



University
for the
Creative Arts



BERLIN SCHOOL OF
BUSINESS & INNOVATION

Essay / Assignment Title: Corporate Financial Analysis

Programme title:

Name:

Year:

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INTRODUCTION

Market efficiency is one of the most fundamental principles in finance. It reflects the asset prices and all the available information effectively. Despite its importance, it is not a fundamentally or universally accepted concept (Martina and Nagel 2022). This essay delves into the validity of market efficiency in contemporary financial markets.

CHAPTER ONE (the number of Chapters could be more depending on the content)

Task 1 Market efficiency in Financial Market

Critical Evaluation

The Efficient market hypothesis was introduced by Eugene Fama in the 1960s. This hypothesis offered an option to understand market efficiency. Under this framework it was classified into three forms (Kelikume *et al.* 2020). The markets were divided into weak, semi-strong and strong. For example: Weak efficiency means that the former prices do not hold or guarantee future success. On the other hand, semi-strong efficiency that publicly available information has been incorporated in asset prices. It simultaneously also means that investors cannot solely rely on publicly available data. Whereas strong form efficiency means that private information can also be incorporated. Hence insider information is also reflected in the asset prices. Hence this hypothesis offered an opportunity to understand how accurately information is incorporated in the financial market.

Recent studies reflect that one cannot depend on weak form efficiencies. It is because the past prices always necessarily do not reflect the future (Axtell and Farmer 2022). According to the author, there is no guarantee that just because a stock did well in the past, will certainly do the same in the future. Hence according to this study, one cannot depend on the past trends. Various studies challenge the idea of market efficiency. They reflect the role of human behaviour in shaping the very decisions related to investments. A study particularly emphasized on the role of human psychology and irrational behaviour in financial markets. It has been emphasized that it is human behaviour that leads to market inefficiencies.

A study analyzed the reaction of investors towards semi strong form efficiency. It reflected that either investors got extremely happy or sad from the publicly available information (Asamoah *et al.* 2021). Sometimes they react to new information in a way that enhances the price of a particular stock. However there have also been instances where the investors have not made proper use of the information that is available to them. For example, they have not taken into consideration the asset price, recent profit or loss of a company. Hence this has translated into

market inefficiency. Hence market efficiency is not regulated by the publicly available information. It again reinforces the fact that it is regulated by human behaviour. These studies reflect the continuous ongoing debate surrounding market efficiency. Some researchers have spoken in favour of market efficiency. Where the studies mentioned above clearly reflects a divergent thought towards market efficiency. This perspective reflects the need to take into consideration both rational and emotional factors during an investment decision.

The empirical data also reflects a diverging thought process. Various empirical studies undertaken to understand the importance of market efficiency reflects different perspectives (Wieland *et al.* 2021). One particular study reflected that there was no relationship between the past stock prices and future returns. This particular study supported weak form efficiency. It clearly states that there is no relationship between past prices and the future trend. Whereas on the other hand another study reflected that in a short time span, the stock markets that perform well tend to follow the same trend. This on the other hand contradicts the very idea of weak form efficiency.

The semi strong form efficiency states that the stock prices quickly adjust to the new information. Researchers found that each time a new information is made publicly available, it directly influences the stock price. Hence it establishes the fact that marketers react to publicly available information. On the other hand, as mentioned above there have also been instances where investors have not made effective use of the information. Hence even the empirical data also reflects mixed perspective towards market efficiency in the financial market.

While talking about market efficiency, a huge section tends to believe that the market is regulated by factors such as risk, cost of making transactions and various other aspects (Ketokivi and Mahoney 2020). Hence these factors are a part of the market. On the other hand, many also tend to believe that human beings are not always inclined towards rational decision making. Behavioural finance reflects that the emotions, Biosis of an investor plays a very important role in how and where they invest their money. Hence the market always does not behave as it theoretically.

There has been a considerable increase in the use of technology in training. Today algorithms, high-frequency trading are some of the most common aspects. The technology has a strong influence on market efficiency (Sazu, 2022). It has been observed by researchers that high frequency trading has directed the market towards more volatility. It has directly reduced the rate

of efficiency today. Today no one can say with utmost confidence that the market represents accurate information. It is within a matter of seconds that the market changes. Hence the debate between market efficiency and behavioural finance continues.

Personal opinion/ Conclusion

In accordance with the above analyses, I personally believe that the concept of market efficiency is an effective theoretical concept (Nadeem *et al.* 2020). However, the reality is very different from the framework. In the financial market, human behaviour and psychology plays a very important role. The advancement in technology, high-frequency trading has also increased volatility across different markets. It has been observed that a continuous effort is being made to incorporate new information in the market at a regular interval. There are two aspects to this scenario. One that with huge number of transactions, information it sometimes leads to inefficiencies. On the other hand, it is also observed that investors do not make effective use of the information that is readily available to them. Hence market efficiency in the financial world is an intersection of various aspects. There is a need to consider human emotions, technological advancements to name a few.

