FINC 5001

Foundation in Finance

Major Assignment

Semester 2, 2023

Group Number: 132

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1.Stocks Details

Q1: Company Overview

Eli Lilly and Company, often referred to as Lilly, is a global pharmaceutical company headquartered in Indianapolis, Indiana, United States. Lilly manufactures and markets a variety of prescription drugs primarily used to treat diabetes, cancer, heart disease, neuropsychiatric disorders and other conditions (Eli Lilly and Company, 2023).

Q2: Related new articles

The first news story reported on the completion of the acquisition of DICE Therapeutics, an event that is important for Eli Lilly and Company (LLY) to increase Eli Lilly's competitiveness in the highly competitive immunology market (Eli Lilly and Company, 2023). DICE Therapeutics is a biopharmaceutical company establishing novel oral therapeutic candidates with comparable or better efficacy and safety profiles and better portability and compliance than biologics for therapeutic immunology and other therapeutic areas of chronic diseases (DICE Therapeutics, 2023). By acquiring DICE Therapeutics, Eli Lilly can gain a foothold in the immunology market and differentiate itself from other biopharmaceutical companies.

The second news article reported that Eli Lilly and Company (LLY) will be attending the Morgan Stanley 21st Annual Global Healthcare Conference, a major conference was attended by more than 200 healthcare companies from various sub-sectors including biotechnology, pharmaceuticals, medical devices, diagnostics, life science tools, healthcare services and managed care (Eli Lilly and Company, 2023). This event increases Eli Lilly's brand awareness and reputation. By participating in this conference, Eli Lilly was able to highlight its position and achievements in the healthcare industry and enhance its recognition and trust among the public and the industry.

The third news article reported the latest results of Eli Lilly and Company's (LLY) Retevmo® (selpercatinib) in the LIBRETTO-531 study, The LIBRETTO-531 study is testing Retevmo® (selpercatinib) in a Phase 3 trial. It compares selpercatinib with either cabozantinib or vandetanib as the first treatment for advanced RET-mutant medullary thyroid cancer patients (Eli Lilly and Company, 2023). This improves the evidence of the clinical efficacy and safety of Retevmo® (selpercatinib) in thyroid cancer.

Q3: Competing Company

Eli Lilly and Company (LLY) belongs to the Healthcare industry and the Managed Healthcare subsector because it is a company that provides healthcare services, manufactures medical devices or drugs, provides health insurance, or otherwise facilitates the provision of healthcare Managed healthcare is a type of healthcare (The Investopedia Team, 2021).

Merck (MRK) belongs to the Healthcare industry and the Pharmaceuticals subsector because it is a company engaged in the development, manufacture, and marketing of pharmaceuticals. Pharmaceuticals are substances used to diagnose, treat, or prevent disease and to restore, correct, or modify organic functions. Merck is involved in the pharmaceutical industry as it produces various prescription drugs, vaccines, biotherapeutics, animal health products and consumer care products (Merck KGaA, 2023).

Q4: Summary Table

The current price is the last price a stock traded at during the most recent market trading session. The current price (565.22) of Eli Lilly and Company (LLY) is higher than Merck (MRK) means that the market price of Eli Lilly and Company (LLY) is more than MRK (104.5) now.

The 53-week range of Eli Lilly and Company (LLY) as the highest and lowest price a stock has traded at over the last 53 weeks is higher than Merck (MRK) means that the Eli Lilly and Company (LLY)'s stock has traded at a higher maximum and a higher minimum price than the Merck (MRK)'s stock in the past 53 weeks. This could indicate that the Eli Lilly and Company (LLY) has more volatility or more growth potential than the Merck (MRK).

The beta of Merck (MRK) as measurement of how much it changes in price relative to the overall market,it is higher than Eli Lilly and Company (LLY) means less sensitive to the movements of the overall market than the Merck (MRK)'s stock. This could mean that the Eli Lilly and Company (LLY) has less systmetic risk than the Merck (MRK).

Market capitalization is the total value of company's shares. Higher market capitalization of Eli Lilly and Company (LLY) means that higher value of company share than Merck (MRK). Market Cap of Eli Lilly and Company (LLY) is higher than Merck (MRK) means that LLY has larger scale of company.

The price-to-earnings ratio is result of Share Price divided by earning per share of Eli Lilly and Company (LLY), it is higher than Merck (MRK) means that the market is willing to pay more for each dollar of earnings of the Eli Lilly and Company (LLY) than for each dollar of earnings of the Merck. This imply that the Eli Lilly and Company (LLY) has more growth expectations or more profitability than the Merck (MRK).

The earning per share of Eli Lilly and Company (LLY) is higher than Merck (MRK) means that the Eli Lilly and Company (LLY) has more net income per share than the Merck (MRK). This could suggest that the Eli Lilly and Company (LLY) has more efficiency or more profitability than the Merck

(MRK).

The forward dividend and yield are next year's expected dividends per share and dividend yield. Forward dividend and yield of Eli Lilly and Company (LLY) is higher than Merck (MRK) means that the Eli Lilly and Company (LLY) is expected to pay more cash per share and offer a higher return on investment than the Merck (MRK) in the next year. This could indicate that the Eli Lilly and Company (LLY) has more cash flow or more shareholder-friendly policies than the Merck (MRK).

The one-year forecast is the average price analysts predict a stock will reach in the next year. The one-year estimate for Eli Lilly and Company (LLY) is higher than Merck (MRK) means that analysts predict that the Eli Lilly and Company (LLY)'s stock will reach a higher price than the Merck (MRK)'s stock in the next year. This could imply that analysts have more confidence or optimism about the future performance or prospects of the Eli Lilly and Company (LLY) than about those of the Merck (MRK).

