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An Exploration of the Impact of Economic Recessions on the S&P 500 and its Sectors

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An Exploration of the Impact of Economic Recessions on the S&P 500 and its Sectors

by

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Abstract

  The Capital Asset Pricing Model (CAPM) is a method of predicting future stock prices based on past returns. Specific areas of CAPM analysis utilize regression analysis to accomplish this goal. Historic prices and returns for a specific stock in a company, or even whole sectors of the economy, are compared with the corresponding returns for the market. There have been several historical recessions in United States history, as well as a current, ongoing recession. These recessions, along with their causes and effects, will be discussed extensively in this paper. This paper utilizes an analysis of the Capital Asset Pricing Model to determine which sectors of the economy are most drastically impacted by certain economic downturns, and in some cases dramatically outperformed the market. In addition to baseline analysis, this paper explores the reasoning behind some of the more noteworthy trends during the time period January 1990 through February 2021.

Introduction

        The United States (U.S.) economy has experienced multiple historical recessions including the current, ongoing recession caused by the novel Coronavirus pandemic. Using financial models to predict a recession in the past has proven to be just as challenging as predicting future stock performance. However, the profession of financial analysis and modeling has advanced since recessions of the past. Professionals in this industry have been able to track metrics and gather information about risk factors, especially with the advent of big data in the past decade. There are several factors that impact the United States economy, and trends in these metrics can be pinpointed to be the events that lead to a recession or other long-term trends in the economy. There are a multitude of forces affecting the return on stocks such as *systematic* risk and *idiosyncratic* risk. Systematic risk is "the overall, day-to-day, ongoing risk that can be caused by a combination of factors, including the economy, interest rates, geopolitical issues, corporate health, and other factors," (Nguyen, 2020), while idiosyncratic risk is "a type of investment risk that is endemic to an individual asset, or a group of assets, or in some cases, a very specific asset class" (Chen, 2020). Systematic risks are market risks such as recessions, as implied by the description as being a risk associated with the overarching 'system' as a whole. These risks tend to be more macroeconomic in nature and harder to pinpoint. On the other hand, idiosyncratic risks are specific risks related to individual stocks. Examples of idiosyncratic risks are a corporation's financial decision-making structure, investment strategy, and operations (Chen, 2020).

        The Capital Asset Pricing Model (CAPM) uses linear regression to separate these risk factors by exploring historical data to separate company-specific risk from market risk. An analysis of a firm's CAPM provides three statistics: "Alpha", "Beta", and "R-squared." Alpha (α) measures a company's excess return over the market and represents idiosyncratic risk (Chen, 2020). Beta (β) measures the market's overall risk, or volatility, and represents systematic risk (Chen, 2020). The last statistic explored by the CAPM Analysis is the R-squared metric (R^2). R-squared measures the correlation of a stock's performance and a selected benchmark. The R-squared is a percentage that quantifies which portion of the variance in the data can be explained by the regression.

        This paper investigates the connection between historical recessions of the United States dating back to 1990 and explores the effects of these economic downturns of varying severity on the sectors of the S&P 500. A recession has been defined as "two consecutive quarters of decline in GDP, the combined value of all the goods and services produced in the United States" (Staff, 2021). Sectors across the Standard and Poor 500 index range in economic sectors from Materials, which includes firms extracting and processing natural resources like crude oil and forged steel, to Information Technology (sometimes shortened to 'Info Tech' for the purposes of brevity in this paper), which encompasses modern day well-known stocks such as Apple (AAPL) and Microsoft (MSFT). An additional sector for Real Estate was added to the index by Standard and Poor in the early part of the new millennium, in the wake of the devastating September 11, 2001 attacks. Lastly, this paper will be performing CAPM Analysis with a risk adjustment using the U.S. Treasury 10-year yield as a benchmark, which will be discussed in a section to follow.

        The remaining sections of this paper will be organized as follows: the following section will discuss literature surrounding the SPX, the S&P 500 sectors, the CAPM, and the historical recessions of the United States. Section 3 will outline the design of the study, provide an explanation of the sample selected, and present the methodology used to determine the performance of the S&P 500 sectors during historical U.S. recessions. Section 4 will present the

regression statistics, correlations, and CAPM analysis for the relationship between the SPX and the S&P 500 sectors. Section 5 will discuss the performance of the S&P 500 sectors with risk adjustment during the historical recessions of the U.S., and lastly, Section 6 will give conclusions on these trends and how America can be more prepared for a recession in the future.

