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Essay / Assignment Title: ADVANCED QUANTITATIVE ANALYSIS AND VALUATION IN FINANCIAL MARKETS: CAMELS ASSESSMENT, FREE CASH FLOW VALUATION, NAV ANALYSIS, AND PORTFOLIO OPTIMISATION

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INTRODUCTION

The importance of quantitative analysis in financial decision making is that, it helps investors, financial institutions and regulators to analyze performance, estimate values and analysis of risk on the basis of implementing data-driven methods. Various quantitative tools in the analysis of investment opportunities and the financial markets are applied in this report. PNC Financial Services analysis, Free cash flow analysis of Kimberly-Clark and MongoDB and Net Asset Value analysis of a hypothetic mutual fund and portfolio risk-return analysis of diversified financial assets are analyzed.

TASK 1: CAMELS ANALYSIS OF PNC FINANCIAL SERVICES

1.1 Introduction

Banking industry has a great contribution to stability of finances as well as aiding economy to develop. The regulators have a few models which they utilize to ascertain the solvency and sustainability of the commercial banks. The CAMELS framework is considered one of the most popular and common frameworks to analyse the performance of a bank based on six dimensions of Capital Adequacy, Asset Quality, Management Efficiency, Earnings Quality, Liquidity and Sensitivity to Market Risk. The structure enables regulators and investors to have a full picture of financial position and risk exposure of a bank.

1.2 Capital Adequacy

Capital adequacy is a metric of the ability of a bank to absorb unexpected losses, but to still be financially stable. Capital ratios is of great concern to the regulators as it gives enough capital cover to depositors and minimises systemic risks. The key ratios are that of the Common Equity Tier 1 (CET1) ratio and Tier 1 Capital Ratio (Bhatia and Mahendru, 2024).

C - CAPITAL ADEQUACY			
Tier 1 Capital Ratio (%)	12.45	12.12	11.89
Total Capital Ratio (%)	15.67	15.34	15.01
Equity/Assets (%)	8.96	8.78	8.54

Figure 1: Capital Adequacy

(Source: Obtained from MS Excel)

During the analysis, it has been established that PNC Financial Services has been able to maintain a capital level, which is above the minimum required by regulations in the last three years. The CET1 ratio remained at the same ratio which means that the bank can absorb the economic uncertainty and losses in terms of credits. Similarly, Tier 1 Capital Ratio also did not change, something that is a sign of healthy capital management.

1.3 Asset Quality

Asset quality is an evaluation of the risk of asset of a bank in the form of loan portfolio and investment. The quality of the assets is also extremely poor and contributes to the higher risks of lending defaults and loss of credit. The typical ones are Non-Performing Loan (NPL) Ratio and Loan Loss Reserve Ratio.

A - ASSET QUALITY			
NPL Ratio (%)	1.27	1.12	0.99
Loan Loss Reserves/Loans (%)	2.69	2.60	2.50
Loan Loss Provision/Net Income (%)	18.45	22.10	25.30

Figure 2: Asset Quality

(Source: Obtained from MS Excel)

The results show that PNC has relatively low non-performing loans in the duration of assessment. NPL ratio was also maintained at reasonable industry levels that signify proper credit assessment procedures as well as proper lending habits (Tarkom and Wang, 2025).

1.4 Management Efficiency

Management efficiency is applied to derive the quality of management of the bank in comparison with the way it manages its resources to generate income and manage operating costs. Another measure that is normally applied to determine the effectiveness of the manager is the Cost-to-Income Ratio.

M - MANAGEMENT QUALITY			
Efficiency Ratio (%)	52.30	53.10	54.20
Cost/Income Ratio (%)	52.30	53.10	54.20
Personnel Expense/Assets (%)	1.24	1.29	1.35

Figure 3: Management Efficiency

(Source: Obtained from MS Excel)

The operational efficiency of PNC Financial Services was not very volatile in the time in question. The Cost-to-Income Ratio shows that the management has been able to control operating costs and generate sustainable sources of revenues. It could also have enhanced the level of efficiency owing to the enhancement of the digital banking systems and operation processes (Sidaoui et al., 2022).

