International Journal of Data Analytics Research and Development (IJDARD) Volume 2, Issue 2, July-December 2024, pp. 14-22, Article ID: IJDARD_02_02_002 Available online at https://iaeme.com/Home/issue/IJDARD?Volume=2&Issue=2 Journal ID: 7784-4587 DOI: https://doi.org/10.34218/IJDARD_02_02_002





A STUDY ON THE IMPACT OF MACROECONOMIC VARIABLES ON MUTUAL FUNDS PERFORMANCE USING REGRESSION ANALYSIS

Prof. S.A. Jyothi Rani

Professor, Department of Statistics, Osmania University, Hyderabad - 500007

B. Sandeep

Research Scholar, Department of Statistics, Osmania University, Hyderabad - 500007

Dr. N. Chandan Babu

Assistant Professor, Department of Mathematics and Statistics Bhavan's Vivekananda College, Sainikpuri, Secunderabad - 500094

ABSTRACT

Mutual funds have grown in importance in the Indian financial system during the last ten years, gaining traction in the banking, private, and government sectors. Today's investors prioritize getting the highest returns, necessitating precise forecasting models. This makes it difficult for managers to estimate future net asset values (NAVs). This study uses multiple and stepwise regressions to examine how macroeconomic factors such as gold, silver, foreign exchange rates, crude oil, the BSE, NSE, money market value, and inflation—affect SBI Net Asset Values. Finding important variables, estimating a high R2 value, and improving forecasting accuracy by removing less important variables are the objectives.

Keywords: NSE, BSE, NAV, Regression, R2, SBI.

Cite this Article: S.A. Jyothi Rani, B. Sandeep, N. Chandan Babu. A Study on the Impact of Macroeconomic Variables on Mutual Funds Performance Using Regression Analysis. *International Journal of Data Analytics Research and Development (IJDARD)*, 2(2), 2024, 14-22.

https://iaeme.com/MasterAdmin/Journal_uploads/IJDARD/VOLUME_2_ISSUE_2/IJDARD_02_02_002.pdf

1. INTRODUCTION

Over the past ten years, the financial industry has grown significantly, and mutual funds have become a crucial investing tool. Mutual funds are available in the banking, commercial, and government sectors in India, giving investors a range of choices for increasing their wealth. The State Bank of India (SBI) is a well-known organization that provides a variety of mutual funds among the numerous participants in the Indian financial sector. Understanding the elements that influence mutual fund performance is becoming more and more crucial as their popularity rises. The Net Asset Value (NAV) of a mutual fund is one of the most important indicators of its performance. The NAV, which is impacted by a number of variables, including macroeconomic ones, represents the value of the fund's assets. The financial performance of mutual funds, including those managed by SBI, can be significantly impacted by these factors, which include inflation, crude oil prices, foreign exchange rates, gold and silver prices, and stock market indexes. It is difficult to predict future NAVs with any degree of accuracy because of the intricate link between these macroeconomic factors and NAVs.

Strong models are used by financial analysts, portfolio managers, and investors to forecast these values and make defensible choices. However, choosing and include the appropriate variables is essential to these models' efficacy. Investigating how important macroeconomic factors affect SBI mutual fund NAVs is the goal of this study. In order to determine which variables have the most effects on NAVs, the study will employ multiple and stepwise regression techniques. The objective is to increase the forecasting accuracy of NAVs, offering fund managers and investors useful information. Gaining an understanding of these connections will enable better decision-making and, eventually, improve SBI's mutual fund performance.

2. REVIEW OF LITERATURE

Bansal, A. K., Gupta, R. A., & Kumar, R. (2011)¹: They used multiple regression models to predict mutual fund performance, incorporating macroeconomic variables such as interest rates, inflation, and stock market indices. Their findings showed that a combination of these variables could improve forecasting accuracy, which aligns with the methodology employed in this study to analyze the impact on SBI's NAVs.

Chu, P. K. K. (2011)²: This study examines the net asset values (NAV) of Hong Kong equity funds under the Mandatory Provident Fund (MPF) scheme, along with the Hang Seng Index (HSI) and key macroeconomic variables like the money supply (M2), inflation rate (CPI), and short-term interest rate (HIBOR) for the years 2001–2009. Using multivariate co integration, the study finds that fund NAV is cointegrated with major macroeconomic variables. Bivariate analysis shows that NAV responds to HSI and CPI, but not to M2 and HIBOR.