Literature Review

The Standard & Poor 500 Index, or S&P 500 (SPX), is a market-capitalization-weighted index of the 500 largest publicly traded companies in the United States that took shape in 1957 (Kenton, 2021). To be included in the S&P 500, a company must meet specific liquidity-based size requirements (Kenton, 2021). Since the index is weighted, a company with a smaller market capitalization will impact the index less than a company with a larger market capitalization in terms of single price changes, other factors held equal. Taking the current stock price and multiplying it by the number of outstanding shares gives the market capitalization of a company. The level of the S&P 500 index is calculated by the equation below:

$$Index\ Level = \frac{\Sigma(P_i \times Q_i)}{Divisor}$$

An interpretation of this equation is as follows. The index level is equivalent to the sum of all firms' market capitalizations, which can be broken down further by a stock's price multiplied by the number of shares outstanding, divided by a proprietary divisor that is known only to upper-level individuals working for the Standard and Poor, the financial services agency responsible for calculating this index and rating most securities that are traded on the open market (Kenton, 2021). Since it is made up of five hundred companies, more than any other index (the Dow Jones Industrial Average only utilizes thirty companies, and the Nasdaq Composite index only consists of one hundred companies), it can be used as a holistic figure to analyze the market's performance overall.

The S&P 500 is broken down by the Global Industry Classification Standard (GICS), which was developed by Morgan Stanley Capital International and Standard and Poor in 1999 (GICS - Global Industry Classification Standard). The GICS organizes the S&P 500 based upon four tiers of segmentation: 11 sectors, 24 industry groups, 69 industries, and 158 sub-industries. The sectors are divided based on the company's primary business activities. The eleven S&P 500 sectors are weighted by taking each company's market capitalization and dividing it by the total market capitalization of the S&P 500 index for all of the companies in each sector as shown by the equation below (Kenton, 2021).

$$Company\ Weighting\ in\ S\&P = \frac{company\ market\ cap}{total\ of\ all\ market\ caps}$$

The Capital Asset Pricing Model (CAPM) was developed in the 1960's by William Sharpe. Sharpe realized that not all risks should affect the prices of assets, and he evolved the model to measure systematic risk by calculating investment risk and the expected return on an investment (McClure, 2020). The CAPM furthers diversification of a portfolio which assesses risk to specifically incorporate and measure systematic risk. The CAPM is formulated by the equation below.

$$R_a = R_r f + \beta_a * (R_m - R_r f)$$

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An interpretation of the CAPM equation is as follows. The expected return on a security equals the risk-free rate plus the beta of the security multiplied by the equity market premium, or the expected return of the market minus the risk-free rate. For the paper's analysis of the CAPM, this paper used the U.S. Treasury 10-year yield (GT10) as the risk-free rate. The CAPM generates two statistics that correspond with the linear regression model. Alpha (α) refers to the intercept or y-intercept of the regression. A firm or index with a positive alpha outperforms the market overall. Beta (β) refers to the x-variable or the slope of the regression. A firm or index with a beta greater than 1 is typically more volatile and has a heightened inherent risk, exceeding that of the market.

The United States economy experienced a recession from July 1990 to March 1991 which is now known as "The Gulf War Recession." A combination and chain reaction of events stemming from Iraq invading Kuwait began this period of economic downfall. The result of this invasion led to increased oil prices in 1990, followed by a decline in manufacturing sales. The provisions of the North American Free Trade Agreement (NAFTA), a disastrously unfavorable trade deal for the United States, caused American manufacturing to move offshore. During this time, there were also domestic issues involving the consolidation of the airline industry. The leveraged buyout of United Airlines and bankruptcy of airline giant Pan-Am Airways triggered a stock market crash (Staff, 2021). During this 8-month recession, the United States GDP declined 1.5% (Staff, 2021).

The United States economy experienced its next recession 10 years later from March 2001 to November 2001 which is known as "The 9/11 Recession." This eight-month long recession was caused by the downfall of the 'dotcom bubble' in 2000, the 9/11 terrorist attacks, and a sequence of accounting scandals at major United States corporations such as Enron that triggered the stock market crash of 2001 (Staff, 2021). The United States GDP declined only 0.3% during this recession (Staff, 2021). President George W. Bush worked with congress to pass the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA), which enabled taxpayers to keep more of their own money and helped end the recession (Amadeo, 2020). The Federal Reserve began lowering interest rates in January 2001 and continued lowering rates to provide for more liquidity which also helped end the recession (Amadeo, 2020).

