Investment Theory and Applications Final Part B

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Executive Summary

The below papers is a discussion and analysis of a stock portfolio that I built with four stocks. The companies I chose were Apple, Amazon, JP Morgan Chase, and UnitedHealth. The first three are companies I’m very familiar with. I own both Apple and JP Morgan stock, and run my small businesses through Amazon. UnitedHealth was a new company for me, and fun to analyze. I conducted a full portfolio optimization with these four stocks and came up with the ideal asset allocation across the three of them. Also in this report you will find a summary of the industrys’ characteristics, stock/bond allocation, how I selected these companies using fundamental and technical analysis, and performance evaluations of the final portfolio.

Industry Characteristics

Health Care

Health care is one of the oldest and simultaneously fastest growing fields in our economy. It enjoys numerous advantages, including a constant demand thanks to the reality of people always getting sick or injured. Our current aging population will likely continue to fuel this demand. Our percent of GDP that goes to healthcare in the US has held just shy of 17.8% the last four years, up from 13% in 2000 and only 5% in 1960. The Coronavirus pandemic has thrown the industry into upheaval, as elective surgeries (one of the biggest profit drivers for hospitals) have been stopped temporarily. Obviously there is an equal amount of opportunity considering the massive amount of money being spent to fight the virus. Despite the industry's various risks, regulation in particular being the biggest one, it is a strong and stable industry to invest in.

Cloud Computation and Technology

Tech has been the star of the investing world during the past decade, with the FAANG stocks in particular contributing a massively outsized share of the stocks market's total gain. Technology companies greatly benefit from their ability to operate at massive scale with little to no cost of goods sold, meaning their profits can grow almost exponentially faster as they add more revenue. The obvious downsides in the industry include the fact that technology is constantly changing, and companies can very easily get behind and lose their market overnight. But in terms of raw growth potential and recent stock market returns, there is no industry that can compare with technology and cloud computing. They also stand to gain as we all stay home during the Coronavirus and use cloud technology to work and for more of our entertainment.

Banking and Financial Services

Banking is another great industry that has significantly grown in the modern economy. Since 1947, the percent of GDP that the finance, insurance and real estate sector generates has doubled. Banks have been the biggest winner of this growth, and our modern banks are some of our largest companies in the US and have delivered outsized stock market returns. Banks also tend to have a very long life cycle, with our modern banks being some of the oldest corporations in the country. They are very safe, and also recently have been able to survive extreme financial upheaval thanks to the government's willingness to bail them out. Banks don't likely have the same growth potential as the technology sector, but they can be very steady money makers for a much longer time frame.

Asset Allocation

The original portfolio had an asset allocation of 40% bonds, 60% stocks. I would classify such a portfolio as fairly conservative, and designed for someone who anticipates needing some of that capital in the near future. Assuming that I am designing the portfolio for myself, I would allocate 100% to stocks (assuming that I have a substantial emergency fund that is in cash/money market accounts). There are several reasons I would do this. First off, at 25 years old, I am decades away from needing to access the principle of my investments, giving me a very long investment time horizon and virtually unlimited ability to handle volatility. Second, there has never been a ten year period during which bonds have outperformed stocks. With interest rates currently as low as they have ever been, it seems highly unlikely that that trend will reverse itself anytime soon. The combination of those two factors makes it seem best in my opinion to allocate 100% to stocks. In terms of my macroeconomic outlook, I'm optimistic overall. We are definitely entering a period of significant economic slowdown. Unemployment will be high for the foreseeable future, and businesses will fail. The government also seems intent on taking over large portions of the economy. Interest rates are at all time lows, and inflation is surprisingly non-existent. I don't think it is possible for any human being to accurately and repeatedly predict macroeconomic trends. No one knows what the future will hold. But I am confident that in the long term, the US economy will perform admirably, even if it means a short term burst of volatility. I'm happy to own a piece of that economy by owning the stock market.