CHAPTER TWO

Introduction

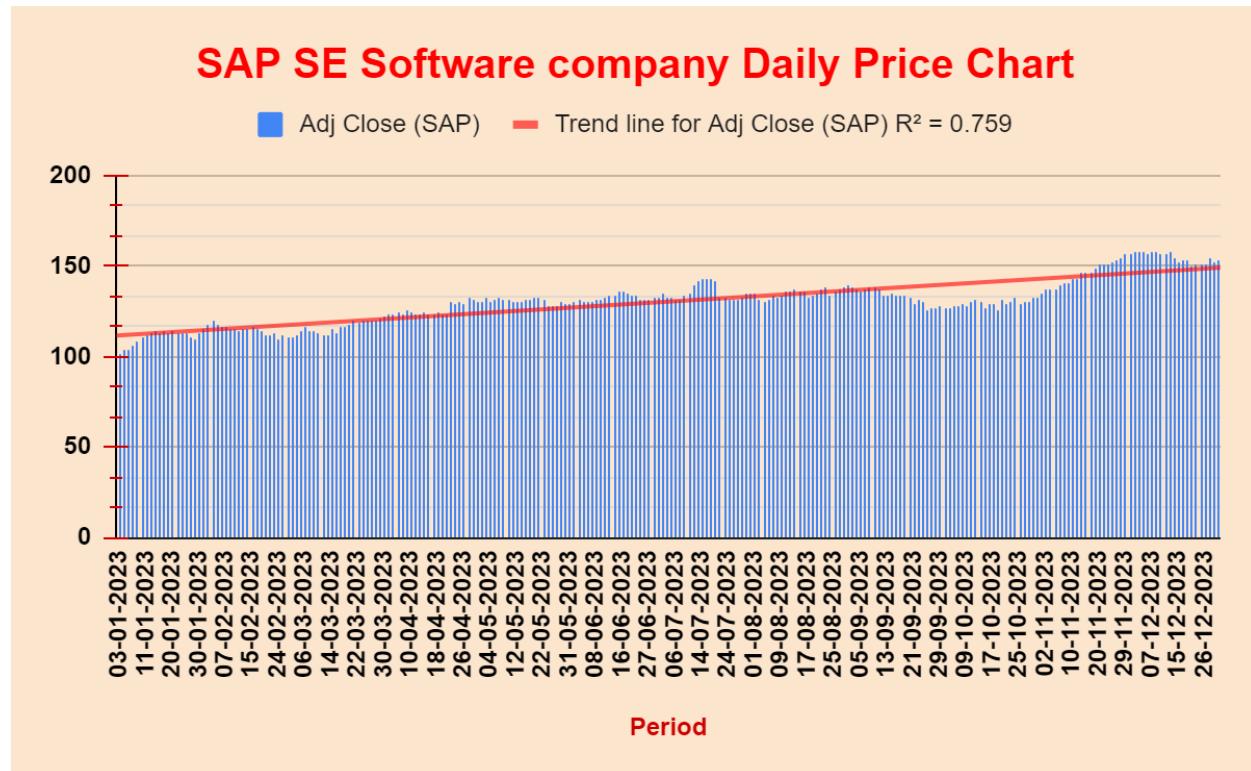
This report aims to construct an investment portfolio consisting of four stocks from the Frankfurt Stock exchange. The following companies have been chosen to be included in the report:

- SAP SE (software company)
- Allianz SE (financial services provider)
- Siemens SE (automation company)
- Mercedes-Benz Group AG (automotive manufacturer)

Main body

SAP SE (software company)

- Description of daily prices



The daily prices of SAP SE reflect fluctuation over a period of time (Jung *et al.* 2020). It can be clearly seen that the stock market has experienced volatility. There has been increases and

decreases in the price. It is a reflection of the investor sentiment in the organisation. It can be observed that from February to mid-March 2023 there has been a consistent upward trend. It is a reflection of the positive performance undertaken by the company. It is also a reflection of the strong financial, strategic development undertaken by the company. It has played an effective role in creating a sense of confidence amongst the investors. The favourable market condition, industry trends have also made a significant contribution towards the upward trend observed in the company. However, by the end of March, there was a decrease in the prices. This shift has been observed due to certain external factors. However, despite various ups and downs the overall trajectory reflects a sign of continuous growth. The investors have continued to capitalize on various opportunities. While undertaking investment in this company one needs to take into consideration the economic indicators, and market sentiment.

- **Risk Analysis**

The return of SAP SE Reflects significant fluctuations. It ranges from -2.72% to 2.24%. It reflects extreme volatility in the performance of the company. It is simultaneously a reflection of high risk (Liu *et al.* 2024). The higher standard deviation is also a reflection of high variability. The higher volatility reflects that the investors will experience extreme situations in their investment period. Hence the probability of experiencing potential losses is extremely high when the market turns.

- **Return Analysis**

SAP SE reflected higher risk. It also simultaneously reflects the possibility of higher returns. The return ranges from -2.72% to 2.24%. This window offers the opportunity for the investors to acquire significant gains. It is simultaneously important for the investors to make a comparison to other investment options. As the organisation offers high returns, it is equally important to consider the high risk associated with it.

- **Beta**

	Remarks	Result
SAP SE	BETA	-0.12668133
	MEAN	130.2795916
	SD	12.43810923
GDAXI	MEAN	15649.88984
	SD	499.1739191
	Covariance	3737.738813
	Corelation	0.603216244
Observations	n	250

The beta of SAP SE is -0.1267. It reflects that the stock moves inversely in consideration to the market (Almeida and Gaspar 2021). The beta below one reflects that the company is comparatively less volatile. Each time the market experiences certain fluctuations, the beta reflects that SAP SE reflects a degree of stability. The negative beta reflects the protection against market fluctuations. An investor who is trying to regulate the overall risk of their portfolios, can consider investing in this company. It will offer them the opportunity to regulate losses due to market fluctuations. However, it is equally important to understand that the negative value does not imply profit during market fluctuations.

