Systematic Investment Plan vs. Lumpsum Investment: A Comparative study across Time and Indexes

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Abstract:

Introduction: SIP is based on the logic of rupee cost averaging wherein regular periodic investments are made (generally monthly) as LI which means one time investment There is always a debate between active and passive investing. Even though some active investors might outperform passive investors, there will be balancing underperformers as well. Considering transaction cost and risk adjusted returns passive investors tend to outperform the active investors over the longer time horizon.

Objectives: This paper compares success of two popular methods of passive investing that could be used by retail investors for investing in Indian stock markets viz. Systematic Investment Plan (SIP) vs. Lumpsum Investment (LI). The paper calculates risk and return for buy and hold strategy for the period of 5 ,10 and 15 years in various indices.

Methods:The study was based on monthly data for seven indices over a period of 20 years from 1st October 2004 to 1st October 2024. There were four broad-based indices viz. Nifty 50, Nifty 100, Nifty 200 and Nifty 500. The other three were sectorial indices viz. Nifty AUTO, Nifty BANK and Nifty FMCG. They were evaluated on various time frames of 5 years, 10 years and 15 years. The evaluation parameters were Extended Internal Rate of return adjusted for investing time (XIRR) for SIP and Compounded Annual growth rate (CAGR) for LI. The two methods were evaluated based on Maximum, Minimum, Average, Standard deviation, Variance of XIRR and CAGR numbers. Comparative analysis was done using t-Test: Paired two Sample for means. The papers cover various market cycles and investment horizons commonly recommended for retail investors.

Results: Out of the 21 combinations of (3 timeframes * 7 indexes) SIP was better than LI in terms of risk related parameters in 19 combinations. However, in terms of returns there were many combinations wherein LI was better than SIP. Contrary to the popular belief, there was no conclusive evidence that SIP was better than LI particularly for large cap index like Nifty 50 and defensive index like Nifty FMCG across timeframes. For the timeframe of 5 years and 10 Years SIP was better as compared to LI for Nifty 200, Nifty 500, Nifty AUTO and Nifty BANK index. However, based on returns and absolute amount LI was better as compared to SIP investment.

Conclusions: Passive investing in Index funds is highly recommended for retail investors because of transaction costs in Indian mutual funds. In the case of index funds, they can choose broad based funds or sectorial funds based on their risk appetite and time horizon and SIP or LI as a style of investment.

Keywords: Systematic Investment Plan (SIP), Lumpsum Investment (LI), buy and hold strategy, Extended Internal Rate of Return adjusted for investing time (XIRR), Compounded Annual growth rate (CAGR), Retail Investors

1. Introduction

First SIP in India was launched by Franklin Templeton Fund in 1993. Yet, the growth was moderate in SIP investments and in mutual fund investments till 2014. The growth momentum has picked up in

last 10 years, particularly in the during and post Covid era of last 4 to 5 years where Indian equity markets have rallied from March 2020 lows without any significant correction as of 1st October 2024. As it could been seen from the Table I there was surge in SIPs by Indian retail investors over last 8 years, this was particularly evident in the post covid times starting Financial Year (FY) 21 to FY 24 and first half of FY 25. Monthly SIP numbers were in the range of ₹ 20000 Cr. to ₹ 25000 Cr. for the first 6 months of FY 25. These were roughly 7 times the monthly numbers of what they were in FY 17. As per the data dependence of Indian stock markets in Foreign Institutional Investors (FII) has reduced. More direct and indirect retail participation has increased the financial strength of Domestic Institutional Investors (i.e. Mutual Funds in particular). Considering the risk of equity as an asset class these returns over investment horizon of 5 to 15 years should generate inflation beating returns. SIPs by their very nature give advantage of rupee cost averaging and small investments which were beneficial for retail investors. As could be seen from table II more and more retail investors have stated investing in SIPs.

Table I – Investment in Indian markets through SIP in ₹ Cr.

	FY 25	FY 24	FY 23	FY 22	FY 21	FY 20	FY 19	FY 18	FY 17
Total during FY	1,33,925	1,99,219	1,55,972	1,24,566	96,080	1,00,084	92,693	67,190	43,921
March		19271.00	14276	12328	9,182	8,641	8,055	7,119	4,335
February		19187.00	13686	11,438	7,528	8,513	8,095	6,425	4,050
January		18838.00	13856	11517	8,023	8,532	8,064	6,644	4,095
December		17610.00	13573	11305	8,418	8,518	8,022	6,222	3,973
November		17073.00	13306	11005	7,302	8,273	7,985	5,893	3,884
October		16928.00	13041	10519	7,800	8,246	7,985	5,621	3,434
September	24509	16042.00	12976	10351	7,788	8,263	7,727	5,516	3,698
August	23547	15814.00	12,693	9923	7,792	8,231	7,658	5,206	3,497
July	23332	15245.00	12140	9609	7,831	8,324	7,554	4,947	3,334
Jun	21262	14734.00	12276	9156	7,917	8,122	7,554	4,744	3,310
May	20904	14749.00	12286	8819	8,123	8,183	7,304	4,584	3,189
April	20371	13728.00	11,863	8,596	8,376	8,238	6,690	4,269	3,122