Asset Selection

Amazon

Amazon is easily one of my favorite companies, and that is in no small part because I have built several businesses using their platforms (mainly the Amazon Associates affiliate network and the Fulfilled by Amazon merchant seller program). Amazon dominates the continually growing world of eCommerce, and has successfully branched off into other businesses, most notably cloud computing. In my opinion, they have some of the best long term prospects of any company around. Their main strengths include the dominance of their brand, loyalty of their customers, superior technology, and an incredibly leadership team that continually pushes them to new heights.

Amazon's stock has been a top performer, rising nearly 600% in the last five years alone! They do tend to be a little more volatile than the stock market, with a Beta of 1.25 and a five year standard deviation of 30.2%. But that is a small price to pay for their outsized returns.

Apple

Another of my all time favorite companies (and one I've had in my portfolio for quite a while now), Apple is a giant in technology, and regularly trades off with Microsoft as the largest publicly traded company by market capitalization. Their core business is selling iPhones and other technology devices that are virtually essentials in today's world. They have also recently really pushed into cloud computing and other services businesses, including launching a streaming service to compete directly with Netflix and Amazon. Apple's arguably has the strongest brand in the world, with incredibly loyal customers.

While they are a more mature company than Amazon, and therefore haven't enjoyed as much recent stock market appreciation, owners of AAPL still have a lot to brag about. Their share price has more than doubled in the last five years. With a Beta of 1.17 and a 5 year standard deviation of 28%, AAPL is hardly more volatile than the stock market as a whole.

JP Morgan Chase

JP Morgan Chase is the USA's largest bank (and second largest in the world), and is another company that I personally have a long term holding in. As far as banks go, it is impossible to find one that has a stronger long term balance sheet or is run by a better management team. Jamie Dimon is considered no less than a genius in the banking world, and judging by the performance of his company it is for good reason.

JPM shareholders have been rewarded with a stock that has handily outperformed the market consistently since the merger of the two companies. However, the Coronavirus pandemic has caused an outsized panic in this stock, and so far this year they are underperforming. This may mean it is the perfect time to buy this great company. Their Beta is 1.29 and five year standard deviation is 27%.

UnitedHealth Group Inc

I knew a lot about the technology and banking sectors and companies in this assignment before tackling it, and it was easy for me to pick the companies I wanted to analyze. However, I knew next to nothing about healthcare. After looking through the companies, I settled on UnitedHealth Group Inc. UnitedHealth is a managed healthcare company, primarily offering healthcare products and insurance, two types of business that I understand pretty well. They are the largest healthcare company in the world by revenue, and are obviously the type of quality company that appeals to me.

UNH stockholders have been very happy with their stock's performance. In the last five years, the stock has moved from being around ~$120 per share to now nearly $300. The stock also has incredibly low volatility, with a Beta of .63 and a 5 year standard deviation of 26.9%.

Fundamental Analysis

I spent the bulk of my energies doing fundamental analysis on these companies, as I view that as the best way to determine whether or not a stock should have a long term place in my portfolio. I decided to look primarily at the companys' earnings, P/E ratio, dividend yield, and return on equity. A full chart including all six assigned ratios for all of the possible companies to choose from is located in the appendix. Here are my findings.

Amazon.com, Inc

Amazon is a very unique company. I have fairly intimate knowledge of how they work thanks to my business experience with them, but even with nearly a decade of that experience they are still at times an enigma to me. A great example of that is looking at their most recent financial ratios and metrics:

- **Earnings per Share:** $23.01
- **P/E:** 104.75
- **Dividend Yield:** 0%
- **ROE:** 21.94%

On first glance, surface level, these metrics seem absurd. Paying $104.75 for every dollar the company earns? That is borderline heresy to a self proclaimed value investor like myself! The pricey internet services segment has an average P/E of just over 29, meaning Amazon is priced much higher than its direct competitors. However, there is a key thing to consider when it comes to this unique company, and it comes in the form of a direct quote from Jeff Bezos in 1997 that he still references today:

"We will continue to make investment decisions in light of long-term market leadership considerations rather than short-term profitability considerations or short-term Wall Street reactions… When forced to choose between optimizing the appearance of our GAAP accounting and **maximizing the present value of future cash flows, we'll take the cash flows.**"

Amazon is a company focused on long term growth. In fact, I would say the only other company whose leadership is as dedicated to focusing on the long term at the expense of the short term is Berkshire Hathaway. Because of that focus and their continued pursuit of growth, their current earnings do not reflect the true earning power of the business. They don't pay a dividend for the same reason. While their financial ratios may not show it, I believe they are fundamentally one of the strongest companies in the world, perhaps the strongest.

Apple Inc.

Apple has long been a powerhouse company, and their financial metrics reflect that:

- **Earnings per Share:** $12.60
- **P/E:** 21.66
- **Dividend Yield:** 1.11%
- **ROE:** 55.47%

It's immediately obvious that they are a different beast than Amazon, and that is primarily because they are a mature company at a later stage in their cycle. Amazon has strong earnings (and a tremendously strong balance sheet loaded with cash). This allows them to even pay a small dividend, a rare thing in the technology stock world. Their P/E ratio puts them above the S&P 500 average, but is very reasonable when compared to its tech competitors. What's most impressive about them is their return on equity number. No investor would be disappointed with a 55.47% return on equity, and that is what Apple Inc. is delivering right now. They have some of the best fundamentals of any company out there.

JPMorgan Chase & Co

Banks can be a bit tricky to analyze compared to other companies, but here are the metrics for JPM:

- **Earnings per Share:** $8.90
- **P/E:** 10.10
- **Dividend Yield:** 3.92%

- **ROE:** 11.56%

JPMorgan has a strong dividend yield at nearly 4%. Now that dividend is likely at risk as the company deals with the fallout of the coronavirus in the short term. However, I view it as unlikely that it won't be a solid income producer in the long term. Their ROE number might seem low at first blush, but this is largely because banks have to hold a certain amount of equity compared to debt. The next highest ROE of the banks I could have chosen from was Bank of America, which only earns 9% on capital. JPM is a bit pricier in terms of P/E than the other bank options. However, I feel their industry leading position and strong leadership more than justify this premium, and the stock's current price level is very attractive (more on that below).

UnitedHealth Group Incorporated

Lastly, here are the metrics for UHG:

- **Earnings per Share:** $14.29
- **P/E:** 19.97
- **Dividend Yield:** 1.51%
- **ROE:** 23.96%

UnitedHealth has strong earnings, and generates a 23.96% return on equity capital, more than attractive enough by my standards. Their small dividend is also a plus. The one major downside to them in terms of fundamentals is their price to earnings. It is at a fairly high level for a slower growing, stable company in a mature industry. There is also a lot of uncertainty in this sector because of the coronavirus, which is having mixed effects on healthcare providers. Compared to the other companies I could have chosen though, it was obviously the best in terms of fundamentals. Pfizer recently reported a nearly 10% YoY drop in revenue, Gilead is a major gamble right now since they are working on coronavirus drugs, and McKesson has not been profitable over the most recent year.

Technical Analysis

I'll be 100% honest, I am not a big believer in technical analysis. I've seen no examples of someone repeatedly beating the stock market using traditional technical analysis to predict price fluctuations successfully. However, I am a big believer that the price you pay for a company is one of the main contributors to how well your investment performs. No matter how great the company is, if you pay too much for it your investment can perform poorly. Below I will analyze the stocks on technical terms and in general in terms of price. All prices/other data points quoted as of market close 4/27/2020.

AMZN

- **Per Share Price:** $2,376
- **50 Day Moving Average:** $2,020.92
- **200 Day Moving Average:** $1,877.85
- **MACD:** 117.42
- **RSI:** 70.65

Amazon's stock has been soaring lately due to speculation that stay at home orders will substantially increase their business, and they are currently near their all time high. Their share price is currently 19% over their 50 day moving average and 28% over their 200 day average, indicating strong price appreciation. However, their MACD level indicates to Buy and their RSI is neutral. Here is a chart of the stock's price, RSI and MACD:

The technical indicators seem to indicate a decent time to buy. I think Amazon still has a long way to grow. Because of my businesses, I personally have a bit of semi insider information about how their demand is at any given time, and can say that since the pandemic started, Amazon's sales have been through the roof. I expect great earnings reports from them in the near future.