From December 2007 to June 2009, the United States economy experienced an 18-month recession known as "The Great Recession," which is said to be the worst financial crisis since The Great Depression of 1929. The combination of the collapse of the housing bubble in the 2000s led to foreclosures and eventually a major financial crisis. The oil industry took a hard hit during this recession when oil prices spiked in mid 2008 following a major crash (Staff, 2021). President George W. Bush signed into law the Emergency Economic Stabilization Act of 2008 and the Troubled Assets Relief Program (TARP) in October of 2008 with hopes to help stabilize the economy (2008 Emergency Economic Stabilization Act). Former president Barack Obama passed the American Recovery and Reinvestment Act in 2009, which acted as a stimulus bill, in an attempt to use federal spending to lift the United States economy out of a major recession (2009 American Recovery and Reinvestment Act).

The United States economy is experiencing a recession that began in February 2020 and is ongoing known as the "COVID-19 Recession." The United States and nations around the world began assessing the novel Coronavirus, referred to as COVID-19, by restricting travel from countries with a higher risk of infection and transmission, enforcing stay at home orders, shutting down nonessential businesses, and implementing social distancing guidelines starting in

March of 2020 to curve the spread of the COVID-19 (Staff, 2021). In March of 2020, the World Health Organization (WHO) officially declared a pandemic. Later, the National Bureau of Economic Research declared a recession in the U.S. economy on June 8, 2020 (Staff, 2021). The record unemployment rate and substantial GDP decline has the United States economy in a very unfortunate position.

Section 3: Research Design and Sample Selection

The primary independent variable used for this analysis was the S&P 500 Index (SPX). This variable represents a widely used benchmark for the U.S. stock market, making the selection of this variable easy. This variable is "widely regarded as the best gauge of large-cap U.S. equities" (Kenton, 2020). This benchmark was slightly altered by the same risk-free 10-year United States Treasury yield (GT10), effectively reducing the monthly returns for both the independent and dependent variable by the month's risk-free rate.

The S&P 500 sectors were used as the dependent variables to test the impact during economic recessions dating from 1990 against the overall S&P 500 index. The eleven S&P 500 sectors are, in descending order of market capitalization: Information Technology, Consumer Discretionary, Financials, Health Care, Communication Services, Industrials, Consumer Staples, Materials, Energy, Utilities, and Real Estate. The Real Estate sector was not included in this study as there is insufficient data for the time periods being analyzed.

Annual, monthly, and weekly data for the SPX and S&P 500 sectors were downloaded directly from Bloomberg Professional Service, which is a widely used source for financial and market data. The equation below was used to calculate average returns for monthly and weekly data:

$$Average\ Return = \frac{(Ending\ Price - Previous\ Price)}{Previous\ Price}$$

The study began with the SPX current monthly price and subtracted it by the previous monthly price, resulting in the period's increase or decrease of price, expressed as the numerator in the above expression. Next, the numerator was divided by the adjusted closing price of the prior period (the week or month before the month being observed). This process was repeated recursively for each sector's price from 1990 to 2021, on a both monthly and weekly basis. The first phase of data analytics resulted in two sets of returns: the monthly and weekly returns for the SPX index and each of the individual sectors. After computing these returns, the study gathered data from the 10-year United States Treasury yield (GT10), to adjust for risk. A proper CAPM analysis requires that some benchmark for risk-free rate be used to make this adjustment. Once the excess returns were calculated, the study ran multiple regression models. Monthly data for the SPX, S&P 500 sectors, and GT10 are recorded on the last day of each month from January 1990 to February 2021. Weekly data for the SPX, S&P 500 sectors, and GT10 were recorded as stated below.

The study ran multiple regression models with the independent variable being SPX, used as the risk premium, and dependent variables being the S&P 500 ten sectors included in the sample, adjusted for risk. The first regression was generated using monthly data from January 1990 to February 2021 to capture an overall look at the market during the past 30 years, with the beginning date being January 31, 1990 and ending date being February 22, 2021. This discrepancy in month length is because monthly data was downloaded on this ending date. The remaining week of February 2021 is immaterial to the overall CAPM analysis. The other

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regression models were run using weekly data during the time periods of past historical recessions dating from 1990, and are as follows: July 1990 to March 1991, March 2001 to November 2001, December 2007 to June 2009, and March 2020 to February 2021. For the period July 1990 to March 1991, the beginning date was July 6, 1990 and the ending date was March 29, 1991 because weekly data was used, and these were the duration months of the Gulf War Recession. For the period March 2001 to November 2001, the beginning date was March 2, 2001 and the ending date was November 30, 2001 because weekly data was used, and these were the duration months of the 9/11 Recession. For the period December 2007 to June 2009, the beginning date was December 7, 2007 and the ending date was June 26, 2009 because weekly data was used, and these were the duration months of The Great Recession. For the period March 2020 to February 2021, the beginning date was retrieved as March 6, 2020 because weekly data was used, and this recession began in March 2020. The ending date was February 19, 2021 because this was the last week of data when downloaded, as explained in the preceding paragraph.

