European Economic Letters
ISSN 2323-5233
Vol 14, Issue 3 (2024)
http://eelet.org.uk

Influence of Macroeconomic factors on Alternative Investment Funds

Ajith M*, Aishwarya T*, Akshayalekal* & Abhin M*, Dr. Ravi Veeraraghavan**
*PGDM Student, Xavier Institute of Management and Entrepreneurship, Chennai
**Professor, Xavier Institute of Management and Entrepreneurship, Chennai

ABSTRACT

This study examines the relationship between key macroeconomic variables and the growth of Alternative Investment Funds (AIFs) in India from 2015 to 2022. It analyzes the correlation between the annual growth of AIF categories and macroeconomic indicators such as GDP growth, inflation, real interest rates, FDI inflows and outflows, unemployment, tax revenue, the Nifty 500 index, and mutual fund investments. Using correlation analysis and simple linear regression, the findings show that only Category I AIFs significantly correlate with FDI outflows, while real interest rates and unemployment display moderate R-squared values of around 0.4 and 0.5.The results suggest that traditional macroeconomic factors have limited predictive power for AIF investment behaviour in India, indicating that AIF growth may be driven by more complex variables, possibly including industry-specific or policy-related factors. This research contributes to the understanding of the alternative investment landscape and has important implications for investment strategies, risk management, and policy formulation in India's rapidly evolving AIF sector.

Keywords: AIF Category 1, AIF Category 2, AIF Category 3, GDP, Inflation, Interest Rates, FDI (Inflows). FDI (Outflows), Tax revenue, Nifty500, Mutual funds

1.INTRODUCTION

Alternative Investment Funds (AIFs) have become a significant force in global capital markets, offering diverse strategies beyond traditional asset classes. In India, the formalization of AIFs through SEBI's 2012 regulations marked a key milestone, creating a structured framework for these funds. AIFs gather private investments, both domestic and foreign, under a defined investment policy. They encompass various types, including venture capital, private equity, hedge funds, infrastructure, real estate, debt, special situation, and social venture funds.

SEBI categorizes AIFs into three groups:

- Category I: Funds investing in startups, SMEs, social ventures, and other sectors considered economically or socially desirable.
- Category II: Money not included in Category I or III, including private equity and debt funds.
- Category III: Funds employing complex trading strategies, including hedge funds.

The AIF sector in India has seen rapid growth, with commitments rising from ₹60,000 crores in 2016 to over ₹5.35 lakh crores by 2023. Macroeconomic factors such as GDP growth, inflation, interest rates, and fiscal policies play a key role in shaping the investment environment for AIFs**.**

2. REVIEW OF THE LITERATURE:

The paper by Srinivas Yadav et al investigates the impact of macroeconomic variables such as inflation, interest rates, GDP growth, and exchange rates on the performance and risk of equity-oriented mutual funds, highlighting the need for further study due to their significant influence as indicated by existing literature. [1]

The paper by Misra, P. examines the impact of macroeconomic variables on the Indian stock market from April 1999 to March 2017, using econometric models to identify long and short-term relationships, and finds that exchange rates & interest rates significantly affect stock market returns, with implications for policymakers & investors in predicting market trends.[2]

The paper by Kumar et alexamines the interrelationship between macroeconomic variables and Indian mutual fund returns and volatilities from 2006-2008 using Granger causality tests, finding that different macroeconomic factors affect various mutual fund categories, highlighting the need for time series techniques in asset price research. [3]

The research by Kotha et al analyses the impact of macroeconomic variables like interest rates, inflation, GDP, and exchange rates on stock market performance using regression and econometric models, concluding that these factors significantly influence stock prices, though their impact varies with market conditions. [4]

The research by Aygunes, G.in 2017 analyses the impact of macroeconomic variables like GDP, inflation, and interest rates on venture capital financing, concluding that shifts in the economic environment significantly influence venture capital availability and investment trends.[5]

The research by Aygunes, G. in 2018 analyzes the impact of venture capital (VC) funding on macroeconomic variables using stepwise regression, finding that GDP growth and interest rates are significant predictors, with VC investments positively linked to GDP growth and negatively to interest rates, highlighting the importance of macroeconomic stability for optimal VC development. [6]

The research by Daskalakis et al.examines how the capital structure of SMEs responds to macroeconomic changes, finding that debt ratios adjust faster for short-term debt during downturns, and highlighting the importance of debt structure in managing financial adjustments through economic cycles. [7]