1.5 Earnings Quality

The quality of earnings earned by an entity is the capacity of the bank to maintain profits on business. The Return on Assets (ROA) and Return on Equity (ROE) and Net Interest Margin (NIM) are the most important profitability ratios.

E - EARNINGS			
ROA (%)	1.02	0.96	0.91
ROE (%)	11.36	10.92	10.68
Net Interest Margin (%)	2.33	2.28	2.26

Figure 4: Earnings Quality

(Source: Obtained from MS Excel)

The analysis indicates that PNC has been experiencing good profitability throughout the period of analysis. Return on Assets remained the same and this means that the assets are used effectively to earn incomes. The Return on Equity also indicated that all shareholders returns are good which is a pointer of good investment deployment strategies.

1.6 Liquidity

Liquidity is the ability of a bank to meet the immediate financial obligation as well as the withdrawal request by the customers. The Loan-to-Deposit Ratio is used to measure the liquidity management.

L - LIQUIDITY			
Loan/Deposit Ratio (%)	76.92	76.75	75.30
Liquid Assets/Total Assets (%)	5.13	5.73	5.52
Cash Flow Coverage (%)	185.43	173.65	162.40

Figure 5: Liquidity

(Source: Obtained from MS Excel)

The results indicate that PNC had sufficient levels of liquidity during the period. The Loan to Deposit Ratio was within the industry acceptable ratios and this implied that there was a balanced lending and mobilization of deposits (Gupta et al., 2025). Sufficient liquidity will enable the banks to adequately respond to the abrupt need of funds and market shocks.

1.7 Sensitivity to Market Risk

The sensitivity to market risk is what is used to quantify how changes in interest rate, the exchange rate and the overall general market environment will have on the performance of a financial institution. The interest rate risk is especially high in the case of commercial banks since it directly affects the lending margins and investment income.

S - SENSITIVITY TO MARKET RISK			
Interest Rate Risk (%)	2.15	2.08	2.01
Duration Gap (years)	1.23	1.30	1.38

Figure 6: Sensitivity to Market Risk

(Source: Obtained from MS Excel)

TASK 2: FREE CASH FLOW VALUATION OF KIMBERLY-CLARK AND MONGODB

2.1 Introduction

Valuation is a basic element of investment analysis, which helps investors to determine the intrinsic value of a company and evaluate it as compared to the market price. The Free Cash Flow (FCF) model is one of the models that are popular among the various models in valuation since the model is based on the amount of cash that can be generated by the firm, which can be distributed to the investors after the firm has satisfied the requirements of the operating expenses and capital expenditures.

2.2 Kimberly-Clark: One-Stage Free Cash Flow Valuation

Kimmerlly-Clark Corporation is another multinational consumer product company that has such brands as Huggies, Kleenex and Scott. The company is in the old-fashioned markets where the demand is stable, revenues are predictable and the profitability there is rather stable.

PART A: MATURE COMPANY - KIMBERLY-CLARK (ONE-STAGE FCF MODEL)			
Input Assumptions			
Current Stock Price	79.45		
Shares Outstanding (millions)	381.50		
Tax Rate (%)	21.50		
Target Debt/Equity	0.45		
Risk-Free Rate (%)	4.20		
Market Risk Premium (%)	6.00		
Beta	68.00%		
WACC (%)	6.85		
Growth Rate (%)	2.50		
FREE CASH FLOW PROJECTION (5 Years)			
Year	**FCF Projection ($M)**	**Discount Factor**	**PV of FCF ($M)**
1	2,507	0.9359	2,346.42
2	2,570	0.8759	2,250.89
3	2,634	0.8197	2,159.26
4	2,700	0.7672	2,071.35
5	2,767	0.7180	1,987.02
TERMINAL VALUE CALCULATION			
Terminal Year FCF	2,836.61		
Terminal Value ($ millions)	65,209.43		
PV of Terminal Value ($ millions)	46,820.68		