Company	Current Price	52-Week Range	Market Cap	Beta	P/E Ratio	EPS	Forward	1-Year Target Est.
Eli Lilly (LLY)	$565.22	$304.88 - $601.84	$522.63B	0.32	76.49	$7.19	$4.52 (0.82%)	$569.28
Merck (MRK)	$104.50	$89.27 - $119.65	$265.171B	0.38	85.66	$1.22	$2.92 (2.81%)	$124.15

Source: author

Q5: P/E Ratio

Comparing Eli Lilly and Company's price-to-earnings ratio (76.49) with the industry's price-to-earnings ratio (43.59) (GuruFocus, 2023), Although a P/E ratio higher than the industry average means the market has higher expectations or confidence in a company's future growth or profitability, The Lily's stock is overvalued. Comparing price-to-earnings ratio of Merck (MRK) (85.66) with the industry's price-to-earnings ratio (43.59), also Merck (MRK) is

overvalued. Even if Eli Lilly and Company (LLY) is valued lower than Merck (MRK), but they are both extremely overvalue at this moment, therefore it is more appropriate to consider selling Eli Lilly and Company (LLY)'s stock.

	Eli Lilly (LLY)	Merck (MRK)	S&P500	Healthcare Industry
P/E Ratio	76.49	85.66	24.75	43.59

Source: author

2.Summary Statistics and Risk Characterisation

Q6. Index Annual Return

The S&P 500 only measures the price changes of the index without taking into account dividends where investor returns come from. Dividends therefore need to be added to capital gains. That's what the S&P 500 Total Return Index does. It captures the index's price appreciation and income generation by assuming all dividends are reinvested in the index (Chen, 2021).

The arithmetic average return is the annual return over a given period. Standard deviation is a measure of how much annual returns deviate from the mean, thereby reflecting the volatility or risk of the index. The S&P 500 Total Return Index has performed slightly better over the past five years than over the past 20 years, with higher average returns. This reflects the strong recovery and growth in the U.S. economy and corporate earnings following the COVID-19 pandemic and recession, as well as stimulus measures and low interest rates that have supported the stock market (Vartika Gupta, 2022). The S&P 500 Total Return Index has also been more volatile over the past five years than it has been over the past 20 years, with a higher standard deviation. This reflects higher uncertainty and risk in the stock market due to factors such as trade wars, geopolitical tensions, inflation concerns and COVID-19 variants. For investors, increased risk means that investors should

be more cautious about market timing. Although the average return in the last five years is higher than that in the past 20 years, such a high-risk, high-return market environment requires a long-term perspective and risk tolerance. Investors should ensure that they have sufficient tolerance for possible losses and can cope with short-term market fluctuations.

S&P 500(TR)	*Open Index*	*Adjusted Close Index*	**annual return**
2003	1,303.17	1622.94	24.54%
2004	1618.05	1799.55	11.22%
2005	1784.96	1887.94	5.77%
2006	1918.96	2186.13	13.92%
2007	2183.92	2306.23	5.60%
2008	2,273.41	1,452.98	-36.09%
2009	1,499.17	1,837.50	22.57%
2010	1,867.06	2,114.29	13.24%
2011	2,115.97	2,158.94	2.03%
2012	2,158.93	2,504.44	16.00%
2013	2,504.45	3,315.59	32.39%
2014	3,311.58	3,769.44	13.83%
2015	3,776.49	3,821.60	1.19%
2016	3,811.74	4,278.66	12.25%
2017	4,303.12	5,212.76	21.14%
2018	5,232.72	4,984.22	-4.75%
2019	4,924.81	6,553.57	33.07%
2020	6,582.55	7,759.35	17.88%
2021	7,777.41	9,986.70	28.41%
2022	10,011.81	8,178.02	-18.32%

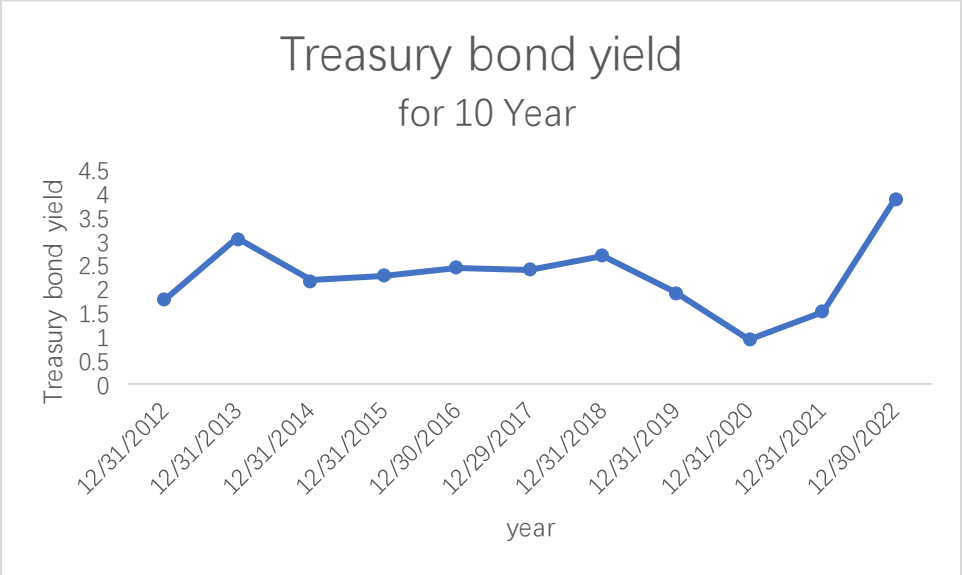
	Arithmetic Mean	**Geometric Mean**	**Standard Deviation**
2018-2022	11.26%	9.40%	22.05%
2013-2022	13.71%	12.51%	16.79%
2003-2022	10.79%	9.38%	16.73%

Source: author

Q7: Government bond rates

This image shows a line graph of 10-year Treasury yields over time from 2012 to 2021. The Treasury yield is the interest rate the U.S. government pays to borrow money over time. Treasury yields are inversely proportional to the price of Treasuries and are commonly used to price and trade fixed-income securities, including Treasuries. The graph shows that yields have been fluctuating over the past 10 years, with Treasury yields decreasing from 2018 until they begin to increase in 2021.The decrease in yields from 2018 to 2021 is clearly due to the economic downturn caused by the COVID-19 pandemic and recession, which has reduced the demand for credit and increased the demand for safe-haven assets, such as Treasuries, as well as implying a willingness on the part of investors to accept lower returns (Tomwfranck, 2020).

