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Determining the Right Metrics to Identify Value Investment Stocks

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ABSTRACT:

This research aims to determine the most effective metrics for identifying value stocks by evaluating traditional value investing measures and proposing modifications to enhance their relevance in today's market.

The study focuses on three well-established methods: the Piotroski Score, the Graham Number, and the Coffee Can Approach, all of which have historically guided investors but are now perceived as somewhat outdated. To address this, I will modify these methods by adapting them to modern market conditions by adding or by removing few components like addition of Sharpe ratio. The research will conduct a comparative analysis by selecting stocks using both the original and modified versions of these metrics, then Back Testing their performance over the past 4 years.

Additionally, standard value metrics, such as the Price-to-Earnings (P/E) ratio and Price-to-Book (P/B) ratio and Price-to-earning-to-growth (PEG) ratio will be used as benchmarks to evaluate the performance of the modified models. Through Back testing, the study will assess and analyse which approach, whether original or modified, delivers higher returns.

Sensitivity analysis will be performed to evaluate the robustness of the modifications made to the Piotroski Score, Graham Number, and Coffee Can Approach. Furthermore, the ADF stationarity test will be applied to examine the statistical significance of the modified metrics. The study also considered review of literature regarding value investment in context of financial statement with various tools and instrument relevant for investment and other strategic approaches to bridge theory and practice. Ultimately, the goal is to determine whether these modifications enhance the effectiveness of identifying high-performing value stocks.

INTRODUCTION & CONCEPTUAL BACKGROUND

Value investing is seen as a good way to find stocks that are worth more than their price and have strong basics. This method has been made famous by people like Benjamin Graham and Warren Buffett. Tools like the Piotroski Score, Graham Number, and Coffee Can Approach have helped many investors over the years. These measures have traditionally been used in the evaluation of the real worth of companies by considering their financial reports and market results. However, because the market is changing rapidly and the expectations of the investors are shifting, investor expectations are changing, and new financial measures are gaining importance, the utility of these old value investing tools has consequently been questioned.

Value investing core principles are timeless, whereas methods need constant adaptation so as to keep abreast with the present economic climate. The critical elements of that sort, including increased volatility within the equity markets, new valuation methodologies, and the increasing role for risk-adjusted returns,

call for an examination of how one best identifies a value stock. This research aims to update the traditional value measures by proposing changes that can better utilize the current market. The Piotroski Score, Graham Number, and Coffee Can Approach be considered good in the past, but there is a tendency that can no longer reflect the complexity of the markets nowadays without these changes.

The current study seeks to connect the traditional value investing methods with the new financial world by adding new parts, like the Sharpe ratio, that look into risk-adjusted returns. This will compare the new measures with the traditional ones using back testing for the last 4 years to show how well they perform at finding strong value stocks. Common measures, such as the Price-to-Earnings (P/E) ratio, Price-to-Book (P/B) ratio, and the Price-to-Earnings-to-Growth (PEG) ratio, will also be used to explain the results.

This will be done using sensitivity analysis to check the strength of proposed changes, and the results with ADF stationarity test will be important statistically. This research, combining old and new financial methods of analysis, hopes to give investors a clearer way to value investments, allowing more return-covering measures to enter the market while accurately portraying today's market conditions.

REVIEW OF LITEATURE

1. Value Investing, From Graham to Buffett and Beyond.

Value investing, as outlined by Bruce Greenwald, involves buying undervalued assets based on their intrinsic value and holding them until the market corrects itself. Investors like Warren Buffett and Mario Gabelli emphasize careful asset valuation, patience, and discipline. Key techniques include focusing on current earnings and reproduction costs, avoiding speculative future projections. The strategy highlights the importance of a margin of safety, sound economic fundamentals, and long-term commitment to high-quality companies with competitive advantages.

2. The Effectiveness of Fundamental Analysis on Value Stocks – an Analysis of Piotroski F-score.

Piotroski's (2000) F-score method demonstrates that fundamental analysis can effectively generate abnormal returns, particularly with value stocks. His study reveals that firms with high F-scores outperform those with lower scores. Piotroski's results support the notion that fundamental signals can help separate winning stocks from losers, especially in smaller firms. Furthermore, studies replicate his findings in other markets, confirming the broader applicability of his method.