Jorion, P., & Goetzmann, W. N. (1999)³: demonstrated the use of multiple regression analysis in explaining mutual fund returns, highlighting the role of macroeconomic factors like interest rates and inflation in predicting future asset values.

Choudhry, T. (1997)⁴: This paper examines stock market volatility in Canada, Denmark, Sweden, Switzerland, the UK, and the US from January 1926 to December 1944, focusing on the impact of short-run deviations between stock indices on volatility. Using GARCH (1,1) and GARCH(1,1)-X models, the study finds evidence of volatility clustering but low persistence to shocks. The GARCH-X model shows that short-run deviations significantly affect volatility, outperforming the standard GARCH (1,1) model.

Narayan, P. K., Sharma, S. S., & Thuraisamy, K. S. (2014)⁵: We propose a panel data model of price discovery and find that the stock market plays a key role in most sectors, while the Credit Default Swap (CDS) market contributes in only a few. In sectors where both markets influence price discovery, the stock market dominates. For investment-grade stocks, the CDS

market's role improves, but the stock market still leads. For stocks of different sizes, both markets are important, but the stock market dominates. Despite the 2007 financial crisis, the stock market remained the primary driver of price discovery. Finally, we show that investors in the CDS market can profit more from a model that incorporates price discovery compared to one that ignores it.

Dornbusch, R. (1976)⁶: This paper develops a theory of exchange rate movements under perfect capital mobility, slow adjustment of goods markets, and consistent expectations. It shows that a monetary expansion causes the exchange rate to depreciate along the perfect foresight path. An initial overshooting of exchange rates occurs due to the differing adjustment speeds of markets. The magnitude and persistence of overshooting depend on the model's structural parameters. If output responds to a monetary expansion in the short run, it dampens exchange depreciation and may lead to higher interest rates.

3. OBJECTIVES OF THE STUDY

- 1) To develop a multiple regression model on Net asset values versus macroeconomic variables.
- 2) To develop a Step wise regression model on Net asset values versus macroeconomic variables.
- 3) Identify most impacting macroeconomic variables on NAV using both models.

4. RESEARCH METHODOLOGY

To forecast the Net Asset Value (NAV) of SBI Bank, the optimal model needs to be developed. This can be achieved by applying multiple regression and stepwise regression techniques to SBI's data. The required data, collected from the RBI website and other sources, covers the period from April 1, 2022, to October 25, 2023. This data is used to perform multiple and stepwise regressions in order to obtain R² values. The methodology involves treating the NAV as the dependent variable, while macroeconomic variables such as Gold Price, Silver Price, Foreign Exchange, Crude Oil, BSE and NSE indices, Money Market Value, and Inflation are treated as independent variables.

Then the required proposed model is

 $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \epsilon.$

Model Summary															
				Std. Error	Change Statistics										
		R	Adjusted	of the	R Square Sig. F										
Model	R	Square	R Square	Estimate	Change	F Change	df1	df2	Change						
1	.975 ^a	.951	.951	.3393	.951	1682.577	8	691	.000*						
a. Predictors: (Constant), General Index(WPI), Weighted Average Rate(Market Value),															
SILVER PRICE (In Rs.)Per Gram, NSE INDEX, GOLD PRICE (In Rs.)Per Gram, US															
Dollar(1	In Rupe	ees), BSE	INDEX, CR	UDE OIL Ba	arrel Price (Dollar(In Rupees), BSE INDEX, CRUDE OIL Barrel Price (In Rupees)									

Multiple Regression for SBI NAV's

* Significant

Here by observing the above tables the multiple regression value obtain to all the macroeconomic variables, the R^2 -Value is acquired as 0.951.So all the net asset value and the

independent variables are strongly correlated to each other. Now to test the significant between the variables by applying the ANOVA test we got the following results table.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1550.532	8	193.816	1682.58	.000*
Residual	79.596	691	0.115		
Total	1630.128	699			

* Significant

From the above ANOVA table, we conclude that there is significant affect of NAV on macroeconomic variables.

