III Group plc

(The amount is in billions)

Contents

Part A: Overview of 3I GROUP Plc.

Introduction:

3i is an investment company specialising in Private Equity and Infrastructure. **(Annual report 2023, Pg 4)**. We invest in firms in our key investing areas of northern Europe and North America through our Private Equity division, typically at an enterprise value of between **€100** million and **€500** million at purchase. In the following industries, our teams make investments: Services in Business and Technology, Healthcare, Consumer Industrial, Technology (Annual report, 2023, Pg 5) As of February 20, 2023, 3i group plc had a market capitalization of **23.893** billion GBP, with 973,362,957 shares in circulation at a price of **2,454** GBX. **(yahoo finance)**

(Source: Financial times)

Strategic Assessment: Analysing the Company's Strengths, Weaknesses, Industry Position, and Future Prospects.

Strength: 3i has a lengthy and prosperous history of making investments in infrastructure and private equity. With more than 70 years of experience, the company is well-known for producing profits for its owners.3i is dedicated to funding businesses that are environmentally and socially responsible, as well as those that are sustainable**(Annual report,2023,pg 50)** A group of seasoned investors with extensive knowledge of the infrastructure and private equity markets makes up 3i.

Weakness:

3i Group plc maintains a more focused investment strategy compared to its competitors, emphasizing private equity and infrastructure. In contrast to competitors that invest across various sectors, this specific focus may constrain diversification efforts and limit exposure to potentially lucrative opportunities in other high-growth areas **(Annual report,2023,portfolio section)**. 3i may possess lower brand recognition and public awareness, potentially diminishing its appeal to prospective investors and co-investors **(3I group plc website, news & events section)**.Although 3i has invested in certain technology companies, it lacks the same degree of specialization and expertise in the technology sector as some other firms**.(3I group plc website, portfolio section)**

Current industry position: 3i Group may be an undervalued company because it trades below the P/E for its industry. Although it offers a unique specialisation, their emphasis on infrastructure and private equity may limit diversification. Investor analysis may be hampered by information that is not as easily accessible as it is for some competitors.

Opportunity: Fintech, cybersecurity, and robotics are a few industries where increased use of AI, automation, and digitalization may open up new investment opportunities. Growing interest in infrastructure investment, particularly in digital infrastructure and renewable energy, may offer prospects for 3i's current experience in these fields. Forming strategic alliances with other financial institutions, business leaders, or IT organisations may open up new doors and quicken expansion.

Future challenges: The markets for infrastructure and private equity are extremely competitive. To secure business and provide profits for its investors Uncertainty in the economy is another challenge Growing interest rates and, 3i must keep setting itself out from its rivals. inflation is only two of the problems the world economy is currently confronting.

Part B- Share Valuation

Evaluating share valuation is crucial for making informed investment decisions. By comparing the market price to the intrinsic value of a company, 3i can assess the financial viability of potential acquisitions or divestments. A robust share valuation also streamlines access to capital through more cost-effective equity offerings, enabling 3i to explore new opportunities and broaden its portfolio.

A high share price is indicative of investor confidence in the company's future and management capabilities, bolstering 3i's reputation and attracting potential business partnerships. Furthermore, the appreciation of share prices serves as a significant source of return for long-term investors. A company with a consistently increasing share valuation translates to expanding capital gains for its investors.

This section has rightly considered four critical factors in the context of share valuation:

Dividend discount modal -The dividend discount model (DDM) is a valuation approach utilized to gauge the inherent value of a stock by evaluating the present value of its forthcoming dividend payments. Put plainly, it aims to ascertain the current value of a stock by aggregating all anticipated dividends an investor expects to receive over time, while factoring in the time value of money. McClure, Ben. "Digging into the Dividend Discount Model." **(McClure). (Gordon)**