The study by Kuhan et al. uses correlation, regression, and Granger causality tests to examine the impact of macroeconomic indicators on the SME IPO index, finding that interest and inflation rates have a positive relationship while exchange rates have an inverse one, providing valuable insights for policymakers and investors. [8]

The paper by Murty et al examines the impact of public investments on economic growth and poverty reduction in India using a multi-sectoral econometric model, finding that a 10% increase in public investment could boost economic growth by 2.5% and reduce poverty by 1% without causing inflation.[9]

The article by Aarekol, S. W analyzes the impact of macroeconomic variables like economic growth, interest rates, and inflation on private equity investments using regression analysis, concluding that macroeconomic stability is crucial for the success and scale of private equity activity and investment planning. [10]

The study by Steger, D. explores the relationship between macroeconomic variables and private equity returns in Switzerland using regression analysis, finding that economic cycles significantly influence private equity performance. [11]

The study by Lambert et al analyses hedge fund portfolio management under varying economic conditions using time-varying beta estimates and measurement error models, finding that hedge funds adjust their risk profiles to macroeconomic factors differently across styles, with growth stocks serving as a hedge against market downturns and other strategies adapting to positive economic conditions.[12]

The study by Bhengraj et al examines the relationship between GDP, FDI, and stock market performance in India from 2015 to 2021 using correlation and ANOVA analysis, finding gaps in existing research and emphasizing the need for further exploration of these macroeconomic determinants.[13]

The study by Cumming et al reviews the literature on alternative investments in developing economies, including art, venture capital, and private debt, finding a growing body of research but noting gaps in publicly available literature and inconsistencies in data and legal environments for emerging markets. [14]

The paper by Mahato examines the performance and regulatory environment of Alternative Investment Funds (AIFs) in India, noting significant recent growth and their role in directing resources to underperforming sectors, while emphasizing the need for stronger regulatory policies to ensure investor protection and transparency. [15]

The paper by Bialowolski et alanalyses how external factors, such as macroeconomic conditions and legal constraints, influence the investment diversification behaviour of Polish companies, using survey data and factor analyses to highlight the impact of barriers like payment delays on investment decisions.[16]

The study by Farooq et al analyses the determinants of corporate investment decisions in GCC countries using a 14-year panel data and System GMM, finding that foreign direct investment negatively impacts corporate investments, while economic expansion, financial deepening, and inflation positively influence investment growth [17]

The study by Ilmanen et al investigates how different asset classes and investment styles respond to macroeconomic factors and finds that diversified portfolios, especially those using long/short strategies, are more resilient to macroeconomic shocks than traditional equity-dominated portfolios. [18]

3.OBJECTIVES:

1. To identify and analyze key macroeconomic factors and other factors that influence the performance of Alternative Investment Funds in India:
    - Examine the impact of GDP growth rates on AIF returns across different categories.
    - Assess the relationship between inflation rates and AIF performance, particularly for debt-focused funds.
    - Investigate how interest rate fluctuations affect the cost of capital and investment decisions of AIFs.
    - Explore NIFTY 500 index and mutual funds could influence the flow of investments into AIFs, as investors might compare the returns and risk profiles of these two types of investment vehicles.
2. To analyze the correlation between selected macroeconomic indicators and AIF returns across different categories (I, II, and III)

4. HYPOTHESIS:

1. **H0:** GDP growth rates have no significant effect on the performance and attractiveness of AIFs in India.
2. **H0:** inflationary rates do not significantly impact the performance of AIFs in India.
3. **H0:** The unemployment rate has no significant effect on the performance of AIFs in India.
4. **H0:** FDI inflows have no significant effect on the performance of AIFs in India.
5. **H0:**FDI outward is not an influencing factor that affects the performance of AIFs in India.
6. **H0:**The real interest rate is not significant in explaining the performance of AIFs in India.
7. **H0:**percentage of tax revenue to GDP does not significantly affect the performance of AIFs in India.
8. **H0:**Performance of the NIFTY 500 index has no significant influence on the performance of AIFs in India.
9. **H0:** The performance and attractiveness of mutual funds have no significant effect on the investment in Alternative Investment Funds (AIFs) in India.

5. METHODOLOGY:

5.1) Quantitative Data:

1. AIF Investment Data:

- Collected from SEBI reports for the period 2015-2022, covering all AIF categories (I, II, and III).

