Final Year Project Showcase Batch-2021
Year 2025

Department: Mathematics Programme: Computational Finance	
1	**Project Title** Impact of Economic Indicators on Net Asset Value of Conventional Fixed Income Funds: An Empirical Evidence from Pakistan.
2	**Project Idea** Given Pakistan's current economic uncertainty, high inflation, and interest rate volatility, investors are increasingly shifting towards safer investment options. This project focuses on evaluating the role of fixed-income mutual funds, both Conventional and Shariah-compliant, as a stable investment avenue for risk-averse investors in Pakistan.
3	**Process** The study looks at how commodity prices (coal, gold, and crude oil WTI) and macroeconomic factors (CPI, interest rates, money supply (M2), USDPKR exchange rates (EXR), and KSE-100) affect conventional and Shariah-compliant fixed-income mutual funds in Pakistan. From October 2014 to October 2024, NAV-based monthly return data of 6 conventional and 7 Shariah income funds, along with 16 conventional and 3 Shariah money market funds, are used. The Unit Root Test is used to verify stationarity, while Johansen Cointegration is used to examine long-run relationships. Both short- and long-run analyses are conducted using the Vector Error Correction Model (VECM). To explore whether these macroeconomic variables are statistically significant in predicting future values of the funds' returns, the Granger Causality Test was conducted. Furthermore, Impulse Response Functions were used to examine how shocks to macroeconomic and commodity variables impact fund returns over time. Robustness was guaranteed via diagnostic tests. Finally, risk-adjusted performance across fund types was also quantified using the Sharpe Ratio.
4	**Outcome** The VECM results show that Conventional Income Funds have a positive long-run relationship with WTI, gold, and KSE-100, and a negative relationship with CPI, interest rates, M2, and exchange rate. Shariah Income Funds are positively linked with WTI, exchange rate, and KSE-100, and negatively with CPI and M2, with a mixed link to interest rates. In the short run, both fund types show a negative impact from WTI and KSE-100, while coal has a positive effect. Money Market and Shariah Money Market Funds show long-run positive relationships with coal, WTI, interest rate, KSE-100, and exchange rate, and negative relationships with CPI and M2; short-run results confirm CPI and M2 as significant negative influences. The Impulse Response Function supports these findings that CPI, KSE-100, and M2 cause short-run declines, with CPI and KSE-100 remaining negative in the long run, while M2 turns positive. Coal and WTI show long-run positive effects; gold and interest rates improve returns in the short run, but only interest rates remain stable, while gold turns negative in the long run. Exchange rate shocks have a positive impact both in the short and long run. Granger causality tests confirm that CPI, interest rates, and exchange rates significantly Granger-cause fund returns, and collectively, all variables influence returns. Sharpe Ratio analysis identifies NBP Financial Sector Income Fund as the best-performing, making NBP Fund Management Limited the top AMC in Pakistan.
5	**Evidence (Theoretical Basis)** Fixed Income Funds, both Conventional and Shariah-compliant, comprise a mix of short- and long-run instruments. The negative relationship with inflation (CPI) arises because rising inflation leads the SBP to increase interest rates, which lowers the value of existing fixed-rate