The financial analysis involves a planned six-year timeline (2024-2029) with projected dividends and rates of return sourced from the Bloomberg terminal. The assumption is made that the rate of return for 2029 is equivalent to the cost of equity (ke). Due to a lack of specific information for 3i Group plc in 2028 and 2029, it is presumed that both the dividend payment and the rate of return will mirror those of the year 2027. This estimation technique relies entirely on utilizing unique present value factors for each year in question to compute individual present values. According to the Fernandez report dated February 16, 24; the risk free is **3.90%**, and the beta is 1.2151. The Rm-Rf is also taken from the same source, at 6%. Using Rm+(Rm-Rf)*B equal to **11.190%**, the cost of equity (ke) may be calculated. Consequently, **76.18250** is the terminal value according to the following computation. Given that the firm's present worth is determined by

$$P_0 = \sum_{t=1}^{t=5} D_t \frac{1}{(1+r)^t} + P_5 \frac{1}{(1+r)^5}$$

The summation of all present values altogether provides the firm's value of GBP **47.56** billion. The share is underpriced when MV < IV. An investor who purchases shares at a discount will profit from a higher rate of return than what is necessary for the share.

The effectiveness of the DDM is contingent on various assumptions, such as the company's capacity to sustain steady dividend growth and the precision of the estimated discount rate and future dividend growth rate. This model may not be appropriate for companies that do not distribute dividends or exhibit irregular dividend payout patterns.

Earnings and investment modal –

This model predicts a company's forthcoming earnings per share by making assumptions about its future performance. The assumption is that the rate of return for 2029 matches the cost of equity (ke). Because there's insufficient information available for 3i Group plc in 2028 and 2029, it's assumed that both the dividend payment and the rate of return will be the same as those in 2027. This estimation method relies solely on using specific present value factors for each relevant year to calculate individual present values.

As calculated in excel sheet the PVF

$$P_0 = E_1 \frac{1}{r} + \sum_{t=1}^{5} NPV_t \frac{1}{(1+r)^t}$$

The values for 2024, 2025, 2026, 2027, and 2028 are **0.8994, 0.8088, 0.7274, 0.6542, and 0.5884**, respectively and the contribution of assets amounts to 35.51, with a firm value of GBP **47.56** billion. The interpretation suggests that both the earnings and investment model and the dividend discount model yield the same firm value. However, this alignment is solely due to the maintained assumptions. In practical terms, both models may not accurately represent the situation, indicating potential inadequacies for investors seeking to comprehend the company's current market position.

Followings would be the relevant assumption Future Market Conditions: A particular economic environment, including inflation, interest rates, and general market expansion, is frequently assumed by models.

- **Business Performance:** Predictions are made on the company's anticipated future earnings, expenses, profit margins, and other financial variables.
- **Investment Performance:** Certain returns on investments, like growth rates in the stock market or bond interest rates, may be assumed by models.
- **Discount Rate:** To reduce future cash flows to their present value, this rate is utilised, which considers the time value of money.

Price earnings (P/E)- The P/E ratio serves as a valuable tool for investors in making well-informed decisions, yet it is crucial to grasp both its strengths and limitations before depending solely on it. This metric, widely utilized in stock valuation, involves comparing a company's market price-to-earnings ratio with its earnings per share (EPS). By comparing a company's P/E ratio with those of its industry competitors, investors gain insight into the company's share valuation relative to its industry peers. This comparison provides a deeper understanding of the company's future position within the industry, aiding in making informed decisions regarding P/E valuation.

After comparing 3i Group plc with industry competitors such as Schroders, M&G plc, Ninety One plc, and Janus Henderson Group, the estimated share price for 3i Group plc, derived by multiplying the estimated EPS by the estimated P/E ratio, amounts to **2407.84**. In contrast, the industry P/E valuation, calculated by multiplying the estimated EPS by the industry P/E ratio, results in **3999.6** for the year 2024. This significant difference indicates that, at least for 2024, the industry peers have a higher P/E valuation compared to 3i Group plc.

Upon further analysis, extending this trend into the forecasted period reveals a consistent pattern: the industry's P/E value remains higher than that of 3i Group plc. Consequently, it is inferred that 3i Group plc is undervalued in comparison to its industry peers. Investors might find the shares of its competitors more attractive based on the relative pricing information, suggesting a potential preference for investments in the shares of its competitors over 3i Group plc.

The industry's P/E ratio surpassing that of 3i Group plc can be attributed to various reasons.

