Dynamic Asset Allocation Strategy:

Application on a Portfolio and Comparison with Other Investment Strategies

Course Name: Financial Derivatives

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A Report on

"Dynamic Asset Allocation Strategy: Application on a Portfolio and Comparison with Other Investment Strategies"

Submitted to

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Chapter 1: Introduction

1.1 Background of the Study

Portfolio management is one of the most important fields of financial decision making in the recent years, with investors always aiming at increasing returns as they reduce risks. As the financial markets become more unstable and less predictable, the prominence of derivatives instruments and dynamic asset allocations strategies has become astonishingly prominent. Dynamic Asset Allocation (DAA) strategy is a flexible investment strategy which varies the portfolio weight of risky and risk-free assets according to the market. It has a basis on the major principles of Modern Portfolio Theory (MPT) and the Option Pricing Theory (OPT) that combined contribute to the rational decision-making process in the context of uncertainty.

As the largest capital market in Bangladesh, the Dhaka Stock Exchange (DSE) has a great diversity of investment opportunities in various sectors. The market is however usually associated with inefficiencies, volatility, and speculative behaviour, rendering static investment strategies less efficient. Consequently, a dynamic strategy in which a portfolio will have an exposure to equity and risk-free assets will be changed at regular intervals becomes very important in the best performance. Through constant rebalancing of the risky portfolio (equities) and the risk-free asset (Treasury bills), investors can gain greater control over risk exposure whilst improving on potential gains in the upside.

The paper uses the concept of dynamic asset allocation to diversified equity portfolio involving eight listed companies on DSE that represent significant sectors of the Bangladeshi economy. The selected equities consist of: United Commercial Bank Ltd (UCB), IDLC Finance Ltd (IDLC), Grameenphone Ltd (GP), Bata Shoe Company (BATASHOE), Renata Ltd (RENATA), Walton Hi-Tech Industries Ltd (WALTONHIL), RAK Ceramics (RAKC) and Olympic Industries Ltd (OLYMPIC). The 91-day Bangladesh Government Treasury Bill is a risk-free asset and depicts short-term yield of sovereign risks. The research timeframe is January 2024 (4Q) to September 2025 (3Q), with a daily data applied in the empirical study.

1.2 Objectives of the Study

The objectives are:

1. To construct an optimal risky portfolio of eight DSE-listed equities representing diverse sectors.

2. To integrate a risk-free asset (Bangladesh Treasury Bill) into the portfolio for dynamic allocation decisions.
3. To estimate and analyse the performance of the DAA strategy in comparison to alternative trading strategies such as:
    a. 100% Equity Portfolio (No rebalancing)
    b. 100% Risk-Free Portfolio
    c. 50–50 Fixed Asset Mix (With and Without Rebalancing)
4. To evaluate the effect of market volatility on portfolio rebalancing and return stability.
5. To develop an Excel-based implementation model for simulating dynamic asset allocation decisions in real-time.

1.3 Significance of the Study

This study will have important implications to both the individual investors and portfolios managers in the Bangladesh capital market. Dynamic strategies offer a systematic exposures management system to counter the quick changes in the market since the traditional flat investment strategies do not tend to react to the swift fluctuations in the market. As academic research, the study helps in learning how derivative based portfolio insurance like Constant Proportion Portfolio Insurance (CPPI) and option replication can be applied in a developing market such as Bangladesh. Additionally, the study also incorporates the daily price changes, dividend reacts, and Treasury bill returns that serves as an empirical framework to test the efficiency and flexibility of DAA strategies in the local market situations. The Excel-based implementation model will be an effective tool that could be deployed to investors, students, and financial professionals to simulate strategies, risk control, and portfolio optimization.

1.4 Scope of the Study

This scope of this study is limited to the performance of a dynamic asset allocation strategy where a mixed portfolio is used consisting of eight selected DSE-listed equities and one risk-free asset. The analysis includes the daily data between January 2024 and September 2025, with the main emphasis made on the price movement, dividends, and rebalancing results. Although the research focuses on the equity and T-bill assets, other types of assets like bonds, mutual funds, and foreign securities are not included in the research. The results are tested on the basis of comparative analysis with other non-dynamic or semi-dynamic trading strategies. Moreover, the analysis and implementation are fully performed with Microsoft Excel and with the focus on practical application.

1.5 Limitations of the Study

Despite careful selection of data and methodology, several limitations remain:

- The analysis period (Jan 2024 – Sept 2025) is relatively short and may not fully capture long-term market cycles.
- The study relies on historical daily price data and assumes data accuracy from secondary sources such as the DSE.
- Transaction costs, taxes, and liquidity constraints are ignored for simplification.
- Macroeconomic shocks or policy changes during the study period may influence asset behaviour, which is beyond the model's scope.
- The DAA model assumes continuous rebalancing without frictions, which may differ from real-world trading conditions.

Chapter 2: Portfolio Return, Risk, & Risk-Free Rate

2.1 Stock Selection

In this dynamic asset allocation strategy, 8 stocks are taken from 8 sectors based on the P/E ratio in 2025. 5 stocks are taken as growth stocks and 3 stocks are taken as value stocks. The weight of the investment in each stock is equal which is 12.5%. These 8 stocks are given below along with their sectors and styles.

Firm	Trading Code	Sector	P/E Multiple	Style
United Commercial Bank Ltd	UCB	Bank	23.67	Growth
IDLC Finance Ltd	IDLC	Financial Institutions	6.79	Value
Grameenphone Ltd	GP	Telecommunication	12.02	Value
Bata Shoe Company Bangladesh Ltd	BATASHOE	Tannery Industries	41.88	Growth
Renata Ltd	RENATA	Pharmaceuticals & Chemicals	24.43	Growth
Walton Hi-Tech Industries Ltd	WALTONHIL	Engineering	11.87	Value
Rak Ceramics Bangladesh Ltd	RAKC	Ceramics Sector	11.88	Value
Olympic Industries Ltd	OLYMPIC	Food & Allied	14.43	Value

Table 2.1: Stock Selection

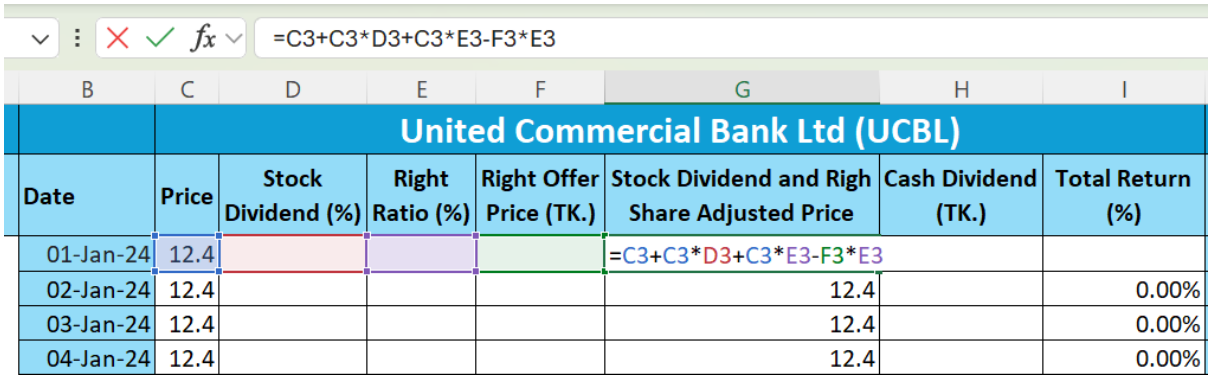
2.2 Individual Stock's Return

Stock prices have been adjusted to any corporate transactions that have an impact on outstanding number of shares (stock dividends and rights issues). This guarantees that the calculated returns are actual market performance without any dilution effects. The following are the formula used to calculate all the things in calculations of returns.

$$\text{Adjusted Price}_{\text{after rights}} = \frac{P + R \times S}{1 + R}$$

Where:

- P= Market price before the right issue
- R= Right ratio (in decimal form, e.g., 50% = 0.5)
- S= Offer price per right share



	United Commercial Bank Ltd (UCBL)						
Date	Price	Stock Dividend (%)	Right Ratio (%)	Right Offer Price (TK.)	Stock Dividend and Righ Share Adjusted Price	Cash Dividend (TK.)	Total Return (%)
01-Jan-24	12.4				=C3+C3*D3+C3*E3-F3*E3		
02-Jan-24	12.4				12.4		0.00%
03-Jan-24	12.4				12.4		0.00%
04-Jan-24	12.4				12.4		0.00%

Table 2.2: Adjusted price calculation

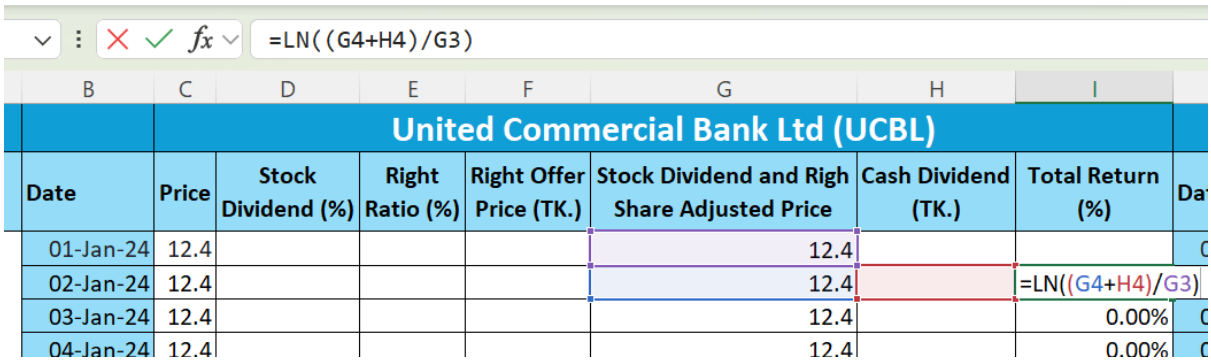
After adjusting for dividends and rights, the Total Return (%) was computed as:

$$\text{Total Return (\%)} = \frac{(P_t - P_{t-1}) + D_t}{P_{t-1}} \times 100$$

Where:

- P_t= Adjusted closing price on day t
- P_{t-1}= Adjusted closing price on previous day
- D_t= Cash dividend (if declared on day t)

If there is no dividend on that day, $D_t = 0$.



	United Commercial Bank Ltd (UCBL)							
Date	Price	Stock Dividend (%)	Right Ratio (%)	Right Offer Price (TK.)	Stock Dividend and Righ Share Adjusted Price	Cash Dividend (TK.)	Total Return (%)	Da
01-Jan-24	12.4				12.4			
02-Jan-24	12.4				12.4		=LN((G4+H4)/G3)	
03-Jan-24	12.4				12.4		0.00%	
04-Jan-24	12.4				12.4		0.00%	

Table 2.3: Total return calculation

Daily return has been then gathered in another sheet called “Returns”

Stock Returns

Quarter	Date	UCB	IDLC	GP	BATASHOE	RENATA	WALTONHIL	RAKC	OLYMPIC	No. of Trading Days
	01-Jan-24									
	02-Jan-24	0.00000	0.00000	0.00000	-0.00550	0.00000	0.00000	0.00000	0.00528	
	03-Jan-24	0.00000	0.00000	0.00000	-0.00010	0.00000	0.00000	0.00000	0.01502	
	04-Jan-24	0.00000	0.00000	0.00000	0.00767	0.00000	0.00000	0.00000	0.01288	
	08-Jan-24	0.00000	0.00000	0.00000	0.00083	0.00000	0.00000	0.00000	-0.00513	
	09-Jan-24	0.00000	0.00000	0.00000	-0.00662	0.00000	0.00000	0.00000	-0.00193	
	10-Jan-24	0.00000	0.00000	0.00000	0.01238	0.00000	0.00000	0.00000	0.00129	
	11-Jan-24	0.00000	0.00000	0.00000	-0.00607	0.00000	0.00000	0.00000	-0.00387	
	14-Jan-24	0.00000	0.00000	0.00000	0.00996	0.00000	0.00000	0.00000	0.00258	
	15-Jan-24	0.00000	0.00000	0.00000	0.00479	0.00000	0.00000	0.00000	0.01026	
	16-Jan-24	0.00000	0.00000	0.00000	-0.00051	0.00000	0.00000	0.00000	-0.00319	

Table 2.4: Stock returns

2.3 Covariance, Portfolio Return and Risk

To compute the portfolio return and risk, the initial procedure was to compute the covariance matrix of all the selected stocks. The covariance of all eight stocks that were chosen, i.e. United Commercial Bank Ltd (UCB), IDLC Finance Ltd (IDLC), Grameenphone Ltd (GP), Bata Shoe Company (BATASHOE), Renata Ltd (RENATA), Walton Hi-Tech Industries Ltd (WALTONHIL), RAK Ceramics (RAKC) and Olympic industries Ltd (OLYMPIC), of the DSE-listed stocks was calculated in this study according to the Data Analysis Toolpak within Microsoft Excel. In particular, Covariance function was calculated on the daily returns of individual stocks during the sample period January 2024 to September 2025.

After obtaining the covariance matrix, the portfolio return, portfolio variance, and portfolio standard deviation (risk) were calculated using matrix algebra. The following formulas were applied in the analysis:

$$\text{Portfolio Return} = MMULT(\text{Weight},\text{Return})$$

$$\text{Portfolio Variance} = MMULT(TRANSPOSE(\text{Weight}), MMULT(\text{Covariance},\text{Weight}))$$

$$\text{Portfolio Standard Deviation (Risk)} = \sqrt{\text{Portfolio Variance}}$$

Since the study assumes equal weighting among all eight stocks, the proportion of funds invested in each stock is:

$$w_i = \frac{1}{8} = 12.5\%$$

Thus, each stock contributes equally to the overall portfolio return and risk.

Covariance matrix offers the information about the co-movement between the securities. Since the chosen companies are in seven industries, that is, banks, financial institutions, telephone, pharmaceuticals, consumer goods, engineering, and ceramics, the pairwise

covariances will be relatively small indicating diversification advantages in the portfolio. The portfolio estimate of the return as well as risk in the respective periods was estimated and these estimates were entered into the Dynamic Asset Allocation (DAA) model as input. Notably, in this study, a rolling forecast method has been used to make sure that the process of estimating is dynamic. As an illustration, the standard deviation between 2024 Quarter 1 and 2024 Quarter 4 was used to predict the level of risk in 2025 Quarter 1.

Forecast Q1 2025

	UCB	IDLC	GP	BATASHOE	RENATA	WALTONHIL	RAKC	OLYMPIC	Weights
Weights	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	
UCB	0.0006489	0.0002277	0.000194	5.716E-05	0.0001104	9.939E-05	0.0002248	0.0001435	12.50%
IDLC	0.0002277	0.0006121	0.000246	0.0001033	0.000177	0.000271	0.0003344	0.0002866	12.50%
GP	0.000194	0.000246	0.0003293	6.316E-05	0.0001812	0.0001476	0.0001586	0.0001917	12.50%
BATASHOE	5.716E-05	0.0001033	6.316E-05	0.000144	6.94E-05	8.338E-05	0.0001013	7.954E-05	12.50%
RENATA	0.0001104	0.000177	0.0001812	6.94E-05	0.0004242	0.000194	0.0001651	0.0001249	12.50%
WALTONHIL	9.939E-05	0.000271	0.0001476	8.338E-05	0.000194	0.0006591	0.0002774	0.0001548	12.50%
RAKC	0.0002248	0.0003344	0.0001586	0.0001013	0.0001651	0.0002774	0.0006506	0.0002194	12.50%
OLYMPIC	0.0001435	0.0002866	0.0001917	7.954E-05	0.0001249	0.0001548	0.0002194	0.0005952	12.50%

Table 2.5: 2025 quarter 1 forecast

Q1 2025	
Portfolio Variance	0.021%
Portfolio Standard Deviation	1.45%
Quarterly Portfolio SD	11.32%
Trading Days	61

Table 2.6: 2025 quarter 1 portfolio standard deviation

Then, in the next step, the period was rolled forward by dropping the earliest quarter (2024 Q1) and adding the next quarter (2025 Q1) to forecast 2025 Q2.

Forecast Q2 2025

	UCB	IDLC	GP	BATASHOE	RENATA	WALTONHIL	RAKC	OLYMPIC	Weights
Weights	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	
UCB	0.0006829	0.0002215	0.0001878	4.646E-05	0.0001306	0.0001051	0.000187	0.0001408	12.50%
IDLC	0.0002215	0.0005165	0.0002361	0.000111	0.0001762	0.0002011	0.0002798	0.000275	12.50%
GP	0.0001878	0.0002361	0.0003162	6.507E-05	0.0001737	0.0001433	0.0001532	0.0001889	12.50%
BATASHOE	4.646E-05	0.000111	6.507E-05	0.000178	7.463E-05	9.469E-05	8.412E-05	8.191E-05	12.50%
RENATA	0.0001306	0.0001762	0.0001737	7.463E-05	0.0003828	0.0001771	0.0001726	0.0001189	12.50%
WALTONHIL	0.0001051	0.0002011	0.0001433	9.469E-05	0.0001771	0.0004917	0.0001904	0.0001697	12.50%
RAKC	0.000187	0.0002798	0.0001532	8.412E-05	0.0001726	0.0001904	0.0005502	0.0002208	12.50%
OLYMPIC	0.0001408	0.000275	0.0001889	8.191E-05	0.0001189	0.0001697	0.0002208	0.0005836	12.50%

Table 2.7: 2025 quarter 2 forecast

Q2 2025	
Portfolio Variance	0.020%

Portfolio Standard Deviation	1.40%
Quarterly Portfolio SD	10.37%
Trading Days	55

Table 2.8: 2025 quarter 2 portfolio standard deviation

The same rolling procedure continued for subsequent quarters to maintain consistency with the dynamic nature of the portfolio.

Forecast Q3 2025

	UCB	IDLC	GP	BATASHOE	RENATA	WALTONHIL	RAKC	OLYMPIC	Weights
Weights	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	
UCB	0.0007825	0.0002698	0.0001932	5.561E-05	0.0001631	0.0001123	0.00024	0.0001344	12.50%
IDLC	0.0002698	0.0004959	0.0002361	9.394E-05	0.0001448	0.0001654	0.0002553	0.0002518	12.50%
GP	0.0001932	0.0002361	0.0003246	5.081E-05	0.0001604	0.0001313	0.0001411	0.000189	12.50%
BATASHOE	5.561E-05	9.394E-05	5.081E-05	0.0002254	4.331E-05	7.46E-05	7.709E-05	7.325E-05	12.50%
RENATA	0.0001631	0.0001448	0.0001604	4.331E-05	0.0002915	9.637E-05	0.000135	9.394E-05	12.50%
WALTONHIL	0.0001123	0.0001654	0.0001313	7.46E-05	9.637E-05	0.0003484	0.0001583	0.0001456	12.50%
RAKC	0.00024	0.0002553	0.0001411	7.709E-05	0.000135	0.0001583	0.0005516	0.0002167	12.50%
OLYMPIC	0.0001344	0.0002518	0.000189	7.325E-05	9.394E-05	0.0001456	0.0002167	0.0005846	12.50%

Table 2.9: 2025 quarter 3 forecast

Q3 2025	
Portfolio Variance	0.018%
Portfolio Standard Deviation	1.36%
Quarterly Portfolio SD	10.78%
Trading Days	63

Table 2.10: 2025 quarter 3 portfolio standard deviation

2.4 Risk Free Rate Calculation

To compute the risk-free rate, the cut-off yield of the 91-day Treasury Bill issued by Government of Bangladesh via the Bangladesh Bank has been taken. The 91-day T-bill is regarded as a risk-free instrument since it does not have default risk. The following rate is then utilized in the Dynamic Asset Allocation (DAA) model to determine the up factor, down factor, discounting rate and the compounding rate. To ensure accuracy, the average of all 91-day T-bill cut off yields issued by each quarter during the study period has been used as the quarterly risk-free rate.