The 2021 vaccine rollout and rising inflation expectations lead to an increase in Treasury yields, which increases demand for credit and decreases demand for safe-haven assets such as Treasuries (YunLi, 2019).



Source: author

Q8: Company Annual Return

By calculating the arithmetic mean and geometric mean of the annual returns of Eli Lilly and Company from 2013 to 2022 considering the annual dividends can be seen that the results of the two methods of calculating the mean are not the same, the arithmetic mean of this stock for the last 10 years is 26.52 per cent and the geometric mean for the last 10 years is 24.98 per cent. The standard deviation is 20.66%. Brealey in the book ‘Principles of corporate finance’ describes the difference between the arithmetic mean and the geometric mean (Brealey & Myers, 2022). The arithmetic mean reflects the average return per year, while the geometric mean reflects the average return compounded per year. If the return on a group of investments fluctuates a lot, then the arithmetic mean will be higher than the geometric mean because the fluctuations will reduce the compounding effect.

Eli Lilly and Company's higher arithmetic mean return compared to the S&P 500 Total Return Index indicates that the company's stock has provided investors with better returns than the S&P 500 over the past 10 years (Nyaga, 2023). However, the higher standard deviation (risk) indicates that Eli Lilly and Company stock has been more volatile over the past 10 years compared to the S&P 500 Total Return Index over the same period. It also means that investors investing in the company's shares are exposed to higher levels of market risk.

Eli Lilly and Company (LLY)	Open Price	Close Price	Annual dividend	**annual return**
2013	49.939999	51.17	1.96	6.39%
2014	50.970001	69.64	1.96	40.47%
2015	69.769997	86.20	2	26.42%
2016	83.400002	73.55	2.04	-9.36%
2017	73.940002	84.46	2.08	17.04%
2018	84.459999	114.20	2.25	37.88%
2019	114.790001	131.30	2.58	16.63%
2020	131.770004	167.01	2.96	28.99%
2021	169.020004	277.25	3.4	66.05%
2022	274.410004	365.84	3.92	34.75%

2013-2022	LLY	S&P500(TR)
Arithmatic Mean Annual Return	26.52%	13.71%
Geometric Mean Annual Return	24.98%	12.51%
Standard Deviation	20.66%	16.79%

Q9: Beta

After calculating the covariance of the company's annual returns over the last ten years and the annual returns of the S&P 500 Index (broad market), as well as the standard deviation of the broad market, it is possible to arrive at an annual beta that is different from the monthly beta in the stock quotes, because they are calculated using different time periods. The monthly beta is calculated using monthly returns, while the annual beta is calculated using annual returns. Since monthly returns are more volatile than annual returns, the monthly beta will be more volatile than the annual beta. This means that the monthly beta will be more sensitive to short-term market fluctuations, while the annual beta is more stable and less sensitive to short-term market fluctuations (Hawawini, 1983).

Comparing the beta of companies with no epidemic time period from 2013 to 2019 (-0.55) to the beta of companies affected by epidemics in the previous decade (-0.18), Beta is a measure of a stock's volatility relative to the overall market, and an increase in beta due to an epidemic indicates that the

epidemic has affected the economic conditions and industry trends in which the company operates, resulting in consumer demand for the company's products or services decrease (Brealey & Myers, 2022).

	5Y Monthly	2013-2019	2013-2022
Beta	0.33	-0.56	-0.18

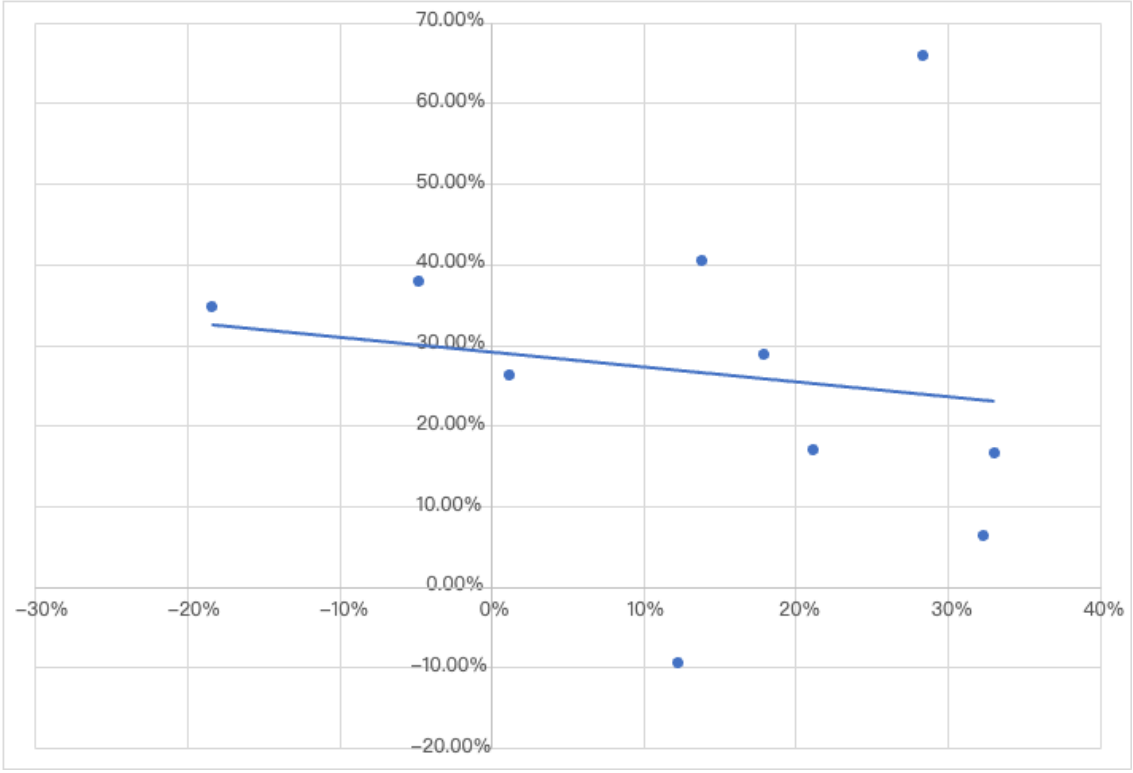
Q10: Compare and Discuss

Based on the table below, the relationship between the annual index return and annual stock return for the last ten years can be seen in the graph, it can be seen that the regression line of the scatter plot shows the trend relationship between the stock price and the market index before the negative correlation and the slope indicates the systematic risk of the stock (beta), Beta is a measure of the stock's volatility relative to the overall market volatility, which means that the market valuation and the market index move inversely, while the absolute value of beta (0.18) determines the sensitivity of the company's share price to the market index.

