INFORMATICS JOURNALS

Online **ISSN :** 3049-3455

Mineral Metal Energy Oil Gas and Aggregate

Contents available at: *www.informaticsjournals.com/index.php/2MEOGA*

2MEOGA

Metal and Fuel Commodities: A Catalyst in Portfolio Diversification for Fixed-income and Equity Investors

Sony Thomas[1*] and SSS Kumar[2]

[1]Associate Professor, Indian Institute of Management, Kozhikode (IIMK), Kerala -673570, India; sony@iimk.ac.in
[2]Professor, Indian Institute of Management, Kozhikode (IIMK), Kerala – 673570, India; ssskumar@iimk.ac.in

Abstract

The paper explores the incremental diversification benefit different asset classes offer to both fixed-income and equity investors in India. The additional asset categories considered in the study are domestically traded commodities (Precious metals, Base metals and Energy contracts) and international equities. The study shows that investors in India may include commodities like gold, aluminium, zinc and natural gas to the existing portfolio of equity and bonds to develop a portfolio with the best risk-adjusted returns. The most effective way of including these commodities is through a tactical asset allocation approach.

Keywords: *Commodity Markets, Risk Adjusted Returns, Tactical Asset Allocation*

1.0 Introduction

Following the devastating pandemic that caught the world off guard, there are valuable lessons for both professional and retail investors. Even though the pandemic is akin to a black swan event, investors should always build their portfolios so that unforeseen events of cataclysmic proportions have the most negligible impact on their investments. The good news is that investors do not need to use complicated or quantitative tools to secure their portfolios. Because most quantitative tools are designed to work under 'normal' conditions, they will fail under the abnormal conditions encountered during the pandemic.

In an ideal environment, investors would maximize returns while minimizing risk. This is achievable through asset diversification. When it comes to tradable assets, people can invest in various asset classes such as stocks, bonds, and gold. A person who owns the stock is known as a shareholder. A shareholder is part owner of the company. A person who owns the bond of a company is a bondholder. A bondholder is a lender to the company. In other words, a shareholder is the owner of the company, and the bondholder is a lender to the company. Shareholders' return depends on the company's profitability, whereas bondholders get a fixed assured rate of return. Bonds are also known as fixed-income securities. Diversifying within a given asset class and across asset classes is a fundamental tenet of investing. It is not enough to have a diversified portfolio of stocks, such as an index fund. Still, it is also necessary to diversify across different assets, such as fixed-income securities and commodities.

According to commodity market research, Commodities provide good diversification in a stock and bond portfolio. In a diversified portfolio of stocks and bonds, we investigated the diversification possibilities of all the commodities available to India's investors through commodity futures in the bullion, base metal, and energy categories. The following research questions are explored in this paper: What level of diversification does each commodity provide? When combined with equity and debt, which commodities provided the best risk-adjusted returns? When combined with commodities and debt, which type of equity provided the best risk-

**Author for correspondence*

adjusted returns? We looked at the benefits and risks of various asset classes and portfolios containing multiple combinations of these asset classes. The paper is organized as follows. Section 2 explains the data. Section 3 illustrates the methodology. Section 4 interprets the results, and Section 5 concludes the study.

2.0 Data

Large-cap, midcap, and foreign equity are the three types of equity. We've included all of the bullion, base metal, and energy commodities traded on commodity futures exchanges. Table 1 lists the proxies used in the study to capture data.

Table 1. Assets considered in the study

Asset	Proxy
Debt	Nifty 10-year benchmark G-Sec
Large-cap equity	Nifty 50
Midcap equity	Nifty Midcap 50
Foreign equity	Motilal Oswal NASDAQ 100(N100) ETF
Bullion commodities	Spot prices of gold and silver
Base metals commodities	Spot prices of aluminium, copper, lead, nickel and zinc
Energy commodities	Spot prices of crude oil, natural gas

The National Stock Exchange (NSE) provides prices for the Nifty 10-year benchmark G-Sec, Nifty 50, Nifty Midcap 50, and N100. The Multi Commodity Exchange (MCX) provides spot prices for all commodities. All of the variables in the study were measured from April 2011 to February 2021. The monthly returns of all variables are calculated in the middle of each month to reduce the impact of the futures' expiration effect.