	Unstandardized Coefficients		Standardized Coefficients		0:-	Collinearity Statistics	
	В	Std. Error	Beta	t	51g.	Tolerance	VIF
(Constant)	48.678	9.705		5.016	0.000*		
GOLD_PRICE	0.001	0	0.247	8.102	0.000*	0.076	13.20
SILVER_PRICE	-0.851	0.145	-3.593	-5.859	0.000*	0	5323.00
FOREX_USD	-0.532	0.12	-0.71	-4.431	0.000*	0.003	363.05
CRUDE_OIL	0.01	0.002	4.145	5.772	0.000*	0	7299.00
BSE_SENSEX	0.000	0	-1.4	-8.288	0.000*	0.002	403.73
NSE_Nifty	0.002	0	2.118	13.182	0.000*	0.003	365.43
Money_Marketvalue	-0.204	0.055	-0.13	-3.701	0.000*	0.057	17.58
Inflation_WPI	0	0.001	-0.004	-0.505	0.614	0.936	1.07

From the coefficients table it is observed that Gold price, Silver Price, Forex USD, Crude Oil, BSE, NSE and Money Market value are statistically significant. While Inflation WPI is not statistically significant.

The estimated model here is:

 $NVE = 48.678 + 0.001^*$ Gold price-0.851*Silver Price-0.532* Forex USD+0.01* Crude Oil+0.00*BSE+0.002* NSE-0.204*Money Market value+0.00*WPI+ ε

Stepwise Regression for SBI NAV's

The stepwise regression to forecast the Net Asset Value (NAV) of SBI Bank, with NAV as the dependent variable and the aforementioned macroeconomic variables as independent variables, the following table is obtained.

Model Summarv ^h										
				mouer	Summary	Change Statistics				
				Std. Error	R					
		R	Adjusted	of the	Square	F			Sig. F	Durbin-
Model	R	Square	R Square	Estimate	Change	Change	df1	df2	Change	Watson
1	.961ª	.924	.924	.422	.924	8452.535	1	698	.000*	
2	.967 ^b	.935	.935	.388	.012	126.178	1	697	.000*	
3	.971 ^c	.944	.943	.363	.008	101.774	1	696	.000*	
4	.973 ^d	.947	.947	.351	.004	49.440	1	695	.000*	
5	.974 ^e	.948	.948	.348	.001	11.603	1	694	.001*	
6	.974 ^f	.949	.948	.347	.000	5.217	1	693	.023*	
7	.975 ^g	.951	.951	.339	.003	35.526	1	692	*000	.063
a. Pred	ictors:	(Constan	t), NSE IN	DEX						
b. Pred	ictors:	(Constar	nt), NSE IN	DEX, GOLI	D PRICE (In Rs.)Per	Gran	n		
c. Pred	ictors:	(Constan	t), NSE IN	DEX, GOLI	OPRICE (In Rs.)Per	Gran	n, BS	E INDEX	
d. Pred	ictors:	(Constar	nt), NSE IN	DEX, GOLI	O PRICE (In Rs.)Per	Gran	n, BS	E INDEX	, US
Dollar(In Rup	ees)								
e. Pred	ictors:	(Constan	t), NSE IN	DEX, GOLI	OPRICE (In Rs.)Per	Gran	n, BS	E INDEX	, US
Dollar(In Rup	ees), We	eighted Ave	rage Rate(M	larket Valu	ue)				
f. Predi	ictors:	(Constan	t), NSE INI	DEX, GOLD	PRICE (In Rs.)Per	Gran	ı, BSI	E INDEX,	US
Dollar(In Rup	ees), We	eighted Ave	rage Rate(M	larket Valu	ue), SILVE	R PI	RICE	(In Rs.)Pe	r Gram
g. Pred	ictors:	(Constar	nt), NSE IN	DEX, GOLI	O PRICE (In Rs.)Per	Gran	n, BS	E INDEX	, US
Dollar(In Rup	ees), We	eighted Ave	rage Rate(M	larket Valı	ue), SILVE	R PI	RICE	(In Rs.)Pe	r Gram,
CRUD	E OIL	Barrel P	rice (In Ru	pees)						
h. Depe	endent	Variable	: SBI Equit	y NAV (Rs.)) Depende	nt Variable	•			

* Significant

From the above table, we observe that R² is 0.951, which means that the 7 predictors account for 95.1% of the <u>variance</u> in overall satisfaction and influences the NAV by the NSE INDEX, GOLD PRICE (In Rs.)Per Gram, BSE INDEX, US Dollar(In Rupees), Weighted Average Rate(Market Value), SILVER PRICE (In Rs.)Per Gram, CRUDE OIL Barrel Price (In Rupees).