Source: https://www.amfiindia.com/

Table II- Number of SIP accounts and Total Assets Under Management in SIP

Month	Total No. of outstanding SIP Accounts in Lakhs	No. of New SIPs registered in Lakhs	No. of SIPs discontinued/ tenure completed	SIP AUM in ₹ Cr.	SIP Contribution in ₹ Cr.
Apr 24 -Sep 24	987.44	371.47	223.74	13,81,704	1,33,925
Sep-24	987.44	66.39	40.31	13,81,704	24,509
Aug-24	961.36	63.94	36.54	13,38,945	23,547
Jul-24	933.96	72.62	37.33	13,09,385	23,332
Jun-24	898.67	55.13	32.35	12,43,792	21,262
May-24	875.89	49.74	43.96	11,52,801	20,904
Apr - 24	870.11	63.65	33.25	11,26,129	20,371
FY 24	839.71	428.09	224.37	10,71,666	1,99,219
FY 23	635.99	251.41	143.15	6,83,296	1,55,972
FY 22	527.73	266.36	111.17	5,76,358	1,24,566

Source: https://www.amfiindia.com/

However, LI were also prevalent as investors might get onetime cash through bonuses, endowment insurance policy maturity amounts etc. which could lead to one time investment over a short to long term. LI over a longer term is less of timing the market and more of time in the market.

Some of these investments, particularly SIPs, could be made in Index funds which were proposed as one of the best ways of making passive investments in the markets due to their lesser expense ratio and replication of benchmarks. Also, very few SIPs or LIs were likely to do well if there were low or negative returns by the markets and vice versa. Likewise, it is difficult to evaluate each equity scheme offered by mutual fund houses.

This comparative study aims to provide comprehensive analysis of SIP and LI's across four broad-based indices viz. Nifty 50, Nifty 100, Nifty 200 and Nifty 500. The other three are sectorial indices viz. Nifty AUTO, Nifty BANK and Nifty FMCG. They were evaluated on various time frames of 5 years, 10 years and 15 years. The evaluation parameters were Extended Internal Rate of return adjusted for investing time (XIRR) for SIP and Compounded Annual growth rate (CAGR) for LI. The two methods were evaluated based on Maximum, Minimum, Average, Standard deviation, Variance of XIRR and CAGR numbers.

This study could be used by passive retail investors, financial advisors, index fund investors and policymakers in India to navigate the complexities of investment decision-making in an ever-changing market environment.

2.   Review of Literature

The comprehensive review of literature was done both by researchers in India and abroad. The literature was studied to understand the merits and demerits of SIP and LI as styles of investing. Index fund investing, portfolio diversification and long-term investments which were advised by many experts, both academicians and practitioners, were investigated in the reviewed literature.

Markowitz (1952) was the first scientific proponent of portfolio diversification. The portfolio selection paper became a cornerstone in Modern Portfolio Theory. I.e. Minimizing risk for the given return or maximizing return for the given risk. Diversification led to risk reduction particularly over the longer investment horizon. Lower correlation gave higher diversification benefits.

Sharpe (1964) published a theory of capital asset pricing model which quantified returns generated by a risky investment over and above risk-free investment based on concept of capital market line.

Sharpe (1966) proposed Mutual fund evaluation based on return to variability or return to risk ratio. The study evaluated 34 mutual funds based on average annual returns between 1954-1963 and the standard deviation of annual returns. The Return to Variability R to V ratio was calculated as (Average Return- 3%)/ Variability. It was also observed 23 funds performed worse than the Dow Jones Industrial average because of lack of fund management charges.

Jenson (1968) evaluated performance of the mutual funds from 1945-1964. Study evaluated 115 open ended mutual funds with net asset value and dividend information for the period of 10 years from 1955-64. The study also considered additional information available from 1945 to 1954. On average funds were not able to outperform the buy and hold policy. The other significant conclusion of the study was that mutual funds were doing an excellent job of minimizing the "insurable" risk born by their investors. However, the study suggested mutual funds should do a cost benefit analysis of research and trading activities to provide investors with maximum possible returns for the level of risk undertaken.

Fama (1970) proposed an "Efficient Market Hypothesis" (EMH) which stated that all the available information was fully reflected in assets prices. It was further classified as Weak form of EMH, semi strong form of EMH and strong form of EMH. As to the weak form of EMH price and volume related data the backbone of technical analysis was already reflected in the asset prices, semi strong form of EMH stated annual earnings, stock split, bonus issues etc. was already reflected in the stock prices only insider/ monopolistic information could lead to above normal return or the returns in excess of the risk taken. Strong form of EMH believed nothing even monopolistic information is fully reflected in the asset prices. It was impossible to beat the markets without taking higher risks.

Sharpe (1975) studied likely gains from market timing for the period of 1929-1972 based on one of the parameters of "perfect timing" to conclude that attempts to time the market were not likely to produce incremental returns of more than four per cent per year over the long run. For a Fund manager to be good at timing he needed to be right 7 out of 10 timings. Sharpe also concluded that investors were prepared for the previous market cycle which was different from the last one.

Grossman and Stiglitz (1980) argued that paradox exists against the efficient market hypothesis stating that if there was no profit gathering the information then there would be little reason to trade, and market could collapse eventually. Even after adjusting for the cost of trading and active management there could be returns above that due to price diversion from value.

Sharpe (1991) argued that adjusted for costs which were significantly higher for active investing, passive investing would outperform active investing over any timeframe. It was based on simple mathematical principles of addition, subtraction, multiplication and division. However, Warren (2020) argued that greater attention needs to be paid to investor circumstances, market conditions for active-passive choices, in particular the fees paid, investor objective and asset category. The research findings of Warren were more in line with Grossman and Stiglitz (1980). It depends whether the investor is institutional with lower cost or a retail investor with higher cost to make any conclusion in favor of passive investing.