91 Day Treasury Bill Rate

Quarter 4 2024		Quarter 1 2025		Quarter 2 2025	
Issue Date	Annual Rate	Issue Date	Annual Rate	Issue Date	Annual Rate
7-Oct-24	11.45%	6-Jan-25	11.43%	7-Apr-25	11.24%
14-Oct-24	11.45%	13-Jan-25	11.34%	15-Apr-25	11.45%
22-Oct-24	11.75%	20-Jan-25	11.29%	21-Apr-25	11.59%
28-Oct-24	11.75%	27-Jan-25	11.13%	28-Apr-25	11.64%
4-Nov-24	11.75%	3-Feb-25	10.85%	5-May-25	11.61%
11-Nov-24	11.75%	10-Feb-25	10.54%	12-May-25	11.54%
18-Nov-24	11.75%	17-Feb-25	10.35%	19-May-25	11.65%
25-Nov-24	11.75%	24-Feb-25	10.35%	26-May-25	11.69%
2-Dec-24	11.71%	3-Mar-25	10.34%	2-Jun-25	12.02%
9-Dec-24	11.65%	10-Mar-25	10.35%	16-Jun-25	12.10%
17-Dec-24	11.57%	17-Mar-25	10.75%	23-Jun-25	12.09%
23-Dec-24	11.50%	24-Mar-25	10.90%	30-Jun-25	12.09%
30-Dec-24	11.50%				

Particulars	2025 Q1	2025 Q2	2025 Q3
Average Annual Risk-Free Rate	11.641%	10.801%	11.725%
Continuously Compounding Annual Risk-Free Rate	11.475%	10.658%	11.557%
Continuously Compounding Daily Risk-Free Rate	0.032%	0.029%	0.032%
Continuously Compounding Quarterly Risk-free Rate	**2.869%**	**2.665%**	**2.889%**

Table 2.11: 91-day Treasury Bill Rates

Chapter 3: Dynamic Asset Allocation Application

3.1 Calculation of Up factor, Down factor, p, and 1-p

The possible future values of the stock price in the upward and the downward market conditions are determined by the up factor (u) and down factor (d), respectively. These contribute to simulating the motion of the risky asset price on a binomial model, the foundation of the Dynamic Asset Allocation (DAA) approach.

The probability of the stock price increasing is denoted by p, while the probability of the stock price decreasing is represented by (1 – p). The following formulas are used to calculate these values:

$$u = e^{\sigma\sqrt{\Delta t}}$$

$$d = e^{-\sigma\sqrt{\Delta t}}$$

$$p = \frac{e^{r\Delta t} - d}{u - d}$$

$$1 - p = 1 - \frac{e^{r\Delta t} - d}{u - d}$$

Where:

- u= Up factor
- d= Down factor
- p= Probability of price moving up
- $1 - p$= Probability of price moving down
- σ= Standard deviation (volatility) of the stock or portfolio
- r= Risk-free rate of return (91-day T-bill rate)
- Δt= Fraction of the year corresponding to one trading period

The risk-free rates applied in this calculation include the quarterly averages of the yields of 91-day Treasury bill as stated above. The historical rolling forecast method is used to obtain the standard deviation, in which the volatility of the current quarter of the year is computed based on the data of the last four quarters. The number of trading days applied in each quarter is relative to the number of trading days realized in the Dhaka Stock Exchange (DSE) in the quarter. With these inputs, the up factor, down factor and the probabilities (p and 1-p) of each

quarter were computed. These were the parameters which were then applied in calculating the ratio of the portfolio rebalancing and in the simulation of the dynamic strategy of the asset allocation.

Up & Down Probability

Forecasted Period	Trading Days
Q1 2025	61
Q2 2025	55
Q3 2025	63

91 day Treasury Bill Rate			
	F' Q1 2025	F' Q2 2025	F' Q3 2025
Continuous Quarterly Rate	2.8686%	2.6645%	2.8892%

Components	Q1 2025	Q2 2025	Q3 2025
Sqrt(T), √T	7.8102	7.4162	7.9373
Portfolio SD, 6	1.4490%	1.3985%	1.3584%
6*√T	0.1132	0.1037	0.1078
u	1.1198	1.1093	1.1138
d	0.8930	0.9015	0.8978
a	1.0291	1.0270	1.0293
p	0.6000	0.6040	0.6087
1-p	0.4000	0.3960	0.3913

Table 3.1: Up, down factor and p and 1-p calculation

3.2 Binomial Tree for 100% Equity Portfolio

Assuming the initial investment of BDT 1,000, 000, the value of the 100% equity portfolio is as calculated below. The up factor is the percentage change in the portfolio value when the market rises whereas the down factor is the percentage change when the market falls. The positive value of the portfolio is as the product of the starting portfolio value and factor up and the negative value of the portfolio is taken to be the product of the starting value and the down factor. It is then done in a similar fashion, repeating sequentially the values that the portfolio may have in the next three quarters - 2024 Quarter 4 to 2025 Quarter 2, and lastly, 2025 Quarter 3. In the same way, the value of the portfolio is calculated at every node of the binomial tree, which represents all possible up and down movements of the equity market. In this case, no amount is invested in the risk-free asset because, given that this portfolio is supposed to be fully invested in risky assets (equities), there will be no amount invested in the risk-free asset. Accordingly, the binomial tree shows how the 100% equity portfolio could change throughout the duration of the study, both on the positive and negative slope of the price, depending on the volatility expected and the risk-free rate. The 100 percent equity portfolio binomial tree shown in a graphical form is as shown below.

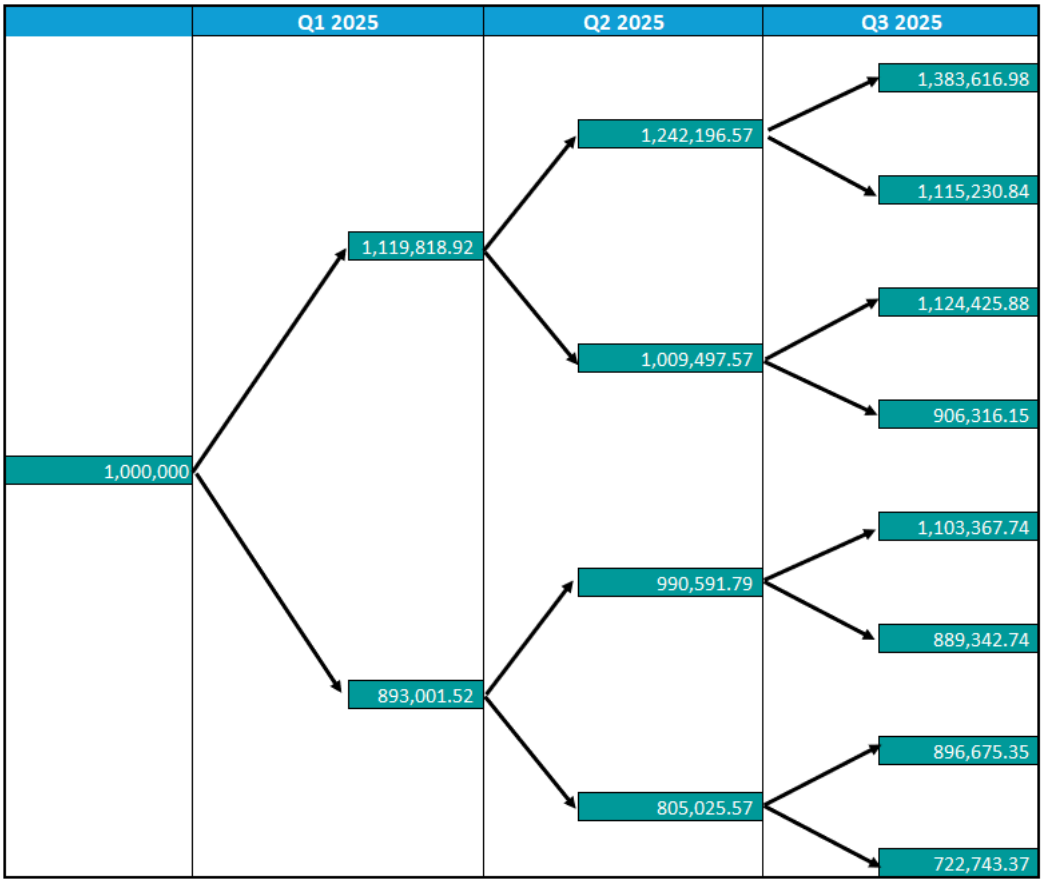


Figure 3.1: 100% Equity Portfolio

3.3 Put Option Dynamics

A European-style option has been taken into consideration in this report so that it can be used to apply the Dynamic Asset Allocation (DAA) strategy. The value of a European put option is computed to build the protective part of the portfolio. The strike price is taken to be BDT 1,000,000 which is the initial price of the investment in the portfolio. The value of the put option at the last node of the binomial tree is calculated as the following:

$$\text{Option Value at Maturity} = \text{Max}(0, \text{Strike Price} - \text{Spot Price})$$

This means the option will only have value if the portfolio value falls below the strike price. To calculate the option values at earlier nodes, the following backward induction formula is applied:

$$f = e^{-r\Delta t}[pf_u + (1-p)f_d]$$

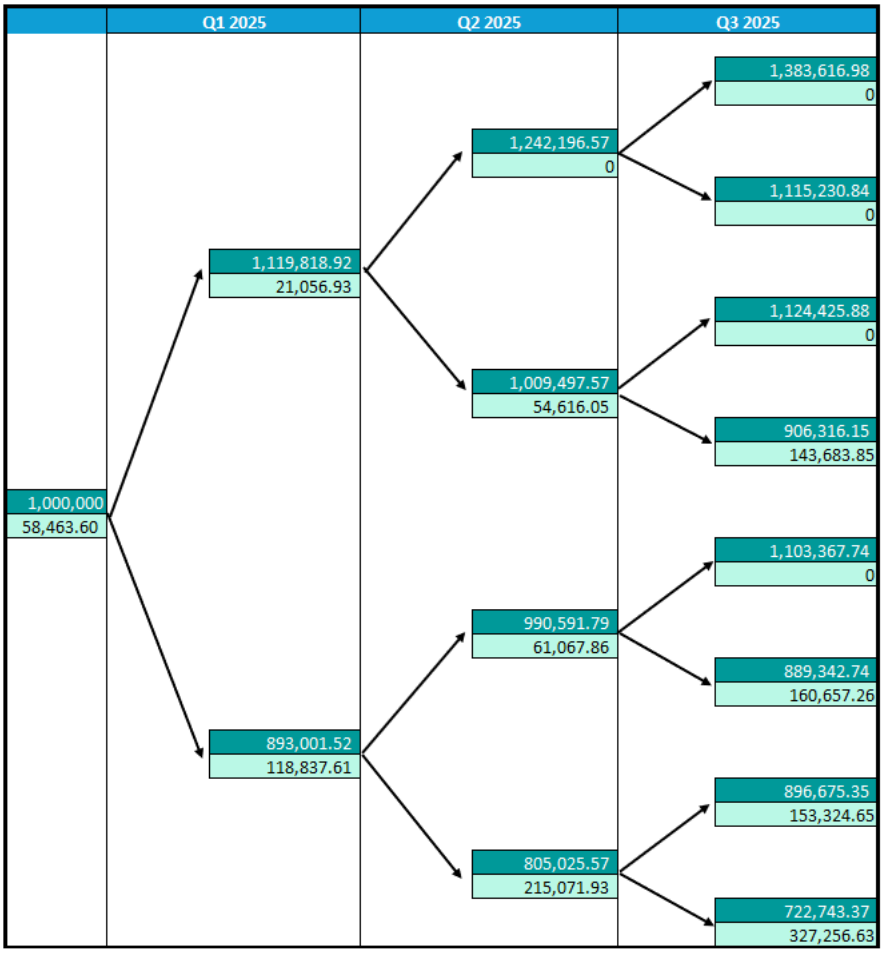


Figure 3.2: Put Option Dynamics

3.4 Insured Portfolio Dynamics

The insured portfolio is determined by summing the value of the 100% equity portfolio and value of the protective put option at each node on the binomial tree. For example, the portfolio value will be BDT 1,058,463.60 at the beginning of Q1 2025. In different market conditions, this value changes: to BDT 1,383,614.98 in the Q3 2025 in the case of a powerful upward trend or maintaining the value at the level of the bottom in unfavorable conditions.

An important finding of this analysis is that there is also a floor value in the dynamic portfolio structure. In this situation, BDT 1,011,839.13 is the floor price, as it can be observed at the bottom node of the insured portfolio tree. It implies that the lowest that the investor portfolio can reach during the time period under observation is insured at this point by the option-based insurance system. In this way, the put options will be effective in reducing downside risk and participating in upside moves in favorable market trends, which is the main benefit of dynamic asset allocation using portfolio insurance programmes.

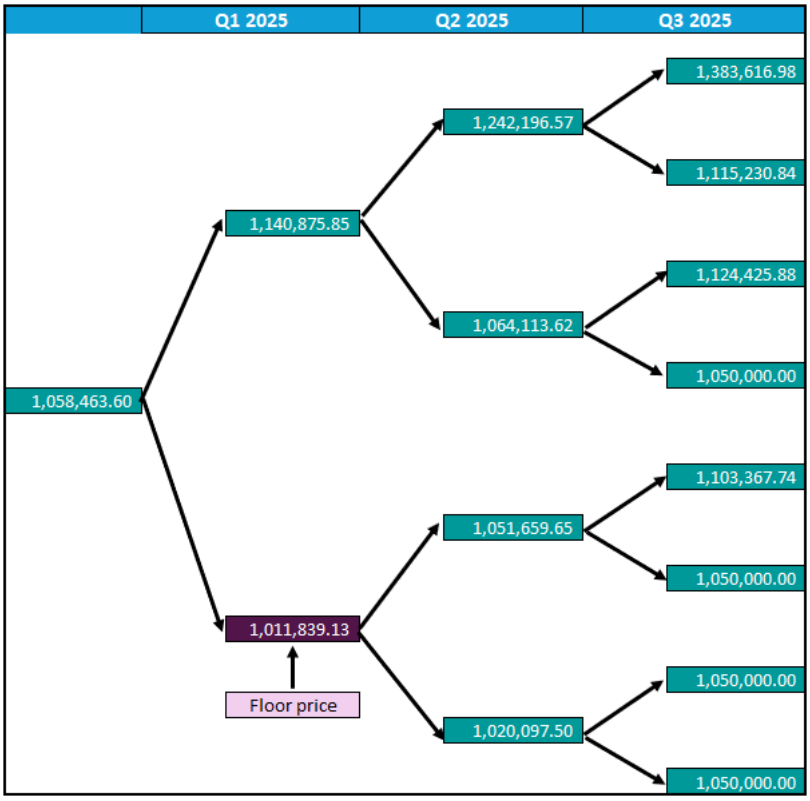


Figure 3.3: Insured Portfolio

3.5 Call Option Dynamics and Call Delta

In this section, the call option for the equity portfolio is modeled with a strike price of BDT 1,000,000. At each final node in the binomial tree, the call option value is computed using the formula:

$$\text{Option Value} = \max(\text{Spot Price} - \text{Strike Price}, 0)$$

For intermediate nodes, the option price is derived as:

$$\text{Option Value}_f = e^{-r\Delta t}[p \times f_u + (1-p) \times f_d]$$

where p is the risk-neutral probability, f_u and f_d are the option values in the up and down states respectively, and r is the risk-free rate.

This makes the value of the call option capture the right of the investor to pursue an upward movement, above the exercise price and has a payoff structure at different positions of the binomial tree. In this portfolio, the highest possible value of a call option at the terminal nodes will be BDT 93,276.72.

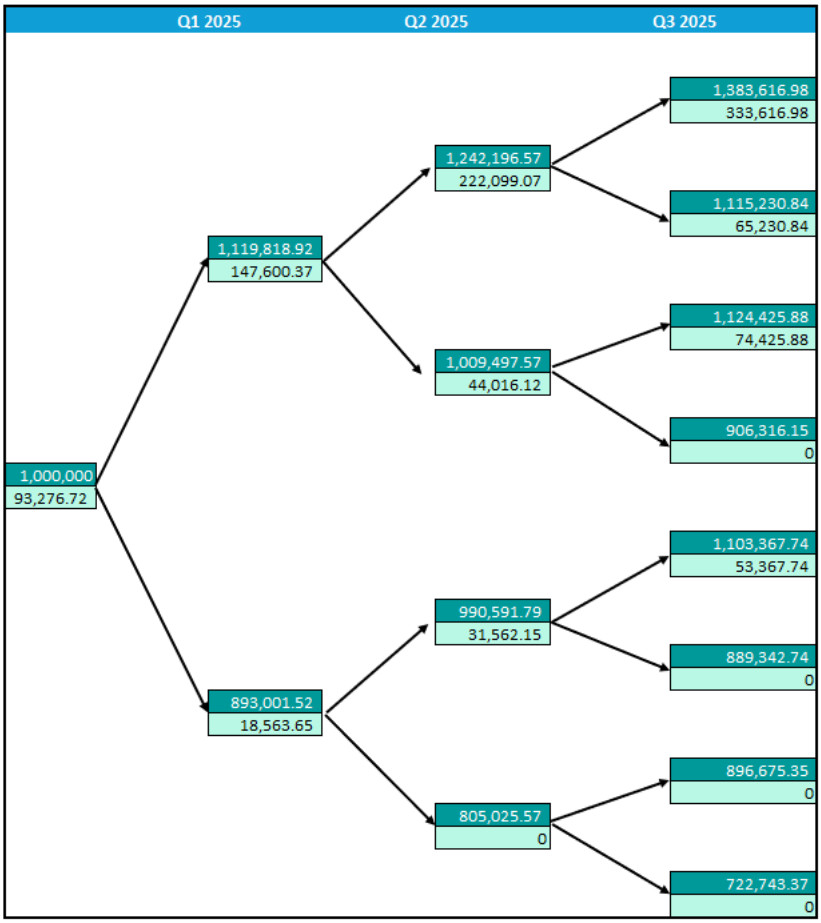


Figure 3.4: Call Option Dynamics

Delta Calculation Procedures:

Delta (Δ) is the derivative of the option price to the equity portfolio price. It is taken to mean the fraction of the portfolio, which must be invested in equities, so as to give the payoff of the call option.

