest of the stocks experienced much less significant changes in terms of drops or gains in their values. Shell was the most impactful among these stocks, with an acceptable weekly loss of 142.1 dollars, that represented a disappointing 3.35% decrease in the value of the stock, which as a percentage drop was significant, but due to its low cost of initial investment, resulted in a lower weekly loss than others. Wells Fargo experienced a rather low weekly gain of 62.28 dollars in turn, which is a 0.41% gain in the stock's value. While not very impactful, it helped offset other low weekly losses such as McDonald's. Specifically, McDonald's had a weekly loss of 53.72 dollars, which represented a 0.54% drop in the value of the initial investment on the stock. Finally, the least impactful stock this week was that of T-Mobile, which had a very low weekly loss of 3.24 dollars, which represented an almost negligible drop in value of 0.022%. Overall, this week was somewhat disappointing despite a mostly profitable growth across the several stocks in the portfolio. The simulation finished with experiencing a total weekly gain of 349.6 for the portfolio, but in the end, this still kept the total asset change at a loss, resulting in a finalized loss of 254.82 dollars for the entire portfolio. The results of the simulation, as well as their comparison to their initial values can be observed in Figure 5.4 below.

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Figure 5.4: Week Four Results of the Narrow Portfolio

Date	Symbol	Original Price	Share s	Net Cost Proceeds	Price Last Friday	Hold Price Friday	Asset This Friday	Week Gain/Loss	Total Asset Change
7/28/2023	TSLA	279.82	108	30220.56	260.02	266.44	28775.52	+693.36	-1445.04
7/28/2023	PFE	36.65	409	14989.85	37.40	36.07	14752.63	-543.97	-237.22
7/28/2023	WFC	43.40	346	15016.4	45.96	46.14	15964.44	+62.28	+948.04
7/28/2023	MCD	294.84	34	10024.56	295.61	294.03	9997.02	-53.72	-27.54
7/28/2023	GD	215.78	47	10141.66	215.47	222.64	10464.08	+336.99	+322.42
7/28/2023	TMUS	139.33	108	15047.64	140.90	140.87	15213.96	-3.24	+166.32
7/28/2023	SHEL	60.68	70	4247.6	62.97	60.94	4265.80	-142.1	+18.20
TOTAL				99688.27			99433.45	+349.6	-254.82

5.5 Total Results

The finalized results of the simulation were somewhat disappointing, by the end of it resulting in a total loss for the portfolio, but it did help highlight the advantages of a narrow portfolio, as well as the great risks in this sort of strategy. The first week of the simulation resulted in a rather devastating loss, as each single stock within the portfolio dropped in value, by differentiating amounts. The first week’s loss was a drop of 1,538.93 dollars, which was a 1.54% drop in the portfolio’s value, but this thankfully would be completely negated by the second week. A large weekly gain for the portfolio was experienced by July 14, in which the portfolio saw an increase of 1,647.38 dollars. These were mostly carried by the top three stocks that lost the largest amount in value the week prior, with all stocks within the second week experiencing growth that brought

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them back or slightly above their initial purchase value. Where it got significantly more interesting was during the third and fourth week of the simulation. During the third week, the portfolio gained 1,594.01 dollars in value, but at the same time one stock dropped by 2,306.88 dollars in value. The comparison between all weekly gains and losses throughout the simulation is observable in Figure 5.1 below. This third week is particularly important to discuss because the large drop in value for the portfolio was caused solely by Tesla. That is to say, the highest accumulated weekly loss throughout the narrow portfolio simulation was caused by a single stock.

