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Derivative and Risk management

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1. Investment philosophy and trading strategy

Sun et al. (2021) differentiates between an investing philosophy and an investment strategy. An investing strategy delineates precise measures, such as acquiring companies with low price-to-earnings ratios, whereas a philosophy serves as the fundamental foundation that directs and influences those measures (Li et al. 2016). Put simply, a philosophy refers to one's mindset toward investing and the markets, which guides the decision to purchase companies with low price-to-earnings ratios. A core investing philosophy, in contrast to a strategy, should stay consistent, serving as a fundamental basis for all investment choices. Adhering to this principle allows investors to maintain their concentration on their long-term objectives, despite potential changes in methods over time (Ajinkya and Jain, 1989).

Due to the limited trading period and my strong desire for financial gain, I position myself as a growth investor. Growth investing is an investment strategy that targets firms with significant potential for development, with the goal of profiting from the increase in the stock's value as the company develops and produces larger revenues. To be a growth investor, it is essential to have confidence in the ability to assess the worth of future growth more accurately than the market. This belief is crucial for making profitable investments by accurately pricing those growth assets. Consequently, the fundamental concepts to consider while selecting stocks are

- Emphasize Growth Opportunities: Growth investors give priority to a company's potential for future growth rather than its present value.
- Earnings and revenue growth are key factors that growth investors seek in firms. They prioritize companies that demonstrate a continuous and above-average increase in both earnings and sales.
- Market Leadership: Growth investors often choose firms that possess a robust competitive position within their respective sector.

The benefits of growth investment include the possibility of substantial profits and the opportunity to leverage new enterprises. Yet, this philosophy has some drawbacks including the elevated risk linked to growth companies and the possibility of overvaluation.

2. Portfolio construction

My initial portfolio consists of 8 stocks illustrated in the figure below:

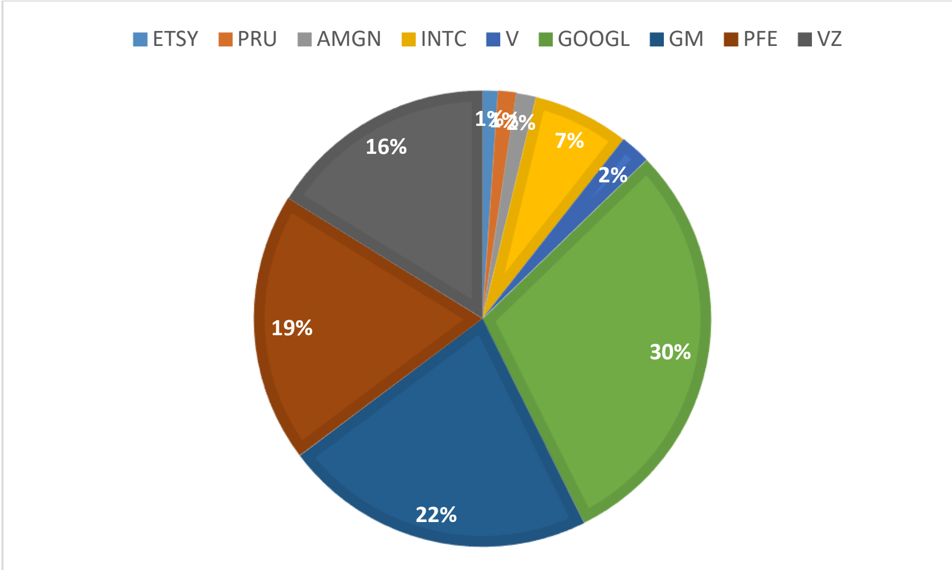

Figure 2-1: Portfolio allocation

The majority of portfolio is allocated to technology sector with presences of GOOGL (Alphabet: 30%), Verizon Communication (VZ: 16%) and INTC (Intel Company); GM (General Motor: 22%) is the only stock from industrial sector; while the PFE (Pfizer: 19%) is also the only representative of the Pharmacy sector. Other stock such as ETSY (Etsy: 1.06%), PRU (Prudential: 1.28%), and AMGN (Amgen Inc: 1.42%) made up the leftover of around 5% of the portfolio. The four largest contributors are discussed as follow:

2.1.GOOGLE (Alphabet Inc.)

Google had a tumultuous and challenging 2023. In the first quarter of 2023, Google reported a 3% increase in revenue to $69.8 billion thanks to the recovery of advertising and cloud computing after the Covid-19 pandemic (Alphabet 2023). In the second quarter of 2023, Google continued to grow strongly with revenue reaching 52.9 billion USD, up 7% over the same period last year. Google also announced a $70 billion stock buyback plan to increase shareholder value. Google's stock price jumped 4% in after-hours trading after releasing its second quarter business report (Alphabet 2023b).