Malkiel (1995) based on study of investment in equity mutual funds between 1971 to 1991 concluded that active equity mutual fund managers underperformed benchmark portfolios both after management expenses and even gross of expenses.

Gruber (1996) analyzed the reasons for growth in the actively managed mutual fund industry and one explanation as per the research was that they were traded on net asset value and fund management ability was not priced into it. The research showed that actively managed mutual fund investors may have been more rational than assumed previously.

Bogle (1997) studied low cost (i.e. Index Funds) viz. other Managed funds across capitalization viz. large, mid and small and Style Value, Blend and Growth. Based on Sharpe ratio Index funds performed better as compared Actively managed funds except small cap growth category.

Wermers (2000) measured the performance of the mutual fund industry from 1975 to 1994 and decomposed the returns and costs into various components. The outperformance of active fund managers of 1.3 percent per year. Of which 60 basis points were due to stock holding and 70 basis points were due to stock picking abilities. However, at a net level they underperformed by 1percent of

the 2.3 percent total underperformance 0.7 percent was due to nonstock holdings and 1.6 percent was due to expense ratios and transaction cost.

Goetzmann and Massa (2003) based on daily data concluded that investors may react asymmetrically to past returns- selling shares when the market drops but not buying after the previous days rise.

Damodaran based on a study of active and passive fund managers observed that 41 to 56% may outperform their benchmark indices across various fund styles of investment for the period of 1983-90. One of the conclusions of the study was that indexing may be the best strategy for many investors. The major reasons for the failures of active money managers were high transaction cost, high taxes, too much activity, failure to stay fully invested in equities and behavioral factors.

Sarkar et al. (2013) concluded that cointegration (i.e. fund was actually tied to underlying benchmark index that it aims to imitate was the most important feature of the index fund. Only 4 out of 23 funds satisfied that criterion.

Biswas and Dutta (2015) studied 22 index funds of which 4 were recommended as these 4 funds were found to be cointegrated with the benchmark indices they tracked. The study also recommended Nifty BeES the exchange traded fund for the investment.

Molander et al. (2020) did a competitive analysis 211 actively managed funds and 191 market and industry specific indices between 2005 to 2020 to conclude that returns were indistinguishable over a length of entire period, however active funds performed well during bearish period and passive funds outperformed in bullish periods. For normal market conditions passive strategy was better as compared to active strategy.

Gajera et al. (2021) in a comparative study between LI and SIP Investment found that over a longer period LI was better than SIP.

Siddiqui et al. (2023) studied top Indian index funds based on Average Asset Under Management (AAUM) for financial year 2017-18 to 2021-22 and found that average technical efficiency of index funds was 83.04 over these five-year periods. Investment risk was the major cause of funds inefficiency. The study was based on data development analysis. Efficiency was defined as the choice of alternatives which produces the largest outputs with the application of given resources.

Boyd (2024) et al. studied various theories and models with advent of technology which tried to better the original Markowitz model based on expected return and standard deviation of the portfolio returns. However so called more complex Markowitz++ optimization-based construction methods took multiple objectives into account while maintaining the same idea.

Research Gap

The literature reviewed did not consider the period of 20 years from 1st October 2004 to 1st October 2024. The four broad-based indices viz. Nifty 50, Nifty 100, Nifty 200 and Nifty 500. The other three are sectorial indices viz. Nifty AUTO, Nifty BANK and Nifty FMCG were not considered by previous researchers. The methodology of computing rolling returns for the period of 5,10 and 15 years based on SIP and LI were not considered.

Need For Study

India was the fastest growing major economy in the world for the FY 24. Indian capital markets are doing well without any major correction from the lows of March 2020. Many first-time retail investors are investing in Indian markets directly or indirectly mainly through SIPs. These are encouraging things as equity is the only liquid asset class which could generate inflation beating returns. These domestic inflows have reduced the dependence of Indian capital markets from the FIIs. However, as there was no major correction the investor sentiment could be too bullish with typical syndromes of bull markets which were flurry of initial public offering, higher market cap to GDP ratio and highest ownership of retail investors in many decades. In this scenario there is a need to study various cycles of market returns from 2004 to 2024 wherein based on historical evidence what could be realistic range of returns for passive index investors either by SIP or LI. Assuming they are willing to hold for at least 5 years and up to maximum of 15 years. Also, study will focus on 4 broad-based indices viz. Nifty 50, Nifty 100, Nifty 200 and Nifty 500 which depending on risk appetite and tenure of investment could be used by retail investors. The study also considers 3 sectorial indices viz. Nifty AUTO, Nifty BANK and Nifty FMCG. The logic being Nifty AUTO could be looked at by more aggressive investors. Nifty Bank could be looked at by investors who believe banks are the true reflection of the economy. Nifty FMCG would be a defensive bet, but many FMCG companies have been the biggest wealth creators over a longer time horizon.

3. Objectives

I. To Calculate and Compare Risk (Standard deviation), Return, Minimum, Maximum values of SIP and LI for the rolling period of 5, 10 and 15 years for Nifty 50, Nifty 100, Nifty 200, Nifty 500, Nifty FMCG, Nifty Bank and Nifty Auto indices.

II. To compute Sharpe Ratio for the rolling period of 5, 10 and 15 years for Nifty 50, Nifty 100, Nifty 200, Nifty 500, Nifty FMCG, Nifty Bank and Nifty Auto indices based on SIP and LI.