The standard deviation of Eli Lilly and Company (Eli Lilly) stock for the period 2013 to 2022 is 20.66%, while the standard deviation of the market index is 16.79%. It is show that the company (20.66%) higher than Market Index (16.79%).

	Index Annual Return	*Stock Annual Return*
2013	32%	6.39%
2014	14%	40.47%
2015	1%	26.42%
2016	12%	-9.36%
2017	21%	17.04%

2018	-5%	37.88%
2019	33%	16.63%
2020	18%	28.99%
2021	28%	66.05%
2022	-18%	34.75%



Source: author

Q11: CAPM

The Capital Asset Pricing Model (CAPM) is a financial model that calculates the expected return on an asset or investment based on its risk. Calculating the model considers the risk-free rate, the market's expected rate of return, and the asset's correlation or sensitivity (beta) to the market (Brealey &

Myers, 2022). For the risk-free interest rate, data for the past 1 year, 5 years, 10 years, 20 years, and 30 years can be obtained through the yield of fixed income securities such as Treasury bonds. Secondly, the correlation or sensitivity (beta) between the asset and the market can be calculated through the annual beta calculated previously, because the result calculated by the CAPM model is the annual required rate of return, and the time base corresponds to the annual return of the market and company stocks in the past 10 years. The annual beta is calculated from the covariance and the standard deviation of the market. The market expected return can be calculated using the index returns over the past ten years corresponding to the annual beta calculated using the data over the past ten years. Braley stated in his book "Principles of Corporate Finance" that the arithmetic mean reflects the average return per year, and the geometric mean reflects the average return calculated with compound interest every year (Brealey & Myers, 2022). So, arithmetic means is more suitable for predicting future data. The annual required rate of return is calculated by adding the arithmetic means of the market's expected return and all the previous elements.

Date					
10/10/2023	beta	10 year			
	q9	q6			
	-0.183065204	13.71%			
	1 Yr	**5 Yr**	**10 Yr**	**20 Yr**	**30 Yr**
Rf	5.37%	4.62%	4.66%	5.03%	4.85%
E(Ri)	3.84%	2.96%	3.00%	3.44%	3.23%

3.Growth Rates and Valuation

Q12. Estimate the growth rate of company.

By looking at the dividend growth rate for each year from 2013 to 2022, the dividend growth rate is steadily increasing each year especially from 2019 to 2022. This is a good indication that the company performed well during the COVID-19 pandemic and recession as it maintained its operations and supply chain, launched new products, and developed therapeutics and diagnostics for COVID-19. This increased the company's revenues and earnings, as well as the company's confidence and commitment to return capital to shareholders (Eli Lilly and Company, 2021). Based on the arithmetic average of the growth rate of dividends over the last ten years it is possible to predict a future trend of continued growth.

Net income is the amount of money a company earns after all expenses, taxes, and interest are deducted. Net Income Growth Rate is the percentage change in Net Income from one period to another, and it reflects how much a company's earnings have increased over time. net income growth rate has fluctuated from 2013 to 2022, with growth in some years and negative growth in others. Based on the negative arithmetic average of the net income growth rate for the last ten years, it is possible to predict a downward trend in the future.

The plowback ratio, also known as the retention rate, indicates how much of the company's earned profit is not distributed as dividends. Return on equity means how much money the shareholders can earn each year for every dollar invested, and this rate of return measures the profitability of the company (Brealey & Myers, 2022). By looking at the retention rate and return on equity from 2013 to 2022 it can be seen that the return on equity in 2017 is the only negative number, which means that the profitability of the company received a

big hit in that year, which means that the shareholders are generating a loss or a negative net income for every dollar of equity. This also resulted in a negative dividend growth rate for 2017. The formula dividend growth rate = plowback rate multiplied by return on equity can be used to estimate its intrinsic value though GGM. But assuming that the plough-back rate and return on equity remain constant over time, for many companies facing changing market conditions, competition, investment opportunities and capital structures. It ignores the effects of inflation, taxes and other factors that may affect the value of dividends and earnings in different years. It proves that this formula has limitations (Adkins, 2017).

	Annual Dividend	Annual Dividends growth rates	1+Annual Dividends growth rates
2013	1.96		
2014	1.96	0.00%	100.00%
2015	2	2.04%	102.04%
2016	2.04	2.00%	102.00%
2017	2.08	1.96%	101.96%
2018	2.25	8.17%	108.17%
2019	2.58	14.67%	114.67%
2020	2.96	14.73%	114.73%
2021	3.4	14.86%	114.86%
2022	3.92	15.29%	115.29%

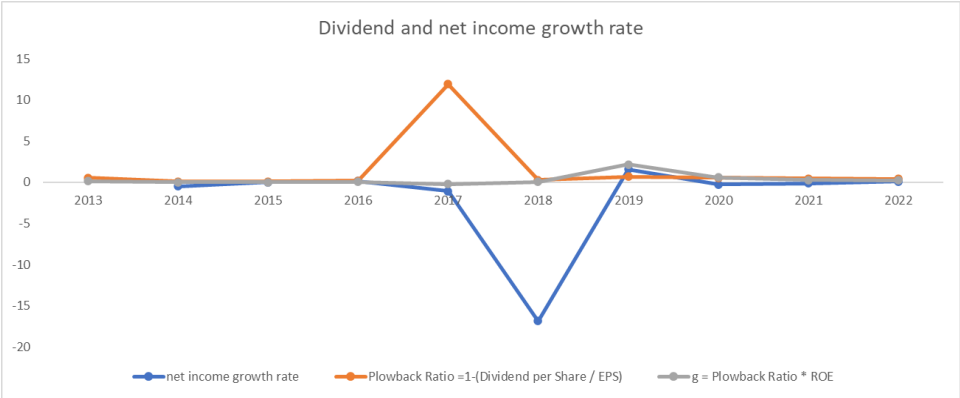
	2013-2019	2013-2022
Arithmatic mean annual growth rates for Dividends	4.81%	8.19%
Geometric mean annual growth rates for Dividends	2.69%	8.01%