Figure 7: Kimberly-Clark: One-Stage Free Cash Flow Valuation

(Source: Obtained from MS Excel)

One-stage Free Cash Flow Model, commonly referred to as the Gordon Growth Model is suitable in the case of Kimberly-Clark since it assumes that the growth rate of the company is going to remain the same in the long-term. The model is suitable when the valuation is involved since it is assumed that mature companies will not have many growth opportunities and that the way they produce cash flows will not be very different (Moraes Barreto et al., 2024).

The findings of the valuation reveal that Kimberly-Clark has a rather stable intrinsic value underpinned by the predictable cash flows and good brand equity. Since the company is in the defensive consumer products industry, its profits are not highly susceptible to recessions as compared to a few cyclical industries.

The investors can determine whether the company is overpriced, underpriced or priced when the expected intrinsic value per share is compared to the current market price. In cases where the intrinsic value exceeds that of the market price, then there is the likelihood that the stock is being undersold implying that there may be a buying opportunity.

2.3 MongoDB: Two-Stage Free Cash Flow Valuation

MongoDB inc. is a provider of Mongo data management software and database, which is a leader in clouds. The company is in the fast-growing technological industry, and it is still enjoying a high growth in revenues due to the growing uptake of cloud computing and digital transformation projects.

PART B: HIGH-GROWTH COMPANY - MONGODB (TWO-STAGE FCF MODEL)			
Input Assumptions			
Current Stock Price	385.50		
Shares Outstanding (millions)	102.30		
Tax Rate (%)	0.0		
Target Debt/Equity	0.10		
Risk-Free Rate (%)	4.2		
Market Risk Premium (%)	6.0		
Beta	1.45		
Cost of Equity (%)	12.9		
WACC (%)	12.6		
Stage 1 Growth (%)	20.0		
Stage 1 Period (years)	5.00		
Terminal Growth (%)	3.0		
STAGE 1: HIGH GROWTH PERIOD (Years 1-5)			
Year	FCF ($M)	Discount Factor	PV of FCF ($M)
1	342.00	0.8881	303.73
2	410.40	0.7887	323.69
3	492.48	0.7005	344.96
4	590.98	0.6221	367.63
5	709.17	0.5525	391.80
STAGE 2: TERMINAL VALUE (From Year 6 onwards)			
Year 6 FCF (Terminal Year)	730.45		
Terminal Value ($ millions)	7,608.82		
PV of Terminal Value ($ millions)	4,203.64		
VALUATION SUMMARY			
PV of Stage 1 FCF	1,731.81		
PV of Terminal Value	4,203.64		
Total Equity Value ($ millions)	5,935.45		
Intrinsic Value per Share	$58.02		
Current Market Price	$385.50		
Upside/(Downside)	-84.95%		

Figure 8: MongoDB: Two-Stage Free Cash Flow Valuation

(Source: Obtained from MS Excel)

MongoDB is yet to assume its growth stage compared to Kimberly-Clark who has been growing in terms of expanding market share, acquiring new customers and colossal investments on future growth opportunities. Therefore, one-step valuation model could not reflect high growth rate of the firm. Rather, there should be two-stage Free Cash Flow.

The two-stage model divides valuation into two distinct periods:

1. High-growth stage.
2. Stable-growth stage.

During the initial stage, the free cash flows are approximated giving higher growth rates that represent the expected growth of MongoDB business. The repositioning of the growth following this is towards the sustainable long-term growth rate at the stage of mature market.

The valuation process comprises of future cash flows (free cash flows) of the high growth period and discounts them using weighted average cost of capital to the present value. A terminal value at the end of the forecast horizon is then derived using the stable growth assumption. The amount is then added to the discounted terminal value and discounted cash flows, to come up with the estimated enterprise value.

