

FINAL REPORT

Group 1

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Executive Summary

We are the Arizona State Retirement System with assets under management (AUM) of approximately \$10 billion. The average annual benefit to retirees is \$21,100. AUM has 219,830 active members, 176,444 retirees with an average age of 72.5 years, and on average 10,100 members are added each year. The total liabilities amount to \$ 299 million. The Arizona State Retirement Systems Investment Portfolio is designed to achieve long-term growth while managing risk to meet the retirement needs of our members. In pursuit of this objective, the fund employs a diversified investment approach across various asset classes and geographies. As AUM we have comprehensively examined the economy and drawn various conclusions about the current and short-term market expectations. While setting up the portfolio we have taken into consideration inflation, interest rates, consumer expectations, and other macroeconomic factors. Based on these assumptions, we have picked assets from different sectors to develop a diversified and well-balanced portfolio. We have assumed a benchmark rate of return at 8 percent based on the annualized rate of return of the portfolio of the Arizona State Retirement System. We aim to match and even expect to surpass this 8% return.

Market Outlook

The US economy started 2024 on solid ground, with various indicators of business activity, labor markets, sentiment, and inflation generally moving favorably. Nonetheless, we foresee

challenges such as the escalation of consumer debt and higher interest rates exerting downward pressure on economic growth. We also expect consumer spending growth to be moderate and overall GDP growth to slow to under 1% over Q2 and Q3 2024. Subsequently, we expect inflation and interest rates to normalize, leading to quarterly annualized GDP growth converging toward its potential of nearly 2% in 2025. (Exhibit 1 a)

In 2023, despite elevated inflation and higher interest rates, US consumer spending demonstrated resilience. We expect consumer spending to be resilient. As seen in the past this happens even in deflationary periods. Based on the assumption we decided to invest in the consumer staples industry. Additionally, labor market conditions may ease during this period, we do not anticipate a significant deterioration.

Following a surge in early 2023, business investment growth decelerated in the latter half of the year due to the higher costs associated with financing following interest rate hikes. We expect this trend to intensify in H1 2024 as the Fed resists calls to cut interest rates likely by the latter half of 2024. Residential investment growth, which rebounded in Q3 2023, is not expected to sustainably improve until interest rates begin to fall.

Government expenditure played a beneficial role in fostering growth in 2023, primarily attributed to non-defense spending at the federal level linked with infrastructure investment bills enacted in 2021 and 2022. However, we anticipate a slowdown in government spending in 2024 and 2025 as infrastructure spending stabilizes, and political volatility surrounding fiscal policy could impact spending.

The tightness in the labor market has demonstrated remarkable resilience throughout the preceding year, with the ongoing trend expected to persist over the coming quarters. This tightness largely reflects a shrinking labor force due to Baby Boomers retiring, leading businesses to resist layoffs. Regarding inflation, ongoing advancements are anticipated in the subsequent quarters, albeit with occasional disruptions.

We expect headline PCE inflation to reach the Fed's 2 percent target in Q3 2024, prompting rate cuts starting in the latter half of June 2024, with a total of four 25 bp cuts this year and an additional four 25 bp cuts in 2025. (Exhibit 1b)

Based on these assumptions we decided to include value stocks instead of growth stocks into our portfolio. Not only have they proven to perform better in the past in low-interest rate, low inflation scenarios. The high dividend yield from these stocks will also help us with a regular influx of liquidity.

Sector Analysis

We have strategically selected the following sectors based on their robust fundamentals and compelling data.

Firstly, the technology sector stands out as a primary driver of innovation, experiencing rapid growth and commanding substantial attention from investment industries. With a

staggering market capitalization of \$15.02 trillion, representing 26.41% of the total market value, its influence on the overall market performance is undeniable. Impressively, the sector has demonstrated remarkable returns of 154.86% over five years and 34.29% over the past year, outperforming broader market indices consistently.

Secondly, the financial services sector, boasting a market capitalization of \$8.465 trillion and a market weight of 14.88%, has delivered solid returns of 47.66% over five years and 20.76% over the past year, further solidifying its position as a strategic investment choice. Despite a modest 1-year return, the healthcare sector remains a strategic option, supported by its substantial market capitalization of \$6.387 trillion and a market weight of 11.23%. Its 5-year return of 64.3% indicates promising growth potential, aligning closely with broader market trends.

Moreover, the consumer sector, with a market capitalization of \$6.076 trillion and a 10.68% market weight, has consistently outperformed, boasting returns of 71.00% over five years and 19.19% over the past year, exceeding those of the S&P 500.

Additionally, the industrial sector, with a market capitalization of \$5.249 trillion and a market weight of 9.23%, has delivered robust returns of 58.72% over five years and 19.23% over the past year, further reinforcing its attractiveness as an investment avenue.

Taiwan Semiconductor Manufacturing Company Limited (TSM)

TSM dominates the global semiconductor foundry business, leading with innovative technology and capacity expansion. It surpassed Samsung in 2022, boasting a market cap exceeding \$600 billion. Benefiting from smartphone, PC, and data center market growth, TSM maintains

technological leadership, capturing over 90% market share below 7 nm nodes. Exclusive deals, like Apple's 3-nanometer capacity booking, fortify its position.

Recently, TSMC secured \$6.6 billion in subsidies under the CHIPS Act, planning a \$65 billion investment in Arizona for a third fab. The first fab is expected to produce 4nm chips by H1 2025, second fab to pioneer 2-nanometer technology by 2025, with full capacity by 2028. The third fab targets production using 2-nanometer or advanced processes by the late 2020s.

Based on our detailed discounted cash flow (DCF) analysis, we anticipate a promising outlook for the stock in consideration. By projecting a future Price-to-Earnings (P/E) ratio of 29x for 2027, in line with industry standards, we have arrived at a fair value estimate of \$894. This figure indicates a robust potential for growth compared to the current market price of \$783. Our optimism stems from an estimated growth rate of 12%, aligning with industry averages. This assumption underpins our confidence in the company's ability to generate sustainable earnings growth over the coming years.

In essence, our DCF analysis suggests that the stock is poised to outperform its current market valuation. This conclusion underscores the potential for investors to capitalize on an undervalued opportunity, benefiting from the anticipated appreciation in stock value driven by solid growth prospects.

Taiwan Semiconductor Manufacturing Company Limited (TSM)

P/E Ratio	29x
EPS	54.72

Altman's Z score	8.75
Fair Price	894
Current Price	783

UnitedHealth Group Inc. (UNH)

UnitedHealth Group Inc. (UNH) stands out in the healthcare sector as a stable investment choice representing 13% of the S&P 500. With healthcare being defensive, less volatile, and resilient to economic cycles, UNH benefits from steady returns. Factors like technological advancements and an aging population drive sector growth, with national health spending projected to reach \$6.2 trillion by 2028. UNH, operating through four major segments, reported 8.6% revenue growth in Q1 and holds a competitive edge with \$371.6 billion revenue in fiscal year 2023. Expectations of 16% adjusted EPS growth for this year and 2025 make UNH an optimistic investment, consistently outperforming estimated EPS.