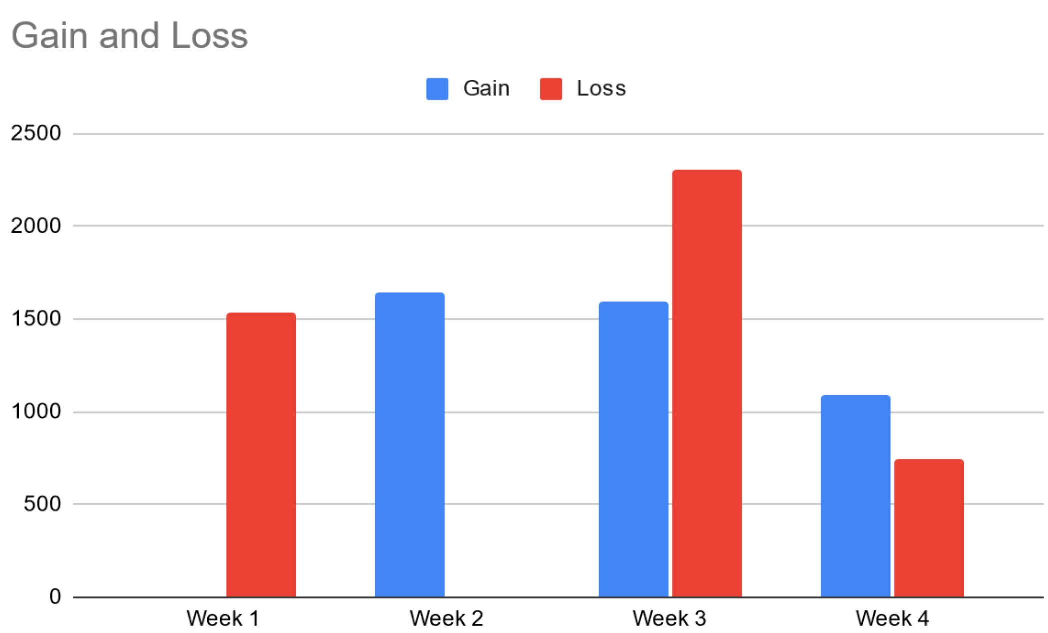

Figure 5.1: Gain/Loss Comparisons for each Week Within the Narrow Portfolio

This highlights the great risk that can be experienced in a non-diversified portfolio, that is to say, a portfolio that only has one company's stock per sector it tries to cover. This was apparently caused by a quarterly announcement by Elon Musk about the drops in their profit margins, from 19.0% to 18.1%, which was a contrast to its previous final quarterly value of 26.1%. I believe this was important to note as the drop in Tesla's value was very significant but represents the type of

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risk any stock can carry. The final week of the simulation resulted in a much tamer change in values, both in terms of gains and losses. The gain in the fourth week of the simulation totaled to 1092.63 dollars, while at the same time the accumulated loss of the portfolio was 743.03 dollars. While this did result in a total weekly positive change of 349.6 dollars, which, while a nice breath of fresh air compared to the third week's monumental loss, was not enough to bring a profitable end for the portfolio. It is important to note how much higher of an impact the stocks with the net cost had on the stock portfolio, in which each week at least one of the stocks with a net cost of 15,000 or more dropped in value, and almost helped negate any potential gains made by other stocks, even if other stocks with more than 15,000 dollars in investment increased in value. This means that practically all weeks except for the second week had a total portfolio value lower than what it started with. Noticeably, the second week was the only week in which every single stock went up in value, explaining the positivity in value for that week. The specific values of the portfolio over the weeks of simulation can be observed in Figure 5.2 below.