- **Risk Assessment** :In many cases, the P/E ratio ignores important risk variables, like debt levels and market fluctuations. An elevated P/E ratio might arise from investors' willingness to pay a premium if industry peers are thought to possess more stable financial structures or lower risk.
- **Future Growth Expectations**: Investors may be expecting greater growth in the future from competitors in the industry than from 3i Group plc. A higher industry P/E ratio may result from investors' willingness to pay more for those companies' future profits growth as a result of this bullish forecast.
- **Investor Confidence**: P/E ratios can be impacted by perceptions of managerial effectiveness, corporate strategy, and investor confidence. Investors may give industry peers' businesses larger valuations if they believe their management teams or strategy are stronger.

- **Market Dynamics**: P/E ratios can be impacted by macroeconomic factors as well as external market pressures. The observed changes in valuation multiples could be attributed to many factors such as industry-specific factors, interest rates, and economic situations.
- **Consistent accounting practices** :Fair comparisons across industries are made possible by the assumption that businesses use consistent accounting procedures.

In terms Revenue :3i Group Plc lost **350** billion during the COVID-19 pandemic in 2020. Following that, 3I Group Plc aggressively returned, increasing its revenue to **4113** billion in 2022, **4736** billion in 2023, and **4669** billion as of right now.

Company	Market cap	Earnings per share	Return on assets	Return on equity	Total debt
3i group plc	23.77b	0.556	25.48%	27.62%	0.0674
Schroders plc	6.41B	0.2852	2.04%	10.69%	1.18B
M & G PLC	132.46m	0.0267	5.04%	5.20%	144.22m
Ninety one plc	1.52 b	3.52	1.48%	46.86%	0.2947
Janus Henderson group	5.19b	-1.77	6.70%	8.55%	1.455

(sources is financial times)

Following is the value of 3i group plc with its competitors. In terms of market cap, earnings per share, return on assets , return on equity, total debt .it is assumed conclude that due to increase in all above value ,3i group plc p/E valuation modal is underpriced in comparison with its competitors.

Recommendation-

The primary factors contributing to the variance between DDM, E&I, and P/E models are: Firstly, the P/E model solely relies on EPS and P/E ratio of 3I Group PLC and its competitors, while DDM and E&I models primarily focus on terminal value derived from RF, Rm-Rf, and beta. Secondly, DDM emphasizes dividend payout ratio, whereas E&I model emphasizes net income value. Thirdly, historical prices often diverge from actual calculations. Additionally, interest rates and inflation rates significantly impact model discrepancies. Elevated interest rates typically result in an increased discount rate, reducing the present value of anticipated future cash flows and consequently lowering the intrinsic value.