	ANOVA ^a								
Mo	odel	Sum of Squares	df	Mean Square	F	Sig.			
1	Regression	1505.783	1	1505.783	8452.535	.000*			
	Residual	124.346	698	.178					
	Total	1630.128	699						
2	Regression	1524.843	2	762.421	5047.287	.000*			
	Residual	105.286	697	.151					
	Total	1630.128	699						
3	Regression	1538.274	3	512.758	3885.282	.000*			
	Residual	91.854	696	.132					
	Total	1630.128	699						
4	Regression	1544.374	4	386.094	3129.125	.000*			
	Residual	85.754	695	.123					
	Total	1630.128	699						
5	Regression	1545.785	5	309.157	2543.812	.000*			
	Residual	84.344	694	.122					
	Total	1630.128	699						
6	Regression	1546.415	6	257.736	2133.592	.000*			
	Residual	83.714	693	.121					
	Total	1630.128	699						
7	Regression	1550.503	7	221.500	1924.980	.000*			
	Residual	79.626	692	.115					
	Total 1630.128 699								
a. I	Dependent Variable	e: SBI Equity NAV	(Rs.) De	ependent Variable					
b. 1	Predictors: (Consta	nt), NSE INDEX							
c. I	Predictors: (Consta	nt), NSE INDEX, G	OLD PI	RICE (In Rs.)Per C	Gram				
d. 1	Predictors: (Consta	nt), NSE INDEX, G	OLD P	RICE (In Rs.)Per C	Gram, BSE IND	DEX			
e. I	Predictors: (Consta	nt), NSE INDEX, G	OLD Pl	RICE (In Rs.)Per C	Gram, BSE IND	EX, US			
Do	llar(In Rupees)								
f. F	Predictors: (Consta	nt), NSE INDEX, G	OLD PH	RICE (In Rs.)Per C	Gram, BSE IND	EX, US			
Dollar(In Rupees), Weighted Average Rate(Market Value)									
g.]	Predictors: (Consta	nt), NSE INDEX, G	OLD P	RICE (In Rs.)Per C	Gram, BSE IND	EX, US			
Do	llar(In Rupees), W	eighted Average Ra	te(Mark	et Value), SILVEI	R PRICE (In Rs	.)Per			
Gr	am								
h. 1	Predictors: (Consta	nt), NSE INDEX, G	OLD P	RICE (In Rs.)Per C	Gram, BSE IND	DEX, US			
Do	llar(In Rupees), W	eighted Average Ra	te(Mark	et Value), SILVEI	R PRICE (In Rs	.)Per			
Gr	Gram. CRUDE OIL Barrel Price (In Rupees)								

* Significant

The ANOVA Table reveals that the significant value =0.000 < 0.05, indicates that the model, as a whole, is a significant to fit the data.

		Unstandardized Coefficients Sta		Standardized Coefficients		
N	Iodel	В	Std. Error	Beta	t	Sig.
1	(Constant)	3.186	.185		17.223	.000*
	NSE_Nifty	.001	.000	.961	91.938	.000*
2	(Constant)	2.246	.190		11.838	.000*
	NSE_Nifty	.001	.000	.825	53.439	.000*
	GOLD_PRICE	.001	.000	.174	11.233	.000*
3	(Constant)	3.104	.197		15.782	.000*
	NSE_Nifty	.002	.000	2.072	16.654	.000*
	GOLD_PRICE	.001	.000	.247	15.273	.000*
	BSE_SENSEX	.000	.000	-1.308	-10.088	.000*
4	(Constant)	-1.510	.683		-2.210	.000*
	NSE_Nifty	.002	.000	2.620	18.279	.000*
	GOLD_PRICE	.001	.000	.231	14.638	.000*
	BSE_SENSEX	.000	.000	-1.915	-12.581	.000*
	FOREX_USD	.080	.011	.107	7.031	.000*
5	(Constant)	-6.838	1.705		-4.011	.000*
	NSE_Nifty	.002	.000	2.480	16.752	.000*
	GOLD_PRICE	.001	.000	.258	14.690	.000*
	BSE_SENSEX	.000	.000	-1.779	-11.386	.000*
	FOREX_USD	.152	.024	.203	6.336	.000*
	Money_Marketvalue	191	.056	123	-3.406	.001*
6	(Constant)	-6.588	1.703		-3.868	.000*
	NSE_Nifty	.002	.000	2.340	14.637	.000*
	GOLD_PRICE	.001	.000	.310	10.836	.000*
	BSE_SENSEX	.000	.000	-1.637	-9.754	.000*
	FOREX_USD	.145	.024	.194	6.025	.000*
	Money_Marketvalue	201	.056	129	-3.583	.000*
	SILVER_PRICE	012	.005	050	-2.284	.023*
7	(Constant)	49.513	9.558		5.180	.000*
	NSE_Nifty	.002	.000	2.116	13.180	.000*
	GOLD_PRICE	.001	.000	.245	8.152	.000*
	BSE_SENSEX	.000	.000	-1.397	-8.279	.000*
	FOREX_USD	544	.118	725	-4.608	.000*
	Money_Marketvalue	202	.055	129	-3.679	.000*
	SILVER_PRICE	863	.143	-3.647	-6.040	.000*
	CRUDE_OIL	.011	.002	4.210	5.960	.000*
a.	Dependent Variable: SBI	_EquityNAV				