- Covariance and correlation Analysis

Calculated by Formula	
Remarks	Result
Covariance	3752.749812
Correlation	0.604426308

The covariance between the returns of SAP SE and its own index is 3752.75 (Oloo *et al.* 2023). The covariance value is a reflection of the degree of their linear relationship. The positive value indicates that when the returns of the company increase, the return of the index also simultaneously increases. On the other hand, negative covariance reflects vice-versa.

The correlation coefficient of SAP SE is 0.6044. The coefficient clearly signifies the direction of the linear relationship. When the coefficient is close to one, it reflects a positive relationship (Esteves *et al.* 2021). As the coefficient of the company is close to one hence it is a positive correlation between the company and its index. Hence the returns of the company are positively

related, however they are not perfectly correlated. This is a reflection of the degree of independence.

- **Cash Flow forecast using DCF approach and intrinsic value**

Free Cash Flow (FCFF) to firm				
	2024	2025	2026	2027
EBIT	£(13,131.00)	£(16,546.34)	£(20,850.01)	£ (26,273.04)
Tax Rate	33%	33%	33%	33%
EBIT * (1-Tax Rate)	£ (8,797.77)	£(11,086.05)	£(13,969.50)	£ (17,602.94)
Add: Depreciation	£ 1,289.00	£ 1,210.14	£ 1,136.11	£ 1,066.60
Add: Decrease in Working Capital	£ 486.02	£ 39.84	£ 3.27	£ 0.27
Add: Decrease in Capex & WIP	£ 321.92	£ 144.94	£ 65.26	£ 29.38
Free Cash Flow to Firm	£ (6,700.83)	£ (9,691.13)	£(12,764.88)	£ (16,506.69)
Terminal Growth Value				\$2,98,553.58
Number of Years				
	2024	2025	2026	2027
Discount Factor (10%)	0.907	0.822	0.746	0.676
PV to FCFF	£ (6,077.65)	£ (7,966.11)	£ (9,522.60)	£ (11,158.52)
Terminal Growth Value				£2,01,822.22
Enterprise Value	£ 53,082.00			
Less: Total Debt	£ 9,676.00			
Add: Cash	£ 8,124.00			
Equity Value	£ 51,530.00			
Share Capital	£ 1,229.00			
Face Value	1			
No. of Shares	122900000			
Share Price	£ 41.93			

The Discounted Cash Flow (DCF) calculation reflects the intrinsic value per share of approximately R41.93 for SAP SE. The current market price of the company will help an investor to understand if the stock is undervalued or vice versa. Hence, they can align their decision accordingly.

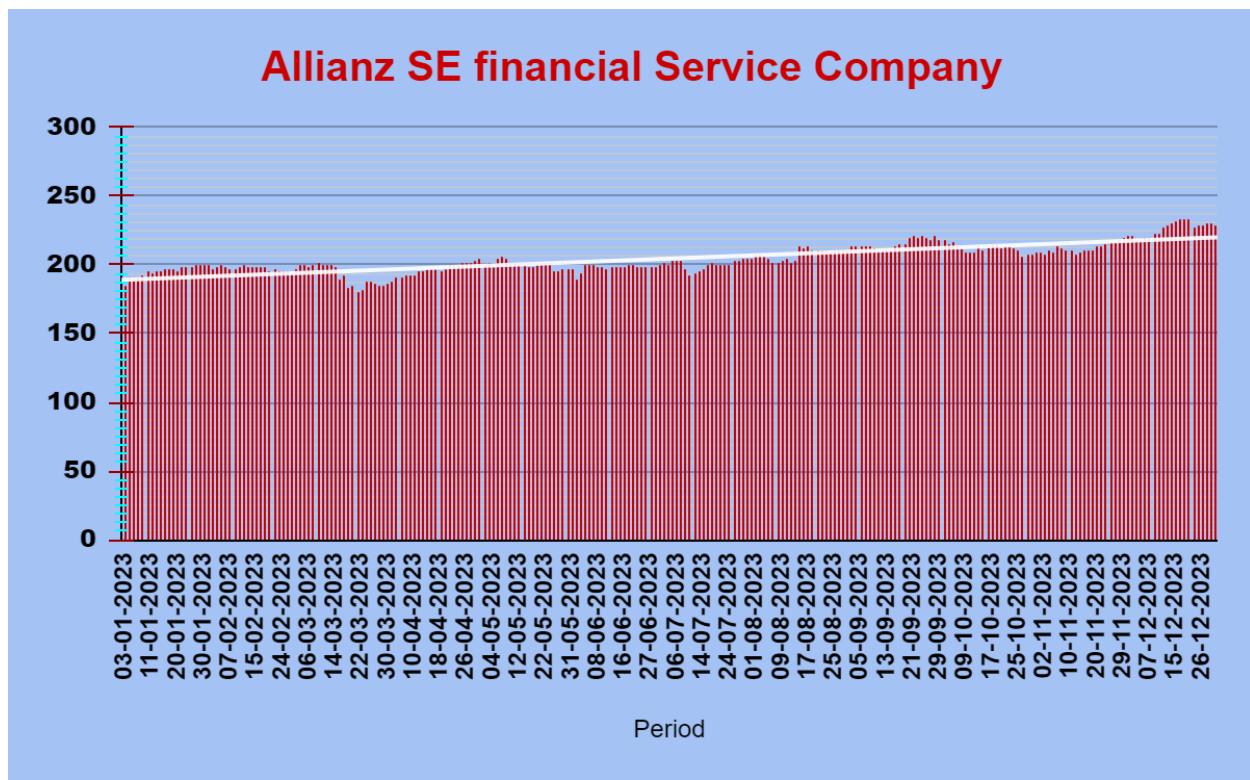
- **Weighted Average Cost of Capital (WACC)**