Based on our meticulous discounted cash flow (DCF) analysis, we are optimistic about the future prospects of the stock under consideration. Our analysis projects a future Price-to-Earnings (P/E) ratio of 23x for the year 2027, aligning with industry norms. This projection leads us to a fair value estimate of \$611.75, indicating substantial growth potential compared to the current market price of \$487.30.

Our optimism is grounded in our estimation of a 5% growth rate, which mirrors industry averages. This assumption instills confidence in the company's capacity to deliver consistent and sustainable earnings growth over the forthcoming years.

In summary, our DCF analysis points towards the stock being undervalued relative to its current market valuation. This conclusion highlights an opportunity for investors to seize potential gains by capitalizing on the anticipated appreciation in the stock's value, driven by its robust growth prospects.

UnitedHealth Group Inc. (UNH)

P/E Ratio	23x
EPS	28.75
Altman's Z score	3.59
Fair Price	611.75
Current Price	487.30

Master Card (MA)

In recent years, economic conditions have been challenging, marked by higher interest rates and inflation. However, Mastercard has stood out with impressive revenue growth driven by

increased payment volume. With a history of strong profitability and projected growth rates, Mastercard appears poised to continue its success. Supported by industry trends favoring cashless transactions and its formidable network effect, the company maintains a solid economic moat.

After conducting a thorough discounted cash flow (DCF) analysis, we're bullish on the stock's future outlook. Our projections indicate a future Price-to-Earnings (P/E) ratio of 35x for 2027, in line with industry standards. This leads us to a fair value estimate of \$505.28, signaling significant growth potential compared to the current market price of \$462.50.

Our optimism is firmly rooted in our forecast of a 7% growth rate, which mirrors industry averages. This assumption bolsters our confidence in the company's ability to deliver steady and sustainable earnings growth in the years ahead.

To sum up, our DCF analysis suggests that the stock is undervalued relative to its current market price. This presents an opportunity for investors to capitalize on potential gains driven by the expected appreciation in the stock's value, fueled by its robust growth prospects.

Master Card (MA)

P/E Ratio	35x
EPS	17.52
Altman's Z score	10.34
Fair Price	505.28
Current Price	462.50

Alphabet (GOOGL)

After conducting a thorough discounted cash flow (DCF) analysis, we're bullish on the stock's future outlook. Our projections indicate a future Price-to-Earnings (P/E) ratio of 31x for 2027, in line with industry standards. This leads us to a fair value estimate of \$176.36, signaling significant growth potential compared to the current market price of \$154.09.

Our optimism is firmly rooted in our forecast of a 7% growth rate, which mirrors industry averages. This assumption bolsters our confidence in the company's ability to deliver steady and sustainable earnings growth in the years ahead.

To sum up, our DCF analysis suggests that the stock is undervalued relative to its current market price. This presents an opportunity for investors to capitalize on potential gains driven by the expected appreciation in the stock's value, fueled by its robust growth prospects.

P/E Ratio	31x
EPS	7.55
Altman's Z score	12.20
Fair Price	176.36
Current Price	154.09

FTSE India Index

We picked FTSE India ETF as it offers exposure to the robust and steadily growing Indian economy, which presents a strong potential for favorable returns for our investors. The ETF provides geographical diversification, a critical component for building a resilient long-term portfolio that can withstand various market conditions. Additionally, the ETF demonstrates prudent risk management practices through its well-curated portfolio, which includes diversified investments designed to mitigate downside market risks. Furthermore, the FTSE India ETF aligns with the evolving expectations of investors who seek exposure to emerging markets and above-average growth opportunities. Its transparent approach to investment options instills confidence and trust among investors, while its cost-effective trading mechanisms offer added convenience.

Interest Rate	7.07%
Consumer price index (CPI)	5.09%
Real GDP (yoy)	\$3732.22 billion

iShares MSCI Turkey Index

We Turkey as a possible market to invest in because of several compelling factors. These include the nation's swift economic expansion, resilient financial and real sectors, access to extensive domestic and regional markets, strategic geographic proximity to Europe, the Middle East, and

Asia and a favorable investment climate supported by strong investor protection measures.

Together, these elements make Turkey an appealing investment destination for our portfolio. An exponential increase in inflation has significantly reduced the value of cash for locals which has in turn gotten them to invest in equities. While inflation is a major concern while investing in Turkey, we are also accounting for steadily growing consumer demand and revenue from tourism.

For the Turkish market, iShares MSCI Turkey Index provides direct exposure to companies based in the nation. We picked it because it offers a distinct opportunity for investors to gain exposure to the Turkish market, which is otherwise limited in many ETFs.

Interest Rate	50%
Consumer price index (CPI)	68.60%
Real GDP (yoy)	\$1024 billion

PIMCO 25+ yr zero coupon

Investing in a 25+ year zero-coupon bond when we are expecting Federal Reserve rates to drop offers the benefits of locking in higher returns by purchasing at a discount during high-interest rate periods, potential capital appreciation if rates decrease, hedging against future rate drops with a fixed payout and portfolio diversification due to low correlation with other assets.

However, we are also cautious of risks such as interest rate and liquidity risks, especially over such a long investment horizon. While keeping in mind our long term liabilities as a pension fund we believe its a great addition to our portfolio as it provides a predictable payout at maturity, which may be suitable for long-term financial planning. the modified duration of a bond is less than its maturity, it suggests lower sensitivity to changes in interest rates relative to the bond's remaining time to maturity.

Yield	4.25%
Rating	AA
Macaulay Duration	27.389
Modified Duration	26.763
Convexity	7.319
Effective Maturity	27.51
YTM	4.67%

iShares 5-10 Year investment grade equity ETF

This suggests that there is a decrease in the rate at which new bonds are being issued by corporations. When primary market issuance slows down, it can indicate several things: companies might be finding other sources of funding, they might be more cautious about taking on new debt, or market conditions might not be as favorable for new issuances. This slowdown can create a situation where existing bonds become relatively more valuable due to reduced supply.

Investment-grade corporate bond curve is less inverted than treasuries suggests an impending decrease in cash yields over the coming quarters. This adjustment could stem from shifts in monetary policy or alterations in market dynamics. Furthermore, there is an anticipation for other investment-grade asset classes to revert to normalcy, potentially resulting in yields aligning more closely with historical averages.



Yield	4.07%
Rating	BBB 49.10%

	A 42.09% AA 4.92% BB 3% NR 0.24% AAA 0.13%
Macaulay Duration	6.251
Modified Duration	6.078
Convexity	0.454
YTM	5.61%

iShares 7-10 Year Treasury Bond ETF

Yield	3.23%
Rating	AA 99.99%
Macaulay Duration	7.358
Modified Duration	7.192
Convexity	0.604

YTM	4.63%
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iShares CMBS ETF

We are choosing to invest in long-term mortgage-backed securities (MBS) amidst expectations of declining federal rates in order to optimize their portfolio performance. By allocating resources to long-term MBS instruments prior to anticipated rate decreases, we can capitalize on higher yields inherent in these securities, potentially securing enhanced returns compared to short-term alternatives. Furthermore, the appreciation potential of long-term MBS, coupled with their stable income streams, offers a compelling proposition for a source of income while navigating a low-rate environment. However we are aware of the potential prepayment and extension risks that come with investment in mortgage back securities. Due the aforementioned risks MBS would offer us higher yields compared to treasuries. By investing in iShares CMBS ETF, we can potentially capture a higher level of income, thereby bolstering portfolio returns and mitigating the impact of low interest rates on overall investment performance.