After the regressions were ran, the study compared the statistics of the four most recent United States historical recessions time periods, dating from 1990, to determine the performance and risk of the 10 S&P 500 sectors, using the SPX as a benchmark for the overall market. It should be noted that during this study, the values for alpha are relatively small and close together. This is due to the fact that an entire sector of the S&P 500, consisting of dozens of companies, is extremely sensitive to risk. In order for a sector to have a comparatively higher alpha in the context of this study, returns would need to be significantly and consistently different across the entire sector.

Section 4: Empirical Results

To benchmark our results, we first analyze the regression statistics of the SPX against the S&P 500 sectors over the full area of the study, from January 1990 to February 2021. Figure 1 (below) shows the summarized regression statistics that were used, alpha and beta, for each of the 10 S&P 500 sectors included in this study.

Figure 1: S&P 500 sector summarized regression statistics from January 1990 to February 2021

Sector	Alpha	Beta
Info Tech	0.0032094	1.341900952
Materials	-0.001176094	1.078586634
Consumer Direct	0.001480923	1.094523521
Health Care	0.002538302	0.723297375
Industrials	-0.000199118	1.093992021
Consumer Staples	0.001451967	0.584242442
Financials	-0.000938674	1.246604224
Energy	-0.001618459	0.941968586
Utilities	-0.001285465	0.414762751
Communication Services	-0.002768514	0.834192384

Source: Bloomberg Finance L.P.

In Figure 1 as shown above, the value for alpha of the Information Technology sector is highlighted. During the period 1990-2021, Information Technology is the highest performing sector of the economy in this analysis. This metric demonstrates that the Information Technology

sector outperformed the S&P 500 (market) most substantially overall from January 1990 to February 2021 with risk adjustment. Next, we look at the beta for the Information Technology sector, also highlighted. This beta is greater than 1, which means the Information Technology sector has a higher level of inherent risk than the market. In addition to being greater than 1, the beta value for the Information Technology sector is the largest of any sector, demonstrating that this sector is also the riskiest compared to the market overall from January 1990 to February 2021. However, risk leads to higher return.

Figure 2, as shown below, shows the summarized regression statistics that were used for this analysis, alpha and beta, of the SPX against the 10 S&P 500 sectors included in this study over the period of the Gulf War Recession, July 1990 to March 1991.

Figure 2: S&P 500 sector summarized regression statistics from July 1990 to March 1991.

Sector	Alpha	Beta
Info Tech	-0.001704639	1.253992292
Materials	-0.001154548	1.029247728
Consumer Direct	-0.000976251	1.264412721
Health Care	0.00377459	1.018797508
Industrials	-0.001893784	1.157676012
Consumer Staples	0.003525462	1.028887911
Financials	.000068167	1.416548069
Energy	0.000649456	0.616461304
Utilities	0.000150375	0.47109646
Communication Services	-0.002306695	0.664790133

Source: Bloomberg Finance, L.P.

In this analysis of Figure 2, the Health Care sector has been highlighted in yellow. The alpha of the Health Care sector is the highest of any sector during this period. The Health Care sector, on average from July 1990 to March 1991, outperformed the market most substantially with risk adjustment. Additionally, the Financials sector has been highlighted in green. The beta of the Financials sector provides that it carries the most risk compared to the overall market during this period. The Financials sector, despite being the riskiest, is only the fifth highest performing index during this period.

Figure 3, shown below, shows the summarized regression statistics that were used for this analysis, alpha and beta, of the SPX against the 10 S&P 500 sectors included in this study over the period of the historical 9/11 Recession from March 2001 to November 2001.

Figure 3: S&P 500 sector summarized regression statistics from March 2001 to November 2001.

Sector	Alpha	Beta
Info Tech	0.002584245	1.632097158
Materials	0.003334372	1.073924217
Consumer Direct	0.001981382	1.166525678
Health Care	0.000712983	0.641402553
Industrials	0.001387557	1.274648344
Consumer Staples	-0.000535142	0.455675463
Financials	0.000799718	1.025788397
Energy	-0.002372153	0.769600022
Utilities	-0.008288567	0.49279528
Communication Services	-0.003983575	0.483417763

Source: Bloomberg Finance, L.P.