2. Macroeconomic Indicators:

- GDP growth rates: Obtained from World Bank data (2015-2022)
- Unemployment rates: Sourced from World Bank data (2015-2022)
- FDI inflows and outflows: Collected from World Bank data (2015-2022)
- Real interest rates: Gathered from World Bank data (2015-2022)
- Tax revenue as a percentage of GDP: Obtained from Our World in Data (2015-2022)
- Inflation rates: Sourced from Statista (2015-2022)

European Economic Letters
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http://eelet.org.uk

3. Market Performance Data:

- NIFTY 500 index data: Collected from NSE website (2015-2022)
- Mutual funds investment data: Obtained from AMFI India (2015-2022)

Time Frame: The study focuses on the period from 2015 to 2022, providing a comprehensive analysis across different economic cycles and allowing for comparison with other investment vehicles.

5.2) Quantitative Analysis :

1. Correlation Analysis :

- Perform Pearson correlation tests to determine the strength and direction of relationships between individual macroeconomic factors and AIF returns.
- Analyze correlations between AIF investments and other investment vehicles (NIFTY 500, mutual funds) to provide context.

2. Regression Analysis:

- Simple Linear Regression: Conduct separate analyses for each macroeconomic factor to assess its individual impact on AIF investments.

Analysis:

The data collected from various sources were normalized to annual growth percentages, as presented in Table 1. A correlation analysis was conducted using Excel's Analysis Toolpak, with the resulting correlation matrix and corresponding coefficients displayed in Table 2. Additionally, simple linear regression analysis was performed to examine the relationship between various macroeconomic indicators and the annual growth rate of investments across different categories of alternative investment funds. The resulting R-squared values are shown in Table 3. The strength of these correlations is further illustrated in the scatter plots found in Figures 2 and 3.

Table 1: Annual Growth rate of various Macroeconomic factors and different categories of Alternative Investment Funds from FY2015 to FY2022

FY	GDP growth (annual %)	Inflation	Unemployment	FDI (inflows) %of GDP	FDI (Outflows) % OF GDP	Real interest rate	Tax Revenue % of GDP	NIFTY 500	MF	AIF 1	AIF 2	AIF 3
2015	8.00%	4.91%	7.89%	2.09%	0.36%	7.56%	16.80%	0.20%	26.15%	218.25%	236.57%	291.98%
2016	8.26%	4.53%	7.80%	1.94%	0.22%	6.23%	17.40%	5.10%	20.50%	373.39%	96.84%	159.98%
2017	6.80%	3.59%	7.72%	1.51%	0.42%	5.33%	17.60%	37.70%	25.40%	71.52%	113.62%	119.78%
2018	6.45%	3.41%	7.65%	1.56%	0.42%	5.36%	17%	-2.10%	30.48%	70.31%	62.83%	139.40%
2019	3.87%	4.77%	6.51%	1.79%	0.46%	6.90%	17%	9.00%	11.51%	42.08%	94.23%	79.70%
2020	-5.78%	6.17%	7.86%	2.41%	0.42%	4.14%	16.20%	17.90%	9.77%	34.08%	64.62%	25.56%
2021	9.69%	5.51%	6.38%	1.41%	0.54%	0.32%	17.60%	31.60%	7.00%	30.80%	38.80%	11.67%
2022	6.99%	6.65%	4.82%	1.49%	0.43%	1.71%	17.10%	4.20%	30.91%	26.15%	46.46%	38.55%

Table 2: Correlation Analysis of macroeconomic factors with different categories of Alternative Investment Funds

	GDP growth (annual %)	Inflation	Unemployment	FDI (inflows) %of GDP	FDI (Outflows) % OF GDP	Real interest rate	Tax Revenue % of GDP	NIFTY 500	MF	AIF 1	AIF 2	AIF 3
GDP growth (annual %)	1.000											
Inflation	-0.336	1.000										
Unemployment	-0.235	-0.600	1.000									
FDI (inflows) %of GDP	-0.706	0.247	0.545	1.000								
FDI (Outflows) % OF GDP	-0.079	0.222	-0.458	-0.436	1.000							
Real interest rate %	-0.084	-0.557	0.635	0.480	-0.584	1.000						
Tax Revenue % of GDP	0.824	-0.388	-0.213	-0.800	0.043	-0.251	1.000					
NIFTY 500	-0.040	-0.037	0.036	-0.272	0.457	-0.421	0.429	1.000				
Mutual Funds	0.382	-0.309	-0.053	-0.283	-0.365	0.237	0.114	-0.466	1.000			
AIF 1	0.336	-0.271	0.476	0.328	-0.910	0.526	0.165	-0.363	0.198	1.000		
AIF 2	0.181	-0.264	0.485	0.400	-0.400	0.722	-0.147	-0.252	0.273	0.497	1.000	
AIF 3	0.356	-0.491	0.548	0.260	-0.589	0.766	-0.027	-0.464	0.507	0.669	0.901	1.000