Calculation of Weightage Average Cost of Capital of SAP SE, 2023	
Element	Value (m)
Total Debt	£ 9,676.00
Total Equity	£43,406.00
Interest Expenses	£ 1,313.00
Tax Rate	33%
Total Capital	£53,082.00
Weightage of Debt	£0.18
Cost of Debt	13.57%
Weightage of Equity	£0.82
Cost of Equity/ CAPM	3.02%
WACC is calculated using the formula given below:	
WACC = Weightage of Equity * Cost of Equity + Weightage of Debt * Cost of Debt * (1 - Tax Rate)	
WACC	4.14%

The Weighted Average Cost of Capital (WACC) for SAP SE in 2023 is 4.14%. It is a reflection of the average cost of financing for the operations of the company. It also takes into consideration the proportions of debt, and equity. The rationale behind using both the aspects is to reflect the specific financial structure, market concerns of the company. This information is collected from the annual reports (Vartiainen *et al.* 2020). The lower WACC, reflects that the company can utilise cheaper financing. It would directly influence the potential profit and valuation. It is a reflection of a low risk profile. Hence it says that the investors are accepting low returns against their investments.

Allianz SE (financial services provider)

- **Description of daily prices**



The daily price data for Allianz SE reflects variation from January to March (Mihoci *et al.* 2020). There has been both upward and downward movement through these months. Initially during the month of January there was a slight decline. It is this reflection of negative returns. However mid-January to February there was a significant upward trend. It is again a reflection of positive returns. The company has seen frequent alternations between positive and negative returns. It is a clear reflection of volatility. One of the most important aspects of this stock is that they have shown resilience in the face of adversity. They have continuously maintained relatively stable prices throughout the fluctuation. Market sentiments and company performance has been listed as some of the factors for such fluctuations. It has been observed that investors have reacted to the news related to insurance industries. The company specific announcement made during this tenure has also influenced the price movement.

- **Risk Analysis**

The historical returns help in analysing the risk associated with investing in ALLIANZ SE. It reflects that there has been volatility in returns. Over a particular period of time there has been fluctuations with the standard deviation of 0.00792642898 (Dawson *et al.* 2022). It reflects that the performance of the stock has shown a degree of variance. However, the company has exhibited resilience in comparison to other stocks. It has also been observed that they have

experienced fewer extreme swings. Hence it can be stated that the company has a certain level of risk. However, they have reflected stability and resilience throughout the process.

- **Return Analysis**

The analysis reflects that there have been occasional negative returns reflected by the company (Lysenko-Ryba and Zimon 2021). However, they have provided their investors with overall positive returns. The average return for the company has been -0.0048587383. It reflects that the company has been able to generate positive returns on an average. Simultaneously their cumulative returns also reflect the same. The company has exhibited short-term fluctuations. Simultaneously they have also reflected a positive trend in terms of returns. Hence the company has a strong market position and effective management in place. Investors who want to create a balance between risk-taking and returns can invest in this stock. This will offer them the opportunity for steady growth and enhance their income simultaneously.

- **Beta**

	Remarks	Result
<u>ALV.DE</u>	BETA	-0.01318068
	MEAN	204.5708892
	SD	10.62152507
GDAXI	MEAN	15649.88984
	SD	499.1739191
	Covariance	2382.828563
	Corelation	0.450323243
	Observations	n
		250

The beta for the company is -0.01318068. It is a measurement of the sensitivity of the return of the stock according to the market position (Awawdeh *et al.* 2020). As mentioned above the value below one reflects that the stock is less volatile. In the case of this company, the negative value reflects that the returns move in the opposite direction of the market. Hence when the market experiences profit, the company tends to reflect losses. However, this portfolio would be advantageous for investors who are willing to diversify their investment. It would provide them a sense of protection when the market turns. It is a reflection of unique behaviour in comparison to the broader market. This can act as a balancing point for many investors.

- **Covariance and correlation Analysis**

Calculated by Formula

Remarks	Result
Covariance	2392.39816
Correlation	0.4512266

The covariance for Allianz SE is 2392.39816. The positive value reflects that the return of the company and the market index move in the same direction (Zhang *et al.* 2021). A high value reflects that there is a strong relationship between the two variables. Whereas the correlation coefficient between the two is 0.4512266. In this case the correlation coefficient is slightly closer to 1. This reflects a moderately positive relationship between the two. However, it also reflects that it is not a very strong relationship. It is not dependent on each other.