In Figure 3, the alpha of the Materials sector, highlighted in yellow, provides that this sector outperformed the market most substantially from March 2001 to November 2001 with risk adjustment. However, it can be noted that the Materials sector has the lowest average weighting as a percentage of the S&P 500 sectors during this recession. The Information Technology sector, highlighted in green, carries the greatest risk during this period compared to the market.

Figure 4, shown below, demonstrates the summarized regression statistics that were used for this analysis, alpha and beta, of the SPX against the 10 S&P 500 sectors included in this study over the period of The Great Recession, December 2007 to June 2009.

Figure 4: S&P 500 sector summarized regression statistics from December 2007 to June 2009.

Sector	Alpha	Beta
Info Tech	0.000943645	0.90433865
Materials	0.000399725	1.08085207
Consumer Direct	0.002624433	1.188331492
Health Care	0.000158077	0.708693587
Industrials	-0.001286459	1.042367137
Consumer Staples	.00004778145	0.576139544
Financials	0.002547884	1.85599734
Energy	0.001189766	1.011095396
Utilities	-0.001531429	0.690650042
Communication Services	-.0000331105	0.895887182

Source: Bloomberg Finance, LP

An observation of Figure 4 will demonstrate that the alpha of the Consumer Discretionary sector, highlighted in yellow, is the highest, providing that this sector outperformed the market most substantially from December 2007 to June 2009 with risk adjustment. The Financials sector, highlighted in green, carries the greatest risk compared to the market during this period.

Figure 5, shown below, shows the summarized regression statistics that were used for this analysis, alpha and beta, of the SPX against the 10 S&P 500 sectors included in this study over the time period of the COVID-19 Recession, March 2020 to February 2021.

Figure 5: S&P 500 sector summarized regression statistics from March 2020 to February 2021.

Sector	Alpha	Beta
Info Tech	0.003330072	0.97404835
Materials	0.001079057	1.116913976
Consumer Direct	0.002613158	1.028599392
Health Care	-0.001093497	0.80057697
Industrials	-0.001588361	1.236587203
Consumer Staples	-0.002718954	0.667058512
Financials	-0.001366143	1.246212276
Energy	-0.004124849	1.380489696
Utilities	-0.007439493	1.132721275
Communication Services	0.002032429	0.839340746

Source: Bloomberg Finance L.P.

In Figure 5, the alpha of the Information Technology sector, highlighted in yellow, provides that this sector outperformed the market from March 2020 to February 2021 with risk adjustment. Note: The Information Technology sector carries the highest average weighting of the 10 S&P 500 sectors used in this study during this recession. On July 31, 2020, Apple became the first trillion-dollar company in the history of the world and continued capturing a larger market share of the global financial system (Klebnikov, 2020). The beta of the Energy sector, shown in green, demonstrates that this sector carries the highest risk during this period. However, the Energy sector has the second lowest average weighting during this recession period.

Figure 6, shown below, illustrates a correlation matrix between the SPX and 10 S&P 500 sectors used in this study, based on average monthly returns from January 1990 to February 2021.

Figure 6: Correlation Matrix of S&P 500 and sectors from January 1990 to February 2021.

	SPX	Info Tech	Materials	Consumer Direct	Health Care	Industrials	Cons Staples	Financials	Energy	Utilities	Comm Services
SPX	1.000										
Info Tech	0.813	1.000									
Materials	0.802	0.569	1.000								
Consumer Direct	0.898	0.723	0.753	1.000							
Health Care	0.690	0.415	0.482	0.553	1.000						
Industrials	0.909	0.672	0.835	0.842	0.577	1.000					
Cons Staples	0.659	0.336	0.499	0.573	0.687	0.600	1.000				
Financials	0.847	0.542	0.705	0.775	0.591	0.820	0.591	1.000			
Energy	0.645	0.384	0.648	0.496	0.392	0.617	0.378	0.539	1.000		
Utilities	0.410	0.167	0.296	0.271	0.363	0.366	0.444	0.343	0.390	1.000	
Comm Services	0.650	0.505	0.428	0.556	0.426	0.532	0.440	0.468	0.399	0.339	1.000

Source: Bloomberg Finance L.P.