Yield (12 month)	3.12%
Rating	AA+ 98%
Macaulay Duration	4.140
Modified Duration	4.035
Convexity	0.334
YTM	5.85%

iShares Gold Trust (IAU)

Gold's low correlation with traditional asset classes like stocks and bonds offers diversification benefits, potentially shielding our portfolio during volatile market conditions. Gold is also recognized as a safe-haven asset, it tends to retain or appreciate in value during economic downturns or geopolitical turmoil, providing stability amidst uncertainty. Furthermore, gold serves as an effective hedge against inflation, preserving wealth when purchasing power erodes. The liquidity and cost-effectiveness of iShares Gold Trust makes it an accessible investment vehicle, offering the flexibility to navigate turbulent markets efficiently. Despite these advantages, we do acknowledge the risks associated with gold investing, including price volatility and the absence of income generation.

Portfolio vs Benchmark

5 years	Portfolio	Benchmark
Beta	1.562031761	1
Return	16.9%	12.24%
Shape	1.304218139	0.77

Tracking error	13.47647048
Treynor ratio	0.09171517
Jenson's alpha	4.067136662
correlation	0.815337945

Sensitivity analysis

ROR-based

We did a sensitivity analysis for equity by initially calculating the rate of return(ROR) based on the historical prices for last five years. We checked that if the ROR of each security increases by 1%, what will be the change in the price of each equity. Even for the Consumer Staples', but it's because the ROR of consumer staples is much smaller than the other equities.

It's true that if the ROR of each security decreases by 1%, the change in the price of all the equity will decrease more than 1% as well. However, the changes when decreasing are slightly lower than those when increasing. It shows that we will get more earnings when the ROR increases, but when the return decreases by the same percentage, we don't lose as much money as a result.

Duration-based

In this analysis, we examine the impact of changes in YTM on bonds, and YTM is inversely related to changes in price. We observe that larger fluctuations in yields lead to much larger changes in bond prices than the corresponding changes in yields, suggesting that bond prices are more sensitive to changes in yields. As the magnitude of the change in yield decreases = small, the percentage change in bond prices also decreases (approaching zero), and the percentage change in bond prices also decreases, indicating lower sensitivity. The more symmetric the magnitude of the bond price change is around a zero yield change, the better.

We also examine the effect of Modified duration on price and can see that when YTM is negative, the longer the Modified duration, the greater the price growth, thus giving us more return on our investment.

Scenario Analysis

We've conducted an extensive analysis of our portfolio's performance across various scenarios, both in normal market conditions and during crises. During regular times, our total returns have remained positive, but during crises, they have dipped into negative territory. We've scrutinized major financial crises such as the Greece Financial Crisis of 2015, the Libya Oil Shock in February 2011, the Russian Financial Crisis of 2008, the Oil Price Drop in May 2010, the Japan

Earthquake in March 2011, the Debt Ceiling Crisis & Downgrade of 2011, currency crises like the EUR strengthening by 10% against the USD, and the Lehman Default of 2008. Across these crises, our overall portfolio's total returns have ranged from a loss of 2.24% to a gain of 0.52%. Equity performance has swung between a substantial loss of 40.84% and a modest gain of 8.28%, while Funds have experienced a range from a loss of 22.83% to a gain of 7.60%. The Russian crisis particularly stands out as the most severe, causing the lowest total return across all asset classes. As a precautionary measure, it's advisable to transition to a cash portfolio when early signs of such crises emerge.

We've also observed similar trends in individual stocks within the equity portfolio and in the Funds portfolio, where the standard deviations of individual stock returns have been greater than those of the overall equity or Funds portfolio.

During the Equity Markets Rebound of 2009 scenario, our overall portfolio returned 2%, with equity and Funds showing impressive returns of 33.28% and 28.48% respectively, indicating the wisdom of portfolio switching in such situations.

We've also analyzed Stress Market Value (MV), finding that while the overall portfolio MV remains relatively steady during different crisis scenarios, there's significant fluctuation in stress MV for equity and Funds. During severe crises, the stress MV drops considerably, with the lowest observed during the Russian crisis.

Hence our analysis indicates that the potential for loss with equity is higher than with Funds during major financial crises or otherwise. In normal times, equity carries less risk compared to the overall portfolio, emphasizing the importance of incorporating portfolio switching strategies into our investment processes.

Value at Risk (VaR)

Value at Risk (VaR) assessment has been conducted utilizing Monte Carlo simulation, historical data, and conditional probability to evaluate potential loss within our investment portfolio. Under normal market conditions, the VaR for the Equity sector is calculated at 6.92%, indicating a 5% probability for equity investments to incur losses up to this threshold. This signifies a lower risk potential compared to the total portfolio VaR, which stands at 9.11%.

Within the Equity sector, specific industries exhibit varying levels of risk. Communication, Financials, Health Care, and IT sectors have respective VaR values of 1.95%, 3.46%, 3.17%, and 2.12%, suggesting relatively lower potential for loss compared to the overall equity portfolio.

Upon examining individual stocks, Alphabet, Mastercard Inc., and UnitedHealth Group demonstrate lower VaR values when assessed through Monte Carlo simulation compared to historical data. This implies potential lower downside risk for these stocks according to the Monte Carlo simulation, offering diversification benefits to the portfolio. However, Taiwan Semiconductor, despite showing a slightly lower risk according to the Monte Carlo simulation, contributes significantly to portfolio risk due to its weight.

Furthermore, certain assets within the portfolio exhibit varying levels of risk compared to historical values. Mortgage-backed securities ETF and iShares 5-10Y Inv Grade Corp show lower VaR (MC), suggesting potential risk reduction. Conversely, PIMCO 25+ YR Zero CPN US

TIF and SPDR S&P Homebuilders ETF exhibit higher VaR (MC), indicating potential increased risk.

Diversification benefits are evident in funds like iShares Core MSCI Emerging and Vanguard Consumer Staple ETF, which display relatively lower VaR (MC). For the remaining portion of the portfolio comprising Global equity, REITs, and commodities, the VaR is 3.02%, indicating less risk potential compared to equity and the overall portfolio.

Historical data reveals that the overall VaR for Equity and Funds stands at 7.59% and 2.96% respectively, suggesting that while equity has been riskier in the past three years, Funds have carried marginally lower risk potential for loss.

Conditional VaR (CVar) stands at 9.25% and 4.17% for Equity and Funds respectively, indicating a greater risk of loss in the event of a major market event. Similarly, at the individual investment level within equity and Funds space, CVar is higher. Cash VaR remains at 0%, confirming that risk is implicit in investment and nonexistent if no investment is made.