GOOG stock has a 52-week range of $83.34 to $129.04, showing great volatility for the stock over the past year. GOOG stock has a P/E ratio of 27.80, higher than the tech industry average of 25. GOOG stock has an analyst 12-month target of $130.92, up 6.66% from its current price.

Google stock has grown steadily over the years, thanks to the company's ability to innovate, diversify and expand its markets. Some factors that could make Google stock rise sharply in the future are:

- Increased demand for cloud computing services, especially in the context of the Covid-19 pandemic when many businesses and individuals switched to working and studying online. Google Cloud is one of the world's largest cloud computing providers, with revenue increasing 46% in 2020, reaching $13 billion. Google Cloud has also signed many large contracts with customers such as AT&T, Deutsche Bank, Ford and Twitter (Alphabet 2023c).
- The development of artificial intelligence (AI) and machine learning (ML), fields in which Google is one of the leaders. Google has applied Al and ML to many of its products and services.
- The rise of online advertising, Google's main source of revenue. Online advertising was negatively affected by the Covid-19 pandemic in 2022, as many businesses cut back on advertising spending. However, online advertising is forecast to recover strongly in 2021 and continue to grow in the following years.

2.2. GM (General Motors)

GM's recent third-quarter earnings report reflected some mixed results. Revenue increased slightly 5.4% year-over-year to $44.1 billion, while adjusted earnings before interest and taxes (EBIT) decreased 16.9% to $3.56 billion (General Motor 2023). Revenue was primarily driven by the performance of its traditional internal combustion engine (ICE) business. However, in the future, revenue from internal combustion engine vehicles will become less important in GM's business model, as the company focuses on developing electric vehicles and mobility technology.

GM said strong consumer demand kept vehicle prices stable while maintaining incentives for customers. GM expects its profit for the whole year to increase by 52% to 2.6 billion USD, while revenue will reach 44.7 billion USD, an increase of 25% (General Motor 2023b). In the fourth quarter, GM's average vehicle selling price was $52,248, up about 4% year-on-year. GM adjusted its business forecast for the full year, raising annual net income to 9.3-10 7 billion USD compared to the previously estimated 8.4-9.9 billion USD. GM also plans to increase vehicle production to about 100,000 EVs in the second half of 2023, double the level of the first half of the year (General Motor 2024).

The transition to electric vehicles also faces some challenges. Although GM's electric vehicle revenue increased 28% to $32,000, its subsidiary Cruise, which specializes in self-driving vehicles, brought in no revenue in the quarter. In fact, Cruise spent up to 700 million USD on research and testing activities (General Motor 2024).

In late October, Cruise temporarily suspended self-driving vehicle operations in the US after California regulators suspended licensing following a series of accidents. The situation calls into question Cruise's viability and could lead to higher costs as GM must work closely with regulators to restore its license to operate.

With a forward price-to-earnings (P/E) multiple of just 4.3x, GM stock is cheaply valued compared to the S&P 500 average of 24x and compared to Tesla at 60x earnings. This low price should make the stock attractive and is the main reason I have 22% of my portfolio invested in this stock.

2.3. PFE (Pfizer)

In the second quarter of 2023, Pfizer recorded an 86% increase in revenue compared to the same period last year, reaching 18.98 billion USD, much higher than experts' forecasts. The company's net profit also increased 59%, reaching 5.56 billion USD, equivalent to EPS of 0.99 USD (Pfizer 2023). The main driver driving Pfizer's positive business results is increased demand for COVID-19 vaccines, causing revenue from this vaccine in the second quarter to reach 7.84 billion USD. In the third quarter of 2023, Pfizer reported historic highest revenue of $24.1 billion, up 16% year over year. The company's net profit reached 5.6 billion USD, an increase of 92% compared to the third quarter of 2022.

COVID-19 vaccine is Pfizer's core business, with revenue reaching 7.8 billion USD in the third quarter of 2023. Pfizer forecasts that 2023 revenue from the COVID-19 vaccine will be 36 billion USD, higher than the previous forecast of 33.5 billion USD (Pfizer 2024). In addition to the COVID-19 vaccine, Pfizer also has many other products with rapid revenue growth such as Eliquis (up 23%), Vyndaqel/Vyndamax (up 77%), Inlyta (up 28%) and Xeljanz (up 28%). 18%) (Pfizer 2023b). In the coming time, Pfizer is expected to maintain growth momentum thanks to expanding its COVID-19 vaccine market share to new customer groups, such as children and pregnant women.