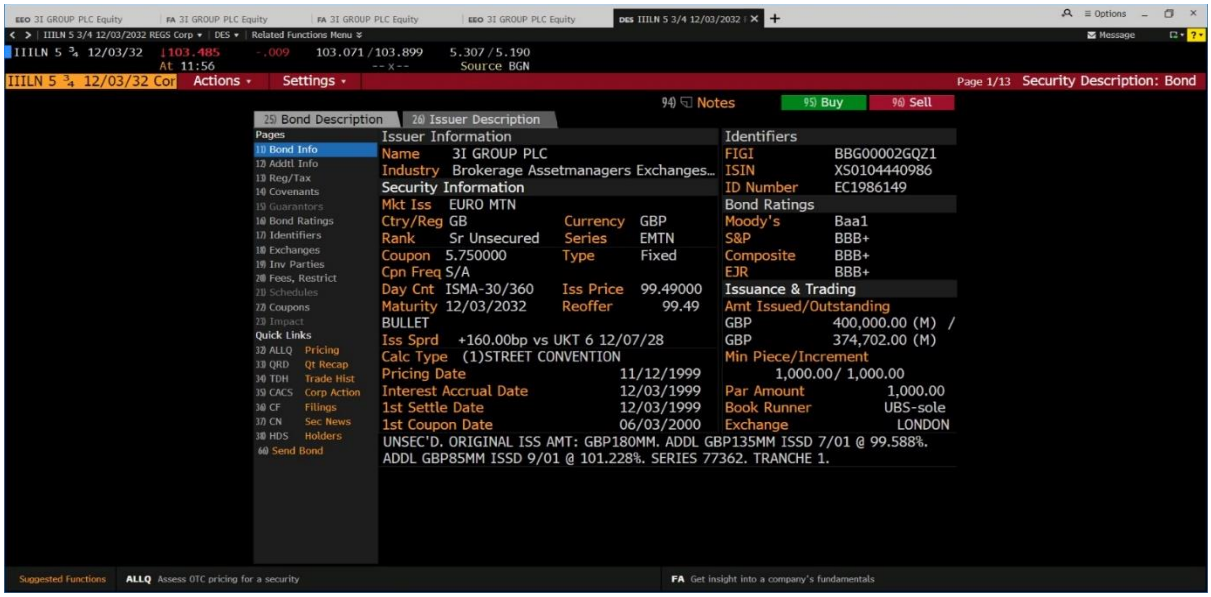
Suggestion to investor: To validate the intrinsic value of the three models, considering the current market price of **£2475** as of February 16, 2024. In both **DDM and E&M** models, IV exceeds MP, i.e., **£4940.50 > £2475**, indicating the stock is undervalued. Investors stand to gain a potential upside of 49% **[(£4940.50 - £2475)/£4940.50]** under the current market conditions. **For P/E Multiple valuation**, IV surpasses MP, with **24.7612 > 24.52**, signifying the stock is undervalued. Investors could potentially enjoy a higher return with an upside potential of 1% **[(24.7612 - 24.52)/24.7612]**.

As a financial analyst, my recommendation to investors would be to buy the shares, considering the undervaluation indicated by the intrinsic value calculated through the three models. The current under-pricing suggests the potential for substantial future gains, making the stock a prospective multi-bagger.

Part C- Bond Valuation

1)Estimation of the market value of the bond-

The bond's projected price on settlement date, which is January 31, 2024, is **104.28**. The bond's maturity date is March 12, 2032. With semi-annual coupon payments and a face value of 100, this bond is taken with a high relevancy. The yearly coupon rate is 5.75%, and the yield to maturity would be 5.07%. The price according to the Bloomberg terminal's yield and spread (YAS) function is **104.586** (price amount), which differs by **0.306** due to the settlement date being estimated to be January 31, 2024. This equally justifies that the bond's face value, market value, or par value is expected to be 104.28 upon maturity on March 12, 2032.



2) Based on the computations (Excel sheet), the following scenarios indicate that an investor should expect a **4%** return over a one-year holding period:

Increase of 1%:

A rise in yield to maturity of 1% usually means a lower return for the investor. Throughout the holding term, investors earn a negative return of -3.26%, which is significantly less than their 4% anticipation. The bond's price decreases from **104.28** to **98.01** over the holding period. However, the bond's price drops to **97.79** if kept until maturity, discouraging investors from making an investment.

Increase of 0.5%:

Returns to investors usually increase by 5% Further, the yield to maturity rises by **0.05598084**. Investors make an adequate 2.43% profit during the holding period, which falls short of the 4% necessary returns. Nevertheless, During the holding period, the bond's price dropped from **104.28** to **100.87**. However, if held to maturity, the identical bond's price grew to **141.69**, making the investment incredibly costly.

No Change: while the yield to maturity, or 5.09% YTM, remains unchanged. Over the course of a one-year holding period, investors typically make 2.34%. During the holding term, the bond's price drops from **104.28** to **103.84**. Since 2025 would be the ideal year to invest.

Decrease by 0.3%:

Investors found the bond more attractive as its current price dropped from **104.28** to **101.94** because of a 0.3% YTM loss. The investor still earns 4.09% returns for the holding term at a price of **105.67**, nevertheless, if the price is disregarded. An inverse relationship exists between the bond price and the YTM. When bond prices rise, they become more appealing to investors; conversely, when bond prices fall, they rise and become overpriced.

In each of the previously mentioned scenarios, an investor expecting a 4% increase in profits is more optimistic. Calculations indicate that engaging in this investment opportunity will lead to better overall returns, considering both capital gains and yield gains.

when faced with the choice of two out of the four scenarios, opting for the no change scenario and a 0.30% decline in the yield to maturity rate seems to be the most prudent decision. This choice yields positive annual holding period returns of 2.34% and 4.09%, respectively.