AAPL

- **Per Share Price:** $283.17
- **50 Day Moving Average:** $274.04
- **200 Day Moving Average:** $256.25
- **MACD:** 4.03
- **RSI:** 56.32

I'll admit that I got lucky on my timing when I built my personal Apple position. I bought while the stock was severely depressed due to news of weaker than expected iPhone demand, and bought the stock for as little as $150 per share. Even though the stock has about doubled since then, technical indicators seem to suggest a buy. The RSI is neutral, and the others all indicate a buy. Here are the price, RSI and MACD charted:

While Apple isn’t priced as low as they were when I built my initial position, I don’t think that their subsequent rise in price is a reason to avoid the stock altogether. With the technical indicators the way they are, it could be a good time to do so.

JPM

- **Per Share Price:** $94.62
- **50 Day Moving Average:** $102.48
- **200 Day Moving Average:** $118.69
- **MACD:** −1.70
- **RSI:** 50.5

JPM stock has suffered a pretty massive decline since the start of the coronavirus pandemic. All banks have been hit hard, and probably rightly so given the uncertainties and the drop in interest rates. The stock's moving averages indicate selling, whereas the RSI is neutral and the MACD indicates buying. Here is the chart:

Despite the technical indicators not pointing to JPM being a good buy at this point, I think this is an instance where they should be ignored. While they might be right and a drop in the short term could be coming, I view it as an opportunity to get a very high quality business at a discounted price. Hard to beat that kind of investing opportunity.

UNH

- **Per Share Price:** $293.98
- **50 Day Moving Average:** $263.60
- **200 Day Moving Average:** $260.39