- **Cash Flow forecast using DCF approach and intrinsic value**

Free Cash Flow (FCFF) to firm				
	2024	2025	2026	2027
EBIT	£ (1,368.00)	£ 624.02	£ (284.65)	£ 129.84
Tax Rate	22%	22%	22%	22%
EBIT * (1-Tax Rate)	£ (1,067.04)	£ 486.74	£ (222.03)	£ 101.28
Add: Depreciation	£ 2,653.57	£ 3,706.02	£ 5,175.89	£ 7,228.74
Add: Decrease in Working Capital	£ 47,813.62	£ 32,461.17	£ 22,038.23	£ 14,961.98
Add: Decrease in Capex & WIP	£ (16,840.79)	£ 20,644.35	£ (25,306.97)	£ 31,022.66
Free Cash Flow to Firm	£ 32,559.37	£ 57,298.28	£ 1,685.12	£ 53,314.65
Terminal Growth Value				\$7,04,908.39
Number of Years	2024	2025	2026	2027
Discount Factor (10%)	0.907	0.822	0.746	0.676
PV to FCFF	£ 29,531.35	£ 47,099.18	£ 1,257.10	£ 36,040.70
Terminal Growth Value				£ 4,76,518.07
Enterprise Value	£ 1,19,862.00			
Less: Total Debt	£ 56,282.00			
Add: Cash	£ 29,210.00			
Equity Value	£ 92,790.00			
Share Capital	£ 1,169.00			
Face Value	1			
No. of Shares	11699200			
Share Price	£ 79.38			

The cash flow forecast is projected for 2024 to 2027. This process has helped in estimating the Intrinsic value of each share for the company. It has been found that the Intrinsic value for Allianz SE stands at 79.38.

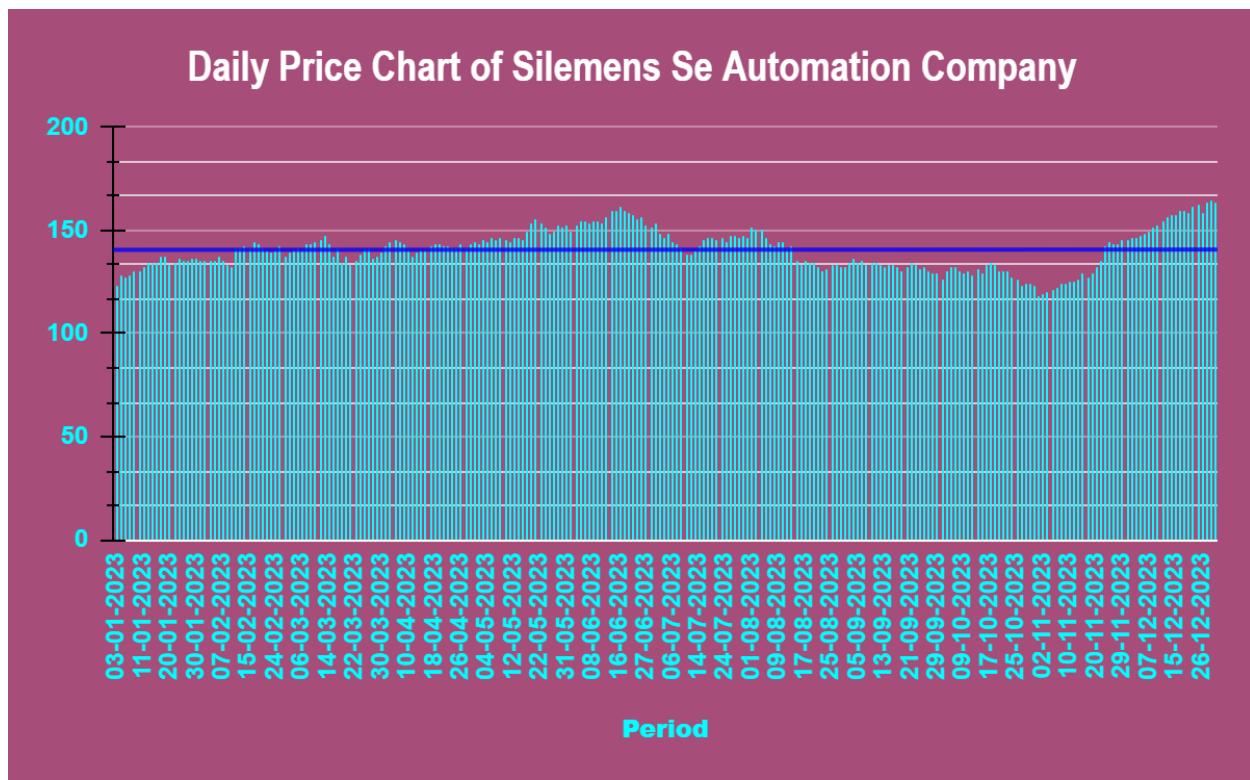
- **Weighted Average Cost of Capital (WACC)**

Calculation of Weightage Average Cost of Capital of Allianz SE, 2023	
Element	Value (m)
Total Debt	£56,282.00
Total Equity	£63,580.00
Interest Expenses	£ 5,487.00
Tax Rate	22%
Total Capital	£1,19,862.00
Weightage of Debt	£0.47
Cost of Debt	9.75%
Weightage of Equity	£0.53
Cost of Equity/ CAPM	8.63%
WACC is calculated using the formula given below:	
WACC = Weightage of Equity * Cost of Equity + Weightage of Debt * Cost of Debt * (1 - Tax Rate)	
WACC	8.15%

The Weighted Average Cost of Capital (WACC) of Allianz SE is 8.15%. This implies that the company needs to generate a return of the same value approximately on its investments (Haas *et al.* 2021). It will help them in maintaining their existing capital structure and the expectations of the investors. The lower value reflects that the company has been able to raise funds at a lower cost. It is particularly profitable in terms of making investment in new projects. Hence the company has been able to maintain a balance between its operations and new investments.