3) This inquiry pertains to the modified duration of a bond, serving as a foundational metric for assessing the correlation between yield fluctuations and the estimated bond value in each scenario. The analysis encompasses four predetermined conditions involving interest rate variations that significantly impact the annual holding period return. Additionally, the examination considers the relationship between modified duration and the dynamic changes in bond values resulting from fluctuating yield rates. Specifically, rising yield rates contribute to a decline in bond value, and conversely, decreasing yield rates lead to an increase in bond value. Therefore, considering these factors, adjustments in annual holding period return rates can be analysed. The modified duration was determined to be 6.33 when there was a modification in the yield rate

4) Modified duration quantifies the percentage variation in a bond's price in response to a 1% adjustment in its yield to maturity (YTM). This metric proves more practical in real-world scenarios compared to Macaulay duration, which represents the weighted average time to receive all bond cash flows.

Modified duration serves as a formula expressing the impact of interest rate fluctuations on a security's value. Its primary advantage lies in its direct correlation with bond prices, requiring investors to be aware of a bond's duration. The relationship is straight forward, the higher the bond's duration, the greater its price volatility.

A greater duration implies a more substantial price fluctuation in response to a given movement in interest rates. Long-term bonds exhibit higher durations in comparison to their short-term counter parts. There exists an inverse relationship between bond prices and interest rates. As interest rates rise, bond prices tend to decrease, and conversely, when interest rates decline, bond prices typically increase. **(Hayes, 2021)** Nevertheless, the effectiveness of the modified duration of a fixed-income security diminishes when predicting price sensitivity to substantial shifts in interest rates. Despite these limitations, both Modified and Macaulay duration remain valuable tools for portfolio managers, aiding them in assessing bond volatility and associated risks.

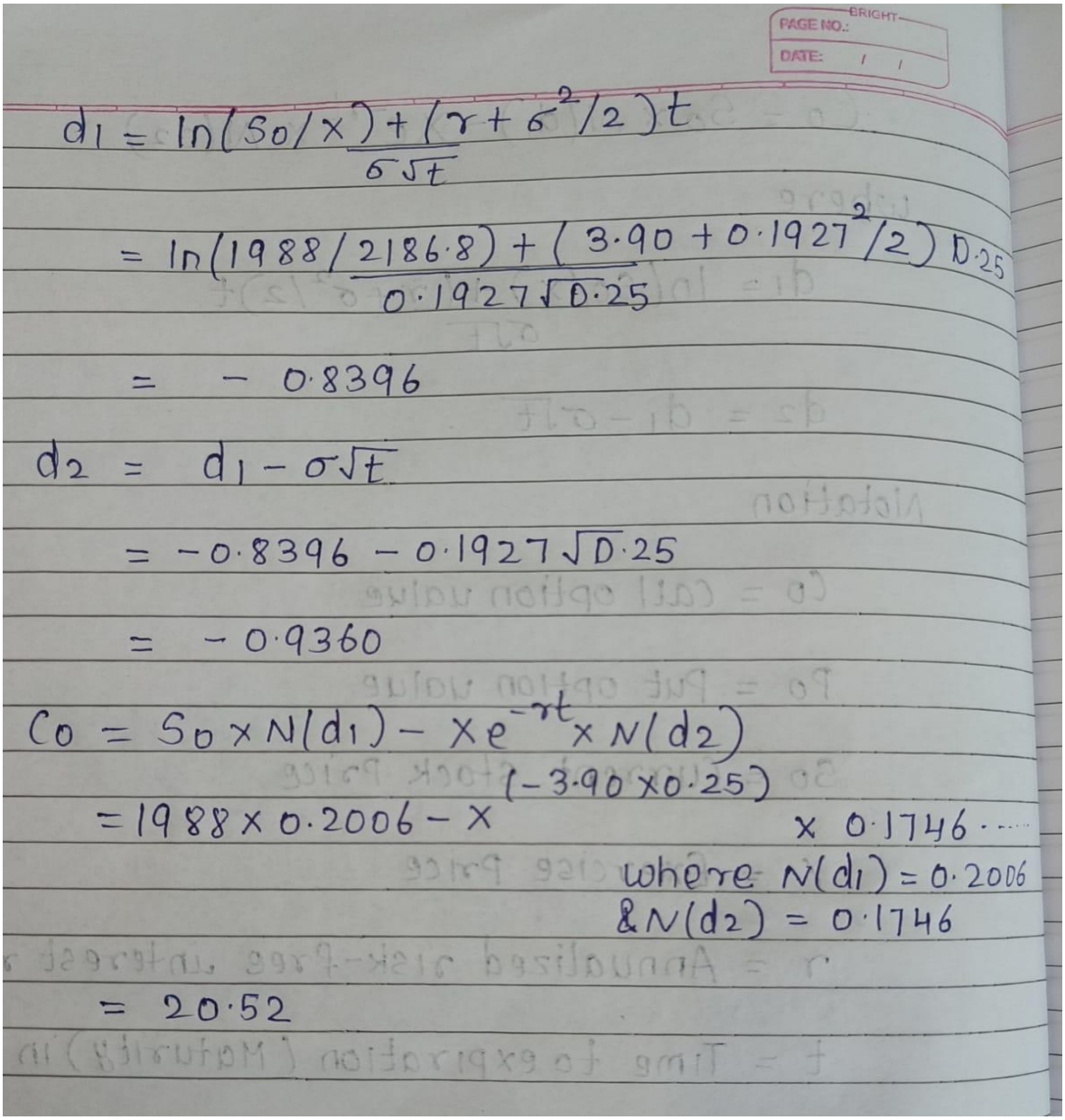
When attempting to forecast changes in bond prices, it is important to remember that modified duration has certain limitations.