Growth assumptions are very sensitive to MongoDB valuation since a significant percentage of the value is based on future anticipated cash flows as opposed to current earnings. Investors are also likely to place a greater value on technology companies that exhibit a high growth rate due to the high rate of profitability and growth of the firm in the future (Evdokimov, 2025).

The output obtained by the two-stage model gives a more realistic analysis of the potential of growth of MongoDB compared to the one stage approach. The projections, however, are more connected with a great degree of uncertainty because the future levels of growth, competition, technological advancements and market conditions might be very different than what is projected.

2.4 Critical Comparison of Valuation Models

The outcomes of Kimberly-Clark and MongoDB valuation indicate that it is important to select an appropriate valuation model basing on the characteristics of businesses. The one stage model assumes that growth is constant and hence appropriate to mature firms with the predictability of cash flows. Two

stage model, on the other hand, can adjust to the evolving trend of growth and can be used in a growing company (Rodrigues, 2026).

Kimberly-Clark has a stable valuation since most of its value is attributed to current operations and proven cash flows. MongoDB valuation is much more sensitive to the discount factor and growth rate, however (Olbert, 2025).

On the investment front, Kimberly-Clark might be drawing income and risk averse investors that would prefer to invest in a company that is stable and has a payoff on dividends.

TASK 3: NET ASSET VALUE (NAV) ANALYSIS OF A HYPOTHETICAL MUTUAL FUND

3.1 Introduction

The Net Asset Value (NAV) is a useful tool of valuing mutual funds and is the price of the fund assets less liabilities, divided by the number of outstanding shares outstanding. As opposed to individual stocks, which are traded all day long, mutual fund prices are computed, using NAV calculations, at the close of each trading day. Thus, NAV provides an investor with an actual image of the value of the holdings of a fund and is an important indicator of fund performance. This discussion presents a hypothetical mutual fund that is constituted which includes Adobe Inc., Salesforce Inc., MongoDB Inc., Qualcomm Inc. and cash. The paper compares the NAV of the fund and how the value of the fund as a whole and returns to the investors are influenced by the movements of the prices of the assets.

3.2 Construction of Mutual Fund Portfolio

The fictitious mutual fund portfolio will be four publicly traded technology companies and cash. The chosen securities will give an exposure to various fields of the technology sector and are still growth-oriented. Adobe and Salesforce are enterprises software and cloud computing companies, which earn recurrent revenues based on business models of subscriptions (DeFuscoe et al., 2015). MongoDB is a high growth technology company and which deals in database management solutions but Qualcomm deals in the semiconductor and wireless communication industry. Holdings of cash are held to provide that there is liquidity and that the portfolio is not as volatile.

TASK 3: MUTUAL FUND NET ASSET VALUE (NAV) ANALYSIS					
HYPOTHETICAL FUND PORTFOLIO COMPOSITION					
Security	Ticker	Price ($)	Shares/Units	Position Value ($)	Weight (%)
Adobe Inc.	ADBE	$552.30	5,000	$2,761,500.00	35.0
Salesforce Inc.	CRM	$285.45	3,500	$999,075.00	25.0
MongoDB Inc.	MDB	$385.50	2,800	$1,079,400.00	20.0
Qualcomm Inc.	QCOM	$165.20	4,200	$693,840.00	15.0
Cash & Equivalents	CASH	$1.00	1,250,000	$1,250,000.00	5.0
TOTAL PORTFOLIO VALUE				**$6,783,815.00**	

Figure 9: Mutual Fund Portfolio

(Source: Obtained from MS Excel)

3.3 Calculation of Net Asset Value

The Net Asset Value of the mutual fund is calculated using the following formula:

NAV = (Total Assets – Total Liabilities) ÷ Number of Outstanding Shares

This will start with the calculation of the market value of each holding of the portfolio. Adobe, Salesforce, MongoDB, Qualcomm and cash balances will be added up to make total assets. The liabilities related to fund management or working activities are then subtracted to get the net assets (Chang, 202).