GDP growth (Annual %) - Annual % growth rate of GDP at market prices based on constant local currency
Inflation - inflation rate as defined as the price increase of a defined product basket.
Unemployment - % of the labour force that is without work but available for and seeking employment.
FDI (inflows) - net inflows in the reporting economy from foreign investors, and is divided by GDP.
FDI (Outflows) - net outflows of investment from reporting economy to the rest of the world& divided by GDP
Real Interest rate% - lending interest rate adjusted for inflation as measured by the GDP deflator

European Economic Letters
ISSN 2323-5233
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http://eelet.org.uk

Tax Revenue % of GDP - Tax revenues as a share of GDP
NIFTY 500 - Calendar year performance of Nifty 500 index
Mutual Funds - Average Assets Under Management of Indian Mutual Fund Industry
AIF 1, 2, 3 - Annual growth % of cumulative net investments made in different categories of Alternative investment fund

Figure 1: Graphs showing comparison of annual growth rate of Macroeconomic Indicators with investments on AIF categories 1, 2 and 3 respectively

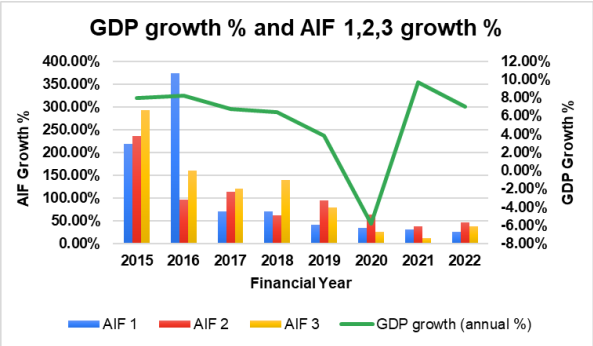

Figure 1a: Comparison of annual growth rate of GDP with investments on AIF categories 1, 2 and 3 respectively

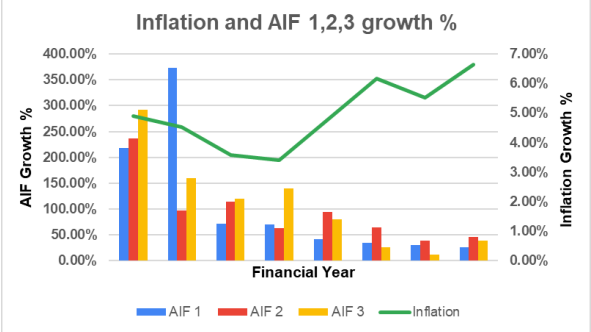

Figure 1b: Comparison of annual inflation rate with investments on AIF categories 1, 2 and 3 respectively

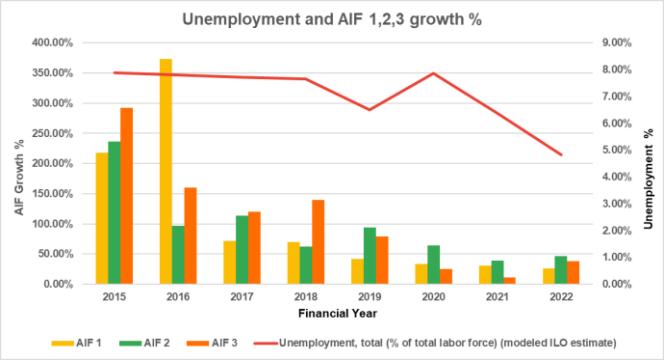

Figure 1c: Comparison of unemployment rate with investments on AIF categories 1, 2 and 3 respectively