	net income	net income growth rate	total asset	total liability	Total Equity	ROE = Net Income / Total Equity
2013	4685		35249	17608	17641	26.56%
2014	2391	-48.96%	36308	20920	15388	15.54%
2015	2408	0.71%	35569	20979	14590	16.50%
2016	2738	13.70%	38806	24725	14081	19.44%
2017	-204	-107.45%	44981	33313	11668	-1.75%

2018	3232	-1684.31%	43908	32999	10909	29.63%
2019	8318	157.36%	39286	36587	2699	308.19%
2020	6194	-25.53%	46633	40808	5825	106.33%
2021	5582	-9.88%	48806	39651	9155	60.97%
2022	6245	11.88%	49490	38714	10776	57.95%

	EPS	**Dividend per share (USD)**	annual growth rates for Dividends	Plowback Ratio =1-(Dividend per Share / EPS)	g = Plowback Ratio * ROE
2013	4.32	**1.96**		54.63%	14.51%
2014	2.23	**1.96**	**0.00%**	12.11%	1.88%
2015	2.26	**2**	**2.04%**	11.50%	1.90%
2016	2.58	**2.04**	**2.00%**	20.93%	4.07%
2017	-0.19	**2.08**	**1.96%**	1194.74%	-20.89%
2018	3.13	**2.25**	**8.17%**	28.12%	8.33%
2019	8.89	**2.58**	**14.67%**	70.98%	218.75%
2020	6.79	**2.96**	**14.73%**	56.41%	59.98%
2021	6.12	**3.4**	**14.86%**	44.44%	27.10%
2022	6.9	**3.92**	**15.29%**	43.19%	25.03%

arithmetic mean growth rate of dividend (2013-2022)
34.07%
geometric mean growth rate of dividend (2013-2022)
124.00%
arithmetic mean growth rate of dividend (2013-2019)
32.65%
arithmetic mean growth rate of dividend (2013-2019)
19.00%



Source: author

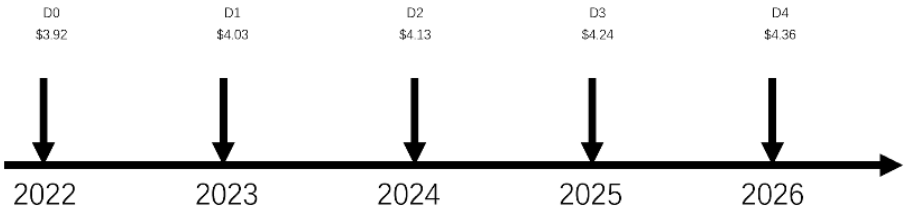
Q13. DCF Analysis and Valuation.

To get the intrinsic value of Eli Lilly and Company stock, we need to use a discounted cash flow model, which "discounts" these future cash flows into a current value that can be compared to our current investment. However, we do not know the future cash flows. So, before we do, we need to use the GGM (Gordon Growth Model) to estimate the value of stocks that are expected to grow steadily in the future (Brealey & Myers, 2022). Firstly, we determine the assumptions of the DCF model: one stage Gordon Growth Model or multiple stage growth model. We believe that the one-stage GGM model is more reflective of the intrinsic value of a company's stock. This is because we observe the stable performance of the company's stock in terms of annual growth rate of dividends in the previous ten years.

Therefore, we believe that the dividend growth rate (g) of Eli Lilly and Company stock will remain stable in the foreseeable future. The formula of discounted cash flow model is V0= D0(1+g)/(r-g), V0 is the current intrinsic share price of Eli Lilly and Company. d0 is the company's most recent dividend, and we can find the figure of 3.92 USD dividend per share from Q12. g is the dividend growth rate, and we can get the figure of 2.69% from Q12. I chose the geometric mean of annual growth rates for Dividends from

2013 to 2019 to avoid the effect of the epidemic on the dividend growth rate. r is the expected rate of return to the market as determined by the Capital Asset Pricing Model (CAPM), and through Q11 I chose 3.84% as the discount rate for the discounted cash flow model. Because the Gordon Growth Model is very sensitive to the choice of r and g, according to the formula if g is greater than r it will result in Eli Lilly and Company's current intrinsic stock price approaching negtive infinity. Therefore, the maximum value of r and the minimum value of g must be chosen to satisfy the applicability conditions of the Gordon Growth Model.

Q14. Cash Flow Timeline



Q15. Present Value of Growth Opportunities

PVGO (present value of growth opportunities) is the intrinsic value of a stock that excludes the present value under the status quo and then the present value of future growth. The present value can be calculated by dividing the earning per share (7.19) obtained in Q4 by the discount rate (3.84%) obtained in Q13, and then subtracting this value from the current share price to find the PVGO, which is positive. Brearley in the book 'Principles of Corporate Finance' explains that a positive PVGO means that the company is capable of generating excess earnings and growth prospects in the future and investors are willing to pay extra value for the company's future growth opportunities

(Brealey & Myers, 2022).

Q16. Sensitivity Analysis

By performing a sensitivity analysis on the intrinsic value of a company's

g/r	+1%	0%	-1%
+1%	353.45	2709.77	N/A
0%	187.23	350.04	2683.63
-1%	126.55	185.41	346.63

stock, we can observe how changes in the variables in the valuation affect the intrinsic value of the company. This is particularly critical to understanding the robustness of the valuation model and our key assumptions. The range of variation in the intrinsic value of the stock is between 2683.632 and 185.406, which is significant and implies that the valuation of the intrinsic value of the stock is highly sensitive to the discount rate and dividend growth rate.