FUND STRUCTURE & NAV CALCULATION	
Total Assets	$6,783,815.00
Less: Total Liabilities	$500,000.00
Net Asset Value	**$6,283,815.00**
Fund Shares Outstanding (millions)	10
NAV PER SHARE	**$628,381.50**

Figure 10: Net Asset Value

(Source: Obtained from MS Excel)

This is followed by a division of the net asset value obtained with the total number of outstanding shares of the fund to obtain the NAV per share. It is the amount that the investors will be buying or selling of the shares of the mutual fund. Increase in market of portfolio assets leads to increase in the NAV and a decrease in the price of assets leads to a decrease in NAV. So, NAV is a transparent pricing system, which provides the actual image of the performance and worth of investment in the fund.

3.4 Impact of Asset Price Changes on NAV

Direct impact on the NAV is the price variation of assets since a fund is as good as the performance of its underlying assets in the market. On favourable market conditions, the stocks of Adobe, Salesforce, MongoDB and Qualcomm are valued higher and the whole portfolio is factored in the assets.

Conversely, unfavorable market conditions can cause the share prices to depreciate because of the decreased economic growth, diminished earning opportunities or industry reasons. The reduction in the price of the assets reduces the total assets and the NAV which adversely impacts on the returns of the investors (Ykema, 2026).

3.5 Importance of NAV to Investors

NAV is a critical measure of an investor as it gives a clear depiction of the worth of the underlying assets of a mutual fund. Investors apply NVA to track the performance of investments, to calculate the growth of a portfolio and when comparing investments. As the value of NAV is calculated using the current market value of the holdings, it enhances transparency and gives the investor a fair opportunity to enter and exit the fund.

3.6 Comparison of Mutual Funds and Hedge Funds

Despite similarities of both mutual funds and hedge funds in the fact that they combine the resources of the investors, fundamental differences between the two are noticeable in terms of investment strategy, level of risk, accessibility and regulation. Long-term capital formation and income generation is oriented towards the differentiation of investment strategies that mutual funds are conventionally filled with. They are highly regulated and can be easily tapped by retail investors and there are strict disclosure policies that are intended to safeguard the interests of investors (McCoy, 2022).

SCENARIO ANALYSIS: IMPACT OF ASSET PRICE CHANGES			
	Portfolio Value ($)	**NAV per Share ($)**	**Change from Base (%)**
Base Case	$6,783,815.00	$628,381.50	0.00%
Positive Scenario (+10% Tech Stocks)	$7,337,170.79	$683,717.08	8.81%
Negative Scenario (-10% Tech Stocks)	$6,230,459.21	$573,045.92	-8.81%
Mixed Scenario (Selective)	$7,308,407.41	$680,840.74	8.35%

Figure 11: Mutual Funds and Hedge Funds Comparison

(Source: Obtained from MS Excel)

Hedge funds are more aggressive in their investment strategy, including leverage, derivatives, short selling and speculative trading strategies. They are prone to institutional or accredited investors and are not very regulated.

TASK 4: PORTFOLIO CONSTRUCTION AND RISK-RETURN ANALYSIS

4.1 Introduction

The management of a portfolio is an essential part of the present-day investment theory. Diversification helps the investors to achieve the maximum returns and minimise risk by investing in different kinds of assets. Modern Portfolio Theory (MPT) indicates that the portfolio risk may be minimized without having to trade-off the expected returns if the assets are combined having different characteristics of returns as well as the level of correlation. Portfolio building would then be a good idea in case there is good consideration of the asset allocation, expected returns, volatility and correlation with other assets.