3.0 Methodology

The methodology is explained from the equity investors' point of view and will be the same for fixed-income investors. We employ Markowitz's (1952) Modern portfolio theory (MPT) to construct the portfolios with the best risk-adjusted returns[1]. The objective of MPT is to create an efficient portfolio by maximizing the expected return for a given level of risk. An efficient portfolio is a portfolio which offers the best risk-adjusted returns. The paper highlights the role of commodities in enhancing the risk-return characteristics of traditional portfolios consisting of stocks and bonds. The efficient portfolios are created using an optimization process. These portfolios are constructed under the no short sales assumption.

The model maximizes the objective function $\left(R_{pf} - R_f\right)/\sigma_{pf}$ subject to the constraint that $\sum W_i = 1$ for i = 1 to N assets and $W_i \geq 0$ for all i.

$\sigma_{pf}^2 = \sum W_i^2 \sigma_i^2 + \sum\sum W_i W_j \sigma_{ij}$ for i and j being two of assets from 1 to N.

$R_{pf} = \sum W_i R_i$ for all assets 1 to N and $\sigma_{ij} = \rho_{ij}\sigma_i\sigma_j$

According to MPT, the variance of assets is used as the proxy for risk. MPT is based on diversification, where one can maximize returns and minimize risk by holding a portfolio of a specific set of assets rather than holding individual assets. It also assumes that investors are risk-averse. For a given level of risk, investors will always prefer the portfolio with the highest level of returns. For higher levels of risk, investors may demand higher returns. But this risk-return trade-off may not be uniform for all the investors. It depends on the risk appetite of the investors. Hence, any study on portfolio management must offer inputs for different types of investors with varying levels of risk aversion so that they can improve their risk-adjusted returns. According to the MPT, portfolio return is the proportion-weighted combination of the constituent assets' returns, and portfolio volatility is a function of the correlations of the component assets, for all asset pairs. Correlation between any two assets will range between -1 and +1. Any value less than 1 denotes some level of diversification. The closer the correlation value to -1, the higher the level of diversification will be. The study neither imposes any constraint nor fixes up on a model to conduct the analysis. What is the best combination among the financial assets available to an investor in the Indian context? We explored the answer to the above question by conducting multiple optimizations among the available investment opportunities.

4.0 Interpretation of Results

The annualized risk, returns, and risk-adjusted ratio denoted by the Sharpe ratio (1966) of various assets used in the study are shown in (Table 2)[2]. The study aims to create a portfolio of assets from a list of assets that can outperform any of the individual assets in terms of risk-

adjusted returns. We've also investigated the possibility of developing a portfolio with lower risk than bonds, stocks, and gold.

Table 2. Annualized risk and return of assets

Annualized Risk and Return of Assets			
Asset	**Returns**	**SD**	**Sharpe Ratio**
Bond	7.21%	5.17%	1.40
N100	24.99%	18.64%	1.34
Nifty	11.26%	16.44%	0.68
Gold	9.12%	14.52%	0.63
Midcap	12.96%	24.40%	0.53
Zinc	10.40%	23.26%	0.45
Copper	6.21%	19.48%	0.32
Aluminium	5.40%	17.10%	0.32
Lead	5.64%	22.46%	0.25
Natural Gas	9.91%	42.54%	0.23
Nickel	4.35%	23.99%	0.18
Silver	4.29%	25.70%	0.17
Crude Oil	5.69%	36.16%	0.16

*proxy for bond and gold are Nifty 10-year G-Sec and Indian gold price, respectively

*proxy for cap equity, mid-cap equity and foreign equity are Nifty index, Nifty Midcap 50 and N100 ETF, respectively

**risk is measured using standard deviation of monthly returns

Table 3 summarizes portfolios with a reward to risk ratio greater than 1.5 (higher than a bond, equity, and gold held separately) over the previous ten years of data.