In conclusion, the portfolio's VaR analysis highlights a higher potential for loss in equity compared to other parts of the portfolio.

HEDGING

We're employing a hedging strategy utilizing SPX Index Options, which are European-style. Our approach involves purchasing out-of-the-money (OTM) Put options. Specifically, we're targeting

deep OTM Put options where the initial premium outlay is minimized, thereby reducing the overall cost of protection. This strategy effectively shields us from extreme downside risks, such as 2-3 sigma events, while acknowledging that in less severe market movements, we'll incur losses in the form of premium payments.

To execute this strategy, we're acquiring 21st June 2024, 4700 Put options. These options require a premium payment of \$12.43 each. Considering the scale of our hedging needs, we're securing 9000 contracts.

The total premium payment amounts to approximately \$11,187,000. When extrapolated to an annual basis, the cost of protection stands at \$33,561,000. This represents a mere 0.03% of the total portfolio value, highlighting the cost-effectiveness of our hedging strategy.

CURRENCY OVERLAY

In Turkey, we're actively implementing a currency overlay strategy, while in India, our approach is more passive. Specifically, in India, we're executing a passive currency overlay strategy by taking a long position on the USD/INR pair, achieved through purchasing out-of-the-money call options. This strategic move allows us to benefit from any depreciation of the Indian Rupee (INR), shielding our investments from potential losses due to currency fluctuations.

The rationale behind this strategy is to mitigate currency risk by leveraging the relative strength of the US dollar (USD) against the INR. By going long on USD/INR through call options, we're essentially securing a hedge against potential devaluation of the INR, regardless of how the India

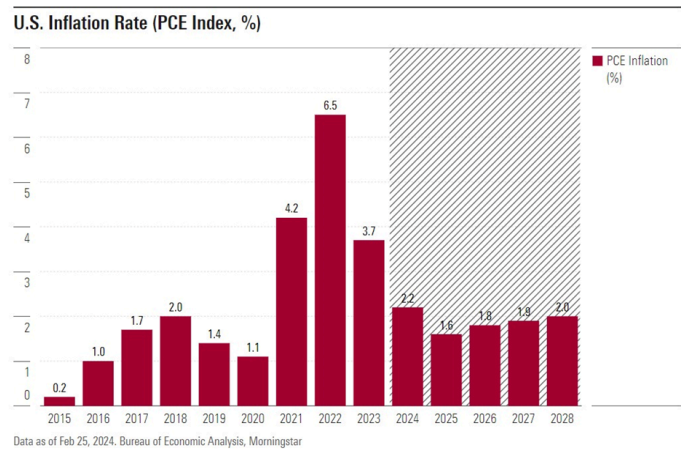
ETF performs. This ensures that any profits earned in foreign currency remain protected, enhancing the overall stability of our investment portfolio.

To execute this strategy, we're focusing on the INTZ4 Currency ticker, with a strike price set at 84, while the current USD/INR exchange rate stands at 83.4. These European options are set to expire on the 27th of December 2024, with a premium of \$1.4975 per contract and a lot size of 100. Considering our hedging requirements, we're looking to acquire 11,130 contracts.

The total premium payment for this hedging strategy amounts to approximately \$1,666,718. When annualized, this translates to a cost of protection totaling \$250,000. Remarkably, this represents just 0.025% of our total portfolio value, underscoring the cost-effectiveness of our hedging approach.

In summary, our passive currency overlay strategy in India, achieved through purchasing out-of-the-money call options on the USD/INR pair, serves as a prudent measure to safeguard our investments against currency risk, while maintaining a cost-efficient approach.

Appendix



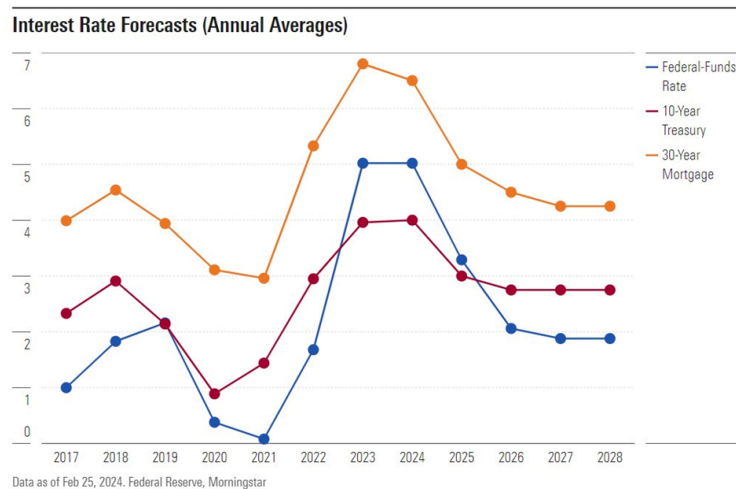


Exhibit 2 (A) - Asset Allocation

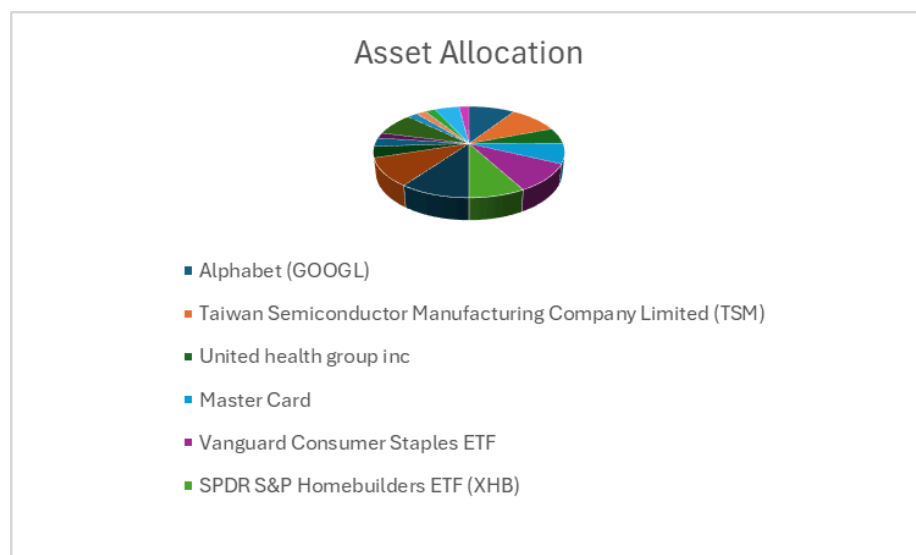


Exhibit 2 (B) - Asset Allocation

A donut chart showing the distribution of responses for the question 'How many people do you know who have been vaccinated?'. The chart is divided into seven segments of varying sizes, representing different ranges of people known to be vaccinated. The segments are colored: dark blue (largest), orange, green, purple, light blue, dark green, and brown (smallest).