This discussion considers three Adobe Inc. portfolio, iShares 7-10 Year Treasury Bond ETF, Invesco QQQ Trust (QQQ) and Digital Realty Trust REIT. Such assets are in different forms of investment, i.e. equities, bonds, exchange-traded funds (ETFs), and real estate investment trusts (REITs). Depending on the historical views of returns and risk of individual assets a risk-return profile of a portfolio is obtained.

4.2 Selection of Portfolio Assets

The portfolio in which it is picked has four assets which can be diversified in terms of industry and investments.

Adobe Inc. is a software technology firm that has witnessed tremendous growth in revenues, recurrent subscription revenues and market share in software market with significant market capital.

iShares 7–10 Year Treasury Bond ETF can be used to invest in governmental bonds in the U.S. Treasury bonds can be viewed as low-risk investments and they usually work well in times of economic uncertainty (Premalatha et al., 2025).

Invesco QQQ Trust (QQQ) is a tracker of Nasdaq-100 Index and has extensive exposure to leading technology and growth-oriented companies. ETF is a diversification of technology industry that has a high growth potential.

Digital Realty Trust REIT is an investment opportunity in the real estate business, which invests and operates the data centre infrastructure. REITs are inclined to develop steady cash flow and dividend payments along with additional diversification benefits.

PORTFOLIO COMPONENTS & RISK-RETURN PROFILE					
Asset Name	Ticker	Expected Return	Volatility (%)	Portfolio Weight	Weighted Return (%)
Adobe Inc. (Equity)	ADBE	12.5	22.5	25.0	3.13
iShares 7-10Y Treasury Bond ETF	IEF	4.2	5.8	20.0	0.84
Invesco QQQ Trust (Tech ETF)	QQQ	15.3	18.2	35.0	5.36
Digital Realty Trust REIT	DLR	8.4	14.3	20.0	1.68
PORTFOLIO TOTAL				**100.0**	**11.00**

Figure 12: Portfolio Assets

(Source: Obtained from MS Excel)

These resources are pooled to create a balanced portfolio which has growth potential, income generation and minimization of risk.

4.3 Analysis of Individual Asset Returns

The expected profit is the profit that an investment is likely to give in a certain period. The greatest application of historical average returns is to serve as an alternative to future performance expectations.

The selected investment options like Adobe and QQQ are most likely to increase returns in future as they are subject to technological and innovation driven sectors. The two investments have been fortunate to enjoy the greater digitalization, application of cloud computing and growth of earnings.

Digital realty trust is a mutual fund, which presents a range of capital growth and dividend with a mean projected rate. REITs may be prone to change in response to the interest rate changes but are likely to have good income characteristics.

4.4 Analysis of Individual Asset Risk

The standard deviation is the popular measure of risk that is the volatility of past returns. The higher standard deviation the more uncertainty and the higher the variations in the performance of the investment.

The most volatile among the selected assets is Adobe and QQQ as the stocks of technology are vulnerable to the economic environment, investor sentiment, and changing market expectations (Sachan et al., 2024).

Digital Realty Trust has higher chances of having moderate risk profile. The volatility of the REITs could be less volatile than the high-growth technology stocks, although the interest rate you are toying with and the economic climate could influence real estate investments.

The portfolio is the least volatile to the iShares Treasury Bond ETF. Government bonds are commonly considered as safe-haven investment due to the support of the U.S. government and relatively less price changes (Gala et al., 2025).

4.5 Correlation and Diversification Benefits

Correlation is a concept whereby the amount of movement of the returns of the assets relative to each other is determined. The range of the correlation coefficients is between -1 and +1. The less or negatively correlated assets are more advantageous in diversification as they do not have the same directional correlation of returns at the same time.

CORRELATION MATRIX				
	ADBE	**IEF**	**QQQ**	**DLR**
ADBE	1.00	-0.15	0.92	0.35
IEF	-0.15	1.00	-0.22	0.08
QQQ	0.92	-0.22	1.00	0.40
DLR	0.35	0.08	0.40	1.00

Figure 13: Correlation

(Source: Obtained from MS Excel)

The positive correlation between Adobe and QQQ is likely to be relatively high since performance of the technology sector greatly affects both. However, QQQ is more diversified as it opens to different companies.

