Comparison of Portfolios Formed by Use of Grid Strategy Model Based on New and Traditional Variables Performance With Sharpe and Treynor Measures (Evidence of IRAN Exchange)

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Abstract

In this research, performance of portfolios formed by use of grid strategy based on new variables (aggressive, indifference and defensive stocks) presented by Rahnamaye Roodposhti (1388), and traditional ones (growth, growth-value and value stocks), calculated with Sharpe and Treynor performance measures and tested by an Active portfolio management approach to identify the portfolios by performance higher than market portfolio performance.

For testing the research hypothesis the Mann-Whitney test is used and its results shows that performance calculated by Sharpe ratio shows higher performance for growth and aggressive portfolio than market portfolio but performance calculated by Terynor ratio shows higher performance than market portfolio only for growth portfolio.

Keywords: Grid strategy model, Active portfolio management, Sharpe performance measure, Treynor Performance measure.

1- Introduction

Selecting an appropriate strategy for investment can increase organization wealth by achieving the highest return related to its capacity and in the other hand optimize the resource allocation in stock exchange. In this reason pay a careful attention to the portfolio management strategies and selecting the most appropriate one is vital for investing companies using active portfolio management strategies in capital market.

Portfolio management requires evaluation and formation of portfolio which can be formed by different methods using related variables and measures including related measures to identification of stocks type with regard to market type. On this basis, portfolio formation on growth, growth – value and value stocks and also aggressive, indifference and defensive stocks regarding to market type (asymmetric and non asymmetric market) are among the approaches discussed in this paper.

One popular strategy in portfolio management is grid matrix strategy that forms different size – adjusted style groups on values such as P/B, P/E and etc. portfolio managers often classify stocks into value and growth categories. Growth (Value) the stocks with relatively high (low) ratio of price-to-book value (P/B), price-to-earnings (P/E), and price-to-cash flow (P/C) are classified as growth (Value) stocks.

Several studies has been done to investigate which value or growth portfolio has higher average returns. Value stocks, with low ratios of price to book value, have higher average returns than growth stocks, with high price-to-book ratios. (See, for example, Banz 1981, Rosenberg, Reid, and Lanstein 1985, Fama and French 1992&1998.). Fama and French (1995, 1996) argue that investors in value stocks tend to bear higher fundamental risk of some sort, and their higher returns are simply compensation for this risk. Gonenc and Mehmet (2003) studied the comparison of returns between value and growth, and between small and large capitalization portfolios for an emerging market, (the Istanbul Stock Exchange (ISE)).They formed the growth and value portfolio by use of B/M ratio and showed that growth portfolios have superior performance over value portfolios. Thus, their results do not confirm the evidence from most developed and emerging markets. Moreover, Size and B/M risk factors along with market risk premium produce better descriptions of the returns on value and growth portfolios. Manjeet, and Mukher (2004) examined the relative efficiency of individual value measures, and investigated whether composite value measures can be used to enhance the performance of value portfolios. They used the variable such as stock price and monthly return , P/E , P/S, M/B and P/C ratios to form their portfolios. Their results show that value portfolios dominate growth portfolios. Among portfolios based on individual valuation ratios, low-P/S provides the highest excess returns, while low-P/C offers the lowest risk and best risk-return tradeoff. However, using composite value measures expands the set of efficient portfolios, enabling investors to achieve a wider range of risk-return tradeoffs.

Size adjusted style groups (value & growth portfolios) also used in some studies for investigation of other financial models. Fama and French (2008) examined the evolution of

equity financing, profitability, and the price-to-book ratios of firms in different style groups (small versus big, value versus growth) from 1926 to 2006 to provide long-term perspective on the apparent deterioration of the pecking order model. Fama and French (2008) specifically, used the price-to-book ratio (P/B) to form different style groups (small versus big, value versus growth) for examining financing decisions from the perspective of the mispricing model of Deboned and Thaler (1985) and Lakonishok, Shleifer, and Vishny (LSV 1994). Their results showed that the financial aggregated of style groups (small versus big, value versus growth) did not suggest that opportunistic financing in response to mispricing was a dominant factor in financing decisions, but regression tests on individual firms suggested that mispricing had marginal effects at least on equity financing decisions.