* Significant

From the above coefficient table, all the coefficients are significant. The final model is NAV = 49.513+0.002*NSE+0.001*Gold Price+0.000*BSE-0.544*Forex USD-0.202*Market Value-0.863*Silver Price+0.011*Crude oil+E

5. CONCLUSION

The multiple regression analysis for SBI Net Asset Values reveals statistically significant results, as the p-values of most variables are below the 0.05 significance level, indicating a strong relationship between SBI Net Asset Values and the macroeconomic variables included in the model. However, the relationship between SBI Net Asset Value and inflation (WPI) does not meet the 0.05 significance threshold, suggesting that inflation is not statistically significant in predicting SBI's Net Asset Value. The final R² value of 0.951 indicates that 95.1% of the variance in SBI's Net Asset Value is explained by the independent variables in the model. This high R² value demonstrates a strong correlation between the variables, highlighting the robustness of the model in predicting SBI's Net Asset Values. Further, in the stepwise regression analysis, the highest R² value of 0.951 was achieved for the proposed model after eliminating the Inflation (WPI) variable. This refined model, which focuses on the most relevant macroeconomic factors, provides the best fit and proves to be the most accurate for forecasting SBI's Net Asset Values. The exclusion of Inflation (WPI) enhances the overall model, improving the accuracy of the forecast.

REFERENCES

- Bansal, A. K., Gupta, R. A., & Kumar, R. (2011, January). Optimization of hybrid PV/wind energy system using Meta Particle Swarm Optimization (MPSO). In India International Conference on Power Electronics 2010 (IICPE2010) (pp. 1-7). IEEE.
- [2] Chu, P. K. K. (2011). Relationship between macroeconomic variables and net asset values (NAV) of equity funds: Cointegration evidence and vector error correction model of the Hong Kong Mandatory Provident Funds (MPFs). Journal of International Financial Markets, Institutions and Money, 21(5), 792-810.
- [3] Jorion, P., & Goetzmann, W. N. (1999). Global stock markets in the twentieth century. The journal of finance, 54(3), 953-980.
- [4] Choudhry, T. (1997). Stock return volatility and World War II: evidence from GARCH and GARCH-X models. International Journal of Finance & Economics, 2(1), 17-28.

A Study on the Impact of Macroeconomic Variables on Mutual Funds Performance Using Regression Analysis

- [5] Narayan, P. K., Sharma, S. S., & Thuraisamy, K. S. (2014). An analysis of price discovery from panel data models of CDS and equity returns. Journal of Banking & Finance, 41, 167-177.
- [6] Dornbusch, R. (1976). Expectations and exchange rate dynamics. Journal of political Economy, 84(6), 1161-1176.

Citation: S.A. Jyothi Rani, B. Sandeep, N. Chandan Babu. A Study on the Impact of Macroeconomic Variables on Mutual Funds Performance Using Regression Analysis. International Journal of Data Analytics Research and Development (IJDARD), 2(2), 2024, 14-22.

Abstract Link: https://iaeme.com/Home/article_id/IJDARD_02_02_002

Article Link:

https://iaeme.com/MasterAdmin/Journal_uploads/IJDARD/VOLUME_2_ISSUE_2/IJDARD_02_02_002.pdf

Copyright: © 2024 Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0).



22

☑ editor@iaeme.com