- | | US stocks | Ticker | Return | Risk | Max | Min | Weight | Benchmark | Benchmark Comparison |
|----------------------------|---|--------|--------|--------|--------|-------|--------|-----------|----------------------|
| Equity | Alphabet (GOOGL) | GOOGL | 37.64% | 31.99% | 10.00% | 2.00% | 9% | SPX | SPX |
| Equity | Taiwan Semiconductor Manufacturing Company Limited (TSM) | TSM | 41.11% | 36.31% | 10.00% | 2.00% | 10% | SPX | SPX |
| Equity | United health group inc | UNH | 21.36% | 29.31% | 10.00% | 2.00% | 6% | SPX | SPX |
| Equity | Master Card | MA | 22.98% | 31.45% | 10.00% | 2.00% | 7% | SPX | SPX |
| Equity ETF | Vanguard Consumer Staples ETF | VDC | 9.05% | 25.25% | 10.00% | 2.00% | 10% | MSUS5CSI | SPX |
| Equity ETF | SPDR S&P Homebuilders ETF (XHB) | XHB | 31.21% | 31.52% | 10.00% | 2.00% | 8% | SP5IHOTR | SPX |
| Fixed Income | Pimco 25+ Year Zero Coupon U.S. Treasury Index ETF (ZROZ) | ZROZ | 2.62% | 25.54% | 10.00% | 2.00% | 10% | STPLB4 | LBSTRUUU |
| Fixed Income | iShares 7-10 Years Treasury Bond ETF | IEF | -2.11% | 7.71% | 10.00% | 2.00% | 10% | IDCOT7B4 | LBSTRUUU |
| Fixed Income | iShares 5-10 years investment grade ETF | IGIB | 3.83% | 7.72% | 10.00% | 2.00% | 4% | CGA0B4 | LBSTRUUU |
| Fixed Income (Non Vanilla) | FlexShares Disciplined Duration MBFS ETF MBSD | MBSD | 1.38% | 4.57% | 10.00% | 2.00% | 3% | LUMSTRUU | LBSTRUUU |
| Emerging Markets | iShares Core MSCI Emerging Markets ETF | IEMG | 5.05% | 22.05% | 10.00% | 2.00% | 2% | MIUMUEMRN | SPX |
| Emerging Markets | Franklin FTSE India ETF | FLIN | 12.21% | 22.67% | 10.00% | 2.00% | 8% | FTINDN | SPX |
| Emerging Markets | iShares MSCI Turkey UCITS ETF | TUR | 14.17% | 37.31% | 10.00% | 2.00% | 2% | TUR | SPX |
| REIT | Vanguard Real Estate ES Equity | VNQ | 6.36% | 25.25% | 10.00% | 2.00% | 2% | M2CXVD | SPX |
| REIT | iShares Core U.S. REIT ETF Class | USRT | 6.92% | 26.07% | 10.00% | 2.00% | 2% | FNRETR | SPX |
| Commodity | iShares Gold Trust | IAU | 11.44% | 14.91% | 10.00% | 2.00% | 5% | GOLDNPM | SPX |
| | Cash | | | | | | 2% | | |

Covariance Matrix	Taiwan Semiconductor Manufacturing Corp	Health goods	Consumer Sts	Homebuilders	Japan U.S. Treas	Investment	MSCI Emerging	Franklin FTSE India ETF	Shares	MSCI Turkey	UCITS ETF	1st Real Estate	Ecore U.S. REIT	ETF U.S. Equity	IAU U.S. Equity	Master Card	Google	MSO
Taiwan Semiconductor Manufacturing Company Limited (TSM)	0.000212551	0.00012048	3.5644E-05	0.000335504	1.57570E-05	-4.432E-06	-3.5671E-05	-3.45792E-05	0.000125114	3.30544E-05	3.34843E-07	7.77541E-06	2.63793E-05	0.000205111	0.0001349	7.7321E-07		
United health group inc	0.000102478	0.00034132	3.4737E-05	0.00017132	0.031995E-04	-4.901E-06	-4.295E-05	-2.90391E-05	9.40631E-05	1.6273E-05	3.1960E-05	1.0096E-05	0.10161E-05	0.00017599	0.00024382	-2.3338E-07		
Vanguard Consumer Staples ETF	0.30544E-05	1.4273E-05	0.0002052851	2.28924E-05	0.015586E-07	3.4825E-05	-3.148E-05	-2.7141E-05	1.78973E-05	0.000212581	0.00025864	2.4219E-06	1.3425E-05	3.49585E-05	4.725E-05	4.5516E-07		
SPDR S&P Homebuilders ETF (XHB)	0.000230504	0.00017132	2.28924E-05	0.00039044	1.57573E-05	-4.245E-06	-1.715E-05	-7.93386E-06	0.000120579	2.28924E-05	5.0361E-06	2.58949E-05	0.000044625	0.00016625	0.00016731	-1.5213E-07		
Pimco 25+ Year Zero Coupon U.S. Treasury Index Fund (ZZO)	1.55709E-05	0.01919E-05	8.01558E-07	1.75775E-05	0.000258564	3.2623E-07	-3.311E-05	-3.16267E-05	5.76686E-06	0.010558E-07	3.85418E-07	4.4851E-07	-3.397E-06	2.08798E-05	1.314E-05	-1.482E-06		
Japan 5-10 years investment grade equity ETF	-4.3196E-06	-4.3096E-06	3.38247E-07	-4.2545E-06	3.25232E-07	3.6236E-08	2.8359E-06	-2.4221E-06	1.20099E-06	3.38247E-07	3.37133E-05	2.74565E-07	-2.9375E-06	1.6731E-06	1.0378E-05	3.7335E-05		
iShares Core MSCI Emerging Markets ETF	-3.56693E-05	-4.295E-05	-3.1481E-05	-1.715E-05	-3.3127E-05	2.8539E-06	0.00019307	0.00014836	-1.8855E-05	-3.1481E-05	-3.1247E-05	6.68852E-06	4.42186E-06	-3.5198E-05	-4.301E-05	5.1948E-07		
Franklin FTSE India ETF	-3.45792E-05	-2.904E-05	-2.7141E-05	-7.934E-06	-3.1627E-05	4.4211E-06	0.00014836	0.000204272	-1.71093E-05	-2.7141E-05	-2.9558E-05	4.22953E-06	3.07943E-06	-1.8621E-05	-3.274E-05	5.2726E-07		
Franklin FTSE Turkey UCITS ETF	0.000125114	9.40866E-05	1.78973E-05	0.000120579	5.76686E-06	1.201E-06	-1.887E-05	-1.71093E-05	0.00052551	1.78973E-05	1.6925E-05	-7.665E-06	1.98362E-05	0.00012334	0.0001283	-1.4514E-08		
Vanguard Real Estate ES Equity	0.30544E-05	1.4273E-05	0.0002052851	2.28924E-05	0.015586E-07	3.4825E-05	-3.148E-05	-2.7141E-05	1.78973E-05	0.000212581	0.00025864	2.4219E-06	1.3425E-05	3.49585E-05	4.725E-05	4.5516E-07		
iShares Core U.S. REIT ETF Class	3.34943E-05	3.1960E-05	0.00025864	2.19053E-05	3.85418E-07	3.3771E-05	-3.325E-05	-2.9581E-05	1.6925E-05	0.00025864	0.00026647	2.8641E-06	-1.1515E-05	3.3835E-05	4.831E-05	1.8358E-07		
IEF U.S. Equity	-7.77363E-06	-1.0077E-06	-2.4219E-06	5.0361E-06	-4.4851E-07	2.7465E-07	6.6886E-06	4.23939E-06	-7.66497E-06	-2.4219E-06	-2.8641E-06	3.2612E-05	1.8423E-05	-1.0455E-05	-0.056E-06	3.4746E-07		
IAU U.S. Equity	2.63793E-05	0.1016E-05	-1.3425E-05	2.58949E-05	-3.397E-06	2.9311E-06	4.4219E-06	3.07943E-06	1.98362E-05	-1.3425E-05	-1.1515E-05	1.8423E-05	8.83664E-05	1.3215E-05	1.577E-05	1.1078E-06		
Master Card	0.000205111	0.00017599	3.49585E-05	0.00024625	2.09788E-05	-2.611E-06	-3.52E-05	-1.86208E-05	0.00012334	3.49585E-05	3.3835E-05	-1.0455E-05	1.3215E-05	0.00019367	0.00012978	-1.2373E-06		
Google	0.000234876	0.00014521	4.74747E-05	0.000216338	1.3141E-05	1.6314E-08	-4.301E-05	-3.27441E-05	0.000128314	4.74747E-05	4.83116E-05	-3.0562E-06	1.57653E-05	0.000129791	0.00040557	-7.5735E-07		
MSO	-7.74302E-07	-2.3346E-07	4.51611E-07	-1.5213E-07	-1.482E-06	3.7335E-07	5.1948E-07	4.35215E-07	-4.15411E-08	4.51611E-07	1.83579E-07	3.47611E-07	1.10781E-06	-1.2373E-06	-7.573E-07	8.2782E-06		
Expected return		16.28%																
Standard Deviation		10%																
Risk Free Rate		4.36%																
Total Weight		1.00																
Sharpe Ratio		1.2428992																