There are two standard methods for calculating Delta:

Call Dynamics Approach: Delta is obtained by taking the difference between option values divided by the difference between the underlying equity values between two adjoining branches:

$$\Delta = \frac{C_{up} - C_{down}}{S_{up} - S_{down}}$$

Here, snapshots of equity portfolio and call price at each node produce Delta values (e.g., an initial Delta of 0.57, meaning 57% exposure to equities and the rest shifted to T-bill to replicate the option).

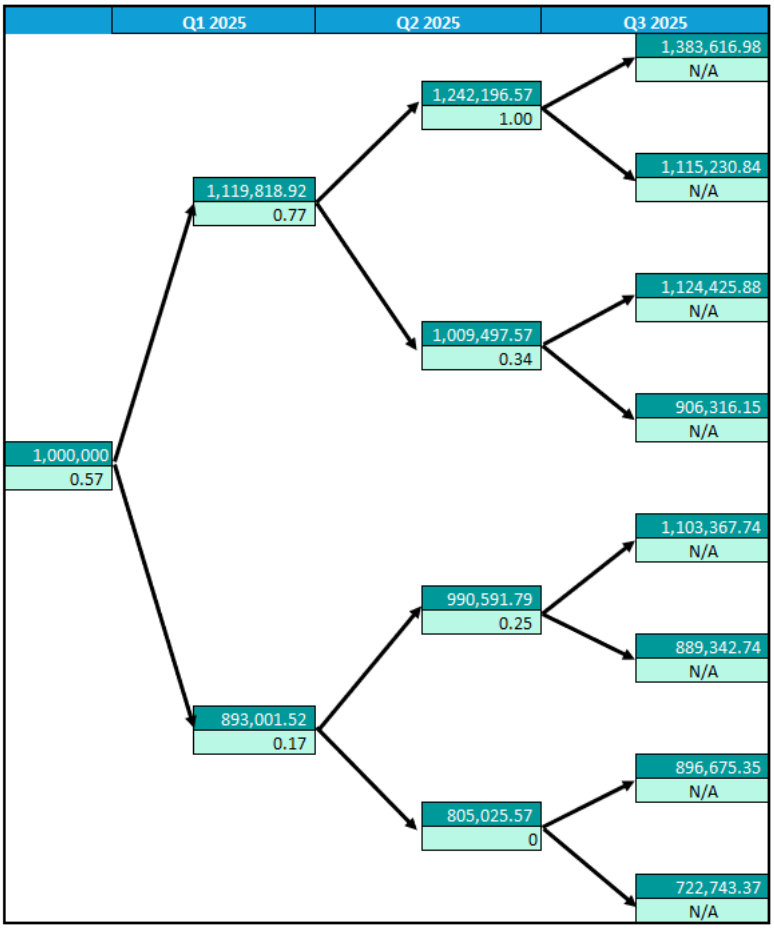


Figure 3.5: Call Delta 1

Insured Portfolio Approach: Delta is calculated by comparing the changes in values of the insured portfolio (equity portfolio and option value) across the tree. The theoretical consistency of the two methods is valid as Delta values at each node are equal.

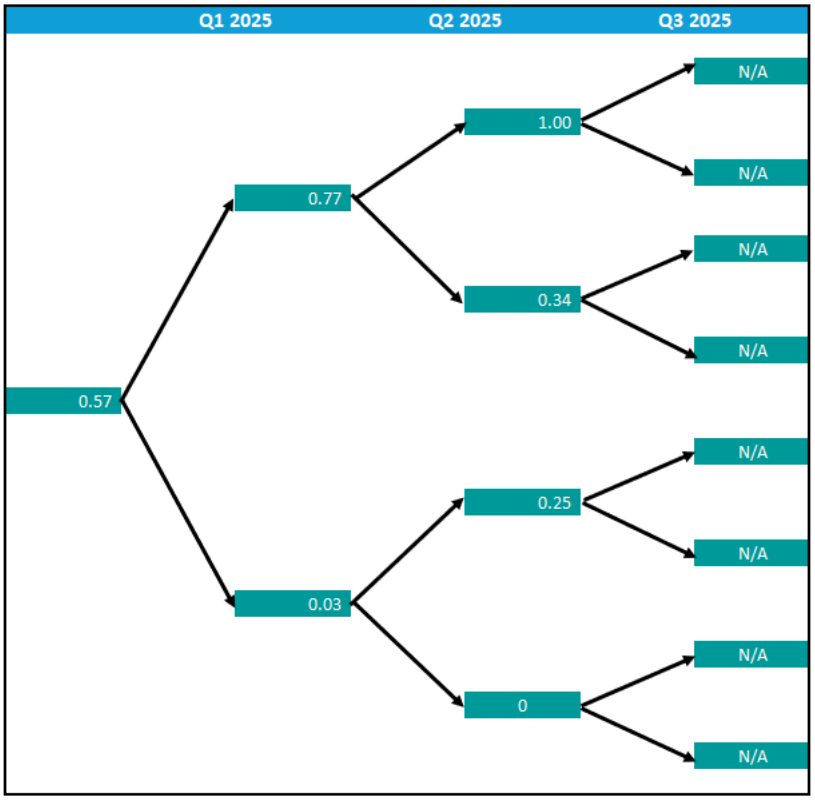


Figure 3.6: Delta calculation from insured portfolio

Delta is positive and it grows with the increase in portfolio value (reflecting high equity allocation during bullish markets) and negative with a decrease in the portfolio value (scheduling exposure to bearish markets). To illustrate, Delta at the topmost Q3 2025 node (1,383, 616.98) is 1 which denotes full allocation towards equities. The Delta values decrease gradually at the lower nodes up to zero in some cases where the option is out of the money.

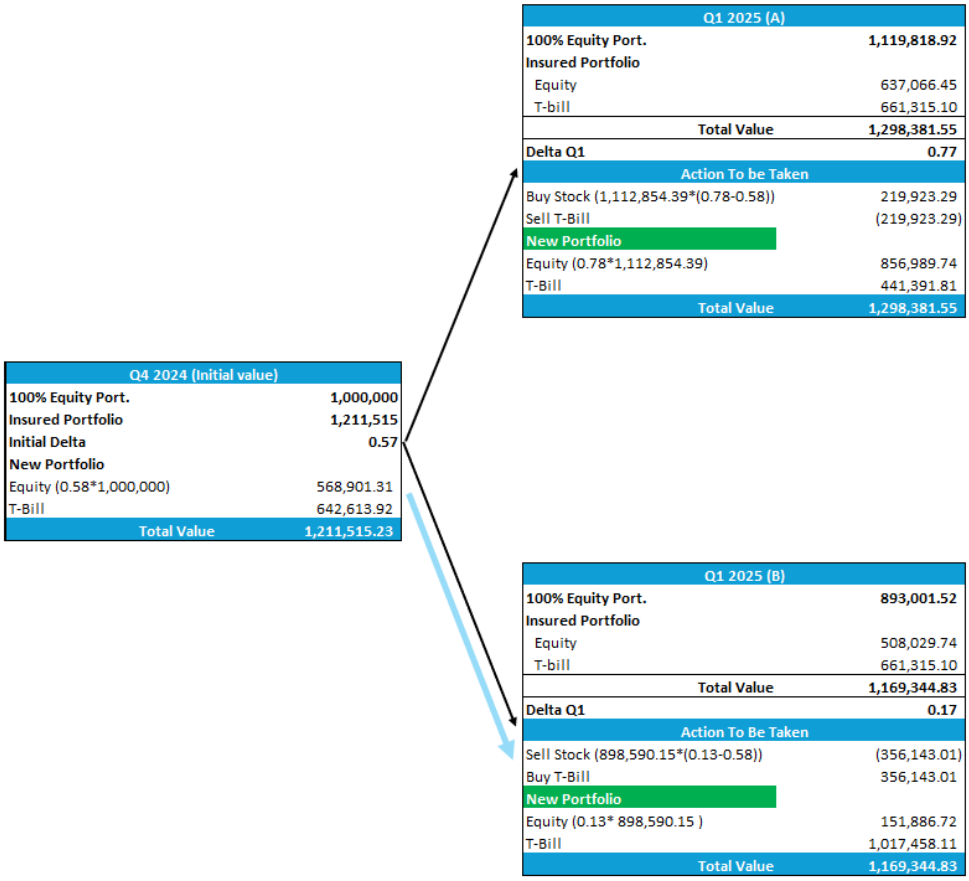
Both approaches always indicate that the investor needs to change his/her equity exposure dynamically as the market evolves to maximize the structure of insured portfolio. The calculated Delta values of each node based on the model are the precise ones used in the rebalancing of each step of the binomial tree.

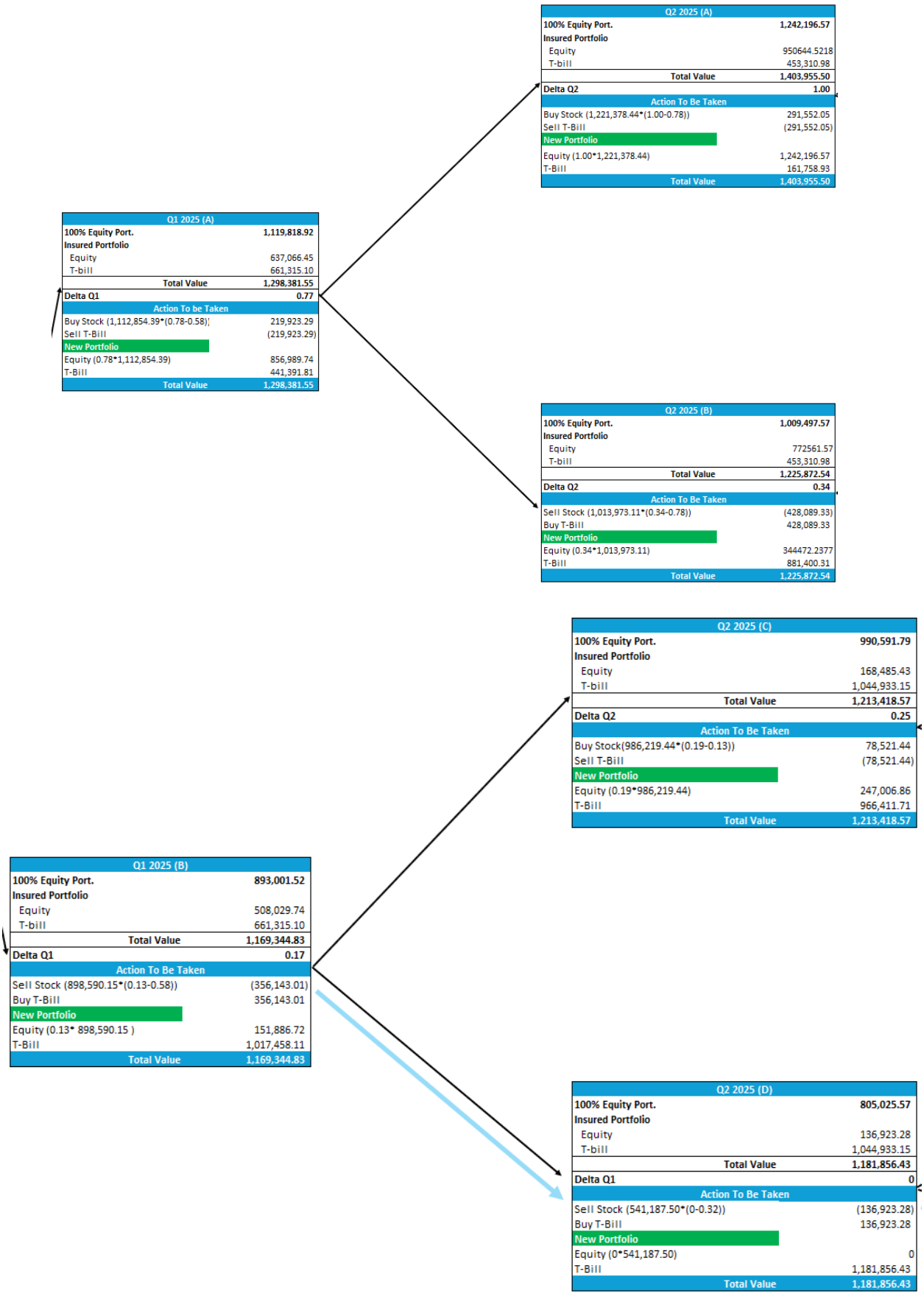
3.6 Dynamic Asset Allocation

The dynamic asset allocation process begins by investing BDT 1,000,000 in equities. The insured portfolio value is BDT 1,211,515.23 having calculated the insurance by applying the binomial model. The first delta is 0.57 and therefore, BDT 568,901.31 is invested in equities and the balance of BDT 642,613.92 in T-bills such that they sum to the insured amount. The model will split in Q1 2025 under the condition that the actual portfolio values will vary with market movements. To move upward, the 100% equity value become BDT 1,119,818.92 and

new delta will be 0.77. This means having to purchase more stocks: compute the new equity exposure will be 1,112,854.39 × 0.78= 856,989.74 and sell T-bills totalling BDT 219,923.29 and maintaining the total value at BDT 1,298,381.55. In the event of a decline, the equity portfolio declines to BDT 893,001.52 and the delta decreases to 0.17. In this case, the quantity of stocks sold is the difference between delta i.e. sell BDT 356,143.04 of equity and purchase T-bills with the proceeds and revise the positions by BDT 151,886.72 of equity and BDT 1,017,458.11 of T-bills. The portfolio value has been maintained at BDT 1,169,344.83.

The same logic is applied in the second quarter and third quarter, where reallocation is performed on a per-binomial node based on the new delta and portfolio values. As an illustration, when the direction is downward, equity decreases to BDT 805,025.57, and the delta becomes 0. This will involve selling all the equity (BDT 136,923.28) and purchasing the same value of T-bills in order to have the full value of the insured value risk-free. In a positive case, the portfolio value and the delta is increased and this requires the acquisition of extra stocks and financing this through the liquidation of T-bills. The same dynamic hedging method is applied at every node and quarter with weights being recalculated according to the changing market values and option deltas.




Q1 2025 (A)
100% Equity Port. 1,119,818.92
Insured Portfolio
Equity 637,066.45
T-bill 661,315.10
Total Value 1,298,381.55
Delta Q1 0.77
Action To be Taken
Buy Stock (1,112,854.39*(0.78-0.58)) 219,923.29
Sell T-Bill (219,923.29)
New Portfolio
Equity (0.78*1,112,854.39) 856,989.74
T-Bill 441,391.81
Total Value 1,298,381.55
Q2 2025 (A)
100% Equity Port. 1,242,196.57
Insured Portfolio
Equity 950644.5218
T-bill 453,310.98
Total Value 1,403,955.50
Delta Q2 1.00
Action To Be Taken
Buy Stock (1,221,378.44*(1.00-0.78)) 291,552.05
Sell T-Bill (291,552.05)
New Portfolio
Equity (1.00*1,221,378.44) 1,242,196.57
T-Bill 161,758.93
Total Value 1,403,955.50
Q2 2025 (B)
100% Equity Port. 1,009,497.57
Insured Portfolio
Equity 772561.57
T-bill 453,310.98
Total Value 1,225,872.54
Delta Q2 0.34
Action To Be Taken
Sell Stock (1,013,973.11*(0.34-0.78)) (428,089.33)
Buy T-Bill 428,089.33
New Portfolio
Equity (0.34*1,013,973.11) 344472.2377
T-Bill 881,400.31
Total Value 1,225,872.54
Q1 2025 (B)
100% Equity Port. 893,001.52
Insured Portfolio
Equity 508,029.74
T-bill 661,315.10
Total Value 1,169,344.83
Delta Q1 0.17
Action To Be Taken
Sell Stock (898,590.15*(0.13-0.58)) (356,143.01)
Buy T-Bill 356,143.01
New Portfolio
Equity (0.13* 898,590.15) 151,886.72
T-Bill 1,017,458.11
Total Value 1,169,344.83
Q2 2025 (C)
100% Equity Port. 990,591.79
Insured Portfolio
Equity 168,485.43
T-bill 1,044,933.15
Total Value 1,213,418.57
Delta Q2 0.25
Action To Be Taken
Buy Stock(986,219.44*(0.19-0.13)) 78,521.44
Sell T-Bill (78,521.44)
New Portfolio
Equity (0.19*986,219.44) 247,006.86
T-Bill 966,411.71
Total Value 1,213,418.57
Q2 2025 (D)
100% Equity Port. 805,025.57
Insured Portfolio
Equity 136,923.28
T-bill 1,044,933.15
Total Value 1,181,856.43
Delta Q1 0
Action To Be Taken
Sell Stock (541,187.50*(0-0.32)) (136,923.28)
Buy T-Bill 136,923.28
New Portfolio
Equity (0*541,187.50) 0
T-Bill 1,181,856.43
Total Value 1,181,856.43

Q2 2025 (A)	
100% Equity Port.	**1,242,196.57**
Insured Portfolio	
Equity	950644.5218
T-bill	453,310.98
Total Value	**1,403,955.50**
Delta Q2	**1.00**
Action To Be Taken	
Buy Stock (1,221,378.44*(1.00-0.78))	291,552.05
Sell T-Bill	(291,552.05)
New Portfolio	
Equity (1.00*1,221,378.44)	1,242,196.57
T-Bill	161,758.93
Total Value	**1,403,955.50**

Q3 2025 (A)	
100% Equity Port.	**1,383,616.98**
Insured Portfolio	
Equity	1,383,616.98
T-bill	166,500.63
Total Value	**1,550,117.61**

Q3 2025 (B)	
100% Equity Port.	**1,115,230.84**
Insured Portfolio	
Equity	1,115,230.84
T-bill	166,500.63
Total Value	**1,281,731.46**

Q2 2025 (B)	
100% Equity Port.	**1,009,497.57**
Insured Portfolio	
Equity	772561.57
T-bill	453,310.98
Total Value	**1,225,872.54**
Delta Q2	**0.34**
Action To Be Taken	
Sell Stock (1,013,973.11*(0.34-0.78))	(428,089.33)
Buy T-Bill	428,089.33
New Portfolio	
Equity (0.34*1,013,973.11)	344472.2377
T-Bill	881,400.31
Total Value	**1,225,872.54**

Q3 2025 (C)	
100% Equity Port.	**1,124,425.88**
Insured Portfolio	
Equity	383689.3845
T-bill	907,237.12
Total Value	**1,290,926.51**

Q3 2025 (D)	
100% Equity Port.	**906,316.15**
Insured Portfolio	
Equity	309,263.50
T-bill	907,237.12
Total Value	**1,216,500.63**

Q2 2025 (C)	
100% Equity Port.	**990,591.79**
Insured Portfolio	
Equity	168,485.43
T-bill	1,044,933.15
Total Value	**1,213,418.57**
Delta Q2	**0.25**
Action To Be Taken	
Buy Stock(986,219.44*(0.19-0.13))	78,521.44
Sell T-Bill	(78,521.44)
New Portfolio	
Equity (0.19*986,219.44)	247,006.86
T-Bill	966,411.71
Total Value	**1,213,418.57**

Q3 2025 (E)	
100% Equity Port.	**1,103,367.74**
Insured Portfolio	
Equity	275127.866
T-bill	994,740.50
Total Value	**1,269,868.36**

Q3 2025 (F)	
100% Equity Port.	**889,342.74**
Insured Portfolio	
Equity	221,760.13
T-bill	994,740.50
Total Value	**1,216,500.63**

Q2 2025 (D)	
100% Equity Port.	**805,025.57**
Insured Portfolio	
Equity	136,923.28
T-bill	1,044,933.15
Total Value	**1,181,856.43**
Delta Q1	**0**
Action To Be Taken	
Sell Stock (541,187.50*(0-0.32))	(136,923.28)
Buy T-Bill	136,923.28
New Portfolio	
Equity (0*541,187.50)	0
T-Bill	1,181,856.43
Total Value	**1,181,856.43**

Q3 2025 (G)	
100% Equity Port.	**896,675.35**
Insured Portfolio	
Equity	0
T-bill	1,216,500.63
Total Value	**1,216,500.63**

Q3 2025 (H)	
100% Equity Port.	**722,743.37**
Insured Portfolio	
Equity	0
T-bill	1,216,500.63
Total Value	**1,216,500.63**

Dynamic Asset Allocation				
Particulars	Q04 2024	Q01 2025	Q02 2025	Q03 2025
Equity Value (BDT)		151,887	0	0
T-Bill Value (BDT)		1,017,458	1,181,856	1,216,501
Total Value (BDT)	**1,000,000**	**1,169,345**	**1,181,856**	**1,216,501**
Quarter to Quarter Return		62.58%	4.26%	11.56%
Change in Quarter to Quarter Return			-58.32%	7.30%

Chapter 4: Comparison with Other Investment Strategies

4.1 Dynamic Portfolio Through Actual Path

To compare the Dynamic Asset Allocation (DAA) portfolio to other investment strategies, it is necessary to establish the actual movement path of the dynamic portfolio. This will enable the research to determine whether the portfolio is taking an upward or downward trend in every quarter, depending on the market performance achieved. The perceived quarterly closing prices of the equity portfolio are to be traced to determine the actual path. The value of equity per quarter is computed based on the actual price of the previous quarter and the initial portfolio value is compared.