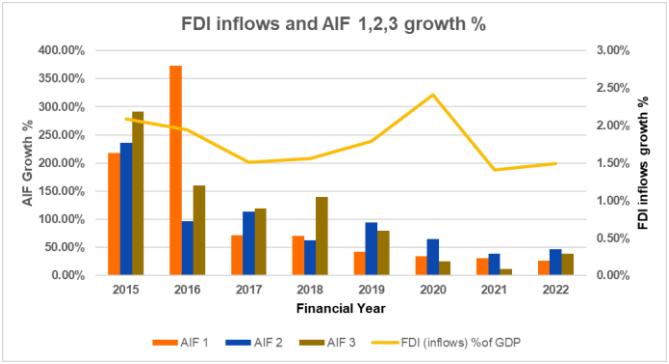

Figure 1d: Comparison of FDI inflow rate with investments on AIF categories 1, 2 and 3 respectively

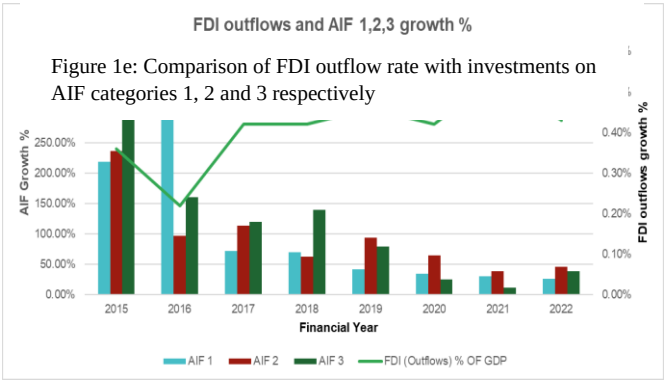

Figure 1e: Comparison of FDI outflow rate with investments on AIF categories 1, 2 and 3 respectively

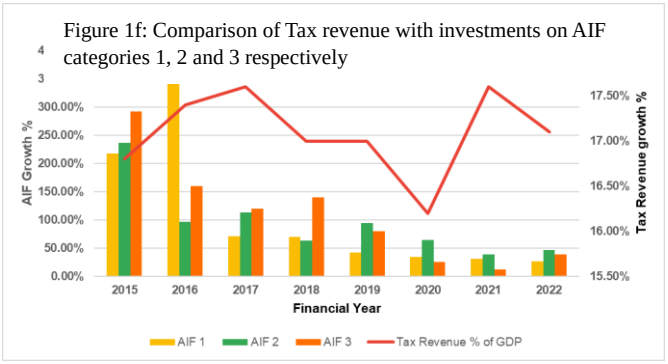

Figure 1f: Comparison of Tax revenue with investments on AIF categories 1, 2 and 3 respectively

Figure 1g: Comparison of NIFTY 500 annual indices with investments on AIF categories 1, 2 and 3

Figure 1h: Comparison of annual real interest rate with investments on AIF categories 1, 2 and 3 respectively

European Economic Letters
ISSN 2323-5233
Vol 14, Issue 3 (2024)
http://eelet.org.uk

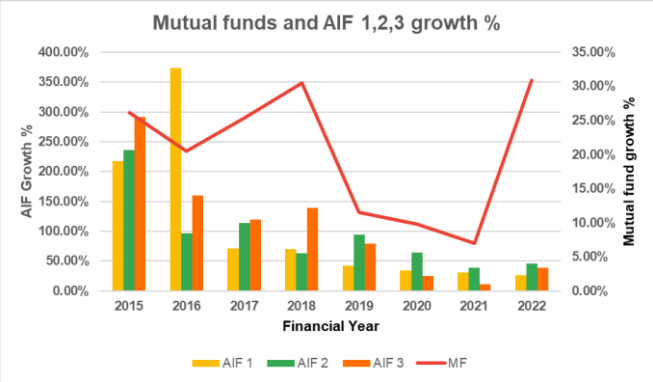

Figure 1i: Comparison of Mutual funds investment with investments on AIF categories 1, 2 and 3 respectively

Table 3: R squared values upon simple linear regression analysis with various macroeconomic indicators and AIF investments in categories 1, 2 & 3

Variables	**R^2 values**		
	AIF1	**AIF2**	**AIF3**
GDP growth (annual %)	0.113	0.033	0.127
Inflation	0.074	0.070	0.241
Unemployment, total (% of total labor force) (modelled ILO estimate)	0.227	0.236	0.301
FDI (inflows) %of GDP	0.107	0.160	0.068
FDI (Outflows) % OF GDP	**0.828**	0.160	0.347
Real interest rate	0.276	0.521	0.587
Tax Revenue % of GDP	0.027	0.022	0.001
NIFTY 500	0.131	0.064	0.215
Mutual funds	0.039	0.075	0.257