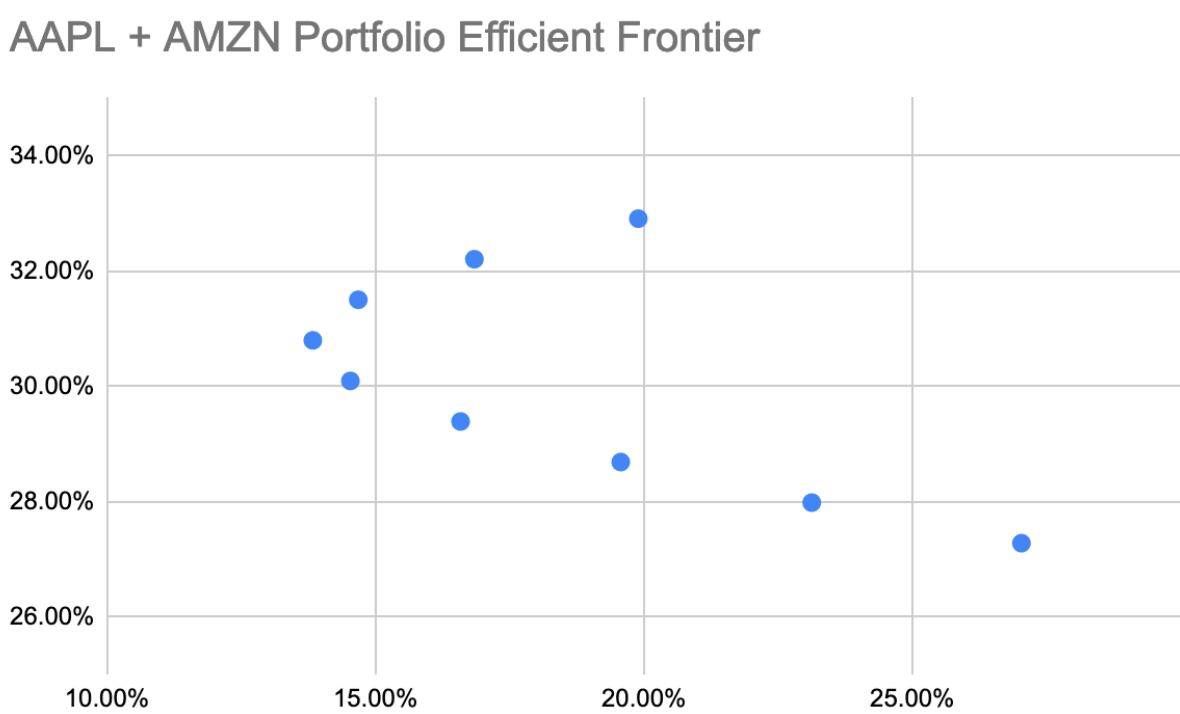
- **MACD:** 9.83
- **RSI:** 60.5

Technical indicators definitely look favorable for UNH. The RSI is neutral, and the other three are all indicating to buy. Here is the chart:

Of the companies I'm looking at, I'm least familiar with UNH, so I'm more hesitant to make a buy recommendation. The technical indicators seem to point to it being an okay time to buy. However, they haven't fallen in price like the rest of the market has, and there is a tremendous amount of uncertainty in this sector right now.

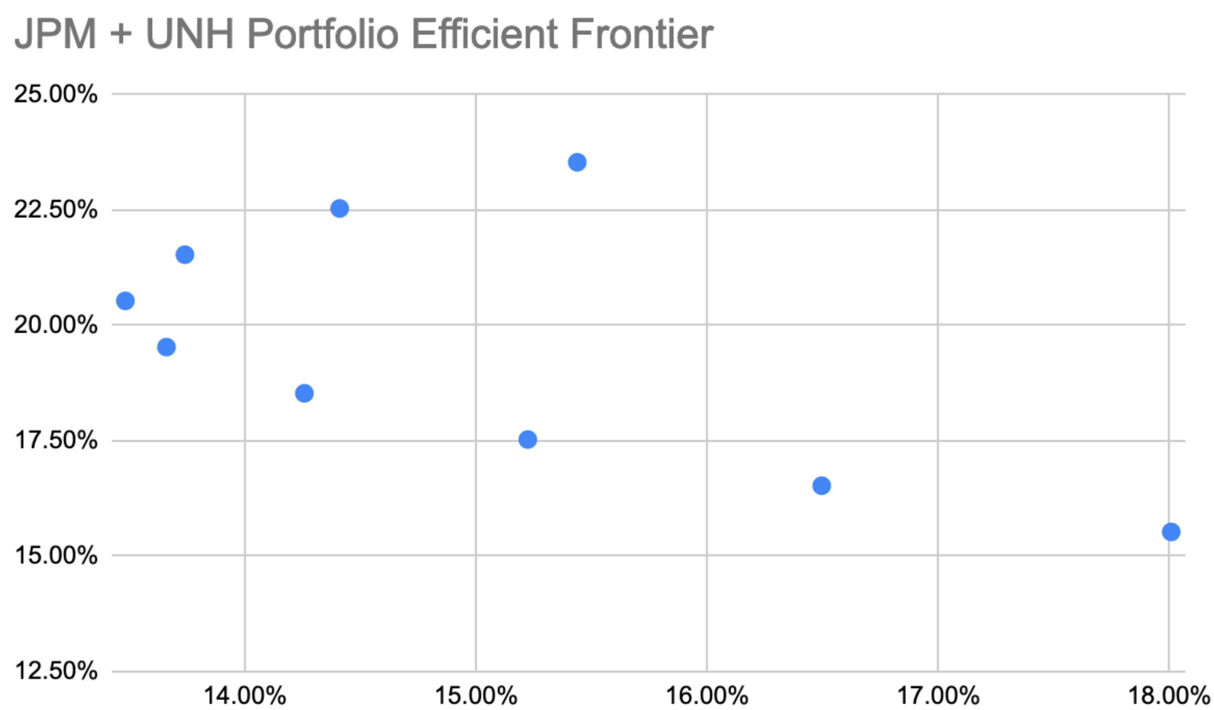
Portfolio Optimization

I did a full optimization on these four stocks to create an efficient portfolio. Or at least as efficient as you can get by looking at past prices. I started by finding an efficient allocation for the combination of AAPL and AMZN. The efficient frontier chart looked like this:



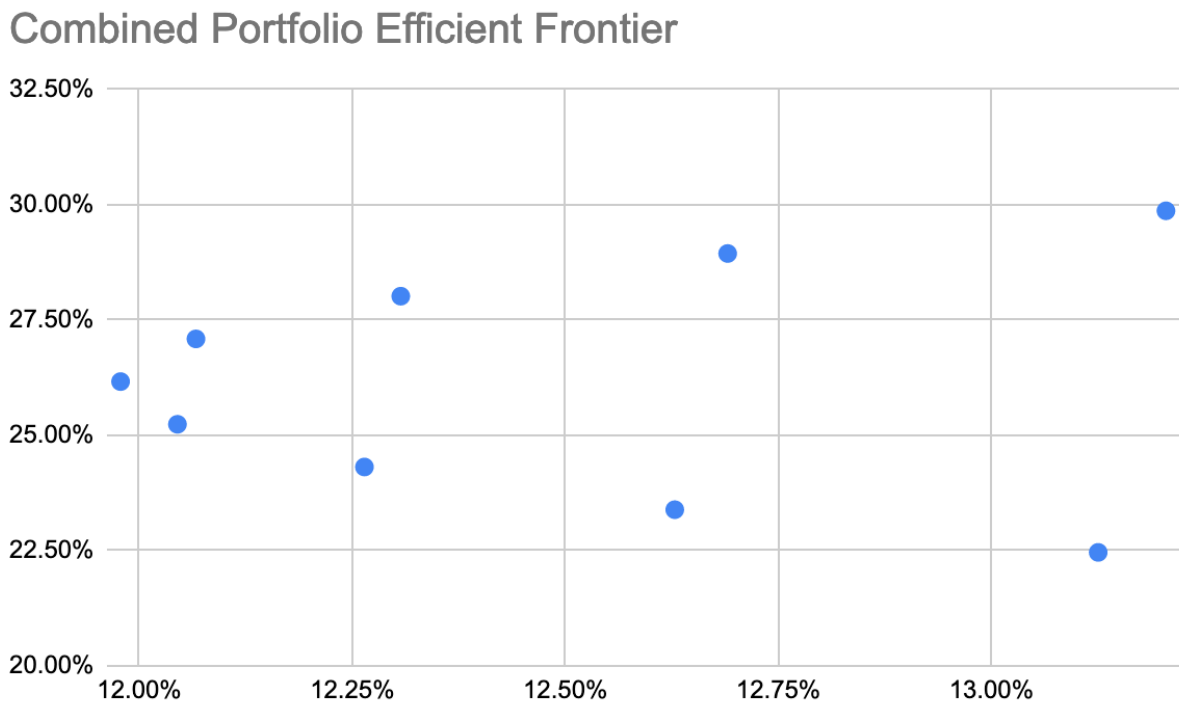
The optimum weight was 40% AAPL, and 60% AMZN. This would have earned a return of 30.79% with a standard deviation 13.84% over the last ten years.

Next was the same process for a combination of JPM and UNH. Here is what that frontier looked like:



This portfolio was most efficient at 30% JNH, 70% UNH. This portfolio would have yielded a return of 21.53% with a standard deviation of 13.74%.

Lastly, I made a combined efficient frontier analysis of the two portfolios combined, which ended up like this:



This portfolio was most efficient at 80% in the tech pair, and 20% in the other pair. Over the last 10 years, it would have yielded a return of 28.94% with a standard deviation of 12.69%. The final asset allocation between the four stocks looks like this:

AAPL	32%
AMZN	48%
JPM	6%
UNH	14%

It should be no surprise that Apple and Amazon take the largest spots in the portfolio, given that they have been some of the best performing large cap stocks over the past decade.