Exhibit Last - Back Testing

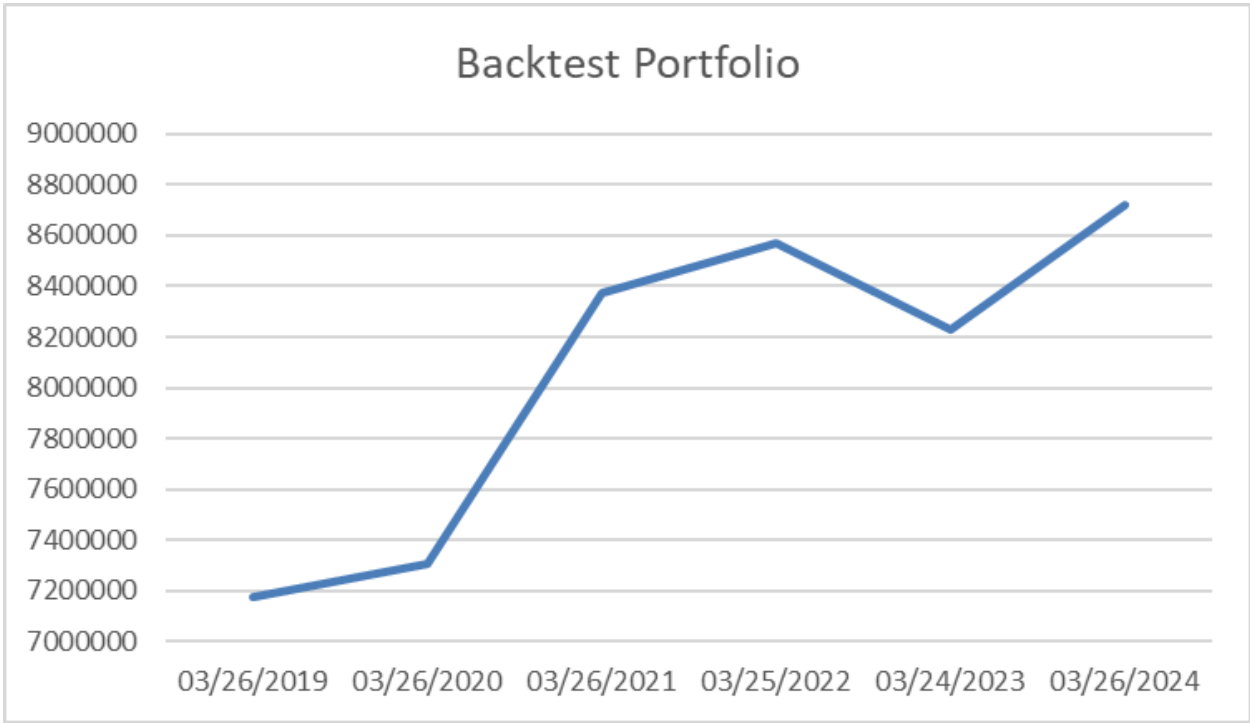


Exhibit 3 - DCF Analysis

(A) Taiwan Semiconductor Manufacturing Company Limited (TSM)

Taiwan Semiconductor (TSM)	2020	2021	2022	2023	2024E	2025E	2026E	2027E
Total Revenue	\$ 1,339,255	\$1,587,415	\$2,263,891	\$2,161,736	\$ 2,730,978	\$ 3,058,695	\$ 3,425,739	\$ 3,836,827
Growth %, YoY	25%	19%	43%	-5%	26%	12%	12%	12%
EBITDA	\$ 711,130	\$ 819,537	\$1,348,355	\$1,175,111	\$ 1,430,951	\$ 1,602,665	\$ 1,794,984	\$ 2,010,382
Margin %	53%	52%	60%	54%	52%	52%	52%	52%
Net Income	\$ 510,170	\$ 603,037	\$1,018,026	\$ 833,674	\$ 1,009,878	\$ 1,131,063	\$ 1,266,791	\$ 1,418,805
Margin %	38%	38%	45%	39%	37%	37%	37%	37%
Shares Outstanding	25,930	25,930	25,929	25,929	25,929	25,929	25,929	25,929
EPS	\$ 19.67	\$ 23.26	\$ 39.26	\$ 32.15	\$ 38.95	\$ 43.62	\$ 48.86	\$ 54.72