With these good prospects, Pfizer shares are of interest to many investors. In the past 6 months, Pfizer stock price has increased nearly 10%, from 39.68 USD on May 3, 2023 to 43.60 USD in early October. Pfizer shares also have an attractive dividend yield, about 4.93%. , higher than the pharmaceutical industry average of 2.77%. According to experts, the Pfizer stock price target in the next 12 months is 44.10 USD, an increase of 1.15% compared to the current level.

Technically, Pfizer stock is on a steady growth trend from the beginning of 2023. The stock has increased 23.5% as of October 14, 2023, far outperforming the S&P 500 index (up 17.2%) and the Nasdaq index (up 15.8%). Pfizer shares have strong support in the 31-32 USD area and resistance in the 44-45 USD area. If the stock breaks through this resistance, it could move to new highs in the near term.

2.4. VZ (Verizon Communication)

Since April 2023, Verizon Communications (VZ) shares have fallen 24% following the market sell-off due to the global economic downturn, while the S&P 500 has fallen about 19%. However, the stock price does not accurately reflect the business situation of this enterprise. During the past four years, Verizon's revenue has increased steadily every year, along with stable profits. In 2022, this segment has earned more than 136.8 billion USD, with a net profit of more than 21.2 billion USD (VZ 2023).

Additionally, if you look at how often the company pays dividends, you'll know that it's an income stock, as the company has paid dividends regularly four times per year and has increased them. Continuous dividends over the past 10 years. It can be said that Verizon has been affected by the general market situation, and if we look back, Verizon is in an extremely attractive price range, when the price is at the bottom, but the group's dividend income is still unchanged.

Verizon is ramping up its development of 5G fixed broadband services for homes and businesses. Verizon claims that its fixed broadband service will reach 30 million households by the end of 2023, a number that is similar to the US telecommunications industry growth forecast from CNBC.

Verizon hopes its 5G services will cover 50% of the US market by 2024 (VZ 2023b). In addition, the company is also investing in 5G-based "cloud computing" sites, through a partnership. Collaborating with two software technology giants Amazon Web Services and IBM.

5G technology is forecast to completely change the world's technology platform in the future, playing an extremely important role in the fields of automation, cloud computing, self-driving cars, drones, and telehealth services. With a strategic vision to dominate the 5G market, Verizon stock will sooner or later experience an explosive price increase within the next 1 to 2 years.

2.5.Beta calculation and CAPM expected rate of return

The table below summarizes all stocks betas based on 52-month prices; which are retrieved from Yahoo Finance:

Table 2-1: Beta of stocks and portfolios

Symbol	Beta	% Holdings
ETSY	2.06	1%
PRU	1.38	1%
AMGN	0.58	1%
INTC	1.00	7%
V	0.95	2%
GOOGL	1.05	30%
GM	1.52	22%
PFE	0.55	19%
VZ	0.38	16%
Portfolio		0.95

At 18 December 223, the 10-year US bill was 3.95%, according to the data of FRED (n.d). The market risk premium, as per the annual survey of Damodaran in association with Stern University (n.d), is 5.48%. Adopting the CAPM model, the expected rate of return from the 14-day trading is:

$$E(r) = 3.95\% + 0.95 * 5.48\% = 9.17\%\ per\ annum; or\ \frac{14}{360} * 9.17\% = 0.35\%\ per\ 14\ days$$

3. Risk identification

3.1. Systematic risk

Forecasts of the S&P 500 index setting a record and a "soft landing" of the US economy in 2024 show that Wall Street is optimistic about 2024. However, many veteran experts warn that the downside risk still exists.

THE RISK OF PERSISTENT INFLATION

The latest US inflation report shows that the consumer price index (CPI) in December 2023 in this country increased by 3.4% over the same period last year (Perkin 2024). This is the highest increase in the past 3 months, after the index recorded an increase of 3.1% in November. This data again disturbs forecasts about the Fed's policy trends and challenges the expectation of lowering interest rates as early as next March.

In case the economy begins to "absorb" the delayed effects of tightening monetary policy, employment in the economy will decrease, unemployment will increase, and consumption will decline. Profit margins will decrease, and stock indexes will go down. Another thing worth noting is that the stock market's profits mainly focused on 7 super-large capitalization stocks last year, so if these codes drop sharply in price, it could drag down the entire market index.

CONSUMPTION DECREASES

According to analysts, Americans have basically used up all of their savings from the Covid-19 pandemic and consumer spending in the economy may have begun a downward trend. Overdue credit card debt in the country is rising, while people save less, and consumer confidence weakens (Katrina and Carly 2024). Even during the holidays, recruitment activity in the retail sector also declines, showing that businesses are becoming cautious.