When the equity value is higher than the last quarter, it means an upward trend (up node). On the other hand when the value of the equity is low, it shows a downward movement (down node). This is repeated on each quarter in the study period (2024 Quarter 4 to 2025 Quarter 3) in order to plot the true path of up and down moves of the dynamic portfolio. The DAA model can be used to realign the portfolio ratio between the risky asset and the risk-free asset using the actual performance of the market so that real market direction is reflected in the rebalancing. The outcome of the initial projected quarter (2024 Q4), which is determined using this actual path approach, is in the following table and the basis of the dynamic evaluation of the portfolio in the following quarters.

Quarter		Q4 2024			Q1 2025				
Investments in BDT (100%)				1,000,000					893,002
Delta				0.5689					0.1701
Firm	Weight	Fund Allocation (BDT)	Closing Price (BDT)	Number of Shares	Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)	Fund Allocation (BDT)	Closing Number of Shares
UCB	12.50%	71,113	9.20	7,730	7,730	11.00	85,026	18,986	1,726
IDLC	12.50%	71,113	32.70	2,175	2,175	31.40	68,286	18,986	605
GP	12.50%	71,113	323.10	220	220	321.90	70,849	18,986	59
BATASHOE	12.50%	71,113	905.40	79	79	834.70	65,560	18,986	23
RENATA	12.50%	71,113	635.10	112	112	500.50	56,041	18,986	38
WALTONHIL	12.50%	71,113	487.50	146	146	462.70	67,495	18,986	41
RAKC	12.50%	71,113	22.60	3,147	3,147	22.60	71,113	18,986	840
OLYMPIC	12.50%	71,113	158.00	450	450	147.20	66,252	18,986	129
Total Equity Value		568,901					550,621	151,887	

Table 4.1: Dynamic portfolio through actual path

Q2 2025					Q3 2025		
				805,026 0.0000			
Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)	Fund Allocation (BDT)	Closing Number of Shares	Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)
1,726	9.90	17,087	0	0	0	10.60	0
605	29.00	17,535	0	0	0	41.20	0
59	303.10	17,877	0	0	0	299.00	0
23	802.70	18,258	0	0	0	877.70	0
38	488.40	18,527	0	0	0	480.40	0
41	406.30	16,672	0	0	0	419.90	0
840	19.20	16,130	0	0	0	25.10	0
129	153.50	19,798	0	0	0	154.70	0
		141,883	**0**				**0**

Table 4.2: Dynamic portfolio through actual path

The following is the summary of these predicted 3 quarter equity value and based on that the actual direction of dynamic asset allocation is also presented below.

Particulars	Q01 2025	Q02 2025	Q03 2025
Initial Investments (BDT)	1,000,000	893,002	805,026
Delta	0.5689	0.1701	0.0000
Initial Equity Investments (BD	568,901	151,887	0
Equity Value at the Quarter E	550,621	141,883	0
Actual Change	**Down**	**Down**	**Down**

Table 4.3: Dynamic portfolio through actual path

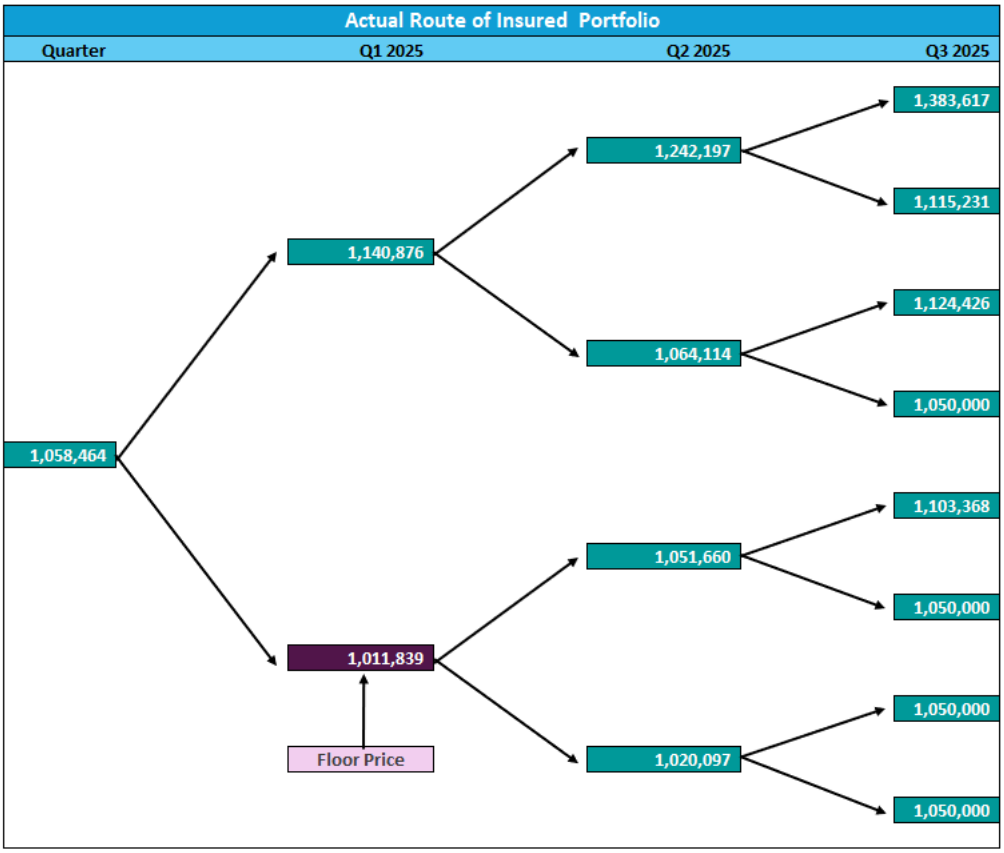


Figure 4.1: Dynamic portfolio through actual path

4.2 Dynamic Portfolio with Actual Price

At each quarter, the dynamic portfolio is recalculated using up-to-date market prices for all 8 selected stocks:

The equity investment is determined based on the value of delta of the current quarter. The 8 stocks are split into the equity allocation, usually in equal shares, but otherwise detailed and the number of shares per stock is calculated as the proportion of the equity allocation divided by the closing price of that quarter. The balance of the insured portfolio value (when the equity investment is discounted) is invested in T-bills and its value is increased with the help of the suitable risk-free rate. At each rebalancing point (at each quarter): with an increase in delta, more stock is bought (and T-bill is sold); with a decrease in delta, stock is sold (and T-bill is purchased). The dynamic portfolio value can be obtained by totaling the market value of the stocks held and T-bill value as reflecting the new asset values based on the actual market movements.

Quarter		Q4 2024			Q1 2025				
Portfolio Value (BDT)				1,058,464					1,054,430
100% Equity Investments with Rebalancing (BDT)				1,000,000					967,867
Delta				0.5689					0.1701
Firm	Weight	Fund Allocation (BDT)	Closing Price (BDT)	Number of Shares	Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)	Fund Allocation (BDT)	Closing Number of Shares
UCB	12.50%	71,113	9.20	7,730	7,730	11.00	85,026	20,578	1,871
IDLC	12.50%	71,113	32.70	2,175	2,175	31.40	68,286	20,578	655
GP	12.50%	71,113	323.10	220	220	321.90	70,849	20,578	64
BATASHOE	12.50%	71,113	905.40	79	79	834.70	65,560	20,578	25
RENATA	12.50%	71,113	635.10	112	112	500.50	56,041	20,578	41
WALTONHIL	12.50%	71,113	487.50	146	146	462.70	67,495	20,578	44
RAKC	12.50%	71,113	22.60	3,147	3,147	22.60	71,113	20,578	911
OLYMPIC	12.50%	71,113	158.00	450	450	147.20	66,252	20,578	140
Total Equity Value		568,901					550,621	164,620	
T-Bill Investments		489,562					503,809	889,810	

Table 4.5: Dynamic portfolio investment actions

Q2 2025					Q3 2025		
				1,067,616			1,098,912
				901,391			1,001,801
				0.0000			
Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)	Fund Allocation (BDT)	Closing Number of Shares	Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)
1,871	9.90	18,520	0	0	0	10.60	0
655	29.00	19,005	0	0	0	41.20	0
64	303.10	19,376	0	0	0	299.00	0
25	802.70	19,789	0	0	0	877.70	0
41	488.40	20,080	0	0	0	480.40	0
44	406.30	18,069	0	0	0	419.90	0
911	19.20	17,482	0	0	0	25.10	0
140	153.50	21,458	0	0	0	154.70	0
		153,778	0				0
		913,838	1,067,616				1,098,912

Table 4.6: Dynamic portfolio investment actions

Firm	Q04 2024	Q01 2025		Q02 2025	
	Number of Shares	Closing Number of Shares	Action	Closing Number of Shares	Action
UCBL	7,730	1,870.7	5,859	0	1,870.7
IDLC	2,175	655.3	1,519	0	655.3
GP	220	63.9	156	0	63.9
BATA	79	24.7	54	0	24.7
RNTL	112	41.1	71	0	41.1
WALT	146	44.5	101	0	44.5
RAKC	3,147	910.5	2,236	0	910.5
OLIS	450	139.8	310	0	139.8

Table 4.7: Dynamic portfolio investment actions

Firm	Q04 2024		Q01 2025				Q02 2025			
	Action	Number of Shares	Fund (BDT)	Action		Closing Number of	Fund (BDT)	Action		Closing Number of
UCBL	Buy	7,730	20,578	Sell	(5,859)	1,870.7	0	Sell	(1,870.7)	-
IDLC	Buy	2,175	20,578	Sell	(1,519)	655.3	0	Sell	(655.3)	-
GP	Buy	220	20,578	Sell	(156)	63.9	0	Sell	(63.9)	-
BATA	Buy	79	20,578	Sell	(54)	24.7	0	Sell	(24.7)	-
RNTL	Buy	112	20,578	Sell	(71)	41.1	0	Sell	(41.1)	-
WALT	Buy	146	20,578	Sell	(101)	44.5	0	Sell	(44.5)	-
RAKC	Buy	3,147	20,578	Sell	(2,236)	910.5	0	Sell	(910.5)	-
OLIS	Buy	450	20,578	Sell	(310)	139.8	0	Sell	(139.8)	-

Table 4.8: Dynamic portfolio investment actions

Particulars	Q4 2024	Q1 2025	Q2 2025	Q3 2025
Dynamic Equity Portfolio (BDT)	568,901	550,621	153,778	0
Dynamic T-Bill Portfolio (BDT)	489,562	503,809	913,838	1,098,912
Portfolio Value (Dynamic Asset Portfolio	**1,058,464**	**1,054,430**	**1,067,616**	**1,098,912**
Quarter to Quarter Return		-1.53%	4.97%	11.56%

Table 4.9: Dynamic portfolio investment actions

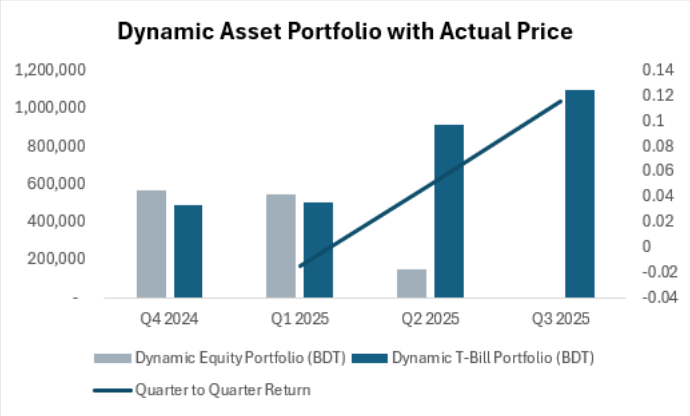


Figure 4.2: Dynamic portfolio investment actions

4.3 100% Equity Investment with Rebalancing

This strategy allocates the entire portfolio value to the equities but the allocation to each of the 8 stocks is the same. The allocation per stock is re-calculated in the beginning of each quarter to ensure that the weights are equal, irrespective of the movement of the individual

prices. At every rebalancing point (quarterly), take the present value of the portfolio and divide it by eight to get the amount invested in the individual stocks. The share shares that are being held in each stock are then calculated by dividing its allocation by the actual closing price in the quarter. Since the prices vary with each passing period, buying or selling of shares is done to ensure that there is an equal monetary investment in each stock. There is also no allocation to T-bills or risk-free assets, and all the funds are kept in equity portfolio at any given time.

Quarter		Q04 2024			Q01 2025				
Initial Equity Investments in BDT (100%)				1,000,000					967,867
Firm	Weight	Fund Allocation (BDT)	Closing Price (BDT)	Number of Shares	Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)	Fund Allocation (BDT)	Closing Number of Shares
UCB	12.50%	125,000	9.20	13,587	13,587	11.00	149,457	120,983	10,998
IDLC	12.50%	125,000	32.70	3,823	3,823	31.40	120,031	120,983	3,853
GP	12.50%	125,000	323.10	387	387	321.90	124,536	120,983	376
BATASHOE	12.50%	125,000	905.40	138	138	834.70	115,239	120,983	145
RENATA	12.50%	125,000	635.10	197	197	500.50	98,508	120,983	242
WALTONHIL	12.50%	125,000	487.50	256	256	462.70	118,641	120,983	261
RAKC	12.50%	125,000	22.60	5,531	5,531	22.60	125,000	120,983	5,353
OLYMPIC	12.50%	125,000	158.00	791	791	147.20	116,456	120,983	822
Total Equity Value		**1,000,000**					**967,867**	**967,867**	

Table 4.10: 100% Equity Investment with Rebalancing

Q02 2025					Q03 2025		
				904,122			1,006,232
Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)	Fund Allocation (BDT)	Closing Number of Shares	Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)
10,998	9.90	108,885	113,015	11,416	11,416	10.60	121,006
3,853	29.00	111,736	113,015	3,897	3,897	41.20	160,560
376	303.10	113,918	113,015	373	373	299.00	111,487
145	802.70	116,345	113,015	141	141	877.70	123,575
242	488.40	118,058	113,015	231	231	480.40	111,164
261	406.30	106,236	113,015	278	278	419.90	116,798
5,353	19.20	102,782	113,015	5,886	5,886	25.10	147,744
822	153.50	126,161	113,015	736	736	154.70	113,899
		904,122	**904,122**				**1,006,232**

Table 4.11: 100% Equity Investment with Rebalancing

100% Equity Investments with Rebalancing				
Particulars	Q04 2024	Q01 2025	Q02 2025	Q03 2025
Equity Value (BDT)	1,000,000	967,867	904,122	1,006,232
T-Bill Value (BDT)	0	0	0	0
Total Value (BDT)	**1,000,000**	**967,867**	**904,122**	**1,006,232**
Quarter to Quarter Return		-13.06%	-27.25%	42.80%
Change in Quarter to Quarter Return			-14.19%	70.05%

Table 4.12: 100% Equity Investment with Rebalancing

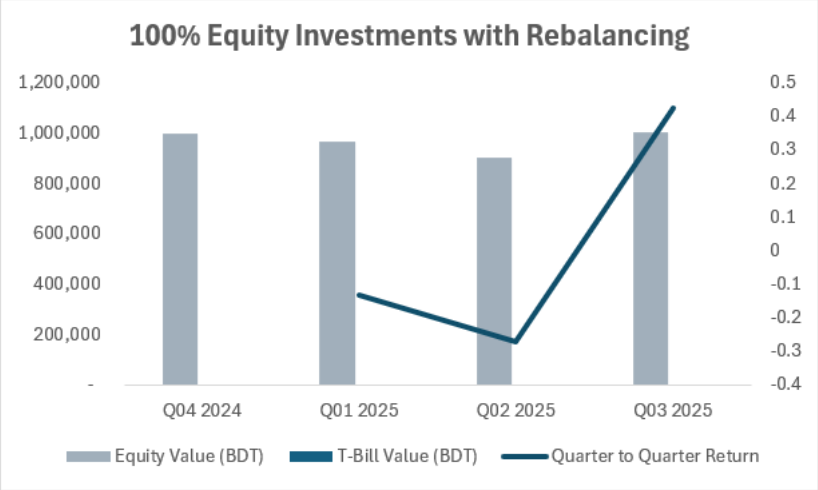


Figure 4.3: Dynamic portfolio investment actions

4.4 100% Equity Investment without Rebalancing

Under this strategy, all the amount of investment (BDT 1,000,000) is invested solely on equity instruments and all the money is divided equally among the eight chosen stocks listed in DSE. The weights of the portfolio are not varied in the middle of the investment period, however, as opposed to the dynamic or rebalanced approaches the weights are determined at the beginning of the period. Consequently, the weights change with changes in individual stock prices, which causes the possibility of concentration in good-performing stocks and underweighting in bad-performing stocks in the long term. The results of the 100 percent equity investment and never rebalanced are as given below which shows the portfolio values and returns in every quarter.