- **Non-linear Relationship:** The modified duration model relies on a linear bond price-interest rate relationship, which works well for minor adjustments but underrepresents price fluctuations in more significant movements**. (Lioudis)**
- **The modified duration approach ignores convexity:** which is the price-yield relationship's curve. Price fluctuations are more pronounced for bonds with higher convexity. **(Corporatefinanceinstitute, Modified duration 2023)**
- **Embedded Options:** Because of their increased complexity, bonds with embedded options, like callable bonds, provide difficulties for modified duration. **(Chen,2019)**
- **Market frictions:** While operating in a perfect market, modified duration ignores real-world elements that can affect price fluctuations in diverse ways, such as transaction costs and liquidity.
- **Limited Scope:** Modified duration has a restricted focus on interest rates, overlooking important factors like credit risk, default risk, and macroeconomic events, all of which can have substantial effects on bond prices.

Part D- Option Valuation

1)To do this, the price of the call option must be estimated to be 10% greater than the price of the company's shares on the day of purchase. As of 1 November 2023, the investors purchased the stock. This is how much is estimated.

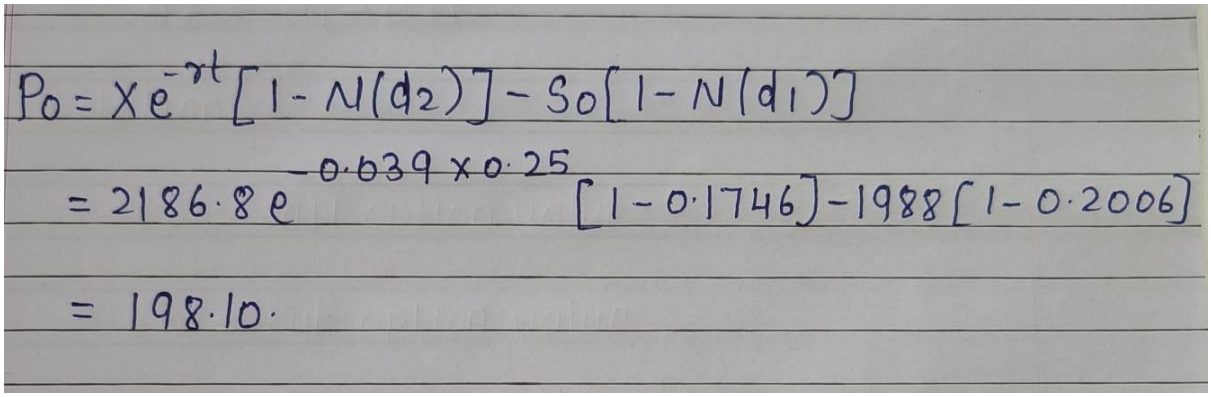
- Purchase date – 1st November 2023
- Maturity date – 31st January 2024
- Current price extracted – **1988.00**
- Exercise price – 10% above the current price i.e., **2186.80**