III. To test if there was any significant difference in Risk and Variance for SIP and LI strategy.

4. Methods

Quantitative and descriptive research was done based on data for 7 indices for the period of 20 years. Monthly SIP investments of ₹ 1000 were assumed starting from 1st October 2004. If the 1st was a holiday, the next working day was taken as an investment day. There were 241 monthly observations of the data.

Population and Sample

Population: Since SIP's started in India in 1993 the data population would be monthly data from 1993 till date.

Sample: 241 observations of monthly of the four broad-based indices viz. Nifty 50, Nifty 100, Nifty 200 and Nifty 500. The other three are sectorial indices viz. Nifty AUTO, Nifty BANK and Nifty FMCG.

Tools and Techniques for Data Analysis:

The 241 monthly observations of 7 indices were taken in 3 timeframes of 5,10 and 15 years.

For SIP of 5 years 1st return was calculated using XIRR function in excel which took care of date of investments on 1st October 2009. There were 180 more return observations like that. For the LI calculations Compounded Annual growth rate (CAGR) was considered.

CAGR in 5 year LI was = (Index level on 1st October 2009/ Index level on 1st October 2004) ^(1/5) - 1

For SIP of 10 years 1st return was calculated using XIRR function in excel which took care of date of investments on 1st October 2014. There were 120 more return observations like that. For the LI calculations Compounded Annual growth rate (CAGR) was considered.

CAGR in 10 year LI was = (Index level on 1st October 2014/ Index level on 1st October 2004) ^(1/10) -1

For SIP of 15 years 1st return was calculated using XIRR function in excel which took care of date of investments on 1st October 2019. There were 60 more return observations like that. For the LI calculations Compounded Annual growth rate (CAGR) was considered.

CAGR in 15 year LI was = (Index level on 1st October 2019/ Index level on 1st October 2004) ^(1/15) -1

Table III - Timeframe for SIP and LI

Timeframe for SIP and LI	Number of Observations
5 Years	181
10 Years	121
15 Years	61

Maximum, Minimum, Average, Standard Deviation of returns and Sharpe Ratio based on Rfr=6.8% was calculated.

Monthly observations of standard deviation were annualized for the purpose of Sharpe Ratio as follows:

σ annual = σ (Monthly) * Square Root (12)

5. Results

Table IV- SIP vs LI comparison for 5-year investment for various indexes

Index/ Style	Maximum		Minimum		Avearge		Std. Deviation (Risk)		Sharpe Ratio	
	SIP	LI	SIP	LI	SIP	LI	SIP	LI	SIP	LI
Nifty 50	20.35%	23.42%	-1.15%	-0.79%	11.45%	11.11%	4.33%	4.83%	3.72	3.09
Nifty 100	21.57%	23.16%	-1.32%	-0.56%	11.85%	11.43%	4.42%	4.87%	3.96	3.29
Nifty 200	23.36%	22.38%	-0.90%	-2.21%	11.76%	11.16%	4.91%	5.10%	3.50	2.96
Nifty 500	24.66%	22.42%	-0.95%	-2.33%	12.08%	11.37%	5.24%	5.25%	3.49	3.02
Nifty AUTO	38.17%	40.71%	0.00%	-11.77%	17.24%	14.41%	9.64%	10.02%	3.75	2.63
Nifty BANK	30.00%	28.34%	-0.59%	-0.44%	14.64%	13.97%	5.56%	5.51%	4.88	4.51
Nifty FMCG	31.11%	29.32%	2.59%	5.52%	15.68%	15.47%	6.00%	5.47%	5.13	5.49

Hypothesis Testing

Null Hypothesis (H$_0$): There was no significant difference in Return and Risk (Variance) of Returns for SIP and LI strategy.

Alternative Hypothesis (Ha): There was significant difference in Return and Risk (Variance) of Returns for SIP and LI strategy.

The above hypothesis was tested 21 times (3 timeframes* 7 indices =21) for various combinations of index and the timeframe.

Hypothesis testing for 7 indices in 5-year timeframe.

Nifty 50

t-Test: Paired Two Sample for Means

	SIP	*LI*
Mean	11.45%	11.11%
Variance	0.19%	0.23%
Observations	181	181
Pearson Correlation	0.74	
Hypothesized Mean Difference	0	
Df	180	
t Stat	1.36	
P(T<=t) one-tail	0.09	
t Critical one-tail	1.65	
P(T<=t) two-tail	0.18	
t Critical two-tail	1.97	

H_0 was accepted. There was no significant difference in SIP and LI investment in Nifty 50 index for the period of 5 years.

Nifty 100

t-Test: Paired Two Sample for Means

	SIP	*LI*
Mean	11.85%	11.43%
Variance	0.20%	0.24%
Observations	181.00	181.00
Pearson Correlation	0.72	
Hypothesized Mean Difference	0.00	
Df	180.00	
t Stat	1.64	
P(T<=t) one-tail	0.05	
t Critical one-tail	1.65	
P(T<=t) two-tail	0.10	
t Critical two-tail	1.97	

H_0 was accepted. There was no significant difference in SIP and LI investment in Nifty 100 index for the period of 5 years.

t-Test: Paired Two Sample for Means

	SIP	LI
Mean	11.76%	11.16%
Variance	0.24%	0.26%
Observations	181.00	181.00
Pearson Correlation	0.72	
Hypothesized Mean Difference	0.00	
Df	180.00	
t Stat	2.18	
P(T<=t) one-tail	0.02	
t Critical one-tail	1.65	
P(T<=t) two-tail	0.03	
t Critical two-tail	1.97	

H_0 was rejected. There was a significant difference in SIP and LI investment in Nifty 200 index for the period of 5 years.