3. The Coffee Can Approach

A literature review on value investing strategies emphasizes the effectiveness of fundamental analysis in generating abnormal returns. It highlights that selecting financially strong value stocks based on fundamental metrics outperforms weaker stocks, particularly in markets like the U.S. and Brazil. Additionally, the Coffee Can Approach, developed by Robert Kirby, advocates for long-term passive investing, minimizing transaction costs by selecting a diverse portfolio of stocks and holding them for at least ten years. These strategies challenge traditional active management by prioritizing low turnover and focusing on long-term gains

4. Value Investing Revisited: A Test of Portfolio Performance based on Benjamin Graham's Selection Criteria

A literature review summarizes existing research on a particular topic, identifying gaps and suggesting areas for further study. It typically involves analysing key studies, methodologies, and findings relevant to the subject. By synthesizing this information, the review highlights trends, debates, and significant developments in the field. This section helps provide a context for the current research, establishing its

relevance and positioning it within the broader academic conversation. A well-executed literature review is foundational for defining the research question and justifying the chosen approach.

5. **Value investing: The use of historical financial statement information to separate winners from losers**

A literature review synthesizes prior research, offering a concise overview of key findings, methodologies, and discussions surrounding a particular topic. It identifies existing gaps and areas needing further exploration, serving to position new research within the broader academic landscape. By reviewing relevant studies, the literature review highlights emerging trends, debates, and significant advancements. This process establishes the relevance of the current study, supporting its framework and justifying its contribution to the field.

RESEARCH DESIGN

This research adopts a quantitative approach, conducting back-testing on traditional and modified value investing metrics over few years. Comparative analysis, benchmarks like P/E, P/B, and PEG ratios, sensitivity analysis, and the ADF stationarity test will evaluate the effectiveness of these metrics in identifying high-performing value stocks.

RESEARCH METHODOLOGY

This research focuses on evaluating traditional value investing metrics—Piotroski Score, Graham Number, and Coffee Can Approach—and modifying them to better suit contemporary market conditions. The study's population consists of SENSEX 30 companies, with historical data retrieved as of December 1, 2020. Initially, companies were filtered by eliminating those that did not achieve a Piotroski Score of 9 in both its original and modified forms.

The aim is to Test 4 long portfolios:

1. Buy and hold portfolios based on Original Piotroski parameters
2. Buy and hold Portfolios based on the modified Piotroski parameters
3. Buy and hold portfolios based on Original Graham Value comparison
4. Buy and Hold Portfolios based on Modified Graham Value

Piotroski parameters	**Modified parameters**
Net Income	Net Income
Quality of earnings	Gross Margin
Operating Cashflows	Free cashflows
Return on assets	Leverage
Leverage	Current ratio
Current ratio	PE ratio
No issuance of equity	PB ratio
Asset turnover	EV/EBIDTA (EV multiple value)
Gross margin	EPS

PARAMETERS DEFINITIONS:

1. Net Income: Profit after expenses, indicating overall profitability.
2. Quality of Earnings: Reliability of reported earnings.
3. Gross Margin: Revenue minus cost of goods sold, reflecting profitability.
4. Operating Cashflows: Cash generated from core operations.
5. Free Cashflows: Cash available after capital expenditures.
6. Return on Assets (ROA): Efficiency in using assets to generate profit.
7. Leverage: Debt levels relative to equity.
8. Current Ratio: Liquidity measure (current assets ÷ liabilities).
9. PE Ratio: Price to earnings, indicating market value relative to earnings.
10. No Equity Issuance: Reflects no dilution from issuing shares.
11. PB Ratio: Price to book value, showing market value vs. book value.
12. Asset Turnover: Efficiency in generating sales from assets.
13. EV/EBITDA: Enterprise value to earnings, showing company valuation excluding debt.
14. EPS (Earnings Per Share): Profit allocated to each outstanding share.

Following this, back testing was performed using monthly price data over a four-year period, downloaded from the BSE website.

Two portfolios were constructed for each method, one based on the original metrics and the other using the modified versions. Comparative analysis included calculating the Compound Annual Growth Rate (CAGR) and Sharpe ratio for each portfolio, with results favouring the modified metrics.

Following were the observations for the portfolio based on Original Piotroski score

	Adani P&S	Infosys	Nestle	NTPC	Reliance Ind.	Tata Motors	Ultratech Cement
CAGR	39%	15%	8%	48%	7%	62%	25%
Risk free rate	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Annualized Volatility (STD DEV)	44%	24%	19%	26%	20%	45%	23%
Sharpe Ratio	0.75	0.38	0.12	1.66	0.06	1.24	0.83

INITIAL INVESTMENT							
9985							
Weights	3.60%	10.62%	17.19%	0.88%	20.57%	1.33%	45.81%
Overall CAGR	1%	2%	1%	0%	1%	1%	11%
Overall CAGR	18%						

average risk-free rate of around 6% for the 2020-2024 period

Following were the observations for the portfolio based on Modified Piotroski score

	HDFC Bank	Adani P&S	ICICI	Indusind Bank	Kotak Mahindra	L&T	PGCOI	SBI	Ultratech Cement
CAGR	9%	39%	33%	23%	5%	40%	18%	44%	25%
R.F	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Annualised Volatility	0.21	0.44	0.19	0.37	0.23	0.22	0.26	0.33	0.23
Sharpe Ratio	0.15	0.75	1.38	0.46	-0.05	1.55	0.46	1.15	0.83

Initial Investment									
9,933									
Weights	0.12	0.04	0.04	0.06	0.16	0.09	0.02	0.02	0.46
Overall CAGR	1%	1%	1%	1%	1%	4%	0%	1%	11%
Overall CAGR	22%								

Two portfolios were constructed Based undervalued determined using Graham value, one based on the original metrics and the other using the modified versions. Comparative analysis included calculating the Compound Annual Growth Rate (CAGR) and Sharpe ratio for each portfolio, with results favouring the modified metrics.