4.Recommendation

Q17. Buy, Sell, or Hold

Comparing the intrinsic value of the company's stock to the current price of the company's stock as calculated by Q13's discounted cash flow model as well as Gordon's growth model, it can be seen that the price tagged at $565.22 per share is only worth $350 per share, which indicates that the company's stock is overvalued, so selling this stock would be the best option. In terms of valuations, Eli Lilly is compared to Nvidia. In this aspect, both are seen as overvalued giant companies in their respective industries. The market cap of Nvidia is $1 trillion while Eli Lilly is also valued highly with strong expectations for future growth (NVIDIA, 2023). The PE ratio of 76.49 in Eli

Lilly is the reason why some see this company as overpriced, necessitating flawless performance in upcoming quarters. Its foray into the weight loss industry with drugs and the acquisition of Versanis Bio is another core reason why its stock is considered crowded (Eli Lilly and Company, 2023). However, investors are eagerly waiting for this company's next earnings release on November 2nd.

Q18. Large language models recommendation

Eli Lilly and Company is a pharmaceutical company with multifaceted investment opportunities because of its long-standing good reputation and extensive product pipeline, which is particularly well-positioned in the treatment of chronic diseases such as diabetes and cardiovascular disease. However, there are inherent risks in the pharmaceutical industry that cannot be ignored, not only legal challenges such as patent expiration, but also fierce competition from generic drugs. In addition, complex regulatory regimes and uncertain global economic conditions pose potential risks to the pharmaceutical industry. Although Eli Lilly and Company is strong and performing well in the pharmaceutical industry, investors should carefully consider investing in Eli Lilly and Company as it is difficult for the average person to make an informed analysis of the financial, legal and market environment and grasp the relationship between risk and expected return. Therefore, we do not recommend buying because of the industrial high risk.

Q19: The Valuation and Future Prospects

Using the DCF model and GGM, we recommend buying the stock, labelled in red, when the required return (r) is less than or equal to 3.84% and the expected dividend growth rate (g) is greater than or equal to 2.69%, i.e., when the intrinsic value (V0) is greater than the current price in Q4 (565.22). On the

contrary, we recommend selling the stock when the required rate of return (r) is greater than 3.84% or the expected dividend growth rate (g) is less than 2.69%, i.e., V0 is less than the current price in Q4 (Brealey et al., 2022).

We believe that sell, also known as blue, is more likely to happen because according to the criteria r and g we calculate that the value of v0 (350.04) in q13 is less than the current price in q4. Combined with the general environment because of the end of the epidemic increased attention to their own health need to improve their own immunity rather than a single dependence on drugs there are more ways to be healthy, but some diseases need medication to maintain So g is still a stable trend growth, now the price is overvalued need to sell.

Reviewing ChatGPT's insights in Q18 on the risks inherent in the pharma sector and the potential risks to the global economy, we maintain our sell recommendation of q17; the gist of ChatGPT's analysis in Q18 align with ours, and since ChatGPT confirms our sell recommendation from q13 calculations and coloring of Q16, we are even more confident in our judgement derived from our coloring in Q16.

There are inherent limitations and assumptions in our analyses, such as company selection, where we chose a company with complete data and a good performance in the industry. However, our model initially lacked sufficient industry contextualization and omitted g and r comparisons, which may not have reliably captured the uncertainty and high risk of the industry, especially given Eli Lilly's particular positioning in the industry, leading us to conclude to sell in later stages of our analysis (Brealey et al.2022).

g/r	+1%	0	-1%
+1%	353.4477	2709.765	N/A
0	187.2301	350.039	2683.632
-1%	126.5476	185.4069	346.6303

Source:author

Q20. Final Recommendation

In summary, further verification through q17-19 reinforces our conviction of our Sell recommendation on Eli Lilly stock due to our data collection and calculations through q1-16 and in-depth consideration of the steady growth rates of required returns and dividends. After background research on Eli Lilly's industry, while we recognize that certain health conditions require medication, the post-pandemic approach to holistic health favours boosting innate immunity over a single reliance on medication. And our late-stage assessment combined DDM theory, sensitivity analyses, and a conclusion that the risks and economic uncertainty associated with Lilly's future earnings were underestimated (Brealey et al., 2022). While our analytical framework has the limitations of an up-front background check, our combination of careful post-evaluation calculations and industry analyses suggests a comprehensive and prudent guide for investors and advises them to be cautious about investing in the healthcare sector, which has high risk and an uncertain future.