Nifty 500 t-Test: Paired Two Sample for Means

	SIP	LI
Mean	12.08%	11.37%
Variance	0.27%	0.28%
Observations	181.00	181.00
Pearson Correlation	0.73	
Hypothesized Mean Difference	0.00	
Df	180.00	
t Stat	2.49	
P(T<=t) one-tail	0.01	
t Critical one-tail	1.65	
P(T<=t) two-tail	0.01	
t Critical two-tail	1.97	

H_0 was rejected. There was a significant difference in SIP and LI investment fin Nifty 500 index for the period of 5 years.

Nifty FMCG

t-Test: Paired Two Sample for Means

	SIP	LI
Mean	15.68%	15.47%
Variance	0.36%	0.30%
Observations	181.00	181.00
Pearson Correlation	0.79	
Hypothesized Mean Difference	0.00	
Df	180.00	
t Stat	0.79	

P(T<=t) one-tail	0.22
t Critical one-tail	1.65
P(T<=t) two-tail	0.43
t Critical two-tail	1.97

H_0 was accepted. There was no significant difference in SIP and LI investment in Nifty FMCG index for the period of 5 years.

Nifty BANK

t-Test: Paired Two Sample for Means

	SIP	LI
Mean	14.64%	13.97%
Variance	0.31%	0.30%
Observations	181.00	181.00
Pearson Correlation	0.65	
Hypothesized Mean Difference	0.00	
Df	180.00	
t Stat	1.97	
P(T<=t) one-tail	0.03	
t Critical one-tail	1.65	
P(T<=t) two-tail	0.05	
t Critical two-tail	1.97	

H_0 was rejected. There was a significant difference in SIP and LI investment in Nifty BANK index for the period of 5 years.

Nifty AUTO

t-Test: Paired Two Sample for Means

	SIP	LI
Mean	17.24%	14.41%
Variance	0.93%	1.00%
Observations	181.00	181.00
Pearson Correlation	0.77	
Hypothesized Mean Difference	0.00	
Df	180.00	
t Stat	5.65	
P(T<=t) one-tail	0.00	
t Critical one-tail	1.65	
P(T<=t) two-tail	0.00	
t Critical two-tail	1.97	

H_0 was rejected. There was a significant difference in SIP and LI investment in Nifty AUTO index for the period of 5 years.

Table V- SIP vs LI comparison for 10-year investment for various indexes

Index/ Style	Maximum		Minimum		Avearge		Std. Deviation (Risk)		Sharpe Ratio	
	SIP	LI	SIP	LI	SIP	LI	SIP	LI	SIP	LI
Nifty 50	15.22%	16.56%	2.41%	4.55%	11.09%	10.92%	2.23%	2.72%	6.68	5.25
Nifty 100	15.68%	16.72%	2.79%	4.86%	11.52%	11.36%	2.14%	2.69%	7.63	5.87
Nifty 200	16.52%	15.96%	2.47%	4.50%	11.53%	11.16%	2.35%	2.83%	6.96	5.33
Nifty 500	17.18%	16.12%	2.49%	4.52%	11.87%	11.42%	2.47%	2.91%	7.10	5.51
Nifty AUTO	24.51%	25.40%	0.00%	3.80%	13.99%	14.83%	6.71%	4.84%	3.72	5.74
Nifty BANK	19.33%	21.95%	3.69%	5.89%	13.90%	14.14%	2.69%	3.11%	9.15	8.17
Nifty FMCG	21.09%	23.50%	9.02%	10.89%	14.43%	15.36%	2.69%	3.11%	9.83	9.52

t- Test results and interpretation based on p- Value.

Nifty 50

t-Test: Paired Two Sample for Means

	SIP	*LI*
Mean	11.09%	10.92%
Variance	0.05%	0.07%
Observations	121.00	121.00
Pearson Correlation	0.66	
Hypothesized Mean Difference	0.00	
Df	120.00	
t Stat	0.87	
P(T<=t) one-tail	0.19	
t Critical one-tail	1.66	
P(T<=t) two-tail	0.39	
t Critical two-tail	1.98	

H_0 was accepted. There was no significant difference in SIP and LI investment fin Nifty 50 index for the period of 10 years.

Nifty 100

t-Test: Paired Two Sample for Means

	SIP	*LI*
Mean	11.52%	11.36%
Variance	0.05%	0.07%
Observations	121.00	121.00
Pearson Correlation	0.63	
Hypothesized Mean Difference	0.00	
Df	120.00	
t Stat	0.83	
P(T<=t) one-tail	0.21	
t Critical one-tail	1.66	
P(T<=t) two-tail	0.41	
t Critical two-tail	1.98	

H_0 was accepted. There was no significant difference in SIP and LI investment in Nifty 100 index for the period of 10 years.

Nifty 200

t-Test: Paired Two Sample for Means

	SIP	LI
Mean	11.53%	11.16%
Variance	0.06%	0.08%
Observations	121.00	121.00
Pearson Correlation	0.65	
Hypothesized Mean Difference	0.00	
Df	120.00	
t Stat	1.82	
P(T<=t) one-tail	0.04	
t Critical one-tail	1.66	
P(T<=t) two-tail	0.07	
t Critical two-tail	1.98	

H_0 was rejected. There was a significant difference in SIP and LI investment in Nifty 200 index for the period of 10 years.