Figure 2: Scatter plot with regression line displaying relationship between annual growth rate of FDI outflows and investments on AIF categories 1, 2 and 3 respectively

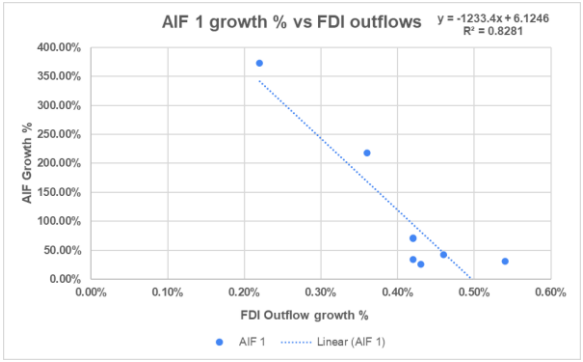

Figure 2a: Scatter plot displaying relationship between FDI outflows and annual investment growth in AIF category 1

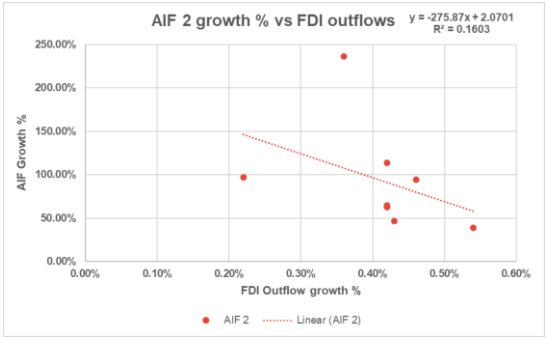

Figure 2b: Scatter plot displaying relationship between FDI outflows and annual investment growth in AIF category 2

European Economic Letters
ISSN 2323-5233
Vol 14, Issue 3 (2024)
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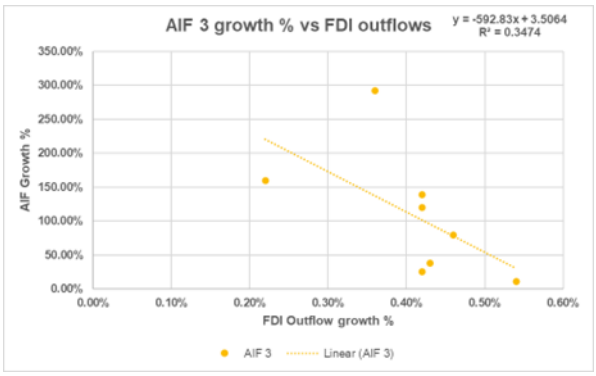

Figure 2c: Scatter plot displaying relationship between FDI outflows and annual investment growth in AIF category 3

Figure 3: Scatter plot with regression line displaying relationship between annual growth rate of FDI inflows and investments on AIF categories 1, 2 and 3 respectively

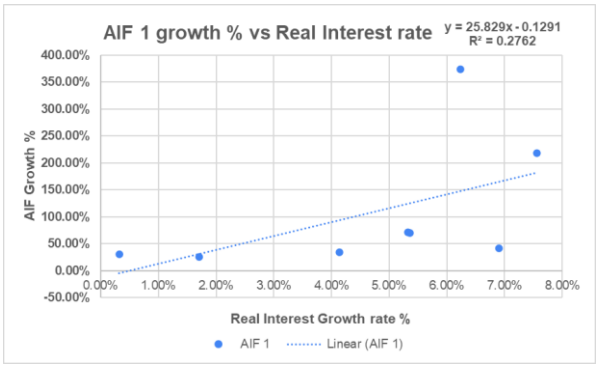

Figure 3a: Scatter plot displaying relationship between Real interest rate and annual investment growth in AIF category 1