5.Reference

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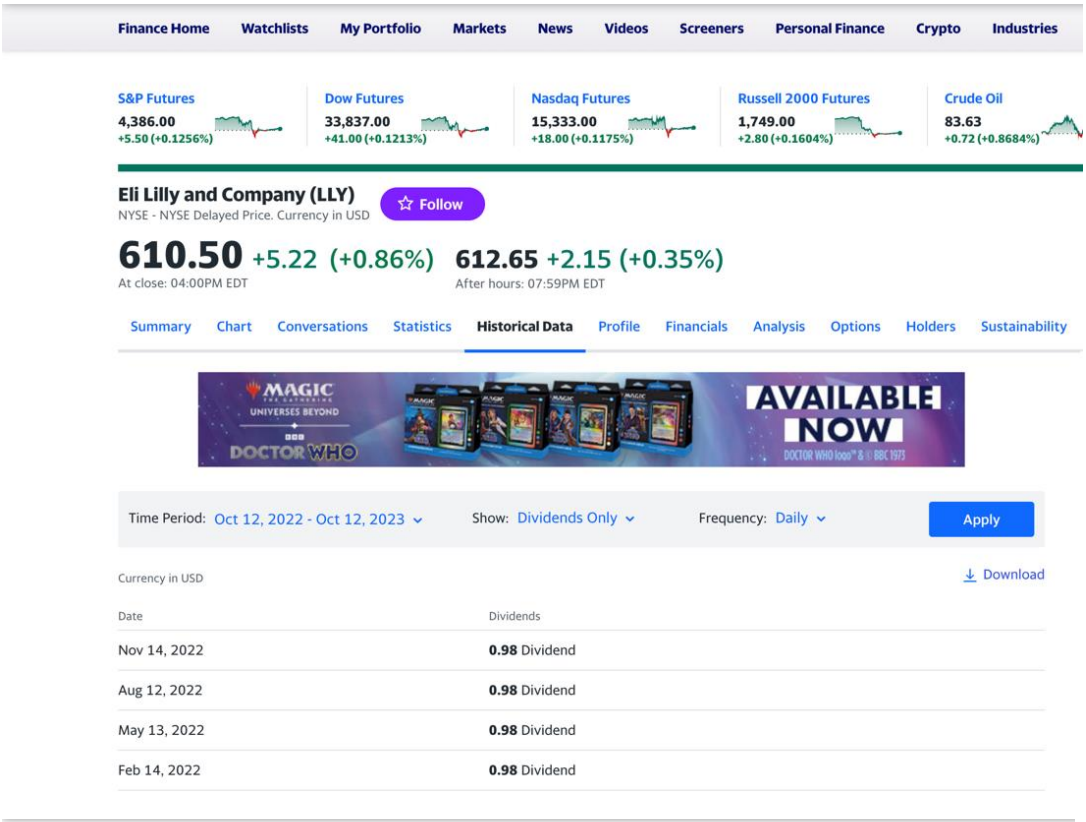
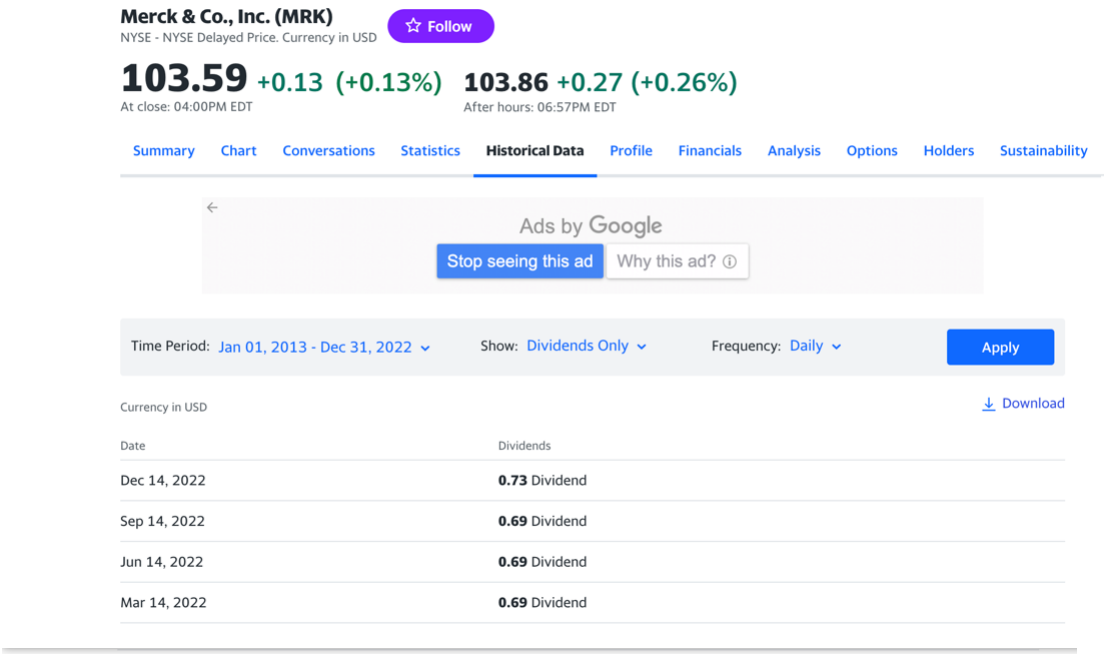
6.Appendixes

Appendix1



Nov 12, 2021	**0.85** Dividend
Aug 12, 2021	**0.85** Dividend
May 13, 2021	**0.85** Dividend
Feb 11, 2021	**0.85** Dividend
Nov 12, 2020	**0.74** Dividend
Aug 13, 2020	**0.74** Dividend
May 14, 2020	**0.74** Dividend
Feb 13, 2020	**0.74** Dividend
Nov 14, 2019	**0.645** Dividend
Aug 14, 2019	**0.645** Dividend
May 16, 2019	**0.645** Dividend
Feb 14, 2019	**0.645** Dividend
Nov 14, 2018	**0.563** Dividend
Aug 14, 2018	**0.563** Dividend
May 16, 2018	**0.563** Dividend
Feb 14, 2018	**0.563** Dividend
Nov 14, 2017	**0.52** Dividend
Aug 11, 2017	**0.52** Dividend
May 11, 2017	**0.52** Dividend
Feb 13, 2017	**0.52** Dividend

Appendix2



Merck & Co., Inc. (MRK)
NYSE - NYSE Delayed Price. Currency in USD

Follow

103.59 +0.13 (+0.13%)
At close: 04:00PM EDT

103.86 +0.27 (+0.26%)
After hours: 06:57PM EDT

Summary | Chart | Conversations | Statistics | **Historical Data** | Profile | Financials | Analysis | Options | Holders | Sustainability

Ads by Google
Stop seeing this ad | Why this ad?

Time Period: Jan 01, 2013 - Dec 31, 2022 | Show: Dividends Only | Frequency: Daily | Apply

Currency in USD | Download

Date	Dividends
Dec 14, 2022	**0.73** Dividend
Sep 14, 2022	**0.69** Dividend
Jun 14, 2022	**0.69** Dividend
Mar 14, 2022	**0.69** Dividend
Dec 14, 2021	**0.69** Dividend
Sep 14, 2021	**0.65** Dividend
Jun 14, 2021	**0.65** Dividend
Mar 12, 2021	**0.620229** Dividend
Dec 14, 2020	**0.620229** Dividend
Sep 14, 2020	**0.582061** Dividend
Jun 12, 2020	**0.582061** Dividend
Mar 13, 2020	**0.582061** Dividend
Dec 13, 2019	**0.582061** Dividend
Sep 13, 2019	**0.524809** Dividend
Jun 14, 2019	**0.524809** Dividend
Mar 14, 2019	**0.524809** Dividend
Dec 14, 2018	**0.524809** Dividend
Sep 14, 2018	**0.458015** Dividend
Jun 14, 2018	**0.458015** Dividend
Mar 14, 2018	**0.458015** Dividend
Dec 14, 2017	**0.458015** Dividend
Sep 14, 2017	**0.448473** Dividend
Jun 13, 2017	**0.448473** Dividend
Mar 13, 2017	**0.448473** Dividend