	instruments and reduces real returns. The interest rate impact depends on asset allocation: funds holding short-run or floating-rate instruments adjust quickly to rate changes and show positive relationships, while those with fixed-rate instruments suffer losses. A positive long-run link with the KSE-100 index reflects investor confidence and improved credit risk during market growth, benefiting funds with corporate sukuks or TFCs. However, a short-run negative relationship may occur due to capital shifts from income to equity funds during bullish markets. The negative effect of money supply (M2) is due to its inflationary impact, which erodes real returns. In runs of exchange rates, Conventional Funds show negative effects from PKR depreciation, as it triggers inflation and rate hikes that devalue fixed-rate assets. Shariah Funds, however, may benefit due to exposure to short-run or USD-linked sukuks, which perform better in such conditions. A short-run negative relationship with crude oil (WTI) stems from inflationary pressures caused by rising energy costs, while long-run positive links with commodities (gold, coal, WTI) suggest benefits from short-run sukuks or T-bills tied to commodity-driven growth. Finally, Money Market Funds, which focus on short-run, low-risk instruments, show similar long-run behavior across macro variables. Their responses to inflation, rates, and exchange movements align with their short-duration investment structure.
6	**Competitive Advantage or Unique Selling Proposition** This project offers a data-driven decision-support tool for the mutual fund industry in Pakistan, focusing on how macroeconomic indicators affect the Net Asset Value (NAV) of conventional fixed-income funds. Its competitive advantage lies in enhancing fund performance strategy, risk management, and investor education, creating value for industry stakeholders, policymakers, and academia alike. **What:** An empirical model that explains the dynamic relationship between economic indicators (like CPI, interest rate, M2, exchange rate, KSE-100) and NAVs of conventional income funds using advanced time series techniques (VECM, Granger Causality, IRF). It offers clear insights into fund behavior under macroeconomic shifts. **How:** By identifying the most influential variables affecting fund returns in both the short and long run, this model enables fund managers to realign asset allocations, optimize fund composition, and anticipate market changes, resulting in cost-efficient investment strategies and improved performance over competitors. **Why:** The mutual fund industry in Pakistan lacks integrated empirical tools to predict fund performance under economic shocks. This study fills that gap, supporting better policy formulation, smarter investment decisions, and helping fund houses gain a strategic edge in capturing market share. **When:** Applicable immediately for both industry practitioners and researchers. Asset Management Companies (AMCs) can adopt the model to enhance their forecasting and fund design processes, while educational institutions can integrate it into their curriculum or research labs.
a	**Attainment of any SDG** This work contributes to the achievement of SDG 4 (Quality Education) and SDG 8 (Decent Work and Economic Growth) as it holds practical value for both the financial sector and the

	education sector. In the financial sector, it provides useful insights for investors and policymakers to make informed decisions based on macroeconomic trends. In the education sector, it can serve as a valuable academic resource for students and researchers studying mutual funds, financial markets, and economic policy.
b	**Any Environmental Aspect** While the project is finance-focused, it indirectly supports environmental sustainability by promoting efficient capital allocation. Funds guided by macroeconomic analysis can channel investments into low-risk, sustainable, or green financial instruments, aligning with environmentally responsible investing trends and encouraging the growth of climate-conscious portfolios.
c	**Cost Reduction of Existing Product** Although not a direct cost-cutting tool, the project enables indirect cost reduction for asset management companies by improving investment timing, asset allocation, and risk forecasting. This reduces portfolio adjustment costs, limits losses during economic shocks, and lowers reliance on expensive external research. Additionally, funds using this model may achieve better performance and ratings, reducing marketing and client acquisition costs. The model is also scalable and reusable, offering long-run efficiency benefits.
d	**Process Improvement, which Leads to Superior Product or Cost Reduction, and Efficiency Improvement of the Whole Process** In Pakistan's volatile economic environment, fixed-income mutual funds are preferred by risk-averse investors. However, many overlook how macroeconomic factors like inflation, interest rates, and exchange rates affect fund performance. Understanding these links leads to efficient investment decisions, reduced risk, and more efficient portfolio management. For institutions, it enhances fund structuring and aligns products with market conditions.
e	**Expansion of Market** By helping fund managers design better-aligned products and enabling investors to make informed decisions, this project fosters confidence. It increases participation, ultimately leading to the expansion of the fixed-income mutual fund market.
f	**Capture New Market** By simplifying how macroeconomic trends affect fund performance, this project opens opportunities to attract new segments of investors who were previously hesitant due to a lack of awareness or trust, enabling fund managers to tap into untapped investor groups and expand their market reach.
g	**Any Other Aspect** This project can help the Government of Pakistan by providing data-driven insights to design better monetary policies, manage inflation, and strengthen the fixed-income market for sustainable economic growth.
7	**Target Market** This study primarily targets policy makers, fund managers, financial analysts, and institutional investors who rely on macroeconomic insights to make informed investment decisions. Additionally, it serves retail investors and financial advisors who seek to understand how economic fluctuations impact returns on fixed income and money market funds. The findings aim to guide these audiences in developing more effective investment strategies, portfolio allocations, and policy responses within Pakistan's volatile economic environment.

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