Quarter		Q4 2024			Q1 2025	
Initial Equity Investments in BDT (100%)				1,000,000		967,867
Firm	**Weight**	**Fund Allocation (BDT)**	**Closing Price (BDT)**	**Number of Shares**	**Closing Price (BDT)**	**Equity Value (BDT)**
UCB	12.50%	125,000	9.20	13,587	11.00	149,457
IDLC	12.50%	125,000	32.70	3,823	31.40	120,031
GP	12.50%	125,000	323.10	387	321.90	124,536
BATASHOE	12.50%	125,000	905.40	138	834.70	115,239
RENATA	12.50%	125,000	635.10	197	500.50	98,508
WALTONHIL	12.50%	125,000	487.50	256	462.70	118,641
RAKC	12.50%	125,000	22.60	5,531	22.60	125,000
OLYMPIC	12.50%	125,000	158.00	791	147.20	116,456
Total Equity Value		**1,000,000**				**967,867**

Table 4.13: 100% Equity Investment without Rebalancing

Q2 2025		Q3 2025	
	901,391		1,001,801
Closing Price (BDT)	**Equity Value (BDT)**	**Closing Price (BDT)**	**Equity Value (BDT)**
9.90	134,511	10.60	144,022
29.00	110,856	41.20	157,492
303.10	117,262	299.00	115,676
802.70	110,821	877.70	121,176
488.40	96,127	480.40	94,552
406.30	104,179	419.90	107,667
19.20	106,195	25.10	138,827
153.50	121,440	154.70	122,389
	901,391		**1,001,801**

Table 4.14: 100% Equity Investment without Rebalancing

Here the portfolio value and quarter to quarter returns are relatively better in the first quarter (2024 Q4) since the market environment ushered in favourable environment in terms of equity performance. Nonetheless, in consecutive quarters (2025 Q1 Q3) the Dynamic Asset Allocation (DAA) portfolio is better when it comes to preserving and maintaining a consistent return. The DAA plan is also less volatile and provides a better downside protection which is also a positive development on the strategy compared to the 100 percent equity investment.

100% Equity Investments without Rebalancing				
Particulars	**Q04 2024**	**Q01 2025**	**Q02 2025**	**Q03 2025**
Equity Value (BDT)	1,000,000	967,867	901,391	1,001,801
T-Bill Value (BDT)	0	0	0	0
Total Value (BDT)	**1,000,000**	**967,867**	**901,391**	**1,001,801**
Quarter to Quarter Return		-13.06%	-0.284619516	42.25%
Change in Quarter to Quarter Return			-0.153976306	70.71%

Table 4.15: 100% Equity Investment without Rebalancing

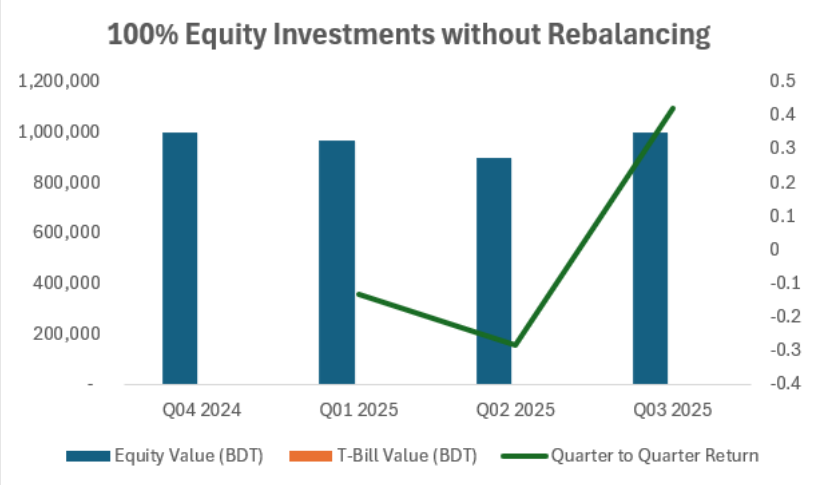


Figure 4.4: Dynamic portfolio investment actions

4.5 100% Risk Free Investment

In a 100% risk-free investment, all the funds would be invested in the risk-free security that is the 91 days Government of Bangladesh Treasury Bill (T-bill). The entire amount of investment will be invested in T-bills at the start of every quarter, and it will increase at the rate of the specific risk-free rate at the end of every quarter. The balance, and the amount earned as interest, is then re-invested, in T-bills the following quarter, in the same continuous compounding manner. The model of the 100% risk-free investment is as follows and illustrates the portfolio value and returns during the quarters depending on the average quarterly 91 days T-bills rates.

Particulars	Q4 2024	Q1 2025	Q2 2025	Q3 2025
T-Bill Investments	1,000,000	1,029,102	1,056,891	1,087,872
Stock Investments	0	0	0	0
Total Investments	**1,000,000**	**1,029,102**	**1,056,891**	**1,087,872**
Quarter to Quarter Return		11.47%	10.66%	11.56%
Change in Quarter to Quarter Return			-0.82%	0.90%

Table 4.16: 100% Risk-free investment

In the first quarter (2024 Q4) the Dynamic Asset Allocation (DAA) strategy has a higher portfolio value compared to the 100 percent risk-free investment, which means that the equity exposure generated additional returns beyond the risk-free: Nevertheless, the DAA portfolio value will decrease relative to that of the portfolio that is entirely risk-free in the two subsequent quarters (2025 Q1 and Q2) as a result of market declines and equity volatility.

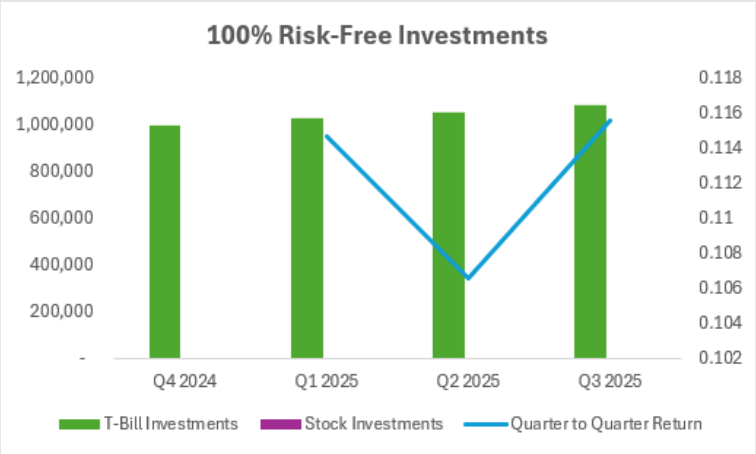


Figure 4.5: 100% Risk-free investment

When it comes to the return behaviour, the 100% risk-free investment has a positive and stable rate of return in every quarter whereas the DAA portfolio has greater variation with a negative rate of return in 2025 Q2. The average or holding period return of the DAA portfolio is slightly less than that of the 100% T-bill investment over the entire period as this indicates the advantage of stability of the risk-free investment in uncertain market situations.

4.6 50% Equity and 50% T-bill with Rebalancing

When we invest 50% in equity and 50% in T-bill and rebalance the portfolio every quarter to keep half of the portfolio in equity and half of the portfolio in T-bill, then we must reassign the fund each quarter both in the combination of share and T-bill. The distribution is redefined to the initial percentage based on the variance which arises out of the price adjustment. This strategy is computed as below.

Quarter		Q4 2024			Q1 2025				
Initial Investments in BDT (100%)				1,000,000					998,484
Equity Weight				50%					50%
T-Bill Weight				50%					50%
Firm	Weight	Fund Allocation (BDT)	Closing Price (BDT)	Number of Shares	Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)	Fund Allocation (BDT)	Closing Number of Shares
UCB	12.50%	62,500	9.20	6,793	6,793	11.00	74,728	62,405	5,673
IDLC	12.50%	62,500	32.70	1,911	1,911	31.40	60,015	62,405	1,987
GP	12.50%	62,500	323.10	193	193	321.90	62,268	62,405	194
BATASHOE	12.50%	62,500	905.40	69	69	834.70	57,620	62,405	75
RENATA	12.50%	62,500	635.10	98	98	500.50	49,254	62,405	125
WALTONHIL	12.50%	62,500	487.50	128	128	462.70	59,321	62,405	135
RAKC	12.50%	62,500	22.60	2,765	2,765	22.60	62,500	62,405	2,761
OLYMPIC	12.50%	62,500	158.00	396	396	147.20	58,228	62,405	424
Total Equity Value		**500,000**					**483,933**	**499,242**	
Total T-Bill Value		**500,000**					**514,551**	**499,242**	

Table 4.17: 50% Equity and 50% Risk-free investment with rebalancing

Q2 2025					Q3 2025		
				979,085			1,048,723
				50%			
				50%			
Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)	Fund Allocation (BDT)	Closing Number of Shares	Opening Number of Shares	Closing Price (BDT)	Equity Value (BDT)
5,673	9.90	56,165	61193	6181	6181	10.60	65520
1,987	29.00	57,635	61193	2110	2110	41.20	86936
194	303.10	58,761	61193	202	202	299.00	60365
75	802.70	60,013	61193	76	76	877.70	66910
125	488.40	60,897	61193	125	125	480.40	60190
135	406.30	54,798	61193	151	151	419.90	63241
2,761	19.20	53,017	61193	3187	3187	25.10	79997
424	153.50	65,076	61193	399	399	154.70	61671
		466,362	**489,543**				**544831**
		512,723	**489,543**				**503,893**

Table 4.18: 50% Equity and 50% Risk-free investment with rebalancing

Particulars	Q4 2024	Q1 2025	Q2 2025	Q3 2025
Equity Investments	500,000	483,933	466,362	544,831
T-Bill Investments	500,000	514,551	512,723	503,893
Total Investments	**1,000,000**	**998,484**	**979,085**	**1,048,723**
(50% Equity and 50% Risk-Free Investments with Change in Quarter to Quarter Return		-0.61%	-7.85%	27.48%
			-7.24%	35.33%

Table 4.19: 50% Equity and 50% Risk-free investment with rebalancing

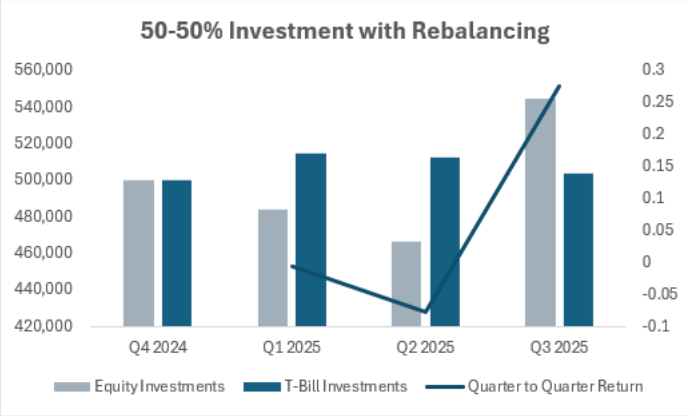


Figure 4.6: 50% Equity and 50% Risk-free investment with rebalancing

4.7 50% Equity and 50% T-bill without Rebalancing

This investment strategy involves splitting the total amount into 2 part and investing both equally in T-bill and equity. The portfolio is not rebalanced after the expiry of the quarter that an action is not acted upon within the period of the investment. This investment strategy is calculated as follows.

Quarter		Q4 2024			Q1 2025	
Initial Investments in BDT (100%)				1,000,000		998,484
Equity Weight				50%		
T-Bill Weight				50%		
Firm	**Weight**	**Fund Allocation (BDT)**	**Closing Price (BDT)**	**Number of Shares**	**Closing Price (BDT)**	**Equity Value (BDT)**
UCB	12.50%	62,500	9.20	6,793	11.00	74,728
IDLC	12.50%	62,500	32.70	1,911	31.40	60,015
GP	12.50%	62,500	323.10	193	321.90	62,268
BATASHOE	12.50%	62,500	905.40	69	834.70	57,620
RENATA	12.50%	62,500	635.10	98	500.50	49,254
WALTONHIL	12.50%	62,500	487.50	128	462.70	59,321
RAKC	12.50%	62,500	22.60	2,765	22.60	62,500
OLYMPIC	12.50%	62,500	158.00	396	147.20	58,228
Total Equity Value		**500,000**				**483,933**
Total T-Bill Value		**500,000**				**514,551**

Table 4.20: 50% Equity and 50% Risk-free investment without rebalancing

Q2 2025		Q3 2025	
979,141		1,044,837	
Closing Price (BDT)	**Equity Value (BDT)**	**Closing Price (BDT)**	**Equity Value (BDT)**
9.90	67,255	10.60	72,011
29.00	55,428	41.20	78,746
303.10	58,631	299.00	57,838
802.70	55,411	877.70	60,588
488.40	48,063	480.40	47,276
406.30	52,090	419.90	53,833
19.20	53,097	25.10	69,414
153.50	60,720	154.70	61,195
	450,696		**500,901**
	528,446		**543,936**

Table 4.21: 50% Equity and 50% Risk-free investment without rebalancing

Particulars	Q4 2024	Q1 2025	Q2 2025	Q3 2025
Equity Investments	500,000	483,933	450,696	500,901
T-Bill Investments	500,000	514,551	528,446	543,936
Total Investments	**1,000,000**	**998,484**	**979,141**	**1,044,837**
Quarter to Quarter Return		-0.61%	-7.82%	25.98%
Change in Return on Investments			-7.22%	33.80%

Table 4.22: 50% Equity and 50% Risk-free investment without rebalancing

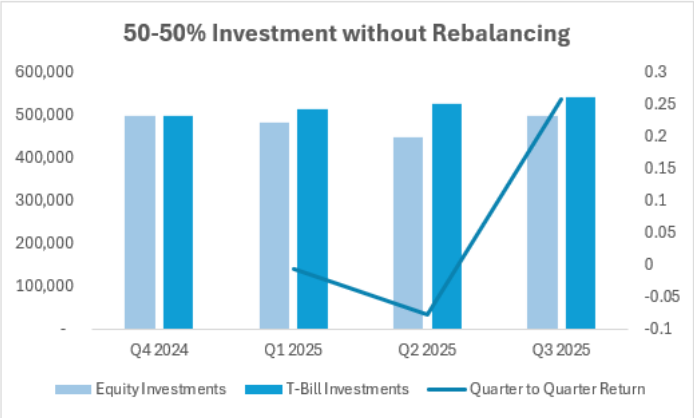


Figure 4.7: 50% Equity and 50% Risk-free investment without rebalancing

4.8 Portfolio Value Comparison

This section presents a comparative summary of the values of the portfolios of all the discussed investment strategies in the preceding section. The following summary table shows the end of quarter value of the portfolio of each strategy in the study period which allows a direct comparison of the performance of each strategy. Overall, the Dynamic Asset Allocation (DAA) strategy shows better results most quarterly than the other methods of investment. The general result of the DAA portfolio is a high cumulative value, which is

indicative of its efficiency to reprisal exposures to track market trends. Nevertheless, in some quarters, the fixed or riskless strategies are better, especially at the time of market decline or low volatility when it is difficult to have a dynamic adjustment with much benefit.

Investment Strategy	Quarter to Quarter Portfolio Value		
	Q1 2025	Q2 2025	Q3 2025
1. Dynamic Asset Allocation	1,169,345	1,181,856	1,216,501
2. Static Asset Allocation (50% and 50%)	998,484	979,141	1,044,837
3. 100% Equity Investments without Rebalancing	967,867	901,391	1,001,801
4. 100% Equity Investments with Rebalancing	967,867	904,122	1,006,232
5. Dynamic Asset Portfolio with Actual Price	1,054,430	1,067,616	1,098,912
6. 50% Equity and 50% Risk-Free Investments without Rebalancing	998,484	979,141	1,044,837
7. 50% Equity and 50% Risk-Free Investments with Rebalancing	998,484	979,085	1,048,723
8. 100% Risk-Free Investments	1,029,102	1,056,891	1,087,872

Table 4.23: Portfolio value comparison

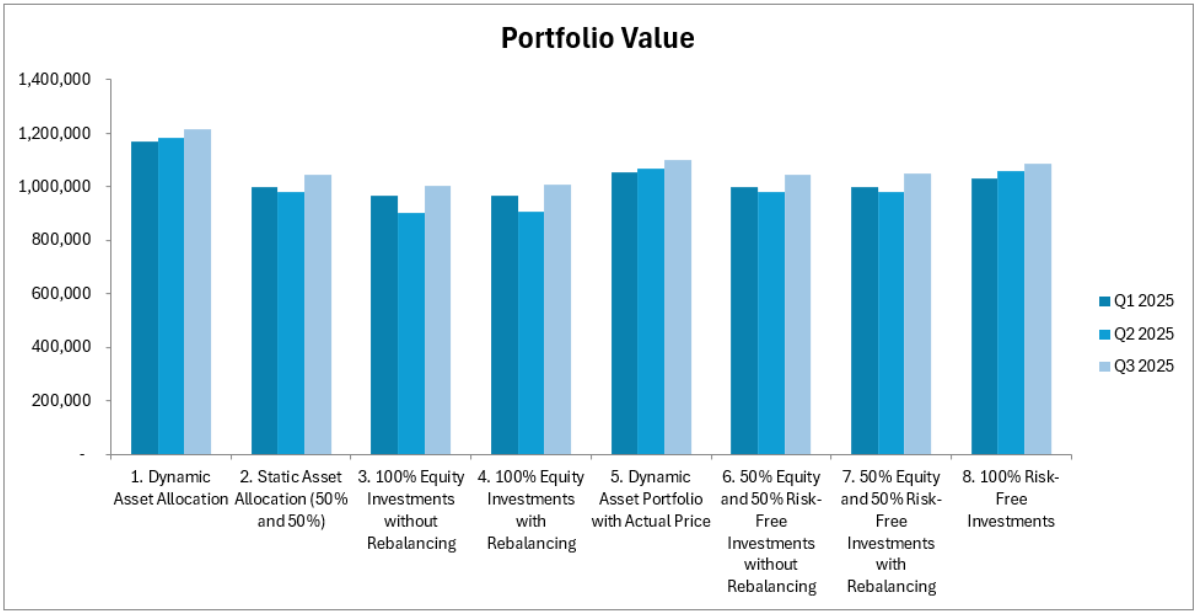


Figure 4.8: Portfolio value comparison

4.9 Quarter to Quarter Return Comparison

The table below summarizes the quarter-to-quarter returns of all investment strategies over the study period.

Investment Strategy	Quarter to Quarter Return			Average Return
	Q1 2025	Q2 2025	Q3 2025	
1. Dynamic Asset Allocation	62.58%	4.26%	11.56%	26.13%
2. Static Asset Allocation (50% and 50%)	-0.61%	-7.82%	25.98%	5.85%
3. 100% Equity Investments without Rebalancing	-13.06%	-28.46%	42.25%	0.24%
4. 100% Equity Investments with Rebalancing	-13.06%	-27.25%	42.80%	0.83%
5. Dynamic Asset Portfolio with Actual Price	-1.53%	4.97%	11.56%	5.00%
6. 50% Equity and 50% Risk-Free Investments without Rebalancing	-0.61%	-7.82%	25.98%	5.85%
7. 50% Equity and 50% Risk-Free Investments with Rebalancing	-0.61%	-7.85%	27.48%	6.34%
8. 100% Risk-Free Investments	11.47%	10.66%	11.56%	11.23%

Table 4.24: Quarter to Quarter return comparison

Based on the findings it is clear that the Dynamic Asset Allocation (DAA) had the biggest average of 26.13 because of how it is able to change its exposure depending on which way the market was going and how volatile it was. Conversely, the fluctuation of the investment in static and 100 per cent equity display negative fluctuations and most returns were negative in Q2 2025, which was the effect of market downturns. The 50% equity-50% T-bill mixes had fairly high returns of reasonable volatility and were therefore more conservative yet not as aggressive as DAA. The 100 percent risk free investment has always given positive returns in all quarters though with less average of 11.23, which proves that it is safe, but has low growth potential.