As a result, the call price when the current stock price is 10% higher is **20.52** as shown in the above calculation (EXCEL SHEET TOO)

2) To do this, the price of the Put option must be estimated to be 10% greater than the price of the company's shares on the day of purchase. As of 1 November 2023, the investors purchased the stock. This is how much is estimated.

- Purchase date – 1st November 2023
- Maturity date – 31st January 2024
- Current price extracted – **1988.00**
- Exercise price – 10% above the current price i.e., **2186.80**



The assessed historical prices indicate a put option value of **198.10**, surpassing the corresponding call option price. These fluctuations highlight the potential to navigate both upward and downward price shifts effectively. The mentioned price pertains to a European put option, aligning closely with the generated call option estimates.

3)Put-call parity asserts that the total cost of holding a long call option and simultaneously shorting a put option, both possessing identical characteristics as described earlier, is equivalent to the cost of entering into a forward contract for the same underlying asset, featuring matching strike price and expiration date. **(Chen,2022)** This correlation is present because, irrespective of market fluctuations, the combined portfolio (long call + short put) replicates the identical economic consequences as a forward contract upon expiration Should the underlying asset's price surpass the strike price, the call option yields profit, simulating the purchase of the asset at the strike price in the forward contract. Conversely, if the underlying asset's price declines below the strike price, the put option generates profit, mirroring the sale of the asset at the strike price in the forward contract.

The key factor in put-call parity is a confirmation of the no-arbitrage principle. If there are any deviations from the specified conditions in this parity, it may prevent arbitrage opportunities. In this instance, the put-call parity is calculated to be **2186.101**. The computed sum of the put option and the stock price is **2186.101** according to the Excel sheet. This result affirms that there is no opportunity for arbitrage, indicating that investors cannot generate any profits through this method.

Following would be the assumption that would be applicable to put call parity.

- Exercise price is Price at which the option holder can buy (call) or sell (put) the underlying asset is being constant for sell and buy options. Until the option expires, the asset value is fixed.
  The risk-free rate is kept at 3.90% for both puts and calls.
- The 3i group plc hasn’t announced a dividend for the previous three months. Thus, it is not factored into the computation.
- The Black-Scholes model relies on the European option framework, disregarding the potential for early exercise. In the case of an American call option tied to a non-dividend yielding stock, the expectation is that early exercise is improbable, rendering it functionally equivalent to a European option.