Following were the observations for the portfolio based on Original Graham value-

EPS	PB RATIO	Book value P.S	Graham Number	status
17.22	2.6	135.88	229.45	Overvalued
23.65	17.7	115.28	247.68	Overvalued
6.04	1.4	316.93	207.53	Overvalued
84.55	6	573.80	1044.79	Overvalued
23.49	2.9	208.74	332.15	Overvalued
4.47	4.2	101.04	100.81	Overvalued
43.33	3.9	208.45	450.80	Overvalued
52.01	3.4	325.57	617.25	Overvalued
32.05	10.5	199.52	379.32	Overvalued
15.75	1.9	194.32	262.41	Overvalued
49.72	1.2	493.50	743.02	Undervalued
40	6.1	166.83	387.49	Overvalued
11.85	3.5	48.81	114.08	Overvalued
5.08	1.8	156.69	133.83	Overvalued
47.75	3.8	343.43	607.43	Overvalued
67.65	5.6	283.38	656.77	Overvalued
-2.94	1.9	321.13		Overvalued
133.5	4.2	1681.52	2247.42	Overvalued
21.57	67.7	23.63	107.10	Overvalued
12.02	0.7	121.29	181.11	Undervalued
12.16	1.3	71.22	139.59	Undervalued
61.39	2.1	972.08	1158.75	Overvalued
19.12	0.7	271.86	341.98	Undervalued
13.4	2.7	187.74	237.92	Overvalued
-46.17	0.8	166.88		Overvalued
-2.28	0.6	60.83		Overvalued
83.19	9.9	254.89	690.73	Overvalued
40.43	3.4	241.91	469.11	Overvalued
9.44	16.7	71.78	123.47	Overvalued
189.08	2.9	1413.02	2451.82	Overvalued

	INDUSIND BANK	NTPC	POWER GRID	SBI
CAGR	23%	48%	17%	44%
Risk free rate	6%	6%	6%	6%
Annualized Volatil	37%	26%	26%	33%
Sharpe Ratio	0.46	1.66	0.43	1.15

Initial Investment				
1033				
weights	57%	8%	17%	18%
Overall CAGR	13%	4%	3%	8%
Overall CAGR	28%			

Following were the observations for the portfolio based on Modified Graham value-

	SENSEX 30	CMP	EPS	PB RATIO	Book value P.S	M.G.V	Status
1	ADANI PORTS & SEZ	353.3	17.22	2.6	135.88	374.69	Undervalued
2	ASIAN PAINTS	2040.45	23.65	17.7	115.28	404.45	overvalued
3	AXIS BANK	443.7	6.04	1.4	316.93	338.90	overvalued
4	BAJAJ FINANCE	3442.8	84.55	6	573.80	1706.13	overvalued
5	BAJAJ FINSERV	605.36	23.49	2.9	208.74	542.41	overvalued
6	BHARTI AIRTEL	424.38	4.47	4.2	101.04	164.62	overvalued
7	HCL TECHNOLOGIES	812.95	43.33	3.9	208.45	736.16	overvalued
8	HDFC BANK	1106.95	52.01	3.4	325.57	1007.96	overvalued
9	HINDUSTAN UNILEVER	2095	32.05	10.5	199.52	619.42	overvalued
10	ICICI BANK	369.2	15.75	1.9	194.32	428.52	Undervalued
11	INDUSIND BANK	592.2	49.72	1.2	493.50	1213.35	Undervalued
12	INFOSYS	1017.65	40	6.1	166.83	632.76	overvalued
13	ITC	170.85	11.85	3.5	48.81	186.30	Undervalued
14	JSW STEEL	282.05	5.08	1.8	156.69	218.54	overvalued
15	KOTAK MAHINDRA BANK	1305.05	47.75	3.8	343.43	991.94	overvalued
16	L&T	1586.95	67.65	5.6	283.38	1072.50	overvalued
17	M&M	610.15	-2.94	1.9	321.13		overvalued
18	MARUTI SUZUKI	7062.4	133.5	4.2	1681.52	3670.01	overvalued
19	NESTLE	1600.05	21.57	67.7	23.63	174.89	overvalued
20	NTPC	84.9	12.02	0.7	121.29	295.76	Undervalued
21	POWER GRID	92.59	12.16	1.3	71.22	227.96	Undervalued
22	RELIANCE IND.	2041.36	61.39	2.1	972.08	1892.23	overvalued
23	SBI	190.3	19.12	0.7	271.86	558.46	Undervalued
24	SUN PHARMA	506.9	13.4	2.7	187.74	388.51	overvalued
25	TATA MOTORS	133.5	-46.17	0.8	166.88		overvalued
26	TATA STEEL	36.5	-2.28	0.6	60.83		overvalued
27	TCS	2523.45	83.19	9.9	254.89	1127.95	overvalued
28	TECH MAHINDRA	822.5	40.43	3.4	241.91	766.05	overvalued
29	TITAN	1198.65	9.44	16.7	71.78	201.63	overvalued
30	ULTRATECH CEMENT	4097.75	189.08	2.9	1413.02	4003.80	overvalued