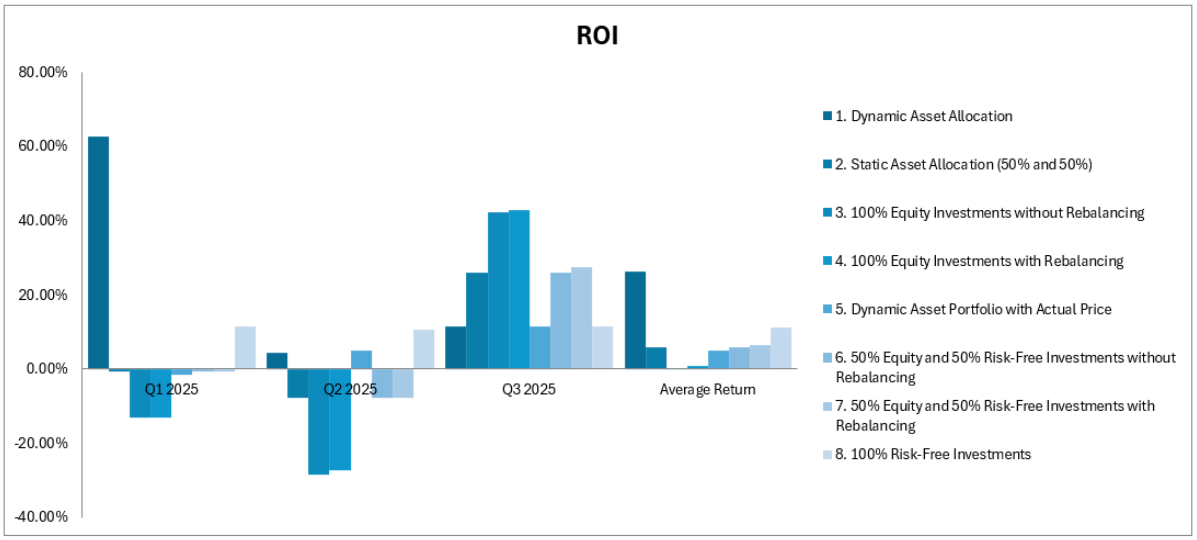


Figure 4.8: Quarter to Quarter Return Comparison

Overall, the DAA method proved more efficient in maintaining a better balance between the improvement of returns and the reduction of the risk in comparison to the other strategies in the majority of market situations.

Chapter 5: Conclusion

This report prepared to apply the practical knowledge of the Dynamic Asset Allocation (DAA) Strategy by combining risky and the risk-free assets in the same portfolio. The research considers the daily price of eight stocks listed on DSE between January 2024 and the September 2025 stock returns and the 91-day Treasury Bill rate as its proxy of the risk-free rate. According to the rolling forecast method, the standard deviation and covariance matrices were calculated to compute the risk as well as to model asset movements using a binomial tree model. To implement the DAA model, the 100% equity portfolio, the dynamics of put and call options, the insured portfolio, and the delta adjustment were calculated. Historical volatility and risk-free rates were used to obtain the values of up factor, down factor and probability (p) and (1-p) whereby dynamic rebalancing of the portfolio was done in response to the real performance of the market.

DAA strategy has been compared afterwards with a few other types of investment strategies such as 100% equity (with and without rebalancing), 50-50 equity T-bill portfolios, dynamic asset portfolio with actual price and 100% risk free investment. Results show that the Dynamic Asset Allocation portfolio had the best average (26.13%) and a standard deviation of 25.94% indicating a good balance is between the risk and the reward. Although the 100 per cent risk-free investment had the most consistent payout (11.23%), the lowest volatility (0.41%), its growth prospects were low. The dynamic asset portfolio that has the actual price had a moderate average return of 5% with the minimum standard deviation 5.34% which turned out to be effective in minimizing risks.

In general, DAA strategy was more efficient than both static and equity-only strategy during most periods which proves its ability to adapt to market changes. The report concludes that dynamical allocation, with derivative-based insurance and periodic rebalancing, optimises portfolio efficiency, giving an investor a better, risk-adjusted return model in turbulent markets.

References

1. www.dse.com.bd

2. www.bsec.gov.bd

3. www.investing.com

4. www.lankabangla.com

Appendix

Return Calculation (2024 Q1 to 2025 Q3)

Date	UCB	IDLC	GP	BATASHOE	RENATA	WALTONHIL	RAKC	OLYMPIC
01-Jan-24								
02-Jan-24	0.00%	0.00%	0.00%	-0.55%	0.00%	0.00%	0.00%	0.53%
03-Jan-24	0.00%	0.00%	0.00%	-0.01%	0.00%	0.00%	0.00%	1.50%
04-Jan-24	0.00%	0.00%	0.00%	0.77%	0.00%	0.00%	0.00%	1.29%
08-Jan-24	0.00%	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%	-0.51%
09-Jan-24	0.00%	0.00%	0.00%	-0.66%	0.00%	0.00%	0.00%	-0.19%
10-Jan-24	0.00%	0.00%	0.00%	1.24%	0.00%	0.00%	0.00%	0.13%
11-Jan-24	0.00%	0.00%	0.00%	-0.61%	0.00%	0.00%	0.00%	-0.39%
14-Jan-24	0.00%	0.00%	0.00%	1.00%	0.00%	0.00%	0.00%	0.26%
15-Jan-24	0.00%	0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	1.03%
16-Jan-24	0.00%	0.00%	0.00%	-0.05%	0.00%	0.00%	0.00%	-0.32%
17-Jan-24	0.00%	0.00%	0.00%	1.19%	0.00%	0.00%	0.00%	-0.71%
18-Jan-24	0.00%	0.00%	0.00%	-0.73%	0.00%	0.00%	0.00%	-0.65%
21-Jan-24	-9.29%	0.00%	0.00%	0.34%	0.00%	-6.45%	-10.30%	0.26%
22-Jan-24	2.62%	0.00%	0.00%	0.82%	0.00%	-7.79%	-5.58%	5.17%
23-Jan-24	6.67%	-5.75%	0.00%	1.04%	0.00%	-7.79%	0.00%	-0.96%
24-Jan-24	-1.63%	-3.48%	0.00%	-0.02%	0.00%	-7.28%	-4.18%	-0.19%
25-Jan-24	-2.49%	-4.34%	0.00%	-0.17%	0.00%	-2.16%	0.00%	-0.19%
28-Jan-24	0.00%	-5.57%	0.00%	-0.73%	0.00%	-6.98%	-7.39%	0.26%
29-Jan-24	1.67%	-1.05%	0.00%	0.00%	0.00%	-1.57%	1.22%	-0.84%
30-Jan-24	-0.83%	2.34%	0.00%	-0.84%	0.00%	7.22%	3.28%	0.13%
31-Jan-24	-0.84%	-0.52%	0.00%	-0.59%	0.00%	-0.27%	-1.78%	-0.85%
01-Feb-24	0.84%	6.74%	0.00%	0.58%	0.00%	0.60%	4.09%	-0.46%
04-Feb-24	0.83%	2.15%	0.00%	0.76%	0.00%	5.66%	5.30%	0.52%
05-Feb-24	2.45%	2.80%	0.00%	0.22%	0.00%	5.29%	-0.27%	0.39%
06-Feb-24	-1.63%	-1.86%	0.00%	-0.19%	0.00%	-0.17%	1.62%	-0.65%
07-Feb-24	0.00%	-0.23%	0.00%	-1.01%	-6.45%	-2.52%	9.46%	-0.26%
08-Feb-24	2.43%	-0.71%	0.00%	0.32%	-6.45%	0.23%	-2.72%	-1.39%
11-Feb-24	6.20%	3.48%	0.00%	1.60%	-5.56%	-1.61%	-3.57%	0.47%
12-Feb-24	-0.75%	-1.15%	0.00%	-0.98%	-1.54%	-2.16%	3.57%	-0.13%
13-Feb-24	-1.53%	-1.63%	0.00%	1.05%	-2.02%	-1.22%	-2.54%	0.07%

14-Feb-24	-0.77%	-1.66%	0.00%	0.00%	3.01%	-0.43%	-2.08%	-0.07%
15-Feb-24	-2.35%	-0.24%	0.00%	-0.93%	-2.23%	-0.53%	-1.59%	-0.13%
18-Feb-24	0.79%	-1.93%	0.00%	0.09%	-0.71%	0.15%	1.59%	0.20%
19-Feb-24	2.33%	-0.98%	0.00%	-0.13%	-0.08%	-2.22%	2.59%	-0.20%
20-Feb-24	0.77%	0.00%	0.00%	-1.21%	-0.80%	0.05%	-2.12%	-0.13%
22-Feb-24	0.00%	-0.99%	0.00%	-0.04%	-0.20%	-0.07%	-0.81%	-0.27%
25-Feb-24	-0.77%	-0.50%	0.00%	-0.79%	-0.89%	-1.03%	-0.81%	0.00%
27-Feb-24	0.00%	0.25%	0.00%	2.02%	-1.39%	-0.36%	-0.27%	-2.30%
28-Feb-24	0.00%	-0.25%	0.00%	-0.55%	0.65%	-0.28%	0.82%	-0.27%
29-Feb-24	0.77%	-0.50%	0.00%	-1.40%	-0.87%	-0.36%	-0.54%	-0.41%
03-Mar-24	-1.54%	-1.01%	-4.46%	-0.25%	0.21%	2.08%	0.00%	-0.62%
04-Mar-24	0.77%	-1.02%	-1.70%	0.90%	-0.57%	-1.30%	-1.93%	1.24%
05-Mar-24	-2.33%	0.00%	-1.80%	0.26%	-0.85%	-1.29%	-0.56%	3.43%
06-Mar-24	1.56%	0.26%	1.61%	-0.65%	0.15%	-1.77%	-0.28%	-0.86%
07-Mar-24	-1.56%	-0.77%	-1.25%	0.16%	-1.09%	-0.14%	-1.13%	0.07%
10-Mar-24	-0.79%	-0.26%	-1.23%	0.03%	-1.24%	-0.66%	-0.57%	0.60%
11-Mar-24	-0.80%	-1.30%	-1.53%	0.80%	-0.48%	-0.67%	0.28%	-0.60%
12-Mar-24	0.00%	0.00%	-0.69%	-1.12%	-1.24%	-0.63%	-1.72%	0.13%
13-Mar-24	0.00%	-1.85%	-1.52%	0.83%	-1.00%	0.66%	-1.16%	-0.40%
14-Mar-24	0.00%	-1.07%	0.87%	-0.08%	-1.18%	-0.03%	-0.29%	0.33%
18-Mar-24	-3.25%	-3.01%	0.08%	-0.43%	-1.57%	-1.19%	-2.37%	-1.07%
19-Mar-24	-2.51%	-5.72%	-0.41%	-0.20%	-1.43%	-0.20%	-3.98%	-0.47%
20-Mar-24	2.51%	1.17%	-0.75%	0.21%	-1.23%	0.18%	4.28%	0.07%
21-Mar-24	-0.83%	6.47%	-0.04%	0.60%	0.37%	0.55%	1.49%	0.61%
24-Mar-24	-0.84%	-1.10%	0.66%	0.93%	-0.20%	-1.11%	-1.49%	0.74%
25-Mar-24	-1.69%	-0.28%	-0.25%	-0.03%	-3.05%	-1.28%	-3.04%	0.00%
27-Mar-24	-2.60%	-1.67%	-1.21%	-2.00%	-2.69%	-1.26%	-4.10%	0.07%
28-Mar-24	4.29%	1.12%	-1.22%	0.05%	-3.64%	-4.78%	2.23%	-0.27%
31-Mar-24	0.84%	1.65%	0.84%	0.80%	1.19%	-0.89%	2.48%	1.66%
01-Apr-24	-2.53%	0.27%	-0.38%	0.46%	-3.58%	-0.03%	-0.62%	0.52%

02-Apr-24	-0.86%	0.00%	0.34%	0.25%	2.06%	3.37%	-0.93%	0.39%
03-Apr-24	0.86%	1.62%	0.80%	0.60%	0.27%	1.18%	1.55%	0.58%
04-Apr-24	-1.72%	0.00%	0.25%	-1.17%	0.34%	-0.83%	0.61%	-0.06%
08-Apr-24	0.87%	0.53%	0.00%	0.78%	1.39%	0.80%	1.51%	0.52%
09-Apr-24	-1.74%	0.83%	-0.08%	-0.30%	3.42%	-0.89%	1.49%	-1.36%
15-Apr-24	0.00%	-2.51%	-0.46%	-0.56%	0.04%	-1.90%	-3.92%	-1.98%
16-Apr-24	0.87%	-0.28%	-1.18%	-0.90%	0.07%	-0.18%	-0.62%	1.19%
17-Apr-24	0.00%	-0.57%	0.34%	0.17%	0.63%	-1.30%	-1.25%	0.85%
18-Apr-24	-0.87%	-5.57%	-0.93%	-1.72%	-1.55%	-0.80%	-1.58%	-2.98%
21-Apr-24	-3.57%	-2.44%	-0.21%	0.49%	-2.27%	-2.25%	-0.32%	0.13%
22-Apr-24	0.90%	1.53%	-0.47%	0.00%	0.09%	2.14%	0.00%	-0.54%
23-Apr-24	-2.74%	-0.92%	-0.21%	-1.51%	0.48%	0.83%	-3.91%	-0.34%
24-Apr-24	0.00%	-2.17%	-0.04%	2.32%	-0.45%	-1.39%	-1.34%	-0.48%
25-Apr-24	-0.93%	-2.22%	1.07%	-3.85%	-3.05%	-2.25%	-1.36%	-2.34%
28-Apr-24	0.00%	3.77%	2.31%	3.98%	1.54%	1.00%	1.69%	0.35%
29-Apr-24	0.93%	0.92%	-1.68%	-0.35%	-0.58%	-1.64%	-2.72%	-0.84%
30-Apr-24	-0.93%	0.61%	-0.30%	1.01%	0.20%	-2.12%	2.72%	0.98%
02-May-24	0.00%	0.30%	0.76%	-1.76%	-1.05%	-0.21%	-2.72%	-1.75%
05-May-24	0.00%	1.50%	0.80%	-0.30%	1.16%	-1.07%	1.37%	0.42%
06-May-24	-1.89%	2.94%	0.08%	1.64%	1.15%	-0.67%	2.68%	-0.85%
07-May-24	2.82%	-1.17%	-0.08%	-0.89%	-2.48%	0.75%	-1.33%	-1.07%
08-May-24	-0.93%	0.58%	-0.33%	0.48%	-0.58%	0.17%	-2.03%	1.07%
09-May-24	0.00%	-0.88%	-0.55%	-1.27%	-0.15%	-1.22%	-1.38%	-1.14%
12-May-24	0.93%	-1.48%	-0.21%	2.47%	-0.36%	0.02%	1.38%	-2.91%
13-May-24	0.00%	-1.50%	0.72%	-2.63%	-0.96%	-0.32%	-1.38%	-1.04%
14-May-24	-2.82%	-1.53%	-0.67%	0.24%	-2.16%	-0.45%	-1.05%	-1.35%
15-May-24	0.00%	-0.62%	-1.44%	-1.16%	-2.63%	-2.05%	-2.49%	0.38%
16-May-24	0.00%	-0.62%	-0.56%	0.00%	-1.38%	-0.07%	0.00%	-0.98%
19-May-24	0.00%	-2.84%	-2.84%	0.16%	-2.75%	-3.05%	-2.92%	-0.38%
20-May-24	-2.90%	-0.64%	-0.62%	-1.37%	-0.52%	-2.81%	-2.25%	-1.85%

21-May-24	0.00%	0.64%	0.40%	1.70%	-0.98%	-0.26%	0.00%	-0.94%
23-May-24	0.00%	-2.93%	-0.18%	-0.89%	-2.98%	-1.53%	-2.30%	1.56%
26-May-24	6.59%	-1.33%	0.49%	-0.27%	-3.00%	-2.83%	-1.56%	0.15%
27-May-24	-6.92%	3.61%	1.45%	2.69%	0.54%	-0.19%	2.72%	0.08%
28-May-24	-2.08%	-2.61%	-1.67%	-1.00%	0.25%	0.95%	0.38%	1.83%
29-May-24	0.00%	-2.35%	0.97%	1.54%	-0.14%	-2.70%	-2.71%	-2.07%
30-May-24	-1.06%	3.66%	-1.86%	-3.04%	-0.22%	0.37%	1.56%	1.92%
02-Jun-24	1.06%	-2.99%	0.85%	1.25%	0.68%	-0.62%	-1.17%	0.00%
03-Jun-24	0.00%	-0.34%	0.13%	-2.67%	0.20%	-2.16%	1.55%	0.23%
04-Jun-24	-5.41%	1.01%	0.79%	0.57%	0.62%	-0.22%	1.90%	-0.08%
05-Jun-24	0.00%	-1.69%	-0.57%	0.48%	-0.62%	-1.76%	-2.68%	-2.07%
06-Jun-24	-1.12%	0.00%	0.62%	-1.06%	-0.75%	-2.54%	0.00%	-1.72%
09-Jun-24	-2.27%	-1.03%	0.66%	0.53%	-0.82%	-2.71%	-2.35%	-2.95%
10-Jun-24	0.00%	-2.08%	-1.63%	-2.30%	-2.57%	-2.92%	-2.41%	-2.79%
11-Jun-24	1.14%	-2.13%	-0.85%	-0.94%	-0.54%	-2.69%	-2.05%	-1.51%
12-Jun-24	-2.30%	-1.44%	-0.22%	0.22%	2.01%	0.50%	1.24%	1.76%
13-Jun-24	1.16%	-1.10%	0.49%	0.85%	-0.79%	0.95%	0.00%	-0.33%
19-Jun-24	-2.33%	1.10%	-0.85%	-0.53%	1.37%	8.38%	0.82%	-1.17%
20-Jun-24	2.33%	3.57%	1.21%	0.59%	7.22%	8.38%	0.41%	2.75%
23-Jun-24	-2.33%	2.43%	0.89%	3.89%	7.18%	7.22%	2.40%	1.47%
24-Jun-24	0.00%	1.02%	0.57%	-1.71%	-0.21%	2.46%	-0.40%	0.08%
25-Jun-24	-1.18%	1.01%	0.22%	-1.85%	0.35%	-2.90%	-0.40%	1.36%
26-Jun-24	0.00%	1.99%	3.23%	2.35%	0.34%	7.22%	0.79%	2.68%
27-Jun-24	1.18%	-0.99%	2.18%	2.29%	5.21%	7.23%	5.01%	3.36%
30-Jun-24	-2.38%	-2.01%	2.58%	1.93%	0.55%	-0.48%	-1.52%	-0.60%
02-Jul-24	0.00%	-0.34%	-1.51%	-2.28%	-1.77%	-0.15%	-1.15%	-1.98%
03-Jul-24	2.38%	3.34%	-1.57%	0.04%	-1.75%	1.09%	2.29%	-0.54%
04-Jul-24	3.47%	6.68%	2.22%	1.63%	2.14%	0.40%	3.70%	2.90%
07-Jul-24	4.45%	3.92%	2.25%	0.66%	-0.70%	-3.02%	2.16%	0.90%
08-Jul-24	0.00%	-1.79%	-0.96%	-1.82%	-0.35%	-2.68%	-1.43%	-0.30%