GEOPOLITICAL RISKS

Conflicts and geopolitical fluctuations around the world are also factors that negatively affect the US economy and stock market. The Russia-Ukraine conflict as well as the Israel-Hamas war and recent attacks in the Red Sea have disrupted global supply chains and shipping activities. Tensions are also escalating in Asia regarding China-Taiwan and US-China issues. America's military response to these conflicts could put enormous pressure on the world's largest economy.

Besides, disruptions in the Red Sea also threaten to bring global inflation back to high levels this year. Because the waters around the Suez Canal are one of the most important maritime routes for international trade activities. In particular, disruptions in energy flows could open a new chapter in the inflation story.

3.2. Unsystematic risk

The author performs historical simulation on 1,256 scenarios. The following figure depicts the histogram of portfolio's gains and losses during the simulations.

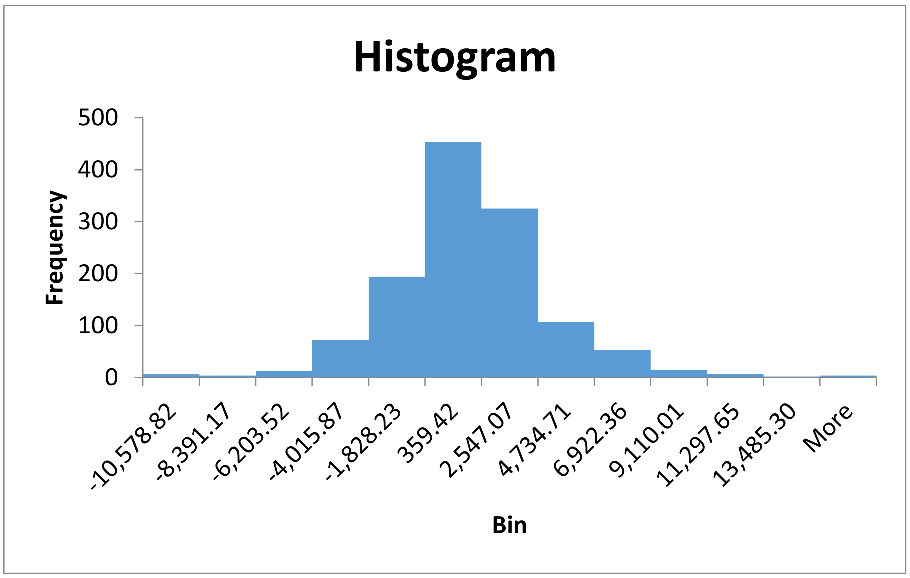

Figure 3-1: Histogram of portfolio's gains/losses

The table below provides a summary of the expected value at risk (VAR) of the portfolio at various levels of risk:

K	Percentile	VAR
0.99	99%	(8,183.53)
0.95	95%	(4,684.67)
0.9	90%	(3,568.29)
0.8	80%	(2,153.33)

Thus, at 99% confidence level, the portfolio VAR is $8,183.53.

4. Hedging

4.1. Portfolio

To hedge the possible downturn of the market, the author decided to short the E-mini S&P 500 future contract. The rationale is simple, if there is a downside in the portfolio, shorting E-mini contract would bring a gain to balance that loss.

$$N = \beta * \frac{V_P}{V_{S\&P\ mini}} = 0.98 * \frac{240{,}797.61}{20 * 4{,}719.55} = 2.37 \approx 3 contracts$$

Thus, the author should short at least 3 contracts to neutralize the risk of market downturns.

4.2. Individual stock

The primary concern within the portfolio is in PFE due to its heavy reliance on income generated by the Covid-19 vaccine. As a result, I have obtained a significant quantity of 16 put options on PFE stocks, demonstrating my desire to profit from an increase in their worth. On December 18th, a put option with a strike price of 28 was being sold for a price of $0.47. Through this action, the author assures a minimum profit of $759.52.