Figure 6 illustrates how each of the S&P 500 sectors correlate with one another and with the SPX from January 1990 to February 2021. A correlation of exactly 1 illustrates a perfect positive correlation. A correlation closest to 1 explains the likeliness that these assets move in the same direction with each other. A correlation of -1 illustrates a perfect negative correlation. As the correlations approach 0, these assets likely move in opposite directions of each other. The Industrials sector has the highest correlation to the overall market which could have contributed to its' middling performance throughout this period. The Utilities sector is the least correlated with the overall market, therefore, including this sector in a portfolio could lower a portfolio's risk. The Utilities and Information Technology sectors show the lowest correlation to one another, providing that these assets move in opposite directions more than any of the other sectors and could be used to diversify risk in a portfolio.

Figure 7, shown below, identifies the average monthly returns and the average weightings for the S&P 500 and the 10 S&P 500 sectors used in this study from January 1990 to February 2021.

*Figure 7: Average Monthly Return and Average Weights of S&P 500 Sectors from 1990 to 2021*

Sector	*Average Monthly Return*	*Average Weight*
Information Technology	1.208%	16.415%
Consumer Discretionary	0.938%	12.037%
Health Care	0.898%	12.332%
Industrials	0.770%	11.193%
Consumer Staples	0.735%	10.517%
Financials	0.756%	15.080%
Materials	0.666%	4.013%
Energy	0.568%	8.813%
Utilities	0.395%	3.695%
Communication Services	0.411%	5.492%
Overall	**0.753%**	**100.00%**

Source: Bloomberg Finance L.P.

In Figure 7, shown above, the Information Technology sector exceeds the SPX and all other S&P 500 sectors based on average monthly returns from 1990 to 2021. The increase in technology popularity and advances are described later in this paper. The Information Technology sector had the utmost performance, carried the greatest risk, achieved the highest average return, and carried the greatest weight for this period. An observance of this chart shows that the average monthly return of each sector goes in part with the average weight of that sector. Although not exact, the average returns and average weights of each sector are highly correlated with one another.

Lastly, Figure 8, shown below, is an overall chart of the annual returns for the S&P 500 as well as those of three selected indices: Information Technology, Materials, and Health Care.

Figure 8: Annual Returns for SPX, Information Technology, Materials, and Health Care from 1991 to 2021.
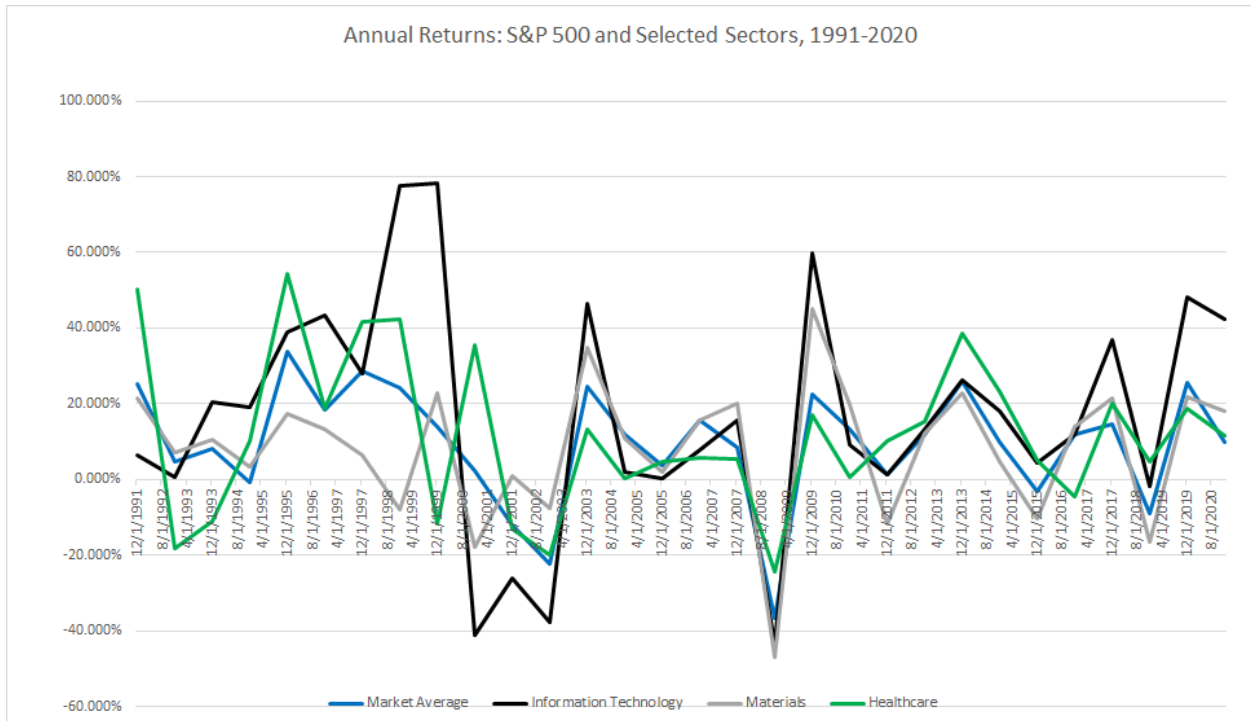
Figure 8 provides an overall graph of the annual returns from 1991 to 2021 for the SPX, Information Technology, Materials, and Health Care sectors. These sectors were chosen based on their performance throughout this study. Looking at the annual returns for the Information Technology sector illustrates just how much this sector overachieved and underachieved throughout this overall period. This graph gives a visual of the results found in this study for these notable sectors.