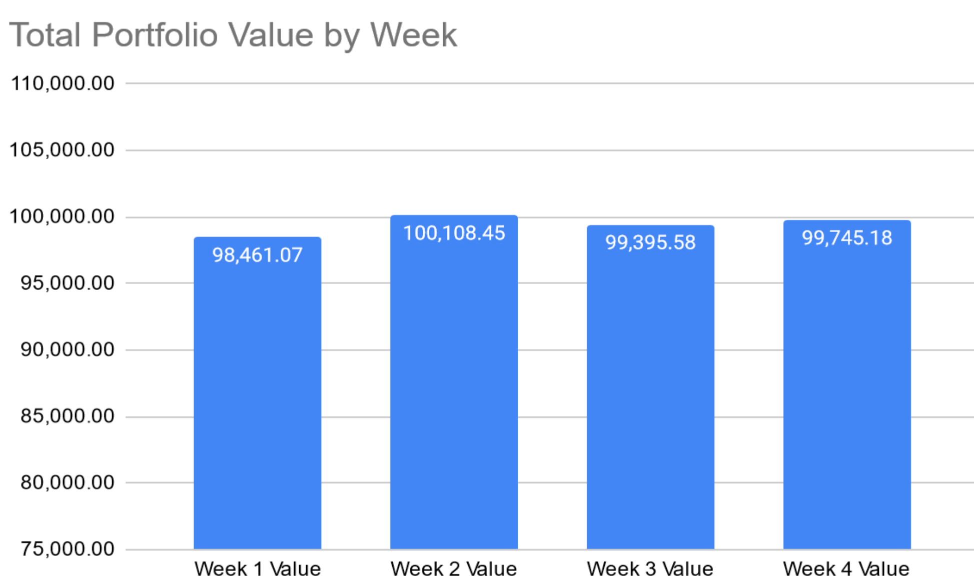

Figure 5.2: Total Narrow Portfolio Value by Week

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As one can observe, the only moment that the portfolio saw any rise in its initial value was in the second week of the simulation, when all the stocks within the portfolio went up. This was mostly caused as stated before by the immense drops in value by Tesla. This was caused by its overall very high net cost, which meant most percentage changes above 2-3% would result in either rather significant gains or losses. The last weeks of the portfolio was caused somewhat by this phenomenon, specifically in the third week in which Tesla dropped by 2306.88 dollars, which represented around a 7% drop in its value. This single stock had such an impact on the portfolio that even on the third week of the simulation, all stocks went up in value save for Tesla's significant drop in value, which still resulted in a total weekly loss of 712.87 dollars. This is meant to show how the lack of diversification can affect the profitability and success of a portfolio, and how large initial investments can cause large offsets in other stocks. This is specifically because changes in percentage affect net costs depending on how large they are, meaning in most cases, those that have the most invested in, decide the profitability of the portfolio.

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Chapter 6: Analysis and Conclusion

6.1 Retrospective

In the end, two different formulas for the portfolios were used for this project, specifically designed to be differentiated by the net cost and investment of individual stocks and the sectors they represent. That is to say, whereas one portfolio would contain several different companies belonging to a particular sector, with equal distribution of initial investment money into each one, the other simply contained one company that represented an entire sector. The diversified portfolio was supposed to include around 3-5 companies within each sector, save for the energy sector which due to its low percentage in the S&P 500, was kept at the same net cost and level of diversification as a small form of control between the two portfolios. This means that whereas the healthcare sector still had a total initial investment of 15,000 in both portfolios, the diversified portfolio spread into stocks from four different companies, in contrast to the narrow portfolio of only one. The specification of this is to elaborate on how this method of spreading out initial investment and thus your risk, demonstrates a method of trading and creating a successful and profitable portfolio. In the end, the results were eye-opening, but somewhat hard to interpret at times. This was due to the moment the stock market found itself throughout the simulation, from a somewhat dubious bull market, into a terrifying bear market. This resulted with some weeks demonstrating very high

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growth, and other weeks demonstrating devastating lows. Overall, the analysis and comparative studies will be demonstrated in the section below.

6.2 Analysis and Comparison

This study compared two portfolios, meant to differ between the two through the number of stocks each sector contained, and to compare and contrast how having several investments in stocks within a single sector may or may not be more profitable than simply investing in one stock of each sector. In the end, their balances saw a significant difference between each other in terms of final profitability. The diversified portfolio finished at a total amount of 102,441.47 dollars, which compared to the narrow portfolio of 99,745.18 dollars, paints a somewhat positive picture of a diversified strategy. It is important to note that both simulations found themselves at different moments during a somewhat chaotic stock market between the months of June and July. While this does not challenge the authenticity of this study, it is important to note that at the time of the first simulation, the stock market was recorded as going through a Bull Market, which in layman terms means that it’s a moment of stock price growth. The opposite is what happened for the narrow simulation, in which at the time, the stock market was going through a bear market in July, which means that the price of most stocks went down instead.

The first comparison that is interesting to note is in the department of its weekly gains and weekly losses, particularly placed against each other individually, and how these changes in portfolio value were afflicted by individual or several stocks. This can be observed in Figure 6.1 demonstrated below, with the overall gains and losses of both simulations placed against each other.