Nifty 500

t-Test: Paired Two Sample for Means

	SIP	LI
Mean	11.87%	11.42%
Variance	0.06%	0.08%
Observations	121.00	121.00
Pearson Correlation	0.65	
Hypothesized Mean Difference	0.00	
Df	120.00	
t Stat	2.16	
P(T<=t) one-tail	0.02	
t Critical one-tail	1.66	
P(T<=t) two-tail	0.03	
t Critical two-tail	1.98	

H_0 was rejected. There was a significant difference in SIP and LI investment in Nifty 500 index for the period of 10 years.

Nifty FMCG

t-Test: Paired Two Sample for Means

	SIP	LI
Mean	14.43%	15.36%
Variance	0.10%	0.10%
Observations	121.00	121.00
Pearson Correlation	0.79	

Hypothesized Mean Difference	0.00
Df	120.00
t Stat	-5.11
P(T<=t) one-tail	0.00
t Critical one-tail	1.66
P(T<=t) two-tail	0.00
t Critical two-tail	1.98

H_0 was rejected. There was a significant difference in SIP and LI investment in Nifty FMCG index for the period of 10 years.

Nifty BANK

t-Test: Paired Two Sample for Means

	SIP	LI
Mean	13.90%	14.14%
Variance	0.07%	0.10%
Observations	121.00	121.00
Pearson Correlation	0.67	
Hypothesized Mean Difference	0.00	
Df	120.00	
t Stat	-1.12	
P(T<=t) one-tail	0.13	
t Critical one-tail	1.66	
P(T<=t) two-tail	0.26	
t Critical two-tail	1.98	

H_0 was accepted. There was no significant difference in SIP and LI investment in Nifty BANK index for the period of 10 years.

Nifty AUTO

t-Test: Paired Two Sample for Means

	SIP	LI
Mean	13.99%	14.83%
Variance	0.45%	0.23%
Observations	121.00	121.00
Pearson Correlation	0.80	
Hypothesized Mean Difference	0.00	
Df	120.00	
t Stat	-2.29	
P(T<=t) one-tail	0.01	
t Critical one-tail	1.66	
P(T<=t) two-tail	0.02	

t Critical two-tail	1.98

H₀ was rejected. There was a significant difference in SIP and LI investment in Nifty AUTO index for the period of 10 years.

Table VI- SIP vs LI comparison for 15-year investment for various indexes

	Maximum		Minimum		Avearge		Std. Deviation (Risk)		Sharpe Ratio	
Index/ Style	SIP	LI	SIP	LI	SIP	LI	SIP	LI	SIP	LI
Nifty 50	13.49%	15.20%	5.42%	7.51%	11.05%	10.99%	1.63%	1.70%	9.06	8.53
Nifty 100	13.97%	15.87%	5.84%	7.65%	11.34%	11.31%	1.62%	1.79%	9.70	8.71
Nifty 200	14.51%	16.01%	5.33%	7.13%	11.33%	11.03%	1.88%	1.93%	8.32	7.60
Nifty 500	15.05%	16.52%	5.36%	7.31%	11.62%	11.23%	2.03%	2.01%	8.22	7.63
Nifty AUTO	16.94%	21.32%	4.34%	10.05%	12.35%	13.97%	2.40%	3.08%	8.03	8.05
Nifty BANK	16.01%	19.12%	8.19%	10.29%	13.12%	13.84%	1.54%	2.04%	14.20	11.95
Nifty FMCG	16.01%	19.12%	12.64%	11.95%	14.13%	15.36%	0.70%	1.46%	36.13	20.36

Nifty 50

t-Test: Paired Two Sample for Means

	SIP	*LI*
Mean	11.05%	10.99%
Variance	0.03%	0.03%
Observations	61.00	61.00
Pearson Correlation	0.17	
Hypothesized Mean Difference	0.00	
Df	60.00	
t Stat	0.23	
P(T<=t) one-tail	0.41	
t Critical one-tail	1.67	
P(T<=t) two-tail	0.82	
t Critical two-tail	2.00	

H₀ was accepted. There was no significant difference in SIP and LI investment in Nifty 50 index for the period of 15 years.

Nifty 100

t-Test: Paired Two Sample for Means

	SIP	*LI*
Mean	11.34%	11.31%
Variance	0.03%	0.03%
Observations	61.00	61.00
Pearson Correlation	0.24	
Hypothesized Mean Difference	0.00	
Df	60.00	
t Stat	0.12	
P(T<=t) one-tail	0.45	
t Critical one-tail	1.67	

P(T<=t) two-tail	0.90
t Critical two-tail	2.00

H_0 was accepted. There was no significant difference in SIP and LI investment in Nifty 100 index for the period of 15 years.

Nifty 200
t-Test: Paired Two Sample for Means

	SIP	LI
Mean	11.33%	11.03%
Variance	0.04%	0.04%
Observations	61.00	61.00
Pearson Correlation	0.35	
Hypothesized Mean Difference	0.00	
Df	60.00	
t Stat	1.07	
P(T<=t) one-tail	0.14	
t Critical one-tail	1.67	
P(T<=t) two-tail	0.29	
t Critical two-tail	2.00	

H_0 was accepted. There was no significant difference in SIP and LI investment in Nifty 200 index for the period of 15 years.