In field of active portfolio management, size-adjusted style groups (value & growth portfolios) investigated for finding a portfolio with performance higher than market portfolio. Arjomandi (2003) examined the active portfolio management strategies power in Tehran Exchange Stocks and showed that stocks classification in forms of value, growth and growth- value exist in Tehran Exchange Stocks and there is significant difference between performances of portfolios formed by grid matrix strategy. Shahmansouri (2008) specially used the grid matrix strategy and formed value and growth portfolios on P/B, P/E ratios and firm size. Results showed that there was not significant statistical difference between market performance and value portfolio but growth portfolio had higher performance in comparison with market portfolio.

Some studies also has been down for comparison of value and growth beta such as Lakonishok et al. (1994), (LSV) reported that value betas were higher than growth betas in good times but are lower in bad times. The same studies all conclude that value did not expose investors to a greater downside risk and that overreaction-related mispricing must be the primary source of the value premium.

In this paper we use β coefficient (as a measure related to identification of stocks type in non asymmetric market) for categorizing stocks , adding three new strategies (aggressive, neutral and defensive) to grid matrix and forming aggressive, indifference and defensive portfolios. Rahnamaye roodposhti (2009) presented variables such as different types of stock (aggressive, neutral and defensive stocks) along with variables such as asymmetric and non asymmetric market for formation of some new style groups. In this paper, we form new groups by sorting stocks beta and investigate the simultaneous effect of risk and return for each group by calculation of their performance.

We present this new model of grid matrix and examine four questions:

1) Is performance of portfolios formed on applying traditional variables (growth, growth- value and value stocks) in grid matrix which calculated by Sharp ratio, higher than market portfolio?
2) Is performance of portfolios formed on applying new variables (Aggressive, Indifference and Defensive stocks) in grid matrix which calculated by Sharp ratio, higher than market portfolio?

3) Is performance of portfolios formed on applying traditional variables (Growth, Growth- Value and Value Stocks) in grid matrix which calculated by Treynor ratio, higher than market portfolio?
4) Is performance of portfolios formed on applying new variables (Aggressive, Indifference and Defensive stocks) in grid matrix which calculated by Treynor ratio, higher than market portfolio?

The rest of the paper proceeds as follows. The next section presents data and methodology. Section 3 analyzes the data, tests hypotheses and shows results. Section 4 concludes the paper.

2. Materials and method

The sample period covered in this study is from 2006 to 2009. All accounting and stock return data for companies existing in Iran national investment company portfolio and listed in Tehran Stock Exchange were obtained from financial statements and Tehran Stock Exchange database.

For any year under consideration, we form 9 growth, growth-value and value portfolios based on size and P/B, P/E, ratios and also 9 aggressive, indifference and defensive portfolios based on size and β coefficient to evaluate their stock return performance using the Treynor and Sharpe portfolio performance measures. (See Fig. 1&2)