Siemens SE (automation company)

- **Description of daily prices**



Siemens SE Is one of the leading automation companies. It has been observed that the company stock experienced a certain decline in January 2023. The returns fluctuated from -0.032 to 0.003 (Franco *et al.* 2023). The company also reflected quick recovery towards mid-January. It increased from 0.0003 to 0.0008. The company exhibited quick stabilisation in their performance. A similar pattern was observed in February. Where the return fluctuated between -0.021 and 0.014. The company again reflected a positive trend. Simultaneously in March and April there was a mix of positive and negative trend. Hence the company has reflected in erratic patterns. It clearly reflects that the company dabbles between growth and uncertainty.

- **Risk Analysis**

While analysing the risk properties of the company there has been certain fluctuations in daily returns (Bhowmik and Wang 2020). It has been observed that the company experiences negative returns such as -0.032 and -0.015. It reflects that the investors experience loss. It is a clear indication that investing in this company constitutes a certain amount of risk. The investors have to witness periods of decline in this particular stock. Hence, they have to ensure that they have proper risk tolerance, diversification strategies in place.

- **Return Analysis**

While analysing the return properties, the company reflects the possibility of potential gain. It also reflects that the company experiences positive returns such as 0.003 and 0.031. This reflects that the investors also have a possibility of acquiring profit on investing in this stock. However, there is a degree of variation in terms of profit. Hence it is extremely important that the investors take into consideration the risk and return properties.

- Beta

	Remarks	Result
<u>SIE.DE</u>	BETA	-0.052842422
	MEAN	140.706006
	SD	9.766151794
GDAXI	MEAN	15649.88984
	SD	499.1739191
	Covariance	3864.884659
	Corelation	0.794385873
Observations	n	250

The beta value for Siemens SE is -0.0528. This company also has a negative correlation with the market (van Brussel *et al.* 2024). It reflects that when the market experiences an increase in return, the company experiences loss. This investment can act as a protection for the investors. It will offer them the opportunity to maintain stability during market decline. The value reflects that the company experiences very small movements. It is a reflection of the fact that the stock is less volatile.

- Covariance and correlation Analysis

Calculated by Formula	
Remarks	Result
Covariance	3880.40628
Correlation	0.79597943

The covariance between Siemens SE and market index is 3880.40628. A positive covariance reflects that both move in the same direction. In this case the value reflects that the company moves in the same direction of the returns as that of market index. On the other hand, the correlation coefficient between the company and the market is 0.79597943. In this case also the coefficient reflects a moderately strong relationship between the both. Hence it reflects that the

performance of the company is influenced by the market index. However, it is not entirely dependent on the same.

- **Cash Flow forecast using DCF approach and intrinsic value**

Free Cash Flow (FCFF) to firm				
	2024	2025	2026	2027
EBIT	£ 7,394.00	£ 39,634.76	£2,12,458.01	£ 11,38,858.98
Tax Rate	22%	22%	22%	22%
EBIT * (1-Tax Rate)	£ 5,767.32	£ 30,915.12	£1,65,717.25	£ 8,88,310.00
Add: Depreciation	£ 3,877.71	£ 4,167.58	£ 4,479.11	£ 4,813.94
Less: increase in Working Capital	£ 17,365.90	£ 19,162.18	£ 21,144.26	£ 23,331.37
Add: Decrease in Capex & WIP	£ 3,772.82	£ 3,733.06	£ 3,693.73	£ 3,654.80
Free Cash Flow to Firm	£ (3,948.05)	£ 19,653.58	£1,52,745.82	£ 8,73,447.37
Terminal Growth Value				-\$2,60,304.12
Number of Years				
Discount Factor (10%)	0.907	0.822	0.746	0.676
PV to FCFF	£ (3,580.88)	£ 16,155.24	£1,13,948.38	£ 5,90,450.42
Terminal Growth Value				£ (1,75,965.59)
Enterprise Value	£ 86,904.00			
Less: Total Debt	£ 39,113.00			
Add: Cash	£ 10,084.00			
Equity Value	£ 57,875.00			
Share Capital	£ 1,007.00			
Face Value	1			
No. of Shares	100700000			
Share Price	£ 57.47			

In order to calculate the intrinsic value of each share various factors has been taken into consideration (Jumran and Hendrawan 2021). By use of discounted cash flow, the Intrinsic value of each share for the company stands at ₹ 57.47.