Nifty 500
t-Test: Paired Two Sample for Means

	SIP	LI
Mean	11.62%	11.23%
Variance	0.04%	0.04%
Observations	61.00	61.00
Pearson Correlation	0.41	
Hypothesized Mean Difference	0.00	
Df	60.00	
t Stat	1.38	
P(T<=t) one-tail	0.09	
t Critical one-tail	1.67	
P(T<=t) two-tail	0.17	
t Critical two-tail	2.00	

H_0 was accepted. There was no significant difference in SIP and LI investment in Nifty 500 index for the period of 15 years.

Nifty FMCG

t-Test: Paired Two Sample for Means

	SIP	*LI*
Mean	14.13%	15.36%
Variance	0.00%	0.02%
Observations	61.00	61.00
Pearson Correlation	0.50	
Hypothesized Mean Difference	0.00	
Df	60.00	
t Stat	-7.58	
P(T<=t) one-tail	0.00	
t Critical one-tail	1.67	
P(T<=t) two-tail	0.00	
t Critical two-tail	2.00	

H_0 was rejected. There was a significant difference in SIP and LI investment in Nifty FMCG index for the period of 15 years.

Nifty BANK

t-Test: Paired Two Sample for Means

	SIP	*LI*
Mean	13.12%	13.84%
Variance	0.02%	0.04%
Observations	61.00	61.00
Pearson Correlation	0.43	
Hypothesized Mean Difference	0.00	
Df	60.00	
t Stat	-2.89	
P(T<=t) one-tail	0.00	
t Critical one-tail	1.67	
P(T<=t) two-tail	0.01	
t Critical two-tail	2.00	

H_0 was rejected. There was a significant difference in SIP and LI investment in Nifty BANK index for the period of 15 years.

Nifty AUTO

t-Test: Paired Two Sample for Means

	SIP	*LI*
Mean	12.35%	13.97%
Variance	0.06%	0.09%
Observations	61.00	61.00
Pearson Correlation	0.69	

Hypothesized Mean Difference	0.00
Df	60.00
t Stat	-5.57
P(T<=t) one-tail	0.00
t Critical one-tail	1.67
P(T<=t) two-tail	0.00
t Critical two-tail	2.00

H_0 was rejected. There was a significant difference in SIP and LI investment in Nifty AUTO index for the period of 15 years.

Absolute Values of SIPs in various indices over a period of time

Table VII- Range of ₹ 1000 SIP values at the end of 5 years in various indices

Index	Maximum	Minimum	Average
Nifty 50	99588	51710	80389
Nifty 100	102565	51550	81212
Nifty 200	107102	50566	81113
Nifty 500	110500	50004	81829
Nifty AUTO	151876	30855	93335
Nifty BANK	125476	49076	87170
Nifty FMCG	128956	64073	89732

Table VIII- Range of ₹ 1000 SIP values at the end of 10 years in various indices

Index	Maximum	Minimum	Average
Nifty 50	266263	135636	215061
Nifty 100	272957	138296	219890
Nifty 200	285635	136043	220311
Nifty 500	295971	136224	224535
Nifty AUTO	440383	93636	265661
Nifty BANK	332504	144886	250613
Nifty FMCG	365331	191352	258994

Table IX- Range of ₹ 1000 SIP values at the end of 15 years in various indices

Index	Maximum	Minimum	Average
Nifty 50	541384	275105	443512
Nifty 100	564310	284599	454466
Nifty 200	591039	273043	455548
Nifty 500	619522	273772	467959
Nifty AUTO	730921	252154	501587
Nifty BANK	637847	345305	528618

Nifty FMCG	673560	503210	573357

Comparison between SIP and LI absolute amounts

Logic for Table X, XI and XII values. – If an investor had ₹ 60000 with him/her for the period of 5 years, the same could be invested in monthly SIP of ₹ 1000 with a remaining amount getting to be invested in saving account as a conservative approach. The remaining amount could be invested in Rfr as well.

Similar logic could prevail for ₹ 120000 investment for 10 years and ₹ 180000 investment for 15 years respectively.

Table X- Comparison between ₹ 60000 invested in SIP with remaining amount in Savings account @ 3% per annum vs LI investment of ₹ 60000 in various indices at the end of 5 years

	Maximum		Minimum		Avearge	
Index/ Style	SIP + SA	LI	SIP + SA	LI	SIP + SA	LI
Nifty 50	163169	171819	115291	57677	143970	103512
Nifty 100	166146	170034	115131	58344	144793	105004
Nifty 200	170683	164693	114147	53649	144694	103933
Nifty 500	174081	164949	113585	53333	145410	105029
Nifty AUTO	215457	330979	94436	32081	156916	126552
Nifty BANK	189057	208920	112657	58680	150751	118071
Nifty FMCG	192537	216978	127654	78507	153313	125980

Table XI- Comparison between ₹ 120000 invested in SIP with remaining amount in Savings account @ 3% per annum vs LI investment of ₹ 120000 in various indices at the end of 10 years

	Maximum		Minimum		Avearge	
Index/ Style	SIP + SA	LI	SIP + SA	LI	SIP + SA	LI
Nifty 50	404711	555638	274084	187214	353509	347520
Nifty 100	411405	562947	276744	192951	358338	360989
Nifty 200	424083	527741	274491	186442	358759	355581
Nifty 500	434419	534675	274672	186743	362983	364575
Nifty AUTO	578831	1154245	232084	174277	404109	517730
Nifty BANK	470952	872771	283334	212596	389061	465656
Nifty FMCG	503779	990766	329800	337290	397442	517880