09-Jul-24	-1.09%	-2.44%	-1.50%	-1.33%	-0.27%	-0.21%	3.20%	-0.30%
10-Jul-24	2.17%	2.44%	-0.16%	0.52%	-0.92%	-1.46%	-0.35%	2.30%
11-Jul-24	-2.17%	-2.13%	-0.49%	-0.99%	-0.62%	-2.30%	-2.85%	-2.83%
14-Jul-24	-1.10%	-0.93%	0.41%	1.86%	-0.50%	-1.28%	-2.19%	-1.83%
15-Jul-24	0.00%	0.31%	0.04%	-1.62%	0.18%	7.23%	-0.74%	-0.46%
16-Jul-24	1.10%	2.75%	1.90%	1.44%	0.92%	4.09%	-1.50%	-0.54%
18-Jul-24	0.00%	-0.60%	0.92%	-2.64%	-0.35%	-3.04%	-1.52%	-1.48%
24-Jul-24	-2.22%	-2.77%	-1.00%	-1.29%	-2.63%	-3.04%	-2.33%	-1.51%
25-Jul-24	2.22%	2.16%	1.99%	2.81%	1.94%	0.31%	3.85%	-0.08%
28-Jul-24	2.17%	-2.78%	1.13%	-0.25%	-0.33%	-1.03%	-1.52%	-0.40%
29-Jul-24	-1.08%	-1.58%	-1.10%	-0.10%	-1.28%	-1.82%	-0.38%	-1.29%
30-Jul-24	-1.09%	-2.91%	-1.35%	-0.17%	-2.03%	-2.90%	-1.55%	-2.97%
31-Jul-24	0.00%	-0.99%	0.68%	0.51%	0.20%	1.77%	-2.77%	0.17%
01-Aug-24	-1.10%	-0.33%	0.91%	-0.76%	-0.03%	1.03%	0.00%	0.25%
04-Aug-24	-2.25%	-3.04%	-3.03%	-2.75%	-3.03%	-3.04%	-2.85%	-2.97%
06-Aug-24	6.60%	9.47%	8.38%	5.41%	5.43%	5.93%	9.46%	9.51%
07-Aug-24	9.14%	9.50%	8.38%	-0.29%	5.25%	1.26%	8.29%	9.47%
08-Aug-24	9.27%	9.45%	8.36%	3.45%	-1.58%	5.29%	9.25%	9.49%
11-Aug-24	9.29%	8.16%	8.39%	-2.04%	0.95%	2.64%	-1.59%	0.00%
12-Aug-24	2.39%	-2.89%	2.82%	-2.21%	-1.60%	-3.03%	-2.93%	-2.95%
13-Aug-24	3.10%	-2.98%	0.00%	-0.13%	1.38%	-3.03%	-1.33%	-2.77%
14-Aug-24	7.36%	4.19%	10.59%	-0.30%	12.01%	0.22%	0.00%	3.57%
15-Aug-24	-2.88%	2.62%	-0.58%	-0.14%	-8.22%	0.76%	0.00%	8.61%
18-Aug-24	-2.96%	-2.86%	-3.04%	-1.16%	-2.05%	-2.97%	-2.37%	3.34%
19-Aug-24	1.49%	-2.95%	-3.03%	-0.36%	-0.65%	-0.99%	-0.34%	1.34%
20-Aug-24	0.74%	-3.04%	-3.00%	0.90%	-1.76%	-0.61%	-1.73%	-3.00%
21-Aug-24	2.18%	-2.87%	-3.04%	-0.75%	-1.91%	-2.96%	-2.84%	-3.03%
22-Aug-24	0.72%	1.83%	3.59%	1.46%	2.97%	1.79%	0.72%	9.32%
25-Aug-24	3.51%	1.29%	-2.75%	0.02%	-1.04%	2.93%	-2.17%	4.76%
27-Aug-24	-2.80%	0.51%	-2.10%	-0.04%	-0.93%	0.44%	0.00%	-0.21%
28-Aug-24	-2.88%	0.00%	5.63%	-1.16%	1.87%	5.95%	2.52%	3.99%
29-Aug-24	-	1.77%	-1.41%	1.14%	-0.12%	3.50%	4.18%	3.34%

	1.47%							
01-Sep-24	-5.32%	1.74%	-0.26%	-1.13%	1.03%	0.42%	0.34%	2.99%
02-Sep-24	3.08%	-2.24%	-0.06%	-0.10%	0.16%	0.85%	-2.76%	-2.84%
03-Sep-24	-2.30%	-0.51%	0.15%	0.33%	5.00%	3.25%	1.04%	1.04%
04-Sep-24	-5.58%	-1.27%	-0.91%	-0.24%	-1.69%	-2.80%	-1.39%	-2.99%
05-Sep-24	0.82%	-0.77%	-0.56%	0.52%	-1.34%	-4.90%	1.39%	5.28%
08-Sep-24	-5.86%	-2.88%	0.50%	-0.52%	0.77%	-2.92%	-2.45%	1.38%
09-Sep-24	-9.02%	-0.80%	-0.41%	-0.54%	-1.21%	-1.21%	-0.36%	0.57%
10-Sep-24	5.51%	0.00%	0.32%	0.39%	0.75%	0.63%	-0.71%	0.00%
11-Sep-24	-1.80%	0.80%	-1.01%	-0.38%	0.05%	-1.50%	0.71%	-3.84%
12-Sep-24	3.57%	0.27%	-1.44%	-0.20%	-0.34%	0.31%	0.71%	-4.40%
15-Sep-24	-0.88%	0.26%	0.75%	-0.18%	-1.68%	0.96%	-1.07%	-2.96%
17-Sep-24	-1.79%	1.31%	-0.99%	-0.08%	-1.26%	-1.99%	-1.80%	-2.78%
18-Sep-24	2.67%	-2.65%	-0.70%	-0.01%	-0.94%	-2.65%	0.36%	4.81%
19-Sep-24	1.74%	2.38%	4.44%	-0.27%	2.65%	2.47%	-0.36%	0.72%
22-Sep-24	0.86%	-2.92%	-1.08%	-0.11%	-1.70%	-0.87%	-0.36%	-4.56%
23-Sep-24	0.85%	1.34%	0.91%	0.16%	-0.45%	-1.10%	1.81%	-0.92%
24-Sep-24	-1.71%	0.00%	1.91%	0.04%	-0.08%	-0.71%	-4.40%	3.98%
25-Sep-24	-1.74%	-4.91%	0.57%	-0.04%	-1.21%	-1.38%	-3.82%	-2.85%
26-Sep-24	4.29%	-1.12%	-0.57%	-0.02%	-1.29%	-2.22%	-1.57%	-1.67%
29-Sep-24	-1.69%	0.56%	-0.03%	0.05%	-2.34%	-0.37%	-1.59%	-0.16%
30-Sep-24	-2.60%	1.12%	0.26%	0.59%	-3.17%	0.00%	-2.03%	0.60%
01-Oct-24	-3.57%	-1.40%	-0.49%	0.17%	0.33%	1.17%	-3.33%	-3.81%
02-Oct-24	-1.83%	-2.28%	-2.15%	-0.72%	-0.91%	-2.55%	-0.42%	-5.80%
03-Oct-24	-0.93%	-3.22%	-0.94%	0.03%	1.26%	0.72%	-0.43%	1.48%
06-Oct-24	-1.89%	0.00%	-1.76%	-0.13%	-0.45%	-1.57%	0.00%	-5.25%
07-Oct-24	0.95%	-0.90%	-1.89%	0.12%	-0.92%	-4.91%	-1.72%	-1.44%
08-Oct-24	-0.95%	-2.12%	1.10%	-0.28%	-0.50%	-0.94%	0.87%	5.44%
09-Oct-24	0.95%	7.10%	2.61%	0.74%	0.83%	1.21%	2.97%	0.95%
14-Oct-24	0.00%	0.00%	-0.77%	-0.16%	-0.23%	-7.06%	-3.40%	2.39%

15-Oct-24	0.94%	-0.86%	-0.03%	-0.54%	-0.07%	-0.76%	2.14%	0.12%
16-Oct-24	-0.94%	-1.74%	0.65%	-0.63%	-3.99%	2.02%	-3.01%	-1.33%
17-Oct-24	-0.95%	-0.88%	-0.77%	0.00%	-0.93%	-2.04%	1.30%	0.81%
20-Oct-24	-2.90%	3.49%	-0.66%	-0.68%	-1.12%	-3.30%	-2.18%	-3.47%
21-Oct-24	0.98%	3.37%	-1.06%	-0.31%	0.00%	0.85%	0.44%	0.54%
22-Oct-24	1.92%	1.92%	0.42%	0.37%	5.58%	0.21%	0.44%	1.01%
23-Oct-24	-0.96%	-2.47%	-2.57%	0.29%	0.39%	-0.76%	-0.44%	-3.29%
24-Oct-24	0.96%	-2.53%	-1.69%	-0.87%	-1.73%	-0.81%	-2.22%	-0.67%
27-Oct-24	-5.88%	-4.07%	-3.60%	-2.03%	-5.41%	-1.82%	-8.91%	-3.49%
28-Oct-24	2.00%	-2.10%	-0.36%	0.95%	0.56%	-1.03%	-0.49%	-10.15%
29-Oct-24	1.96%	3.28%	2.14%	2.73%	1.36%	2.87%	0.00%	2.91%
30-Oct-24	4.74%	4.02%	2.00%	2.35%	1.64%	8.09%	5.74%	3.16%
31-Oct-24	1.83%	-1.42%	-1.04%	-2.25%	1.19%	1.10%	0.46%	-2.14%
03-Nov-24	-1.83%	-2.61%	-1.22%	-1.09%	-1.05%	-2.14%	0.92%	-0.61%
04-Nov-24	0.00%	2.89%	1.41%	-0.01%	-0.21%	1.19%	1.37%	6.51%
05-Nov-24	3.64%	1.13%	0.41%	0.36%	3.08%	2.01%	6.57%	-0.90%
06-Nov-24	-1.80%	-4.02%	-0.13%	-0.60%	-1.34%	5.48%	-3.89%	-2.28%
07-Nov-24	-2.77%	-1.18%	1.70%	-0.38%	-0.06%	-4.08%	0.00%	-1.12%
10-Nov-24	-0.94%	-1.80%	-0.88%	0.23%	-1.68%	-3.38%	-0.88%	1.06%
11-Nov-24	0.00%	0.30%	2.27%	0.20%	0.30%	1.65%	-0.45%	-1.32%
12-Nov-24	-2.87%	2.38%	0.98%	-0.33%	0.24%	-4.04%	-0.90%	1.65%
13-Nov-24	0.00%	-0.89%	-1.01%	-0.62%	-1.01%	-1.04%	-0.90%	4.68%
14-Nov-24	0.97%	2.35%	0.15%	0.45%	-0.30%	0.63%	2.69%	-0.94%
17-Nov-24	-1.94%	-0.87%	-1.64%	1.18%	-0.17%	-0.10%	1.32%	0.00%
18-Nov-24	-0.99%	-1.77%	-0.59%	-0.68%	-0.49%	0.06%	-1.76%	-2.30%
19-Nov-24	-1.00%	-0.30%	0.50%	0.00%	-1.73%	-0.14%	-0.45%	2.49%
20-Nov-24	0.00%	3.52%	0.78%	2.57%	0.09%	-0.47%	-0.45%	-0.76%
21-Nov-24	-1.01%	-2.33%	-1.47%	0.04%	-0.23%	-0.45%	-0.45%	-2.44%
24-Nov-24	-1.02%	-0.30%	-0.13%	-0.40%	-1.07%	-0.18%	-4.14%	0.45%
25-Nov-24	0.00%	-0.89%	-0.82%	-0.11%	-1.34%	-0.72%	3.23%	0.84%
26-Nov-24	0.00%	-1.50%	1.14%	-0.26%	-1.34%	0.06%	-1.37%	-1.75%

27-Nov-24	3.02%	1.50%	0.72%	0.77%	3.32%	0.48%	1.37%	2.33%
28-Nov-24	-1.00%	-0.30%	-0.44%	-0.87%	0.05%	0.60%	4.01%	-1.61%
01-Dec-24	-1.01%	0.00%	-0.60%	0.31%	0.42%	-0.35%	3.85%	-0.39%
02-Dec-24	2.00%	-0.30%	0.44%	-0.01%	0.06%	-0.06%	0.42%	1.17%
03-Dec-24	-2.00%	0.30%	1.43%	-0.19%	0.48%	-0.21%	-1.26%	0.83%
04-Dec-24	0.00%	2.37%	-1.02%	0.08%	0.77%	0.12%	0.42%	2.90%
05-Dec-24	-1.02%	-2.97%	-0.91%	-0.04%	0.34%	-0.37%	-1.27%	-1.25%
08-Dec-24	-3.11%	-0.30%	0.19%	-0.17%	-1.91%	-0.02%	-2.60%	-0.82%
09-Dec-24	-3.21%	-0.91%	-0.09%	0.17%	0.22%	0.19%	-0.88%	-0.70%
10-Dec-24	2.15%	0.30%	-0.50%	0.17%	-0.31%	0.21%	1.32%	1.65%
11-Dec-24	-1.07%	-3.40%	-0.89%	-0.11%	-0.36%	-0.47%	-0.44%	-3.32%
12-Dec-24	-1.08%	0.00%	0.35%	-0.92%	0.00%	-0.31%	-0.88%	0.26%
15-Dec-24	-1.09%	1.87%	-0.10%	0.89%	-0.32%	0.06%	0.00%	1.80%
17-Dec-24	1.09%	0.92%	1.80%	-0.36%	1.52%	0.64%	2.62%	-0.25%
18-Dec-24	-1.09%	-0.31%	1.30%	0.22%	2.18%	0.19%	-2.18%	-0.45%
19-Dec-24	0.00%	-1.23%	0.37%	0.02%	-0.46%	0.51%	1.75%	0.00%
22-Dec-24	-1.10%	1.85%	-0.06%	0.22%	-0.17%	-0.04%	-2.19%	-0.58%
23-Dec-24	0.00%	-1.85%	-0.52%	0.01%	-0.75%	-0.08%	-0.89%	-0.52%
24-Dec-24	0.00%	2.45%	-0.31%	-0.20%	1.95%	-0.27%	0.00%	0.71%
26-Dec-24	0.00%	0.30%	0.00%	-0.18%	-0.74%	0.49%	0.89%	1.34%
29-Dec-24	0.00%	-2.76%	0.00%	1.15%	-4.29%	-0.10%	0.00%	-1.08%
30-Dec-24	2.20%	1.54%	0.19%	-0.17%	0.95%	-0.25%	0.00%	1.27%
01-Jan-25	1.08%	0.00%	0.62%	0.21%	0.17%	0.39%	-0.89%	-1.15%
02-Jan-25	3.17%	-0.31%	-0.28%	-0.90%	-0.43%	-0.10%	0.45%	-0.77%
05-Jan-25	-1.05%	-0.31%	0.15%	-0.17%	-0.38%	-0.37%	-1.79%	0.45%
06-Jan-25	0.00%	0.00%	0.15%	0.62%	0.33%	0.33%	1.79%	-0.39%
07-Jan-25	1.05%	-0.93%	0.28%	-0.22%	-0.52%	-0.08%	-1.34%	-0.97%
08-Jan-25	-1.05%	-0.62%	0.18%	-0.89%	0.02%	-0.23%	0.90%	0.20%
09-Jan-25	0.00%	-0.94%	1.73%	0.71%	-0.19%	-0.21%	-1.80%	0.52%
12-Jan-25	0.00%	-0.63%	0.78%	-0.77%	-1.38%	0.21%	-0.91%	-0.32%
13-Jan-25	-1.06%	-2.90%	1.22%	-0.01%	-1.33%	0.82%	-0.46%	0.72%

14-Jan-25	-2.15%	0.00%	-1.85%	0.08%	-0.56%	4.63%	0.46%	0.45%
15-Jan-25	-2.20%	-0.33%	-1.06%	0.08%	-1.59%	-2.00%	-0.46%	0.39%
16-Jan-25	-1.12%	-0.33%	0.51%	-0.40%	-1.50%	-1.02%	0.46%	-2.60%
19-Jan-25	-1.13%	0.66%	0.42%	-0.35%	-0.05%	0.12%	-0.92%	1.18%
20-Jan-25	1.13%	1.94%	0.18%	3.44%	-0.15%	2.27%	1.83%	0.33%
21-Jan-25	-1.13%	0.00%	0.81%	-1.74%	0.12%	-0.20%	4.01%	-0.72%
22-Jan-25	-1.14%	-0.32%	-0.03%	-0.32%	-1.13%	-1.28%	-2.66%	-0.66%
23-Jan-25	-1.16%	0.00%	-0.60%	-0.68%	-0.60%	-0.86%	0.45%	0.39%
26-Jan-25	0.00%	0.32%	-1.08%	-1.92%	-4.64%	-0.80%	-1.35%	-0.99%
27-Jan-25	1.16%	0.32%	0.21%	0.89%	-3.49%	1.64%	-0.45%	1.05%
28-Jan-25	1.14%	-0.32%	0.27%	-3.66%	-1.53%	-1.26%	5.31%	0.98%
29-Jan-25	-1.14%	-0.64%	0.42%	0.34%	-3.40%	-1.68%	-2.18%	-0.26%
30-Jan-25	1.14%	0.64%	0.69%	2.12%	-1.83%	-0.25%	-2.23%	0.07%
02-Feb-25	1.13%	-0.64%	0.42%	-3.45%	-0.34%	-0.45%	3.97%	-1.71%
03-Feb-25	0.00%	-0.32%	0.06%	2.20%	1.10%	0.25%	-2.63%	-0.80%
04-Feb-25	0.00%	0.00%	0.47%	-0.06%	-0.58%	0.00%	2.20%	-0.13%
05-Feb-25	0.00%	1.61%	-0.18%	-0.10%	0.30%	0.27%	0.87%	0.00%
06-Feb-25	-1.13%	0.95%	-0.06%	-0.15%	-0.08%	-0.76%	-1.74%	-0.07%
09-Feb-25	0.00%	-0.63%	-0.36%	-1.03%	-0.38%	0.39%	2.17%	-0.27%
10-Feb-25	-1.14%	-0.96%	0.30%	0.39%	-0.60%	0.64%	0.85%	0.13%
11-Feb-25	0.00%	0.96%	-0.15%	0.62%	1.20%	0.20%	-0.85%	0.47%
12-Feb-25	0.00%	0.00%	-0.06%	-0.01%	-0.16%	-0.41%	9.02%	-0.60%
13-Feb-25	1.14%	-0.64%	0.50%	0.10%	3.91%	0.10%	0.39%	-0.07%
16-Feb-25	-1.14%	0.64%	0.59%	0.48%	-0.48%	-0.66%	-3.98%	-0.67%
17-Feb-25	1.14%	0.63%	1.52%	-0.13%	0.35%	-0.54%	0.00%	-1.36%
18-Feb-25	1.13%	-1.27%	-0.58%	-1.00%	-0.27%	-0.25%	-4.57%	3.83%
19-Feb-25	0.00%	-0.32%	-0.03%	-0.73%	-0.12%	-0.54%	-1.28%	-0.99%
20-Feb-25	1.12%	-0.32%	0.58%	0.73%	-0.37%	-0.21%	-2.62%	-1.20%
23-Feb-25	2.20%	0.64%	0.20%	-0.52%	-0.47%	-0.46%	2.19%	0.34%
24-Feb-25	0.00%	1.58%	-0.43%	0.00%	-0.10%	-0.34%	0.00%	-1.01%
25-Feb-25	7.33%	0.63%	-0.23%	-0.31%	0.08%	-0.44%	1.29%	-0.34%
26-Feb-25	0.00%	-1.57%	0.00%	0.01%	-0.21%	-0.49%	-2.16%	0.07%