Portfolio Metrics

The following were the final metrics calculated for the portfolio. I calculated beta for the portfolio by multiplying each stocks weight by their individual betas as found on Yahoo Finance, and summing the total. Return and Standard Deviation were calculated as mentioned above in the portfolio efficiency analysis. All calculations were done in excel and the spreadsheet can be found in the appendix.

- **Return:** 28.94%
- **Standard Deviation:** 12.69%
- **Beta:** 1.1272

Portfolio Performance Measurement

I calculated the three performance measurement metrics in Excel for my optimized portfolio, the sheet is included in the appendix. Here are the results:

Sharpe Ratio	2.23
Treynor Ratio	0.251
Jensen Ratio	16.40%

These ratios suggest that this is a very strong portfolio that performed well over the time domain studied, which is obvious. The Jensen Ratio (or Alpha), is particularly strong at 16.4%. If that kind of advantage could be maintained over the long term, it is the type of performance that would not only make you rich, but put you close to being in the league of Warren Buffett, something very few investors have ever pulled off. As indicated by the Sharpe and Treynor ratios, this portfolio did have a bit more variance than the market though. This is something that I personally would very much be happy to accept given the excess return, and I think any investor with a modicum of intelligence would agree.

Conclusion

No portfolio is perfect, but I think the one that I constructed above is a great option given the constraints. The primary concern that I have has more to do with the method than the portfolio itself. Past performance cannot be used to indicate anything related to the future. While the portfolio above would have been a tremendous performer over the last 10 years, it's impossible to know what is coming in the future. Particularly in the time of coronavirus. However, I'm confident in the companies I selected, and as long as they continue to perform well, the stock portfolio should deliver excess returns.

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Appendix

Fundamental Analysis Ratios

All figures quoted end of market on 4/30/2020						
Stock	**Earnings Per Share**	**P/E**	**Dividend Yield**	**Price/Book**	**ROE**	**D/E**
Health Care						
CVS	5.08	12.06	3.19%	1.25	10.81%	138.7
PFE	2.8	13.21	3.83%	3.33	N/A	84.28
UNH	14.29	20.57	1.50%	4.65	23.96%	83.77
GILD	4.22	18.43	3.03%	4.35	24.28%	111.78
ABT	1.99	46.19	1.47%	5.19	N/A	61.02
MCK	-4.97	N/A	1.14%	3.57	-7.43%	154.82
Cloud Computation/Tech						
INTC	5.16	11.51	2.06%	3.32	30.31%	52.28
AMZN	23.01	104.28	0	19.27	21.94%	124.94
NFLX	4.94	85.3	0	22.04	31.63%	193.42
AAPL	12.6	21.66	1.06%	13.44	55.47%	130.4
NVDA	4.52	62.83	0.21%	14.24	25.95%	21.66
Banking						
BAC	2.46	9.58	2.78%	0.84	9.07%	N/A
JPM	8.9	10.69	3.58%	1.25	11.56%	N/A
WFC	2.89	9.93	6.60%	0.72	7.63%	N/A
GS	18.47	9.96	2.42%	0.69	8.08%	445.65