FCFF	2020	2021	2022	2023	2024E	2025E	2026E	2027E
Cash from Operations	\$ 834,147	\$1,116,817	\$1,619,481	\$1,284,017	\$ 1,340,332	\$ 1,009,369	\$ 1,130,494	\$ 1,266,153
Capex	\$ 511,932	\$ 840,396	\$1,082,672	\$ 949,880	\$ 828,666	\$ 321,163	\$ 359,703	\$ 402,867
Free Cash Flow	\$ 322,215	\$ 276,421	\$ 536,809	\$ 334,137	\$ 511,666	\$ 688,206	\$ 770,791	\$ 863,286
Interest Expense	\$ 2,082	\$ 5,414	\$ 11,750	\$ 11,999	\$ 11,999	\$ 11,999	\$ 11,999	\$ 11,999
Effective Tax Rate	11.39%	9.96%	11.12%	14.44%	13.91%	14.18%	14.18%	14.18%
Free Cash Flow to Firm	\$ 324,060	\$ 281,296	\$ 547,252	\$ 344,404	\$ 521,996	\$ 698,505	\$ 781,090	\$ 873,585
PV of FCFF	\$ 324,060	\$ 281,296	\$ 547,252	\$ 344,404	\$ 430,335	\$ 474,731	\$ 437,647	\$ 403,517

Valuation Multiples	2020	2021	2022	2023	2024E	2025E	2026E	2027E
Price at year end	530.00	615.00	448.50	593.00	783.00			
P/E	27x	26x	11x	18x	20x	25x	27x	29x

Valuation	Total	Future Expectation Assumptions						
NPV of FCF	\$ 3,243,236						Revenue Growth	12%
Terminal Earnings	\$ 1,418,805						Discount Rate	21%
Terminal P/E	29x							
Terminal Value	\$ 41,145,358							
PV of Terminal Value	\$ 19,005,428							

Enterprise Value	\$ 22,248,664							
Less : Debt	\$ 968,040							
Less : Preferred & Other	\$ 29,984							
Add : Cash	\$ 1,922,656							
Market Capitalization / Total	\$ 23,173,296							
Diluted Shares Outstanding	25,929							
Target Price	\$ 893.71							
Current Price	\$ 783.00							
Upside Potential	14.14%							

(B) UnitedHealth Group Inc. (UNH)

United Health (UNH)	2020	2021	2022	2023	2024E	2025E	2026E	2027E
Total Revenue	\$ 257,141	\$ 287,597	\$ 324,162	\$ 371,622	\$ 399,414	\$ 419,385	\$ 440,354	\$ 462,372
Growth %, YoY	6%	12%	13%	15%	7%	5%	5%	5%
EBITDA	\$ 26,396	\$ 28,273	\$ 33,135	\$ 37,730	\$ 36,202	\$ 38,012	\$ 39,913	\$ 41,908
Margin %	10%	10%	10%	10%	9%	9%	9%	9%
Net Income	\$ 15,403	\$ 17,285	\$ 20,120	\$ 22,381	\$ 22,899	\$ 24,044	\$ 25,246	\$ 26,508
Margin %	6%	6%	6%	6%	6%	6%	6%	6%
Shares Outstanding	949	943	937	928	922	922	922	922
EPS	\$ 16.23	\$ 18.33	\$ 21.47	\$ 24.12	\$ 24.84	\$ 26.08	\$ 27.38	\$ 28.75

FCFF	2020	2021	2022	2023	2024E	2025E	2026E	2027E
Cash from Operations	\$ 22,174	\$ 22,343	\$ 26,206	\$ 29,068	\$ 13,885	\$ 16,775	\$ 17,614	\$ 18,495
Capex	\$ 2,051	\$ 2,454	\$ 2,802	\$ 3,386	\$ 3,369	\$ 4,194	\$ 4,404	\$ 4,624
Free Cash Flow	\$ 20,123	\$ 19,889	\$ 23,404	\$ 25,682	\$ 10,516	\$ 12,582	\$ 13,211	\$ 13,871
Interest Expense	\$ 1,663	\$ 1,660	\$ 2,092	\$ 3,246	\$ 3,246	\$ 3,246	\$ 3,246	\$ 3,246
Effective Tax Rate	11.39%	9.96%	11.12%	14.44%	13.91%	14.18%	14.18%	14.18%
Free Cash Flow to Firm	\$ 21,597	\$ 21,384	\$ 25,263	\$ 28,459	\$ 13,310	\$ 15,367	\$ 15,996	\$ 16,657
PV of FCFF	\$ 21,597	\$ 21,384	\$ 25,263	\$ 28,459	\$ 12,451	\$ 13,448	\$ 13,095	\$ 12,755

Valuation Multiples	2020	2021	2022	2023	2024E	2025E	2026E	2027E
Price at year end	350.68	502.14	530.18	526.47	487.30			
P/E	22x	27x	25x	22x	20x	21x	22x	23x

Valuation	Total	Future Expectation Assumptions						
NPV of FCF	\$ 148,452						Revenue Gr	5%
Terminal Earnings	\$ 26,508						Discount R	7%
Terminal P/E	23x							
Terminal Value	\$ 609,694							
PV of Terminal Value	\$ 466,876							

Enterprise Value	\$ 615,327
Less : Debt	\$ 73,637
Less : Preferred & Other	\$ 4,548
Add : Cash	\$ 32,710
Market Capitalization / Total	\$ 569,852
Diluted Shares Outstanding	922
Target Price	\$ 618.06
Current Price	\$ 487.30
Upside Potential	26.83%

(C) Master Card

Valuation Multiples	2020	2021	2022	2023	2024E	2025E	2026E	2027E
Price at year end	356.94	359.32	347.73	426.51	462.50			
P/E	55x	43x	33x	34x	32x	33x	34x	35x
Valuation	Total						Future Expectation Assumptions	
NPV of FCF	\$ 83,883						Revenue Growth	7%
Terminal Earnings	\$ 16,402						Discount Rate	10%
Terminal P/E	35x							
Terminal Value	\$ 574,074							
PV of Terminal Value	\$ 396,407							
Enterprise Value	\$ 480,290							
Less : Debt	\$ 16,456							
Less : Preferred & Other	\$ 68							
Add : Cash	\$ 9,180							
Market Capitalization / Total	\$ 472,946							
Diluted Shares Outstanding	936							
Target Price	\$ 505.28							
Current Price	\$ 462.50							
Upside Potential	9.25%							

Valuation Multiples	2020	2021	2022	2023	2024E	2025E	2026E	2027E
Price at year end	356.94	359.32	347.73	426.51	462.50			
P/E	55x	43x	33x	34x	32x	33x	34x	35x
Valuation	Total						Future Expectation Assumptions	
NPV of FCF	\$ 83,883						Revenue Growth	7%
Terminal Earnings	\$ 16,402						Discount Rate	10%
Terminal P/E	35x							
Terminal Value	\$ 574,074							
PV of Terminal Value	\$ 396,407							
Enterprise Value	\$ 480,290							
Less : Debt	\$ 16,456							
Less : Preferred & Other	\$ 68							
Add : Cash	\$ 9,180							
Market Capitalization / Total	\$ 472,946							
Diluted Shares Outstanding	936							
Target Price	\$ 505.28							
Current Price	\$ 462.50							
Upside Potential	9.25%							