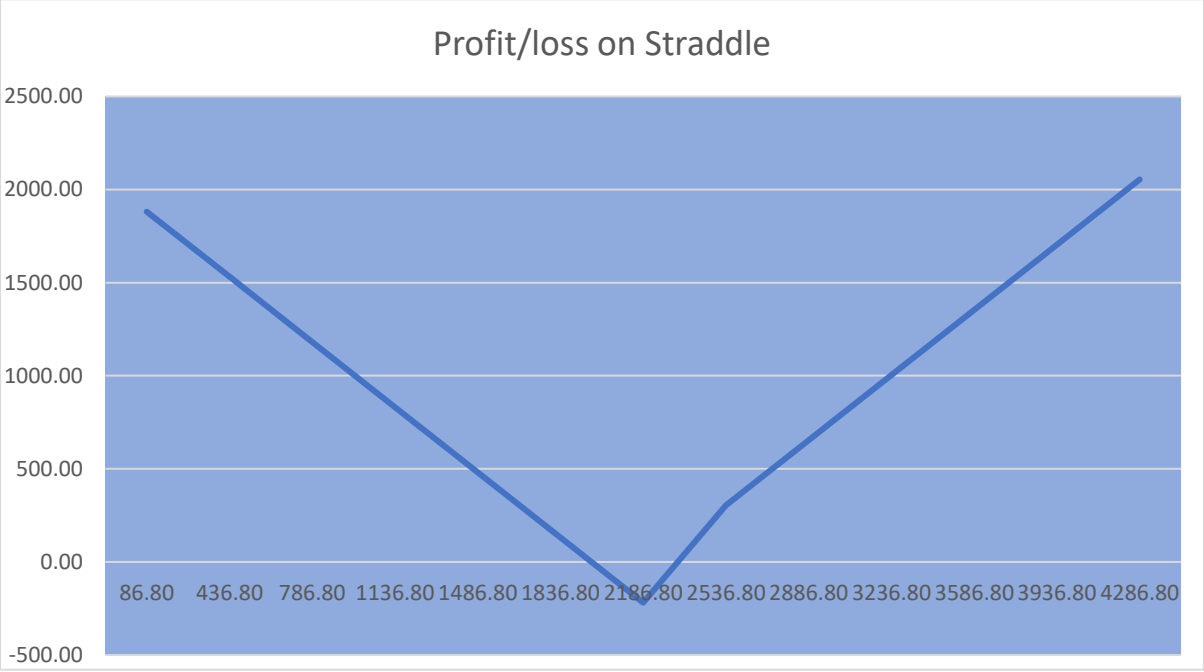
As compared with Bloomberg the strike price is identified as **2186** close to 2200. I am considering as 16 February for justification of the call and put option price. The call option (20.52) aligns with the strike rate of 2200 in range of **12,50** TO **21.25** However put call option doesn't matched due to various reasons such as the volatility of the underlying asset, Time remaining until expiration, Interest rates. Hence the concept of goal seek comes, Goal Seek can help you analyse specific scenarios by setting the option price as the target value and then adjusting other variables to see what values would lead to that specific price. by adjusting these factors in Goal Seek and observing the corresponding changes in the option price, you can gain a better understanding of the sensitivity of the option to each factor. when the excel function of goal seek is implied for put call then the put get matched with the strike price of 2200 with the range of **216.25** to **258** but the value of call changes to 80.

Market risk pertains to the inherent unpredictability and fluctuation observed in financial markets. The prices of options are dynamic, responding to evolving market conditions and new information. Despite the accuracy of a valuation model at a specific moment, the real option price may diverge from the model's forecast owing to unforeseen shifts in the market.

4) The client is anxious about her call and put options purchased in equal amounts. She is equally interested in understanding the potential profit or loss from both the call and put options, aiming to gain insights into future market trends and manage her existing investment portfolio effectively.

The investor is keen to determine whether she can exercise the call or put option. In my analysis, given that the maturity price is less than the exercise price, it implies that exercising the put option would result in a substantial loss. Specifically, if the investor chooses to exercise the put option, she will incur a significant loss. On the other hand, exercising the call option would lead to a loss of **-289680**, calculated by subtracting the exercise price from the maturity price and adding the call option value, multiplied by 1000 calls. Therefore, based on my assessment, I would advise the investor against exercising either option.

The following is the straddle explained the investors will earn profit or loss.



The causes of straddle loss are discussed below

Implied volatility (IV) is a crucial idea in options trading. It shows how much the market expects the price of the underlying asset to change in the future. When prices have been moving a lot recently, or if they've been unpredictable, implied volatility tends to go up. If people really want a specific option, its price and implied volatility increase. On the flip side, if there's not much interest, implied volatility goes down. When things are uncertain, or the economy is shaky, implied volatility usually rises as investors are willing

to pay more to protect against unexpected market moves. This shows how an option's price reacts to changes in implied volatility **(Ganti)**

Both call and put options are equally affected by changes in implied volatility, but options with higher implied volatility are generally more responsive to further changes than those with lower implied volatility. The speed at which options lose value over time is faster for options that are close to the current market price (at the money or ATM) compared to those that are further away (out of the money or OTM). This can make OTM options seem more stable because their value doesn't decrease as quickly over time. **(Schwab.com)**

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