Table XII- Comparison between ₹ 180000 invested in SIP with remaining amount in Savings account @ 3% per annum vs LI investment of ₹ 180000 in various indices at the end of 15 years

	Maximum		Minimum		A>earage	
Index/ Style	SIP + SA	LI	SIP + SA	LI	SIP + SA	LI
Nifty 50	632892	1503393	275105	533098	447204	881424
Nifty 100	644515	1639967	284599	544197	458159	922457
Nifty 200	626095	1670862	273043	506080	459240	892847
Nifty 500	626582	1784288	273772	518940	471652	920454
Nifty AUTO	730921	3269762	252154	756589	505279	1390699
Nifty BANK	820928	2289091	345305	781848	532311	1301158
Nifty FMCG	876484	2484093	503210	978544	577049	1561067

Observations based on t- Test and Tables

Sharpe ratio of the investment increases with tenure meaning investing for longer tenure would be less risky as compared to short term. Sharpe ratio was higher for SIP investments as compared to LI indicating for given risk SIP gave higher returns as compared to LI only exception to this was Nifty AUTO index for the period of 10 and 15 years. Sharpe ratio for Nifty FMCG index was the highest across all the 3 timeframes. All three Sectorial indices tend to outperform over the longest timeframe of 15 years as compared to the benchmark indices. Only Nifty FMCG outperformed in LI as compared to SIP for a 10-year timeframe. For a 5-year timeframe SIP tends to outperform LI for benchmark and sectorial indexes. For riskier indices such as Nifty 200, Nifty 500, Nifty Bank and Nifty Auto SIP was significantly better than LI. As can be seen from Table XI and Table XII there is no point in investors blocking their money in savings accounts @ 3% for the period of 10 or 15 years.

6. Limitations And Future Scope for Further Study

The study assumes that index funds would replicate the performance of index hence performance of index was considered as a proxy to performance of the fund. There were limited index funds particularly for sectorial indexes and very broad indices like Nifty 200 and Nifty 500. As the smaller companies with respect to market capitalization in these indices might have limited liquidity. The study was taken assuming that all investments for SIP were made on the 1st of every month, in practice investment might be made on any other date of the month which might give slightly different results. LI was assumed to be done in indexes in practice investors might be doing LI in individual stocks or selected list of stocks. It was assumed LI was done in mutual fund units. The past performance of all these indices may be significantly different from future performance. Hence it should not be taken as a perfect indicator of the future. Transaction costs, which were least for index funds, were not considered. Annual maintenance charges for individual accounts were not considered.

The study could be done with other sectorial indexes or a fixed income index or based on actual Net Asset Values (NAV) of the Mutual funds. The study did not consider other investment avenues like gold, silver, public provident fund (PPF) etc. The study could be done by selecting a group of stocks of certain sectors.

7. Conclusion and Implications

Passive investing in Index funds is highly recommended for retail investors because of transaction costs in Indian mutual funds. In the case of index funds, they can choose broad based funds or sectorial funds based on their risk appetite and time horizon and SIP or LI as a style of investment.

Investors could select index funds which is cointegrated with the index it tracks or ETF if it available for that fund.

Retail investors belief in India story as an equity investment has grown significantly over last five years. Historically, Stock markets over a longer period tend to give returns little higher than the nominal GDP growth. For SIP investors, which was reflected in average numbers over a period of 5 to 15 years of about 11 to 15% depending on the index. There was a mean reversion tendency in the returns over a length of period with Maximum returns ranging from 20 to 31% over a period of 5 years to 13 to 17% over a period of 15 years. A similar trend was observed with Minimum values which were ranging from -1 to 3% for 5 years which were higher to 11 to 14% over the period of 15 years. Longer term investment leads to reduction in volatility and higher Sharpe ratio indicating higher returns for a given risk. Investors having a long-term horizon of 15 years could do LI in any of the 7 index funds mentioned based on their risk appetite. Based on historical evidence, the returns from these investments could be at par or better as compared to SIP investment. If Indian economy grows at about 7% with an inflation of about 4% investors could be looking at returns of 11% plus few basis points (ex- Agriculture sector which was laggard from the growth point of view). So, investor expectations as per the current scenario could be to have 12% per annum returns which was mathematically doubling money every six years. However, in practice there would be hardly any year in which 12% year of year growth was delivered in indices. As returns come in clusters meaning few above normal returns may compensate for significant underperformance of many years.

Investors should invest for a minimum of 5 years and if they are investing for 5 years SIPs are highly recommended. Based on historical evidence, In the worst-case scenario they would not lose any of their capital. Even in the worst-case scenario for the most volatile Nifty Auto index ₹ 60000 investment for the period of 5 years would be worth ₹ 94436. In fact, SIP plus conservative SA return of 3% for 5 years was better across indices investors would always get their principal back and if it happens it was highly recommended, they could hold on to their investments for another 5 years to get normal returns.

Broad based Index funds not the sectorial index funds would ensure only systematic risk remains which could give better per unit returns (i.e. Sharpe Ratio) if the investments were made for longer tenure.

For investors with a time horizon of 1wereeears LI was highly recommended particularly in sectorial indices as the minimum CAGR was close 10% -12 % based on the index. These returns outperformed SIP for those investors who had ₹ 180000 hand. Instead of keeping money in savings accounts at a return of 3 percent per annum it was better to put money in LI for 15 years.

All the investments in the study were done in diversified portfolios across sectors or within sectors so there was no company specific risk. Nifty FMCG was the best performer on a return adjusted for risks basis across the tenures.

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