Compulsory inclusion of the five assets listed above yielded the best risk-return combinations. According to our research, one of the five asset combinations had the lowest risk of 3.86 per cent and the best reward to risk ratio of 2.47. Commodities act as a catalyst for both Indian and foreign stocks in creating portfolios with better risk-adjusted returns. When combined with bonds, gold, and base metal, the NASDAQ 100 ETF provided the best risk-adjusted returns (among the three types of equity studied). In the last ten years, commodities such as gold, aluminium, and zinc provided the best diversification for stock and bond portfolios. The risk level was also lower than that of a bond portfolio consisting solely of government bonds for most portfolios with these five assets in the range mentioned above.

Let's look at the period from January 2020 to February 2021. We can see that an investor who only holds equity will do poorly compared to an investor who owns 80 per cent of their portfolio in equity and the rest in bonds. The reward to risk ratio for the former portfolio is 0.87, while the equity plus bond portfolio has a Sharpe ratio of 0.95. Furthermore, the Nifty and bond portfolio with gold (80:10:10) had a reward to risk ratio of 0.98. Even for fixed-income investors, the commodities advantage improves reward-to-risk ratios. A bond-only portfolio has a reward-to-risk ratio of 2.12, whereas a portfolio with 80 per cent bonds and the rest in gold has a reward-to-risk ratio of 2.39. The Nasdaq 100 ETF, bond, and gold portfolio (80:10:10) outperformed the Nifty, bond, and gold portfolio with a reward-to-risk ratio of 1.87.

Commodities such as aluminium and zinc can boost the reward-to-risk ratio for long-term investors. As a result, both bond and equity investors will benefit from a moderate allocation to these commodities and gold. Commodity futures are currently a very effective way to gain direct commodity exposure. Financial institutions such as asset management firms, stock exchanges, and

Table 3. Portfolio with the best possible risk-adjusted returns

No	Mandatory Asset	Asset	Range of Weights
1	Bond	Bond	5.68% to 80.56%
2	Gold	Gold	4.12% to 30.30%
3	Natural Gas	Natural Gas	1.80% to 8.68%
4	Equity(Nifty OR Midcap OR N100)	Nifty	3.76% to 27.44%
		Midcap	1.86% to 11.86%
		N100	8.34% to 87.97%
5	Base Metal (Aluminum OR Zinc)	Aluminium	3.64% to 7.70%
		Zinc	2.64 to 9.27%

commodity exchanges may profit from these trends by offering products with higher risk-adjusted returns.

5.0 Conclusion

According to the study, investors in India can add commodities like gold, aluminium, zinc, and natural gas to their existing equity and bond portfolios to create a portfolio with the best risk-adjusted returns. A tactical asset allocation approach is the most effective way to include these commodities. To achieve the best risk-adjusted returns, you must invest in stocks, bonds, gold, natural gas, and one base metal. If risk reduction is the primary goal, aluminium is the material of choice. If you're looking for a way to increase your profits by taking on a small amount of risk, zinc is the way. Foreign equity has outperformed all other types of equity over the last ten years. Market participants such as regulators, asset management firms, and exchanges play a crucial role in developing products and services that benefit commodities' diversification and make them accessible to retail investors. With all physical and derivatives combined, India's bullion market is worth 3-4 lakh crores. According to the World Gold Council, physical gold accounts for 10 to 20% of that. Commodity derivatives account for 3% of all derivatives in India, compared to 24% globally. Institutional investors should concentrate on existing products such as commodity derivatives and new products such as commodity ETFs and other customizable products that provide easy access to commodities.

6.0 References

1. Markowitz H. Portfolio selection. The Journal of Finance. 1952; 7:77-91.
2. Sharpe WF. Mutual fund performance. Journal of Business. 1966; 39:119-38.