(Performance) Portfolio vs Benchmark



Sensitivity Analysis

	BV	EV	Weights	Invested BV	Invested EV	ROR	Change in ROR	Change in Price	Actual Price	Change in Price	Actual Price
Security	25-Mar-19	26-Mar-24					1%	-1%			
Googl	\$ 59.86	\$ 150.07	9.25%	\$ 5.54	\$ 13.88	151%	152%	150%	0.2105842	\$ 14.09	0.2078080 \$ 13.67
Master Card	\$ 230.42	\$ 476.80	7.08%	\$ 16.32	\$ 33.77	107%	108%	106%	0.3645035	\$ 34.14	0.3577489 \$ 33.42
TSM	\$ 34.95	\$ 140.23	10%	\$ 3.50	\$ 14.02	301%	302%	300%	0.4237622	\$ 14.45	0.4209576 \$ 13.60
UNH	\$ 229.06	\$ 485.88	5.67%	\$ 12.98	\$ 27.53	112%	113%	111%	0.3114618	\$ 27.84	0.3059551 \$ 27.23
Home Builders	\$ 36.49	\$ 109.54	10.00%	\$ 3.65	\$ 10.95	200%	201%	199%	0.2204216	\$ 11.17	0.2182308 \$ 10.74
Consumer Staples	\$ 72.52	\$ 84.05	8.00%	\$ 5.80	\$ 6.72	16%	17%	15%	0.0113629	\$ 6.74	0.0100181 \$ 6.71
			Increase		Decrease						
			1.44%		-1.42%						
	\$ 72,135,306.45	\$ 1.54		\$ (71,135,306.45)	-1.52						
	5,000,000,000	\$ 106.89		5,000,000,000	\$ 106.89						

iShares 5-10 Year investment grade equity ETF

change in yield	new yield	Exp.price change%
0.50%	6.11%	-0.030384
-0.50%	5.11%	0.030396
0.25%	5.86%	-0.015194
-0.25%	5.36%	0.015196

iShares 7-10 Year Treasury Bond ETF

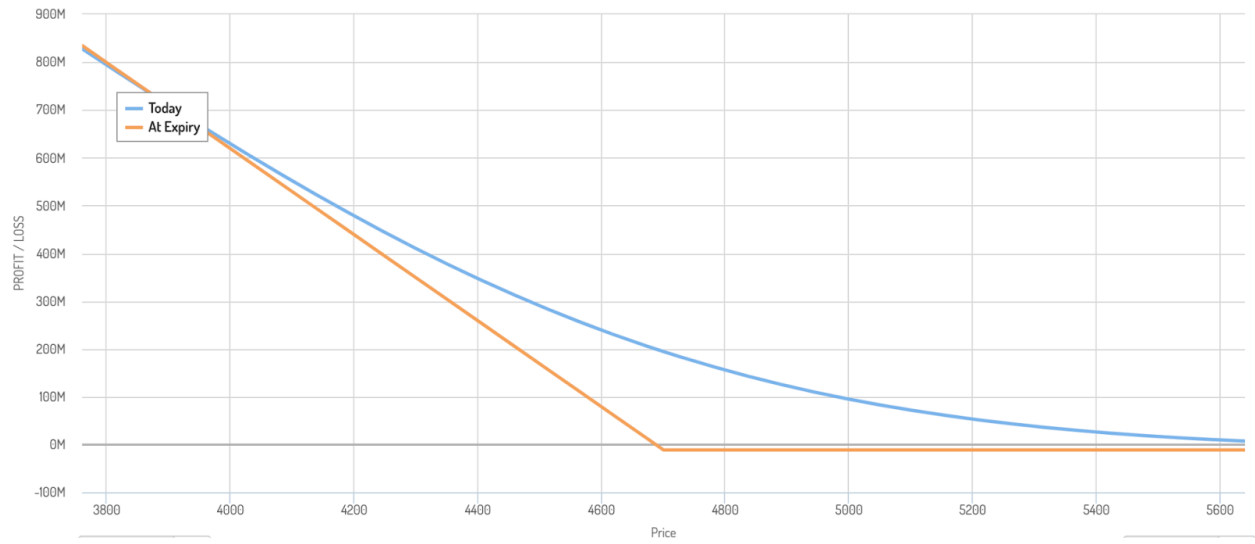
change in yield	new yield	Exp.price change%
0.50%	5.13%	-0.0359525
-0.50%	4.13%	0.0359676
0.25%	4.88%	-0.0179781
-0.25%	4.38%	0.0179819

Invesco Short Term Treasury ETF

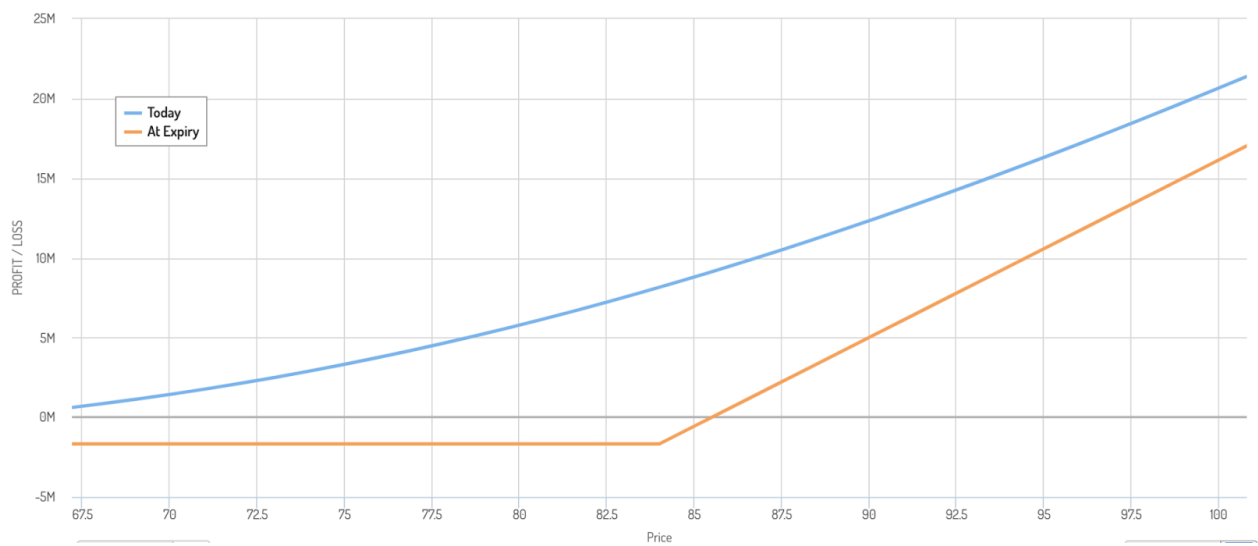
change in yield	new yield	Exp.price change%
0.50%	5.81%	-0.00158996
-0.50%	4.81%	0.00159004
0.25%	5.56%	-0.00079499
-0.25%	5.06%	0.00079501

iShares CMBS ETF

change in yield	new yield	Exp.price change%
0.50%	6.35%	-0.0201708
-0.50%	5.35%	0.0201792
0.25%	6.10%	-0.0100865
-0.25%	5.60%	0.0100885



Pay off graph of long out of the money put option on SPX



Pay-off graph of long out of the money call option on USD/INR