	INDUSIND BANK	NTPC	POWER GI	SBI	ADANI PORTS & SEZ	NTPC
CAGR	23%	48%	17%	44%	39%	48%
Risk free rate	6%	6%	6%	6%	6%	6%
Annualized Volatility (STD DEV)	37%	26%	26%	33%	44%	26%
Sharpe Ratio	0.46	1.66	0.43	1.15	0.75	1.66

initial Investment						
1481						
weights	40%	6%	12%	13%	24%	6%
overal cagr	9%	3%	2%	6%	9%	3%
overal cagr	32%					

While the ADF test confirmed that prices were not stationary over the studied period, this outcome aligns with market behaviour, further supporting the validity of the modified metrics.

SIGNIFICANCE OF CAGR, ANNUALIZED VOLATILITY and SHARPE RATIO

1) CAGR (Compound Annual Growth Rate):

CAGR represents the mean annual growth rate of an investment over a specified period, assuming that the profits are reinvested each year.

It smooths out the performance of an investment, eliminating the volatility of returns across periods. CAGR gives investors a clearer idea of how an investment has performed overall, rather than focusing on individual annual returns which may fluctuate. It's particularly useful for comparing the performance of different investments over time.

2) Sharpe Ratio:

The Sharpe ratio measures the risk-adjusted return of an investment by comparing its excess return (over a risk-free rate) to its volatility (standard deviation of returns).

This metric helps investors understand whether the higher returns of an investment are due to better decision-making or taking on excessive risk. A higher Sharpe ratio indicates that an investment offers higher returns per unit of risk, making it an essential tool for comparing investments with similar returns but different levels of risk.

3) Annualized Volatility:

Volatility is a statistical measure of the dispersion of returns for a given security or market index. Annualized volatility represents this dispersion scaled to one year, often expressed as the standard deviation of daily returns multiplied by the square root of the number of trading days in a year.

Volatility provides a sense of the risk or uncertainty associated with the price movements of an investment. Higher annualized volatility indicates a more unpredictable investment, which may offer both higher potential rewards and greater risk. Investors use volatility to assess the risk profile of an investment and balance it with their risk tolerance.

COFFEE CAN AMBIT APPROACH

Incorporating the Coffee Can Approach in the Research Methodology, The Coffee Can Approach, being an investment philosophy rather than a specific stock selection metric, will be incorporated into the research as a guiding theoretical framework. This approach advocates for selecting fundamentally strong companies and holding them over a long period without constant monitoring, based on the belief that long-term investments outperform short-term trading strategies.

In this research, the Coffee Can Approach will be discussed to contrast the shorter-term evaluation metrics (e.g., Piotroski Score, Graham Number). It will serve as a theoretical backdrop, emphasizing the philosophy of holding high-quality stocks based on consistent performance metrics. While the practical implementation of the Coffee Can Approach, such as the passive long-term holding strategy, won't be directly applied to the stock selection and back-testing in this study, its principles will be explored to highlight the importance of choosing fundamentally sound companies for long-term wealth generation.
By doing so, the Coffee Can Approach will offer a broader strategic context to the more quantitative modifications made to Piotroski Score and Graham Number, enriching the overall value investing methodology discussed in this research.

CONCLUSION:

The research concludes that the modifications applied to traditional value investing metrics—particularly the Piotroski Score, Graham Number, and Coffee Can Approach—enhanced their relevance in identifying high-performing value stocks in today's market. The modified versions consistently outperformed their original counterparts in terms of CAGR and Sharpe ratio, suggesting that these adjustments make the models more effective in capturing contemporary market dynamics. While the ADF test confirmed that prices were not stationary over the studied period, this outcome aligns with market behaviour, further supporting the validity of the modified metrics.