27-Feb-25	7.77%	2.20%	0.32%	-0.09%	-1.00%	0.09%	0.44%	-0.75%
02-Mar-25	-3.81%	-1.25%	-1.01%	-0.04%	-0.35%	-0.11%	-1.31%	0.68%
03-Mar-25	-0.98%	0.31%	0.61%	0.19%	0.12%	0.00%	0.00%	-0.20%
04-Mar-25	-1.98%	-1.26%	-0.46%	-2.43%	-1.35%	-0.21%	0.00%	-0.27%
05-Mar-25	3.92%	-1.28%	-0.03%	-4.53%	0.06%	0.15%	0.44%	-0.27%
06-Mar-25	2.84%	0.64%	-0.15%	3.82%	0.26%	0.02%	-0.44%	0.27%
09-Mar-25	-1.89%	-0.32%	-0.28%	-0.06%	0.69%	-0.41%	-0.88%	-0.82%
10-Mar-25	0.00%	-1.62%	0.89%	-0.68%	-0.32%	-0.02%	-1.34%	-0.28%
11-Mar-25	2.82%	0.97%	-0.58%	2.85%	0.06%	0.60%	1.34%	1.17%
12-Mar-25	1.83%	0.32%	0.18%	0.70%	-0.08%	-0.47%	0.00%	-0.07%
13-Mar-25	2.69%	0.64%	-0.03%	-0.28%	0.20%	-0.58%	0.88%	-0.27%
16-Mar-25	3.48%	-1.29%	-0.18%	-0.95%	-0.24%	0.41%	2.61%	-0.83%
17-Mar-25	5.00%	-0.65%	-0.68%	-0.96%	-0.08%	-0.26%	-2.61%	0.21%
18-Mar-25	3.98%	0.65%	-0.43%	0.40%	-0.10%	-0.37%	0.44%	1.23%
19-Mar-25	1.55%	-0.32%	-0.47%	-0.40%	0.30%	-0.34%	-0.44%	-0.14%
20-Mar-25	-7.17%	1.29%	-0.03%	-0.19%	-0.14%	-0.04%	0.00%	-0.41%
23-Mar-25	-4.22%	-2.27%	0.09%	0.27%	-0.24%	-0.48%	-0.88%	0.55%
24-Mar-25	-4.41%	-0.33%	-0.47%	-0.95%	-0.08%	-0.02%	-0.45%	-0.48%
25-Mar-25	0.90%	4.19%	0.34%	2.00%	0.02%	0.52%	0.89%	1.22%
27-Mar-25	-1.80%	-0.95%	0.75%	-0.29%	-0.28%	-0.09%	0.00%	-0.47%
06-Apr-25	1.80%	-0.96%	-0.34%	-0.87%	0.24%	-0.54%	-0.44%	-1.92%
07-Apr-25	-1.80%	0.64%	0.53%	-1.44%	-0.70%	-0.02%	0.44%	0.83%
08-Apr-25	-1.83%	-0.96%	-0.62%	-0.27%	-0.34%	-0.04%	2.62%	2.71%
09-Apr-25	0.00%	-0.97%	0.09%	1.00%	0.16%	1.81%	2.97%	4.45%
10-Apr-25	-1.87%	0.00%	-0.06%	-0.33%	0.42%	-0.97%	-0.84%	-1.16%
13-Apr-25	-2.87%	-0.65%	-0.16%	0.07%	-0.02%	0.49%	-2.56%	4.37%
15-Apr-25	-1.96%	0.00%	0.22%	0.12%	0.26%	1.45%	-1.31%	-1.12%
16-Apr-25	-2.00%	-0.66%	0.03%	0.06%	-0.20%	-1.36%	-1.32%	-2.47%
17-Apr-25	7.77%	0.66%	-0.31%	-0.28%	0.06%	-1.56%	0.00%	-0.19%
20-Apr-25	1.85%	1.95%	0.37%	-1.12%	-0.50%	-0.50%	-3.62%	-2.28%
21-Apr-25	-1.85%	-0.65%	-0.50%	-1.77%	-0.08%	-0.42%	-2.80%	-0.26%

22-Apr-25	-2.84%	-0.65%	0.06%	0.56%	-0.02%	-0.13%	0.47%	0.85%
23-Apr-25	-2.93%	-0.33%	0.50%	-0.15%	-0.14%	-0.55%	0.00%	1.49%
24-Apr-25	0.00%	-0.66%	-0.25%	-0.28%	-0.73%	-0.55%	-1.90%	-1.82%
27-Apr-25	0.99%	-0.99%	-4.04%	-0.08%	0.00%	0.09%	0.48%	-0.13%
28-Apr-25	-0.99%	0.00%	-1.74%	-0.13%	-0.12%	-0.22%	0.48%	-1.19%
29-Apr-25	0.00%	-0.67%	-0.76%	-1.19%	-0.22%	-0.60%	-0.48%	0.46%
30-Apr-25	0.99%	-0.67%	-0.20%	0.18%	0.00%	-0.27%	0.00%	0.66%
04-May-25	2.90%	0.00%	0.20%	-0.82%	-0.39%	-1.56%	2.36%	-0.46%
05-May-25	-1.92%	0.67%	1.29%	-6.41%	0.39%	-1.24%	-3.81%	-0.40%
06-May-25	2.87%	1.66%	-0.66%	3.49%	-0.33%	-2.84%	1.92%	-1.20%
07-May-25	-2.87%	-2.33%	-1.60%	-1.65%	-2.15%	-4.20%	-4.88%	-2.10%
08-May-25	1.92%	2.33%	0.24%	0.57%	0.96%	2.88%	2.96%	1.50%
12-May-25	9.10%	0.00%	0.03%	0.28%	2.35%	-0.39%	0.00%	-0.07%
13-May-25	2.58%	4.31%	-0.37%	-1.93%	0.22%	-0.19%	-2.46%	-1.70%
14-May-25	-1.71%	-8.05%	-0.03%	0.26%	-0.93%	-0.80%	-4.58%	0.14%
15-May-25	-5.31%	-2.17%	-0.68%	3.92%	-0.06%	-1.11%	-0.52%	-1.52%
17-May-25	0.90%	1.81%	-0.07%	7.05%	-0.22%	0.74%	-2.65%	0.21%
18-May-25	-3.67%	-1.81%	0.51%	7.23%	-1.36%	-0.02%	0.00%	-1.19%
19-May-25	5.46%	0.37%	-0.71%	-1.98%	0.50%	-0.66%	1.07%	0.84%
20-May-25	-6.39%	0.36%	0.14%	-1.47%	-0.52%	-0.20%	-1.07%	-0.14%
21-May-25	-4.83%	-0.36%	-2.09%	-1.32%	0.33%	0.27%	-1.08%	-0.56%
22-May-25	0.00%	-0.37%	-2.28%	-2.32%	-0.02%	-0.25%	0.54%	1.53%
24-May-25	0.99%	-0.74%	-2.66%	3.91%	-0.33%	-0.50%	0.00%	-0.42%
25-May-25	4.79%	-0.37%	-0.80%	0.00%	0.27%	0.00%	0.54%	-0.84%
26-May-25	-4.79%	-1.12%	-0.40%	0.00%	-0.39%	-0.30%	-0.54%	0.77%
27-May-25	-1.98%	-1.13%	0.88%	-2.53%	-0.71%	-2.09%	-1.63%	0.00%
28-May-25	0.00%	-1.53%	-0.15%	-3.37%	-1.75%	-3.13%	-1.10%	-0.98%
29-May-25	0.00%	3.03%	3.67%	2.63%	1.37%	2.10%	0.00%	1.46%
01-Jun-25	0.00%	1.11%	1.30%	1.75%	0.77%	2.79%	2.20%	0.35%
02-Jun-25	1.00%	-0.74%	0.03%	-1.31%	-0.21%	1.12%	0.00%	1.37%
03-Jun-25	-2.00%	0.00%	-0.98%	-0.82%	-0.88%	-1.70%	1.62%	0.48%

04-Jun-25	1.01%	0.74%	0.63%	0.86%	0.73%	0.45%	0.00%	1.55%
15-Jun-25	0.00%	-0.37%	-0.67%	-1.13%	-0.48%	-0.80%	2.12%	0.13%
16-Jun-25	3.92%	2.20%	0.74%	-0.54%	0.73%	2.25%	2.07%	1.13%
17-Jun-25	-2.93%	-1.09%	-0.63%	-1.45%	-0.10%	-0.37%	-3.66%	-1.79%
18-Jun-25	0.99%	0.73%	2.36%	2.30%	1.30%	1.04%	1.58%	1.33%
19-Jun-25	-0.99%	0.36%	0.96%	-0.54%	0.47%	-0.61%	-0.52%	-0.80%
22-Jun-25	-1.00%	-1.09%	-1.44%	-0.84%	-1.61%	-2.12%	-2.13%	-2.36%
23-Jun-25	0.00%	-0.74%	1.88%	-0.60%	-0.15%	1.38%	-0.54%	1.15%
24-Jun-25	0.00%	0.37%	0.07%	-0.39%	1.39%	0.10%	2.14%	-0.41%
25-Jun-25	-1.01%	2.18%	0.03%	-0.38%	-0.41%	1.63%	1.05%	2.01%
26-Jun-25	1.01%	1.07%	2.31%	0.55%	0.94%	0.44%	1.04%	-0.60%
29-Jun-25	0.00%	1.76%	0.26%	0.34%	0.16%	0.10%	1.54%	1.66%
30-Jun-25	-1.01%	1.39%	-0.13%	-0.12%	-0.41%	-1.30%	-2.06%	0.85%
02-Jul-25	2.00%	-0.69%	-1.06%	0.34%	-0.25%	0.96%	0.52%	0.13%
03-Jul-25	0.00%	4.08%	-0.30%	0.10%	-0.14%	0.29%	-1.04%	-1.64%
07-Jul-25	1.96%	2.96%	0.23%	0.06%	0.21%	1.06%	2.07%	1.18%
08-Jul-25	2.87%	1.29%	-0.33%	0.26%	0.41%	-0.17%	0.51%	-0.46%
09-Jul-25	0.94%	-0.96%	0.30%	1.02%	0.29%	2.66%	3.02%	0.85%
10-Jul-25	0.93%	0.00%	-0.10%	1.61%	-0.45%	0.02%	-1.00%	2.76%
13-Jul-25	-3.77%	0.00%	0.13%	1.48%	0.00%	-1.27%	2.47%	0.76%
14-Jul-25	1.90%	0.64%	-0.57%	0.67%	0.25%	0.45%	3.36%	-1.20%
15-Jul-25	0.00%	5.91%	-0.13%	-1.70%	-0.33%	-0.09%	-3.36%	-0.57%
16-Jul-25	0.00%	6.15%	-0.27%	-1.96%	0.39%	0.52%	1.45%	0.26%
17-Jul-25	-2.87%	-1.72%	1.14%	2.51%	0.77%	0.70%	0.48%	-0.45%
20-Jul-25	0.97%	8.85%	0.93%	0.57%	4.53%	2.84%	0.48%	1.90%
21-Jul-25	0.96%	0.53%	2.32%	2.19%	-0.10%	3.48%	-0.48%	-0.38%
22-Jul-25	0.00%	0.79%	1.06%	1.99%	1.77%	2.71%	9.14%	-0.32%
23-Jul-25	1.89%	-0.52%	3.11%	3.84%	0.32%	-1.83%	4.27%	5.48%
24-Jul-25	0.00%	7.09%	-0.68%	-0.74%	0.57%	0.02%	-3.84%	-1.94%
27-Jul-25	4.57%	-0.49%	-0.09%	-0.22%	-0.70%	-1.12%	-2.64%	-1.11%
28-Jul-25	-4.57%	0.49%	-0.47%	-0.56%	-1.90%	-0.15%	-3.64%	-1.12%
29-Jul-25	-2.84%	-0.74%	-2.25%	1.70%	-1.05%	-1.71%	1.83%	1.12%
30-Jul-25	-0.97%	2.67%	0.16%	0.62%	0.16%	-0.54%	0.00%	-0.06%
31-Jul-25	4.74%	1.66%	0.10%	-5.21%	-0.23%	2.34%	-0.46%	3.17%

03-Aug-25	7.15%	0.00%	1.74%	0.16%	0.20%	1.57%	6.20%	3.53%
04-Aug-25	-5.31%	-3.36%	-0.41%	-1.32%	-0.23%	-1.93%	0.00%	-0.81%
06-Aug-25	-1.83%	-2.22%	-0.06%	0.83%	-0.96%	0.29%	-1.30%	-0.76%
07-Aug-25	-1.87%	-0.50%	-0.41%	-0.10%	-1.03%	-1.62%	-3.09%	-1.00%
10-Aug-25	-1.90%	-2.54%	0.16%	-0.44%	-1.17%	0.18%	-1.81%	-1.86%
11-Aug-25	-0.97%	2.04%	0.09%	0.56%	-0.08%	0.47%	0.46%	-0.48%
12-Aug-25	0.00%	-2.55%	-0.38%	0.31%	-0.39%	-0.33%	-1.83%	-1.04%
13-Aug-25	-2.96%	-1.83%	0.00%	-0.39%	-0.45%	-0.45%	-0.46%	2.19%
14-Aug-25	1.98%	1.31%	-3.39%	-0.49%	0.81%	0.80%	0.93%	-0.12%
17-Aug-25	1.94%	0.26%	-0.33%	0.05%	0.34%	-0.33%	0.46%	-0.54%
18-Aug-25	-1.94%	1.29%	0.39%	0.09%	0.30%	1.62%	2.27%	1.26%
19-Aug-25	-1.98%	-2.33%	-0.96%	-0.10%	-0.79%	1.00%	0.00%	1.60%
20-Aug-25	-1.01%	-0.79%	-0.10%	-0.07%	0.00%	-0.79%	-1.81%	-2.02%
21-Aug-25	-2.04%	0.00%	-0.87%	-0.03%	-2.09%	-0.64%	0.00%	0.18%
24-Aug-25	0.00%	0.00%	-0.87%	-0.43%	-1.02%	-1.64%	-1.38%	-1.02%
25-Aug-25	0.00%	5.39%	0.71%	0.15%	-0.54%	0.54%	1.83%	1.56%
26-Aug-25	0.00%	-1.01%	-0.03%	-0.26%	-0.23%	0.04%	3.57%	-1.26%
27-Aug-25	-1.04%	-1.27%	0.33%	-0.02%	-0.04%	-0.29%	-0.88%	-0.85%
28-Aug-25	2.06%	3.52%	1.92%	-0.47%	13.26%	0.80%	3.05%	1.09%
31-Aug-25	0.00%	-0.25%	1.62%	2.35%	-2.50%	8.37%	6.64%	2.14%
01-Sep-25	-1.03%	-0.25%	-1.10%	0.48%	-3.58%	3.47%	-2.44%	-0.24%
02-Sep-25	0.00%	1.97%	1.07%	-0.08%	-1.18%	-2.03%	6.38%	-1.49%
03-Sep-25	2.04%	0.49%	-0.19%	0.15%	0.02%	-0.87%	3.79%	-0.12%
04-Sep-25	-1.02%	2.16%	-1.73%	0.02%	0.18%	-2.44%	-3.40%	-0.78%
07-Sep-25	-1.03%	2.11%	0.62%	-0.72%	-0.12%	-0.21%	2.66%	0.12%
08-Sep-25	-1.04%	2.52%	-0.29%	-0.16%	0.34%	-1.19%	-1.51%	0.06%
09-Sep-25	-1.05%	-2.29%	-1.52%	0.37%	-1.31%	-2.32%	-3.48%	-1.76%
10-Sep-25	0.00%	-2.11%	-0.17%	0.13%	-0.68%	-1.98%	-4.02%	-1.11%
11-Sep-25	1.05%	2.34%	0.50%	0.17%	0.88%	-0.18%	2.83%	-0.12%
14-Sep-25	0.00%	-2.57%	-0.63%	-0.28%	-0.74%	0.48%	-2.42%	-0.69%
15-Sep-25	1.04%	0.00%	0.37%	-1.35%	-1.15%	1.33%	0.00%	-0.19%

16-Sep-25	8.87%	-0.48%	0.27%	1.57%	0.10%	2.88%	0.81%	1.49%
17-Sep-25	-0.95%	-1.20%	0.00%	-0.18%	0.47%	0.08%	0.40%	0.68%
18-Sep-25	-5.56%	-2.19%	-0.23%	-0.40%	-0.75%	-0.61%	-2.04%	-2.11%
21-Sep-25	-0.90%	-2.49%	-0.27%	-0.06%	-0.86%	-0.83%	-1.66%	-0.75%
22-Sep-25	-3.70%	-1.27%	-0.07%	-0.44%	-1.03%	0.79%	0.42%	-1.78%
23-Sep-25	-0.95%	0.76%	-0.53%	0.13%	-0.02%	0.19%	2.87%	0.26%
24-Sep-25	-1.92%	3.00%	0.17%	0.53%	0.33%	-0.17%	1.61%	0.00%
25-Sep-25	3.81%	0.49%	-0.20%	-0.13%	0.46%	-1.21%	1.58%	1.15%
28-Sep-25	0.00%	-1.98%	0.23%	0.51%	-0.83%	0.00%	-0.79%	-1.79%
29-Sep-25	-0.94%	2.23%	-0.37%	0.01%	-0.15%	0.45%	-0.40%	0.45%
30-Sep-25	0.00%	0.73%	0.34%	-0.27%	0.10%	-7.36%	-0.40%	-0.64%

Average Quarterly Return

Average Return 2024Q1 - 2024Q4	-0.11%	-0.13%	0.09%	-0.01%	-0.27%	-0.30%	-0.26%	0.03%
Average Return 2024Q2 - 2025Q1	-0.02%	-0.05%	0.17%	-0.05%	-0.18%	-0.12%	-0.16%	-0.01%
Average Return 2024Q3 - 2025Q2	0.08%	0.01%	0.12%	-0.06%	-0.19%	-0.17%	-0.13%	0.07%