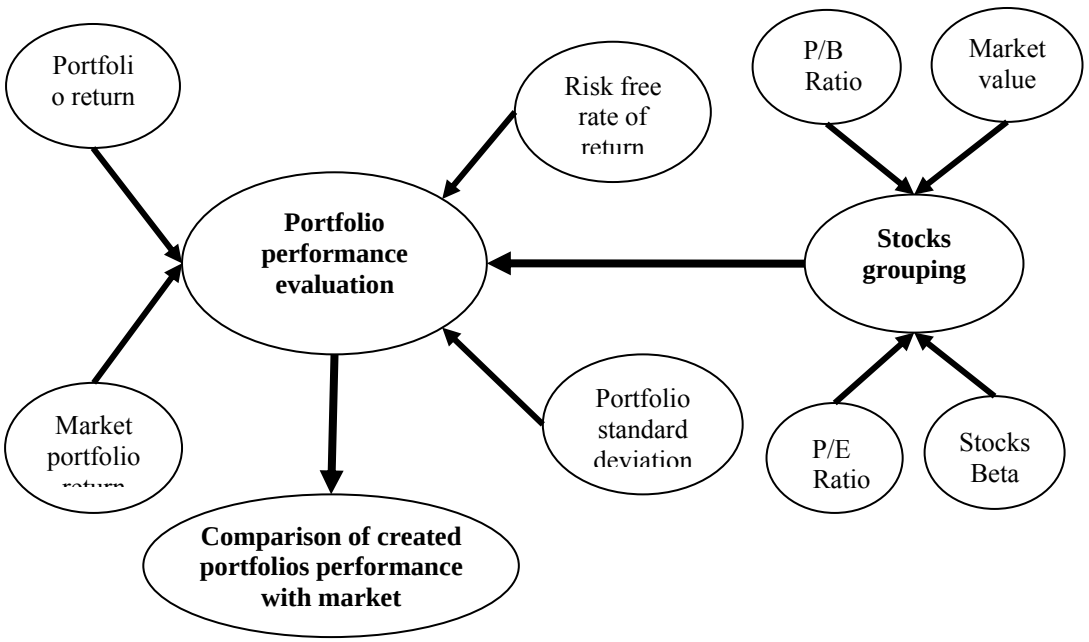

Fig 1. Conceptual Model

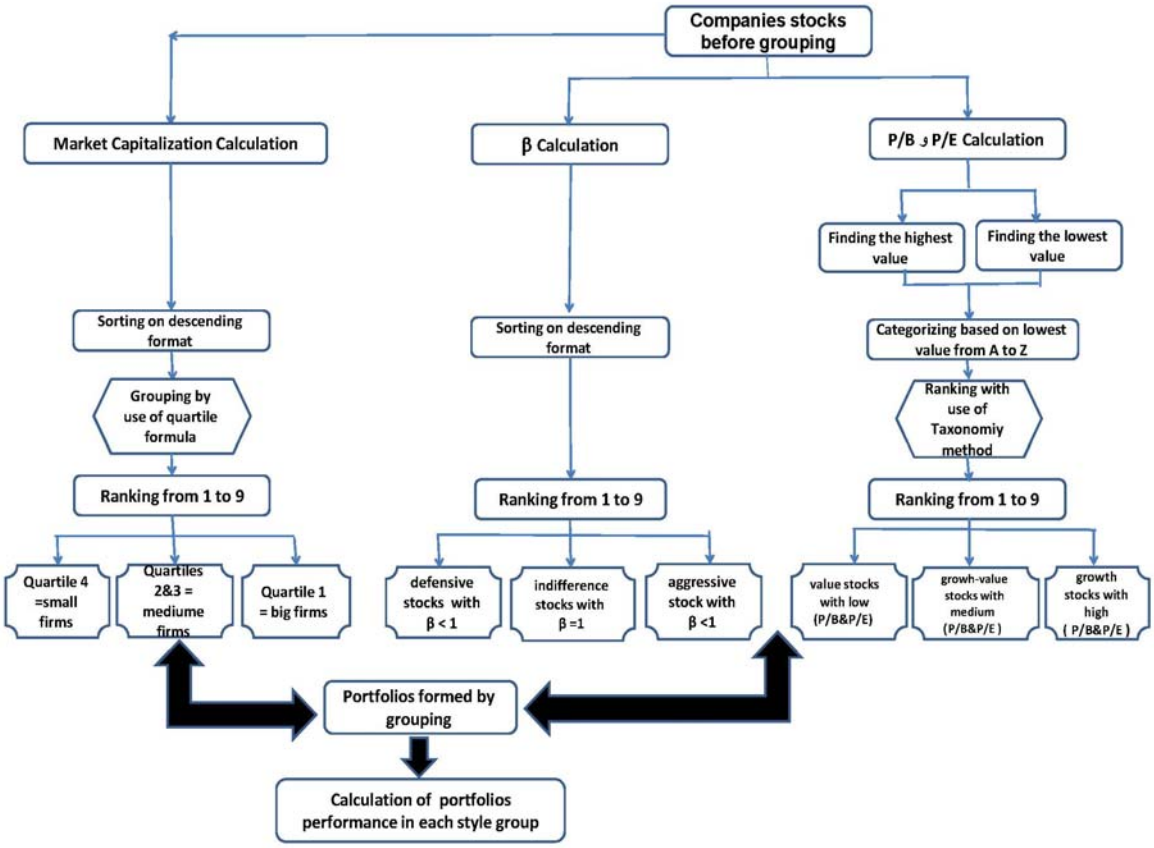

Fig.2. Executive Model

Each company must satisfy the following criteria before it is included in the sample: (1) its stock must have traded at least 50% of total transaction days; (2) it must have accounting information for the fiscal year ending in (any month of) calendar year *t*; and (3) it must have positive P/B, P/E ratios[1] and between 2.5 to 12.