Portfolio Optimization and Performance Metrics

Year	AAPL Price	AAPL Return	AMZN Price	AMZN Return	JPM Price	JPM Return	UNH Price	UNH Return
2020	$309.51	85.96%	$2,008.72	16.87%	$132.36	27.88%	$272.45	0.83%
2019	$166.44	-0.59%	$1,718.73	18.46%	$103.50	-10.52%	$270.20	14.11%
2018	$167.43	37.97%	$1,450.89	76.19%	$115.67	36.68%	$236.78	46.07%
2017	$121.35	24.67%	$823.48	40.29%	$84.63	42.24%	$162.10	40.76%
2016	$97.34	-16.92%	$587.00	65.57%	$59.50	9.42%	$115.16	8.39%
2015	$117.16	63.84%	$354.53	-1.16%	$54.38	-1.77%	$106.25	47.00%
2014	$71.51	9.90%	$358.69	35.10%	$55.36	17.66%	$72.28	30.92%
2013	$65.07	-0.21%	$265.50	36.55%	$47.05	26.14%	$55.21	6.60%
2012	$65.21	34.54%	$194.44	14.62%	$37.30	-17.00%	$51.79	26.16%
2011	$48.47		$169.64		$44.94		$41.05	

	Average Return	Standard Deviation		
AAPL	26.57%	31.16%		
AMZN	33.61%	23.50%		
JPM	14.52%	19.71%		
UNH	24.54%	16.76%		
Correlation				
AMZN + AAPL	-0.4629050847			
JPM + UNH	0.1170709956			
AAPL + AMZN (A)				
AAPL Weight	**AMZN Weight**	**Return**	**StDev**	**Co. of Variation**
90%	10%	27.28%	27.03%	0.99
80%	20%	27.98%	23.13%	0.83
70%	30%	28.68%	19.57%	0.68
60%	40%	29.39%	16.59%	0.56

50%	50%	30.09%	14.54%	0.48
40%	60%	30.79%	13.84%	0.45
30%	70%	31.50%	14.68%	0.47
20%	80%	32.20%	16.84%	0.52
10%	90%	32.91%	19.90%	0.60
JPM + UNH (B)				
JPM Weight	**UNH Weight**	**Return**	**StDev**	**Co. of Variation**
90%	10%	15.53%	18.01%	1.160
80%	20%	16.53%	16.50%	0.998
70%	30%	17.53%	15.22%	0.869
60%	40%	18.53%	14.26%	0.769
50%	50%	19.53%	13.66%	0.699
40%	60%	20.53%	13.48%	0.657
30%	70%	21.53%	13.74%	0.638
20%	80%	22.54%	14.41%	0.639
10%	90%	23.54%	15.44%	0.656
Year	**A Return**	**B Return**		**Correlation**
2020	44.51%	8.95%		0.5093755248
2019	10.84%	6.72%		
2018	60.90%	43.25%		
2017	34.04%	41.20%		
2016	32.58%	8.69%		
2015	24.84%	32.37%		
2014	25.02%	26.94%		
2013	21.84%	12.46%		
2012	22.59%	13.21%		
Combined Portfolios				
A Weight	**B Weight**	**Return**	**StDev**	**Co. of Variation**
90%	10%	29.87%	13.20%	0.442
80%	20%	28.94%	12.69%	0.438

70%	30%	28.02%	12.31%	0.439
60%	40%	27.09%	12.07%	0.445
50%	50%	26.16%	11.98%	0.458
40%	60%	25.24%	12.04%	0.477
30%	70%	24.31%	12.26%	0.504
20%	80%	23.39%	12.63%	0.540
10%	90%	22.46%	13.13%	0.584
Final Weight				
AAPL	32%			
AMZN	48%			
JPM	6%			
UNH	14%			
	Beta	**Weighted Beta**		
AAPL	1.25	0.4		
AMZN	1.17	0.5616		
JPM	1.29	0.0774		
UNH	0.63	0.0882		
Portfolio Beta	1.1272			
Risk Free Rate	0.64%			
Sharpe Ratio	2.23			
Treynor Ratio	0.251			
Jensen Ratio	16.40%			
Year	**S&P 500 Price**	**Return**		
2020	3,225.52	19.28%		
2019	2,704.10	-4.24%		
2018	2,823.81	23.91%		
2017	2,278.87	17.45%		
2016	1,940.24	-2.74%		
2015	1,994.99	11.92%		

2014	1,782.59	18.99%		
2013	1,498.11	14.15%		
2012	1,312.41	2.04%		
2011	1,286.12			
Market Return	11.20%			
Market StDev	9.73%			