Section 5: Discussion of Results

Figure 9, shown below, highlights the key components of the regression analysis of each recession and summarizes the data contained in *Figure 1* through *Figure 5.* The table clearly identifies which sectors outperform the market, adjusted for risk analysis.

Figure 9: Alphas and Betas of Sectors during Recessions, summarized

	1990-2021	1990-1991	2001	2007-2009	2020-2021
Info Tech Alpha Beta	0.003209400 1.341900952	-0.001704639 1.253992292	0.002584245 1.632097158	0.000943645 0.90433865	0.003330072 0.97404835
Materials Alpha Beta	-0.001176094 1.078586634	-0.001154548 1.029247728	0.003334372 1.073924217	0.000399725 1.08085207	0.001079057 1.116913
Consumer Discretionary Alpha Beta	0.001480923 1.094523521	-0.000976251 1.264412721	0.001981382 1.166525678	0.002624433 1.188331492	0.002613158 1.028599392
Health Care Alpha Beta	0.002538302 0.723297375	0.00377459 1.018797508	0.000712983 0.641402553	0.000158077 0.708693587	-0.001093497 0.80057697
Industrials Alpha Beta	-0.000199118 1.093992021	-0.001893784 1.157676012	0.001387557 1.274648344	-0.001286459 1.042367137	-0.001588361 1.236587203
Consumer Staples Alpha Beta	0.001451967 0.584242442	0.003525462 1.028887911	-0.000535142 0.455675463	.0000477817 0.576139544	-0.002718954 0.667058512
Financials Alpha Beta	-0.000938674 1.246604224	0.000068167 1.416548069	0.000799718 1.025788397	0.002547884 1.85599734	-0.001366143 1.246212276
Energy Alpha Beta	-0.001618459 0.941968586	0.000649456 0.616461304	-0.002372153 0.769600022	0.001189766 1.011095396	-0.004124849 1.380489696
Utilities Alpha Beta	-0.001285465 0.414762751	0.000150375 0.47109646	-0.008288567 0.49279528	-0.001531429 0.690650042	-0.007439493 1.132721275
Communication Services Alpha Beta	-0.002768514 0.834192384	-0.002306695 0.664790133	-0.003983575 0.483417763	-.000003311 0.895887182	0.002032429 0.839340746

Source: Bloomberg Finance, L.P.

We begin the final portion of the exploration by observing the overall statistics from 1990 to 2021. The Information Technology sector outperformed the overall market during this period and carried the highest risk. This heightened level of risk and return demonstrates the volatility of investing in technology-based companies. Technology was very in its infancy during this period but began accelerating greatly following the introduction of the World Wide Web in 1990 and SMS text messaging in 1992 (Gewirtz, 2018). Prior to the personal computer revolution of the 1970s and 1980s, most computers were massive, taking up whole rooms, and were extremely expensive and uneconomical to run. The only computers used practically were those being maintained by large corporations and the military. 1984 saw the introduction of the Apple II personal computer, which spearheaded the personal computer revolution of the 1980s and early 90s. Also, during this period, legendary computer models such as the Commodore 64 and VIC-20 emerged (History Extra, 2020). In 1997, Steve Jobs returned to Apple, and just a decade later, the first iPhone was released, and allowed users to carry around a smart telephone in their pockets, giving access to the Internet from a mobile phone, and completely redesigning what a telephone could do (Gewirtz, 2018). The technology sector has been the fastest growing sector of the S&P 500 in terms of weight: in 1990 the weight was approximately 2%, and that weight has massively increased to nearly 30% (Bloomberg.com). The Information Technology sector has been far and away the most interesting sector to analyze over the past thirty years and can be expected to grow to an even larger size with more innovation for years and decades to come.