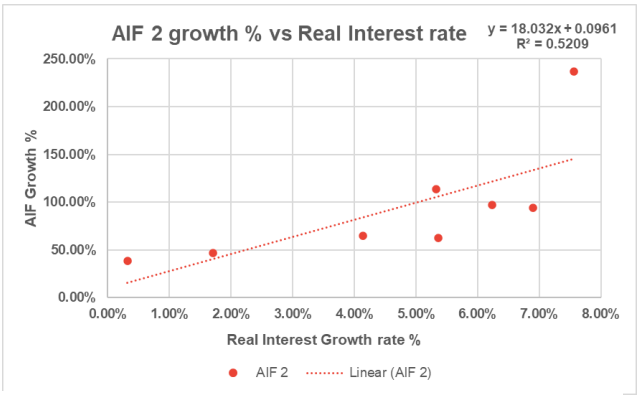

Figure 3b: Scatter plot displaying relationship between Real interest rate and annual investment growth in AIF category 2

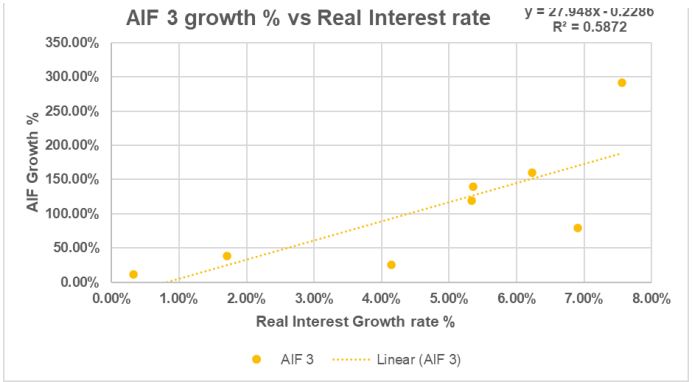

Figure 3c: Scatter plot displaying relationship between Real interest rate and annual investment growth in AIF category 3

Interpretation:

After performing both correlation and regression analyses, the findings indicated that most macroeconomic factors do not exhibit a strong or statistically significant relationship with the growth rate of investments across various categories of alternative investment funds (AIFs). However, one notable exception emerged: Foreign Direct Investment (FDI) outflows were found to have a positive correlation with investments in AIF Category 1. This suggests that FDI outflows may serve

as a meaningful predictor of investment activity within this specific category. Real interest rate was another factor which moderately correlated with investment growth rate of AIF category 2 and category 3 however not significant.

The absence of significant correlations with other macroeconomic factors could potentially be explained by the limited number of available data points, which may have constrained the analysis. Despite these limitations, the observed positive relationship between FDI outflows and AIF Category 1 investments underscores the potential reliability of FDI as an indicator of investment trends in this particular category. Further research with more comprehensive data could help clarify the broader relationships between macroeconomic factors and AIF investment growth.

6.CONCLUSION:

The results of the hypothesis testing are as follows:

Hypothesis	Macroeconomic factor	AIF Category	Result of Null hypothesis testing
1	GDP Growth	1,2,3	Fails to reject null hypothesis
2	Inflation	1,2,3	Fails to reject null hypothesis
3	Unemployment	1,2,3	Fails to reject null hypothesis
4	FDI (Inflows as % of GDP)	1,2,3	Fails to reject null hypothesis
5	FDI (Outflows as % of GDP)	2,3	Fails to reject null hypothesis
6	Real Interest Rate	1,2,3	Fails to reject null hypothesis
7	Tax Revenue as a % of GDP	1,2,3	Fails to reject null hypothesis
8	NIFTY 500 index	1,2,3	Fails to reject null hypothesis
9	Mutual fund investments	1,2,3	Fails to reject null hypothesis

The study analysed the relationship between various macroeconomic factors and the annual growth percentages of all three categories of Alternative Investment Funds (AIFs) in India for the period 2015-2022. Simple linear regression analysis was performed to assess the predictive power of each macroeconomic variable on AIF growth. The results, based on the coefficient of determination (R-squared values) and P-value, revealed that only Category I AIFs demonstrated a significant correlation with Foreign Direct Investment (FDI) outflows. Other macroeconomic indicators showed moderate correlations, with real interest rates and unemployment rates exhibiting R-squared values of approximately 0.4 and 0.5, respectively. These findings suggest that while there are some observable relationships, the macroeconomic factors considered in this study generally have limited predictive power for AIF investment behaviour in India. The analysis indicates that the growth and performance of AIFs in India may be influenced by a more complex set of factors beyond traditional macroeconomic indicators, warranting further investigation into industry-specific or policy-related variables that might have a more substantial impact on AIF investments.

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