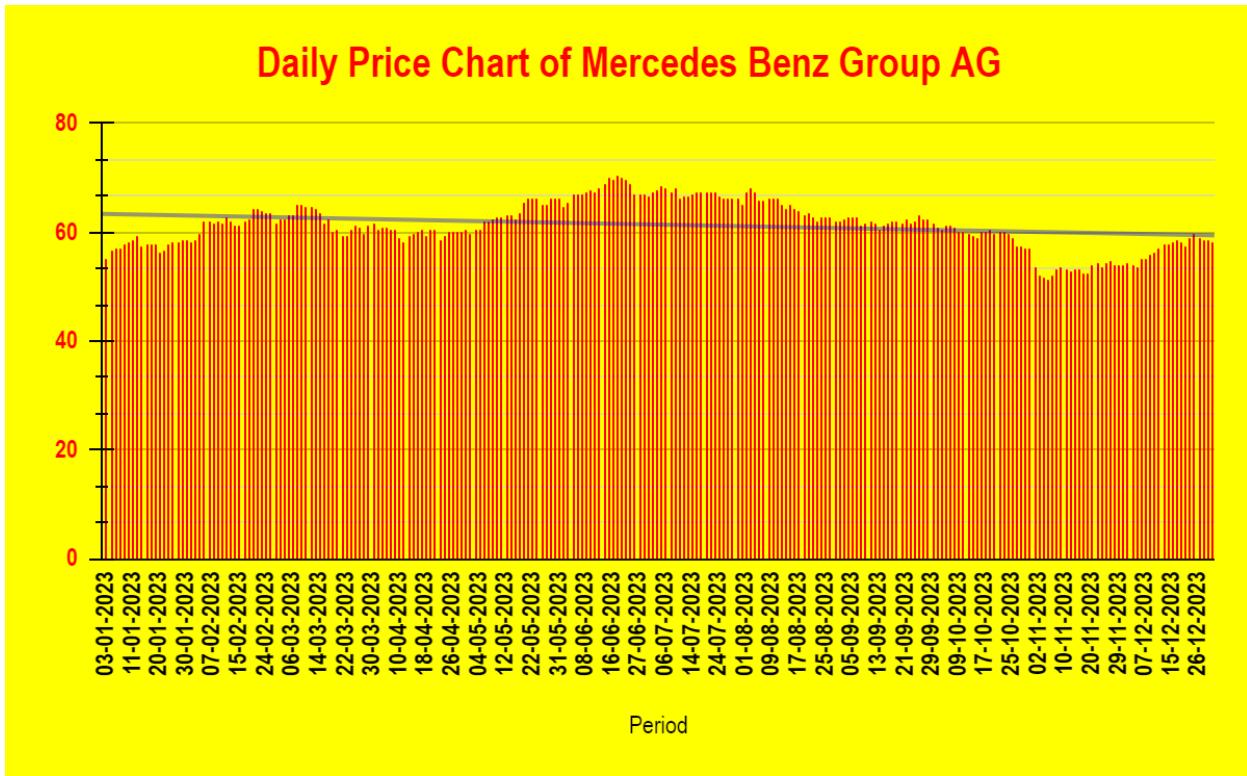
- **Weighted Average Cost of Capital (WACC)**

Calculation of Weightage Average Cost of Capital of Siemens, 2023	
Element	Value (m)
Total Debt	£39,113.00
Total Equity	£47,791.00
Interest Expenses	£ 1,075.00
Tax Rate	22%
Total Capital	£86,904.00
Weightage of Debt	£0.45
Cost of Debt	2.75%
Weightage of Equity	£0.55
Cost of Equity/ CAPM	2.25%
WACC is calculated using the formula given below:	
WACC = Weightage of Equity * Cost of Equity + Weightage of Debt * Cost of Debt * (1 - Tax Rate)	
WACC	2.20%

The weighted average cost of capital for the company stands at 2.20%. It reflects that the company has secured financing for its operation and investments simultaneously. It reflects that they have lower cost for both debt and equity financing. This has translated into profitability and opportunity for growth. The favourable financing environment also offers them the opportunity to invest in research and development. It also simultaneously offers them the opportunity to expand efficiently.

Mercedes-Benz Group AG (automotive manufacturer)

- Description of daily prices



The daily prices for Mercedes Benz group reflect that the stock experiences fluctuations. The stock has experienced volatility. Hence, they have transitioned between upward and downward movement continuously. One of the most important factors in the upward trend has been strategic business decisions and positive earnings reports. However, the company has exhibited stabilization in recent times.

- **Risk Analysis**

The return for Mercedes Benz ranges from -0.036 to 0.030. It reflects that the company experiences volatility in its performance (Dichev and Zheng 2024). It is also a reflection of the degree of risk associated in this particular investment.

- **Return Analysis**

In case of returns also the company experiences the same pattern of fluctuations. The degree of variability in return reflects the amount of risk associated with investing in Mercedes-Benz.

- **Beta**

	Remarks	Result
<u>MBG.DE</u>	BETA	0.067689916
	MEAN	61.40935648
	SD	4.249279146
<u>GDAXI</u>	MEAN	15649.88984
	SD	499.1739191
	Covariance	915.3422491
	Corelation	0.432401001
Observations	n	250

The beta value for Mercedes Benz is 0.0677. This reflects that the return of the stocks is less volatile in comparison to the market. Hence the company is less sensitive to the market movements. This offers the investors an opportunity to invest in a low-risk stock. It also simultaneously means less returns during volatile movements. Hence this is a conservative investment option.

- Covariance and correlation Analysis

Calculated by Formula	
Remarks	Result
Covariance	919.018322
Correlation	0.43326841

The covariance between Mercedes Benz and market index is 919.02 (Ouyang *et al.* 2020). This positive value reflects that the stock return moves in direction with the market movement. The correlation coefficient stands at 0.433. This reflects a moderately positive relationship between the two. It also simultaneously reflects that the performance of Mercedes Benz is not strongly dependent on market movement.