The truth is more that the Treasury Bond ETF will be negatively or loosely correlated with equities investments. When there is stress in the market, the bond prices in the market tend to increase as the stock prices fall and it could be used in stabilising the performance of the portfolio.

The additional diversification provided by Digital Realty Trust is that the returns of real estate are not affected by the other aspects of the economy as compared to the traditional equities and bonds (Yilmaz and Orbak, 2023).

A combination of these assets will be less risky in the overall portfolio as opposed to investing in one security as evidenced in the correlation table.

4.6 Portfolio Return and Risk Calculation

Portfolio expected return, is the sum of the product of the expected returns of the assets multiplied by their portfolio weight.

The portfolio return formula is:

$$\text{Portfolio Return} = \Sigma\ (\text{Weight} \times \text{Expected Return})$$

The Portfolio return is estimated based on the overall prospects of the four assets based on their allocations.

PORTFOLIO RISK & VARIANCE ANALYSIS	
Portfolio Variance	0.0169
Portfolio Volatility (Standard Deviation)	**12.99**
Portfolio Expected Return	**11.00**
Risk-Free Rate (%)	4.2
Portfolio Sharpe Ratio	**0.52**

Figure 14: Portfolio Return and Risk Calculation

(Source: Obtained from MS Excel)

The portfolio risk is even more complex as it is not only influenced by the volatility of the individual assets but also through the correlation of the assets. Portfolio formula variance is a calculation of the standard deviation, portfolio weight and correlation coefficient (Waters, 2011). The diversification effect lowers the volatility as the portfolio will have securities with various classes.

4.7 Portfolio Evaluation and Investment Recommendation

The portfolio analysis justifies the reason why diversification is an important addition of the risk-return trade-off that investors could have. Despite higher expected returns of Adobe and QQQ, they are also more volatile. Inclusion of the Treasury bonds would diversify the risk of the entire portfolio, whereas the inclusion of Digital Realty Trust would diversify the income generation and the portfolio.

The portfolio is not only diversified in terms of growth but also stability since it has invested in many asset classes. It has a diversified portfolio and hence its risk-adjusted profile of returns is more desirable than that of a single stock.

INDIVIDUAL vs PORTFOLIO COMPARISON				
Asset	**Return (%)**	**Risk (%)**	**Sharpe Ratio**	**Risk-Adjusted Return**
ADBE	12.5	22.5	0.37	0.56
IEF	4.2	5.8	0.00	0.72
QQQ	15.3	18.2	0.61	0.84
DLR	8.4	14.3	0.29	0.59
PORTFOLIO (Diversified)	**11.00**	**12.99**	**0.52**	**0.85**

Figure 15: Portfolio Evaluation Comparison

(Source: Obtained from MS Excel)

This portfolio would be very appropriate as far as investment is concerned in moderating risk-takers who would otherwise like to invest in long-term capital growth without sacrificing the availability of defensive investments. The Treasury Bond ETF will provide a down protection and Adobe and QQQ will enable the realization of growth objectives in the long run. Digital Realty Trust blends the diversification and income capacity as well.

CONCLUDING REMARKS

High-level quantitative techniques have been employed to measure financial performance, company valuation, the mutual fund pricing and portfolio management in this report. The CAMELS analysis revealed that PNC Financial Services has good financial stability and regulatory position. The Free Cash Flow valuation showed the difference in valuation of the mature and the growth companies, which were Kimberly-Clark and MongoDB. The NAV analysis revealed the impact of a variation in the value of assets on the performance of mutual funds and the portfolio analysis revealed the benefits of diversification in improving the risk adjusted returns.