Appendix3

Date	1 Mo	2 Mo	3 Mo	4 Mo	6 Mo	1 Yr	2 Yr	3 Yr	5 Yr	7 Yr	10 Yr	20 Yr	30 Yr
10/02/2023	5.56	5.60	5.62	5.62	5.58	5.49	5.12	4.88	4.72	4.73	4.69	5.00	4.81
10/03/2023	5.55	5.60	5.62	5.62	5.58	5.49	5.15	4.95	4.80	4.84	4.81	5.13	4.95
10/04/2023	5.56	5.58	5.61	5.62	5.57	5.42	5.05	4.85	4.72	4.75	4.73	5.05	4.87
10/05/2023	5.57	5.59	5.61	5.62	5.56	5.39	5.03	4.82	4.68	4.73	4.72	5.06	4.89
10/06/2023	5.59	5.60	5.63	5.64	5.59	5.43	5.08	4.87	4.75	4.79	4.78	5.13	4.95
10/10/2023	5.60	5.61	5.61	5.63	5.57	5.37	4.96	4.74	4.62	4.66	4.66	5.03	4.85

Tuesday Oct 10, 2023

Appendix4

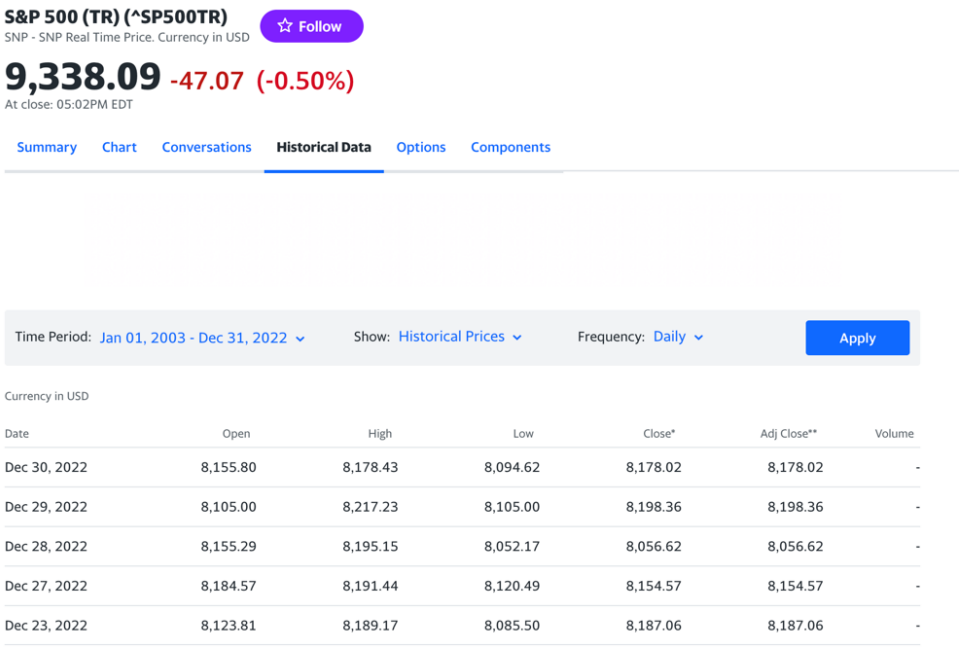
Eli Lilly Annual EPS	
2022	$6.90
2021	$6.12
2020	$6.79
2019	$8.89
2018	$3.13
2017	$-0.19
2016	$2.58
2015	$2.26
2014	$2.23
2013	$4.32
2012	$3.66
2011	$3.90
2010	$4.58
2009	$3.94

Eli Lilly Annual Net Income (Millions of US $)	
2022	$6,245
2021	$5,582
2020	$6,194
2019	$8,318
2018	$3,232
2017	$-204
2016	$2,738
2015	$2,408
2014	$2,391
2013	$4,685
2012	$4,089
2011	$4,348
2010	$5,070

Eli Lilly Annual Total Assets (Millions of US $)	
2022	$49,490
2021	$48,806
2020	$46,633
2019	$39,286
2018	$43,908
2017	$44,981
2016	$38,806
2015	$35,569
2014	$36,308
2013	$35,249
2012	$34,399
2011	$33,660
2010	$31,001

Eli Lilly Annual Total Liabilities (Millions of US $)	
2022	$38,714
2021	$39,651
2020	$40,808
2019	$36,587
2018	$32,999
2017	$33,313
2016	$24,725
2015	$20,979
2014	$20,920
2013	$17,608
2012	$19,625
2011	$20,124
2010	$18,589

Appendix5



S&P 500 (TR) (^SP500TR)
SNP - SNP Real Time Price. Currency in USD
Follow

9,338.09 -47.07 (-0.50%)
At close: 05:02PM EDT

Summary Chart Conversations Historical Data Options Components

Time Period: Jan 01, 2003 - Dec 31, 2022 Show: Historical Prices Frequency: Daily Apply

Currency in USD

Date	Open	High	Low	Close*	Adj Close**	Volume
Dec 30, 2022	8,155.80	8,178.43	8,094.62	8,178.02	8,178.02	-
Dec 29, 2022	8,105.00	8,217.23	8,105.00	8,198.36	8,198.36	-
Dec 28, 2022	8,155.29	8,195.15	8,052.17	8,056.62	8,056.62	-
Dec 27, 2022	8,184.57	8,191.44	8,120.49	8,154.57	8,154.57	-
Dec 23, 2022	8,123.81	8,189.17	8,085.50	8,187.06	8,187.06	-

Appendix6

https://chat.openai.com/share/08c90e73-cc9a-449a-93fc-7eb227512a3a