During the 1990-1991, "Gulf War Recession", the Health Care sector outperformed the overall market. Health care was a contentious topic for Americans during this time. Encyclopedia.com illustrates that "from the 1960s to the 1980s, health-care costs continued to rise rapidly because of economic trends and technological advances in medicine. By the 1990s, even employers with health-care benefits found it difficult to continue to provide the level of protection to which workers had become accustomed without raising employees' premiums or reducing their benefits" (UXL American Decades, 2021). Due to the increased quality of medicine and technological innovation in this field, the Health Care sector was the top performing sector during the 1990-91 recession. The beta of the Financials sector provides that it carried the most risk compared to the overall market during this period. The stock market crash and savings & loan crisis of the late 1980's began demonstrating the growing importance of financial markets to the United States working population. The Federal Reserve's monetary policy focused on deregulation, which made financial service companies riskier and more prone to suspicious activity (1990-92 Early 1990s Recession).

During the 2001, "9/11 Recession", the Materials sector outperformed the overall market most substantially. However, the Materials sector carried the lowest average weighting of the S&P 500 sectors during this period. The outperformance of the Materials sector could be attributed to the fact that by carrying the lowest weighting of the sectors during this time, the Materials sector was the least impacted by this recession. The Materials, Industrials, and Energy sectors are very sensitive to the cycle of recessions. It should be noted that the market anticipates economic recessions, meaning that certain stocks and sectors may not experience the effects of an economic downfall until after the economy is said to be in recovery. The Information Technology sector carried the greatest risk during this period. Technology was on the rise, and the average weighting of the Information Technology sector jumped from second lowest during the previous Gulf War Recession to second highest during this period of the 9/11 Recession.

The recession of 2007-2009 became known as the "Great Recession," because it was the most impactful and important recession in United States history since the Great Depression

(1929-41). The Financials sector shows a remarkable beta of approximately 1.86 which is not only the riskiest sector for this period, but also, the highest beta in all the regression analyses conducted during this extensive exploration. The average weighting of the Financials sector dropped during this recession compared to the previous 9/11 Recession. This recession saw a massive decline in the economic strength of America and millions of Americans lost their jobs or houses during this time. It was frequently asserted during this period that the banks were "too big to fail," meaning that they were so interconnected and massive that they appeared as if they could not possibly be taken down (Amaedo, 2021). Financials were hit the hardest by the Great Recession in terms of risk because many different banks across the United States had to be 'bailed out' by the government (Amaedo, 2021). The Consumer Discretionary sector outperformed the overall market most substantially during this recession period. The extensive time length of this recession can be attributable to how the Consumer Discretionary sector outperformed the market, considering this sector is composed of companies such as Amazon and Comcast.

The current recession of 2020-2021 is sometimes referred to as the Coronavirus recession, because it was caused by the outbreak of the novel COVID-19 pandemic that is still affecting the daily lives of most Americans. During this recession, the Energy sector has been the riskiest investment. In addition to trade being disrupted by the pandemic, 2020 was the year of a highly contentious election. Promises of the elimination of the oil industry, a highly profitable sector of the economy that employs thousands of hard-working Americans caused the energy sector (which consists mainly of oil and gas production and refinement) to continue to be highly volatile. In February of 2021, construction of the Keystone pipeline was forcibly shut down by executive action, further causing a panic among the oil industry. The Energy sector has an uncertain future in the changing times. The Information Technology sector on the other hand has surged during the pandemic. Millions of Americans have been forced to work from home and have needed to quarantine as a result of the pandemic. Older Americans, or Americans who are immunocompromised, are not able to leave their homes, and therefore must rely on technology to receive their groceries. Technology has become such a large part of everyday American life and has not been adversely affected by the pandemic.

Section 6: Conclusion

In conclusion, the results of this exploration are substantial. The regression models afforded as a part of the Capital Asset Pricing Model have revealed findings that not only explain how the market is impacted during economic downturns, but which specific sectors of the economy have been hit the hardest during these trying times. The causes and effects of United States recession contribute to the impact on each of the S&P 500 sectors, even when little impact to a specific sector or a hard negative impact to all other sectors contributes to one sector's overperformance.

1990 was thirty-one years before the research for this paper was conducted. Thirty years is a long time in the scope of individual market trends, and this time period has been an extremely interesting period to analyze. America has been substantially transformed and shaped by these recessions. Downturns in the economy cause a decline in consumer spending, which lowers prices, and once the prices are lowered, some people can afford goods. This cycle of the economy repeats itself every 10-20 years, and because America and the rest of the world is currently experiencing the tail-end of an extreme recession, better days are to come.

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