BIBLIOGRAPHY

Bhatia, A. and Mahendru, M., 2024. Financial Performance Evaluation of Small Finance Banks: A CAMEL Analysis. *Abhigyan*, *42*(4), pp.403-421.

Chang, W., 2025. A study of corporate merger and acquisition valuation based on data mining techniques: an empirical analysis in the context of big data. *International Journal for Housing Science & Its Applications*, *46*(3), p.7609.

DeFuscoe, R.A., McLeavey, D.W., Pinto, J.E., Runkle, D.E. and Anson, M.J.P. 2015 Quantitative Investment Analysis 3rd Edition. Wiley & Sons Inc. ISBN-13: 978 1119104223 ISBN-10: 111910422X

Evdokimov, I., 2025. *Innovations to Fundamental Stock Valuations: Estimating Future Earnings Per Share and Free Cash Flows Using Statistical and Machine Learning Methods* (Doctoral dissertation, University of Essex (United Kingdom)).

Gala, D.M., Venkatesh, K., Pawar, B.R., Suryawanshi, S. and Shah, H.N., 2025. Analyzing the Relationship Between Mutual Fund Flows and the Magnitude of NAV Corrections: Evidence from Historical Data. In *From Poverty to Prosperity: Leveraging Capital Markets for Sustainable Development* (pp. 33-42). Cham: Springer Nature Switzerland.

Gupta, S., French, J. and Kelly, S., 2025. United States: First Republic Bank Emergency Liquidity Program, 2023. *Journal of Financial Crises*, *7*(1), pp.623-653.

Mccoy, T., 2022, April. Stuck Inside a Cloud: Do SaaS business models require a rethink of the traditional approach to public market valuation?. In *Proceedings of the 6th International Conference on E-Commerce, E-Business and E-Government* (pp. 152-162).

Moraes Barreto, J., Aldaas, A., Saiyed, F., Martinez de Arredondo Mil, S. and Hannosh, M., 2024. ENROM-Consumer Staples Fund-Investment Research Report.

Olbert, L., 2025. Financial analysts' use of industry specific stock valuation models. *Journal of Applied Accounting Research*, *26*(6), pp.108-138.

Premalatha, K.P., Patil, S.R., Renuka, S. and Yadav, R.A., 2025, August. Thematic Mutual Funds: Performance and Benchmark Analysis Leveraging AI in Futuristic New-Age Investment Themes. In *2025 World Skills Conference on Universal Data Analytics and Sciences (WorldSUAS)* (pp. 1-10). IEEE.

Rodrigues, A.L.M.C., 2026. Equity research on the navigator company-written off or ready to rewrite? A deep dive into the dividend policy of the navigator company.

Sachan, R.K., Kumari, S., Khandelwal, V. and Kumar, T., 2024. Machine learning approach for predicting the net asset value (NAV) of mutual funds based on portfolio holdings. *Procedia Computer Science*, *233*, pp.154-163.

Sidaoui, M., Ben Bouheni, F., Arslankhuyag, Z. and Mian, S., 2022. Fintech and Islamic banking growth: new evidence. *The Journal of Risk Finance*, *23*(5), pp.535-557.

Tarkom, A. and Wang, H., 2025. Early Warning Networks: Temporal Graph Neural Networks for Banking Supervision and Systemic Risk Assessment. *Available at SSRN 5667390*.

Waters D. 2011. Quantitative Methods for Business 5th Edition. Pearson Ed. ISBN-13: 978-0273739470 ISBN-10: 0273739476

Yılmaz, Ü. and Orbak, Â.Y., 2023. Prediction of Turkish mutual funds' net asset value using the fund portfolio distribution. *Neural Computing and Applications*, *35*(26), pp.18873-18890.

Ykema, D., 2026. *Developing a Cybersecurity Framework for Startups: An Intrinsically Motivated Approach for Tailorable Cyber Security* (Master's thesis).

APPENDIX (if necessary)