- Cash Flow forecast using DCF approach and intrinsic value

Free Cash Flow (FCFF) to firm				
	2024	2025	2026	2027
EBIT	£ 5,613.00	£ 1,506.97	£ 404.59	£ 108.62
Tax Rate	28%	28%	28%	28%
EBIT * (1-Tax Rate)	£ 4,041.36	£ 1,085.02	£ 291.30	£ 78.21
Add: Depreciation	£ 6,719.70	£ 6,776.87	£ 6,834.54	£ 6,892.69
Less: increase in Working Capital	£ 24,577.19	£ 27,967.31	£ 31,825.07	£ 36,214.96
Less: increase in Capex & WIP	£ 8,440.01	£ 12,944.54	£ 19,853.19	£ 30,449.06
Free Cash Flow to Firm	£ (22,256.14)	£(33,049.97)	£(44,552.42)	£ (59,693.12)
Terminal Growth Value				\$18,48,867.80
Number of Years				
Discount Factor (10%)	0.907	0.822	0.746	0.676
PV to FCFF	£ (20,186.32)	£(27,167.07)	£(33,236.11)	£ (40,352.55)
Terminal Growth Value				£ 12,49,834.63
Enterprise Value	£2,01,454.00			
Less: Total Debt	£1,08,638.00			
Add: Cash	£ 15,962.00			
Equity Value	£1,08,778.00			
Share Capital	£ 3,070.00			
Face Value	1			
No. of Shares	307000000			
Share Price	£ 35.43			

By using the DCF method, it has been found that the intrinsic value of each share of Mercedes Benz stands at ₹ 35.43. This analysis will empower the investors to make a detailed decision regarding buying or selling the shares accordingly.

- Weighted Average Cost of Capital (WACC)

Calculation of Weightage Average Cost of Capital of Mercedes Benz Group, 2023	
Element	Value (m)
Total Debt	£1,08,638.00
Total Equity	£ 92,816.00
Interest Expenses	£ 254.00
Tax Rate	28%
Total Capital	£2,01,454.00
Weightage of Debt	£0.54
Cost of Debt	0.23%
Weightage of Equity	£0.46
Cost of Equity/ CAPM	0.27%
WACC is calculated using the formula given below:	
WACC = Weightage of Equity * Cost of Equity + Weightage of Debt * Cost of Debt * (1 - Tax Rate)	
WACC	0.22%

The Weighted Average Cost of Capital for the company is 0.22%. This reflects that the company can acquire financing for its operation and investment at a very minimal price (Steffen, 2020). It is a reflection of very limited expenses on both fronts. Hence the company has been able to make investment in strategic initiatives, product development.

Financial structure ratio analysis

Mercedes Benz

The company has a ROA of 5.52%. The Current Ratio is 1.26. The company has moderate profits and manageable liquidity position. The debt-to-equity ratio (2.08) reflects that the company is inclined towards debt financing. The settlement period for Receivable is 17 days and reflects efficient management. However, the inclination towards debt is an area of concern (Ouyang *et al.* 2020).

Siemens SE

The ROA of the company is merely 4.29%. It indicates that the company has relatively low profit in comparison to Mercedes. The Current Ratio is 0.49 clearly indicates liquidity crisis. The Debt-to-equity ratio of 1.63 reflects moderate inclination towards debt financing. The 82 days Settlement Period for Receivable is a cause of concern.

SAP SE

The ROA of the company is 8.73. It is a reflection of the highest profitability amongst all the four companies. The Current Ratio of 1.40 indicates a comfortable liquidity position. They have a very minimal dependency (0.8) on debt financing. The Settlement Period for Receivable is 2 days. The strong financial performance reflects that the company has efficient management at place.

Allianz SE

The company ROA is even less than Siemens SE. They incur a low profit of 0.92%. The current ratio of 1.08 reflects they have a manageable liquidity position. The Debt-to-equity ratio is 0.89. It reflects that the company is inclined towards debt financing moderately. The Settlement Period for Receivable is 99 days. This slow payment is an area of concern for Allianz SE (Dichev and Zheng 2024).

Hence the analysis reflects varied financial performance of each company.

CONCLUDING REMARKS

The analyses of the four companies offered a detailed understanding of their risk profiles, return potential and market behaviour (Bayar *et al.* 2020). It has been observed that each company has their unique characteristics. Any investor who is willing to diversify their portfolio then consider the four stocks. It will help them to mitigate risk and simultaneously enhance their returns.

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APPENDIX

Ratio Analysis	Mercedes Benz	Siemens SE	SAP SE	Allianze SE
Element	2023	2023	2023	2023
Profitability Ratio				
Return on Assets (ROA)	5.52%	4.29%	8.73%	0.92%
Net Income	£ 14,531.00	£ 4,460.00	£ 5,964.00	£ 9,032.00
Total Assets	£ 2,63,022.00	£ 1,03,884.00	£ 68,335.00	£ 9,83,174.00
Liquidity Ratio				
Current Ratio	1.26	0.49	1.40	1.08
Current Assets	£ 1,04,032.00	£ 31,274.00	£ 20,571.00	£ 9,03,884.00
Current Liabilities	£ 82,434.00	£ 63,417.00	£ 14,642.00	£ 8,33,457.00
Solvency Ratios				
Debt-to-equity	2.08	1.63	0.08	0.89
Debt	£ 86,614.00	£ 34,843.00	£ 3,521.00	£ 56,282.00
Equity	£ 41,622.00	£ 21,422.00	£ 43,406.00	£ 63,580.00
Efficiency Ratio				
Settlement Period for Receivable	17	82	2	99
Trade Receivables	£ 7,281.00	£ 17,405.00	£ 203.00	£ 24,719.00
Sales Revenue	£ 1,53,218.00	£ 77,769.00	£ 31,207.00	£ 91,251.00