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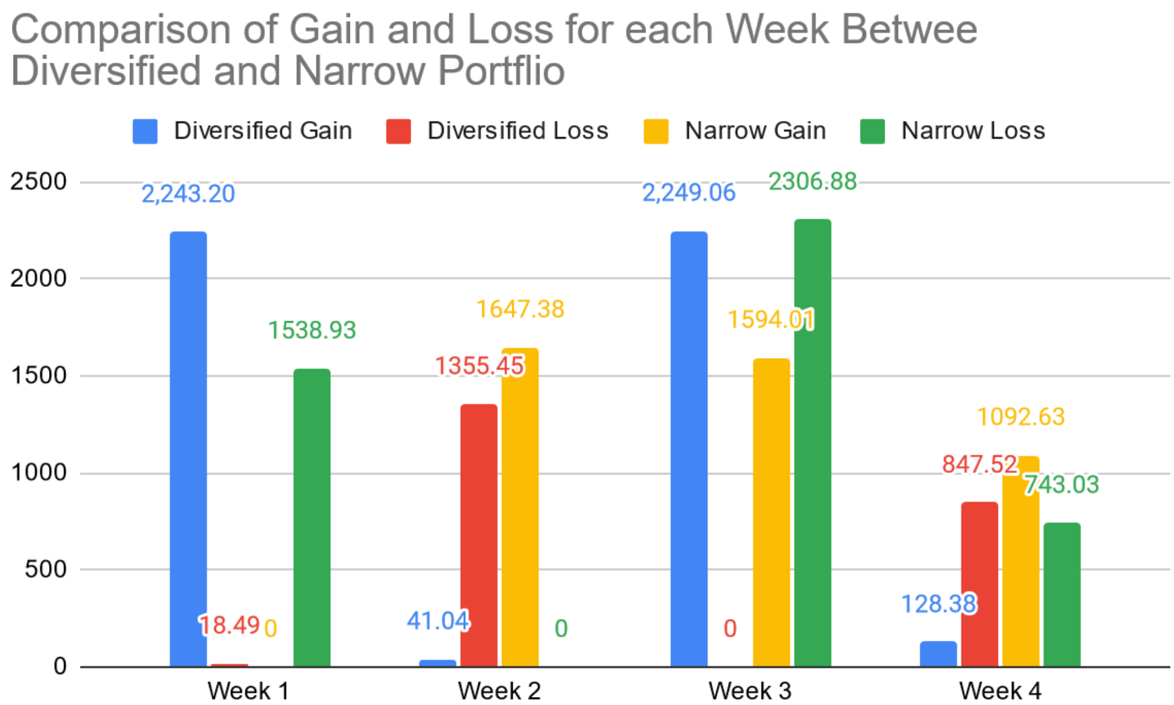

Figure 6.1: Comparison of Gain and Loss for each Week Between the Diversified and Narrow Portfolio

What can be observed in this figure is the fact that in the first week of the simulation for the diversified portfolio, the total gain came from practically all of the stocks save for one small drop in a single one, whereas the narrow portfolio simply lost money across every sector. The second week saw a similar effect in both simulations, but in the opposite trend, where the diversified portfolio dropped in value across almost all its sectors and the narrow portfolio gained in value across all its sectors. The third week is where there is a significant point of interest, as one can note, the diversified portfolio had a rather significant gain, that was almost the same as the significant loss experienced by the narrow portfolio. The reason why this is of important note is how the tremendous loss experienced by the narrow portfolio happened solely because of a single stock which was that of Tesla. Whereas the gain in the diversified portfolio was only able to somewhat match that loss due to every stock within the sector demonstrating growth. This shows simply how the effect of a large investment can have various wide swings in gains and losses, in

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this case specifically, loss. This is even demonstrated by how, in the narrow portfolio, other stocks didn't experience as significant a percentage change as Tesla did in that week, failing to come close to the 7.68% drop in value Tesla had. Which gives points for the diversification of portfolios, as this loss would be negated and possibly offset if the technology sector in the narrow portfolio wasn't simply composed of Tesla stock. It is also important to note that this was partly caused by the sheer netcost placed into Tesla, which overvalued all other stocks and helped hammer down the point that large investments into a single stock result in a very risky portfolio. The last week of both simulations was somewhat uninteresting, demonstrating little movement. While the diversified portfolio simply reported mostly a loss in value, the narrow portfolio instead had a mostly positive gain, somewhat competed by an almost equal loss. Once more, this change was mostly carried out by the higher investment sectors within the narrow portfolio, demonstrating the trend the portfolio has of mostly bowing to the higher net-cost sectors. A more overall view of the portfolios can be observed in a figure below, which demonstrates the value of each portfolio as the weeks ago throughout the simulation. Figure 6.2 demonstrates the total value of the portfolio as the simulations went on, the fact that is observable is how the diversified portfolio follows a much more positive trend in its gains and growth than that of the narrow portfolio. This is particularly noticeable on how the peak value of the narrow portfolio is lower than even the lowest point of the diversified portfolio.