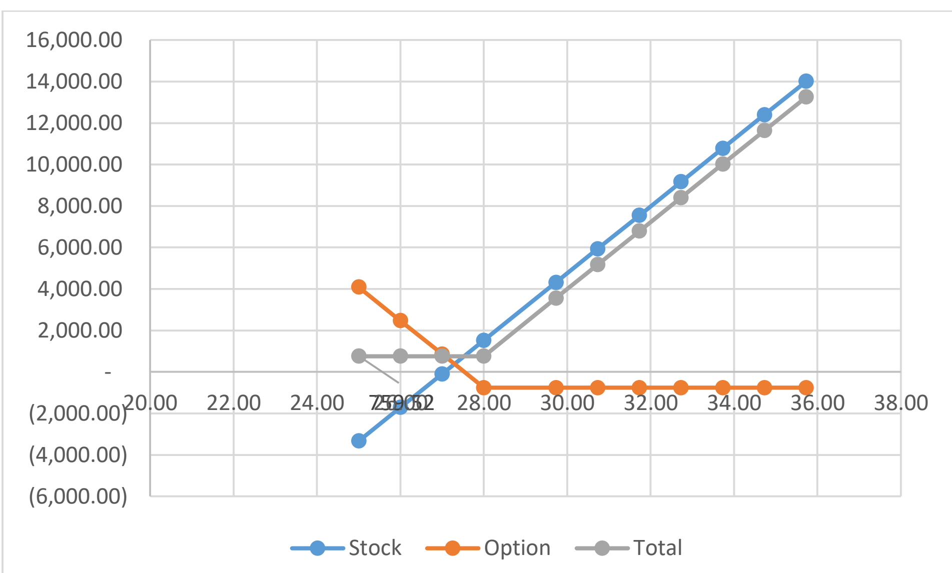

Figure 4-1: Pay-off diagram of hedging with option

If the spot price of PFE is lower than the strike price at the 2nd January 2024, the author will execute the option and earn profit on that. By contrast, if PFE price increases above the strike price; the author would let the option to be expired.

5. Reflection on trading process

5.1. Risk preference

The author thinks of herself as a risk-lover person. A risk lover is an individual who exhibits a greater willingness to assume risks while making investments, with the aim of achieving better returns. When giving investment decisions, the author fully acknowledged of unsystematic risks faced by each stock. For example, GOOGL is at the risk of failing at the court; GM's new electric car is a mere prototype; and the growth of PFE is highly dependent on its Covid-19 vaccine. Nonetheless, it is a bet; that if these companies overcame such difficulties, the reward will be significant.

5.2. The effectiveness of CAPM

At the end of the trading period, the portfolio returns a profit of $5,900.75 or equivalently to 2.45% in rate. This performance is far better than the expected return proposed by the CAPM (0.35%). Hence, it might reveal the fact that CAPM is of deficiency. An inherent limitation of CAPM is the challenge in accurately ascertaining the beta coefficient. Investors must determine a beta value that accurately represents the investment being invested in for this return calculation approach (Abhakorn, Smith and Wickens, 2013; Kwon, 2019; Mishra and O'Brien, 2019). Determining a precise beta value might pose challenges and require a significant amount of effort.

5.3. Impacts of the hedges

In general, hedging does indeed improve portfolio performance. The spot price of the index is 4,783.35 on 2nd January 2024, thereby adding: $20 * (4{,}783.35 - 4{,}719.55) = \$1{,}276.00$ to the portfolio returns and drives the rate of return from 2.45% to 2.98%.

Speaking of the individual stock hedge, the price of PFE stock ended January 2 at $29.73, which is higher than the strike price. Thus, the author lets the option expire and receives:$1{,}616 * (29.73 - 27.06) - 0.47 * 1{,}161 = \$3{,}552.20$. To compared with the return of not using put option, which is $4,536.36, this figure is lower because PFE stock price increases.

As such, the portfolio hedge is a preferable option.

5.4. Could AI replace human investors?

The incorporation of AI-driven software into the hedge fund management sector has sparked conjecture on the future possibility of this technology supplanting human managers. AI-powered software has the potential to surpass human managers in making intelligent investment choices, effectively managing risks, and automating mundane chores, according to some experts (Hyun Baek and Kim, 2023). It is believed that this will result in a transition towards complete automation of hedge fund management, where AI-driven software would assume several tasks presently performed by human managers. The possible consequences of this change are substantial. For the hedge fund business, this might result in enhanced operational effectiveness, reduced expenses, and elevated returns for investors (Zhang *et al.*, 2023). Nevertheless, it is crucial to take into account certain aspects of human discernment that cannot be replicated by AI-powered software. Human managers possess a distinct viewpoint, emotions, and intuition that are essential for decision-making, particularly in intricate and unpredictable circumstances (Back, Morana and Spann, 2023). In addition, people have the ability to adapt to unforeseen market fluctuations, such as those caused by a pandemic or geopolitical occurrences, which may provide challenges for AI-driven software in terms of accurate prediction.

To summarize, AI-driven software may aid human managers in hedge fund management, but it will not completely replace them.

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