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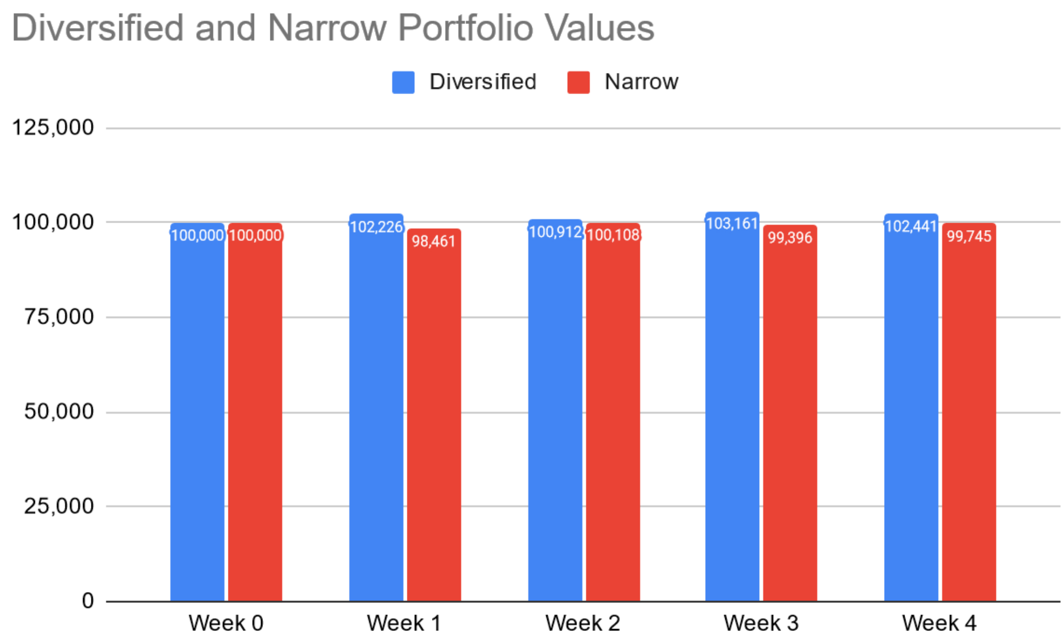

Figure 6.2: Diversified and Narrow Portfolios across each Week

As one can observe, while both portfolios didn't experience as significant growths as I would've liked in order to call them great successes, the diversified portfolio managed to finish with 2,441 dollars above its initial investment, while the narrow portfolio only ended up with a drop of 255 dollars. This demonstrates how the diversified portfolio is a much more successful strategy by the end of it, demonstrating greater capabilities to offset losses across sectors and stocks, while at the same time demonstrating less risk than the narrow portfolio.

6.3 Conclusion

In conclusion, the results seem to demonstrate that the diversified portfolio was a much more effective strategy in terms of bringing out a profit within a portfolio. There are still some important benefits that come from a narrow portfolio, and that is that while a narrow portfolio tends to be much riskier, with great risk may come great reward. While in

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this simulation this risk did not pay off, the humongous changes in value experienced by the Tesla stock in the narrow portfolio, if it were instead a positive growth, could represent an enormous amount of gain in the narrow portfolio, more than the diversified portfolio for sure.

In the end, my first objective was to formulate a list of stocks that would end up doing mostly well across both simulations, which was done by reviewing information from stock experts as well as learning about the history and trends of both sectors and the individual companies that make them. My second objective was to document how the diversification of one's initial investments by buying a multitude of stock instead of proverbially "placing all the eggs in one basket" would compare to each other, and how with some informed investment, would those portfolios end up. Overall, this information helped give me a greater idea on how different stocks can represent different advantages on different types of portfolios. How stocks within different sectors can represent alternating levels of growth and declines, with alternating levels of high-risk growth, or steady and slow increases in a stock's value.

This project was immensely helpful in introducing me to the stock market as a science, and coming to understand how trends and significant events can affect and shift the several sectors within the stock market. In the end, I feel much more confident about my capabilities to successfully turn a profit within the stock market and hopefully create a portfolio that will help fuel my retirement fund.

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