2.1. Portfolio formation

For portfolio formation we use grid matrix strategy based on two different approaches , traditional model (use traditional variables) and new model (use new variables) to form two matrixes, one based on traditional variables (growth , growth – value and value stocks) and the other one based on new variables (Aggressive , Indifference and Defensive stocks).

For each year, sample companies are first divided into three style groups based on their market capitalization (size portfolios) at the end of calendar year. We sort companies market capitalization as descending form and then call the first quartile as big (B) , the second &

1 - Basu (1977) shows that the exclusion of firms with negative valuation ratios will have minimum impact on portfolio returns.

third quartiles as medium (M) and the forth quartiles as small (S). To form the first matrix (formed by traditional variable) we also classify stocks in three other style groups based on price to earnings (P/E) and price to book (P/B) ratios: growth (G) is stocks in the top 30% of stocks P/E & P/B; growth-value (GV) is the middle 40% of stocks P/E & P/B; and value (V) is the bottom 30% of stocks P/E & P/B (Taxonomy ranking method used for ranking the stocks based on concurrent effects of P/E & P/B ratios and defining the quartiles). The intersection of these independent sorts produces nine style groups in form of matrix 1, refreshed at the end of each calendar year, where SG, MG and BG are small, medium and big growth portfolios, SGV, MGV and BGV are small, medium and big growth-value portfolios, and SV, MV and BV are small, medium and big value portfolios. For forming the second matrix (formed by new variable) we use β to form three other style groups: Aggressive (A) is stocks by $\beta > 1$; Indifference (I) is stocks by $\beta = 1$ and Defensive (D) is stocks by $\beta < 1$. The intersection of these independent sorts (groups formed by size and groups formed by β) produces nine new style groups in form of matrix 2, refreshed at the end of each calendar year, where SA, MA and BA are small, medium and big aggressive portfolios, SI, MI and BI are small, medium and big indifference portfolios, and SD, MD and BD are small, medium and big defensive portfolios. (See Fig.3 and 4 for details.)

Book value of equity is defined as the book value of a company's total assets less the book value of all liabilities. It represents the accountant's valuation of the company's net worth. Earnings are measured as net profit per share.

Size \ Strategy	Growth	Growth-Value	Value
Small	1(SG)	4(SGV)	7(SV)
Medium	2(MG)	5(MGV)	8(MV)
Big	3(BG)	6(BGV)	9(BV)

Fig.3. Matrix based on traditional variables (Growth, Growth-Value and Value stocks)

Size \ Strategy	Aggressive	Neutral	Defensive
Small	1(SA)	4(SI)	7(SD)
Medium	2(MA)	5(MI)	8(MD)
Big	3(BA)	6(BI)	9(BD)

Fig.4. Matrix based on traditional variables (Aggressive, indifference and Defensive stocks)

2.2. Portfolios performance calculation

Portfolios performance should be evaluated both in terms of risk and return. Two risk-adjusted performance measures are employed in our study, namely, the Treynor ratio

(diversified portfolio assumed) and Sharpe ratio (NOT diversified portfolio assumed). For each portfolio, we compute the weighted average of company's annual returns as portfolios return and weighted average of company's annual returns standard deviation as portfolio standard deviation. The Treynor ratio is derived by running the following CAPM based regression (Yen et al, 2004).

$$Rpt - Rft = \alpha p + \beta p(Rmt - Rft) + \varepsilon p \quad (1)$$

And calculated by the following formula:

$$\text{Treynor measure} = Rpt - Rft / \beta p$$

Where Rpt is portfolio return in year t; Rft is 'risk-free' rate in year t; Rmt is market return in year t

(proxied by equally weighted market return); and βp is estimated slope. The Sharpe ratio is derived by

dividing the excess portfolio return by the corresponding monthly return's standard deviation, $(Rpt - Rft)/\sigma pt$.), where σpt is portfolio returns standard deviation in year t.

3. Results and Discussion:

3.1. Descriptive Statistics:

98 companies satisfied the required criteria and selected to form the portfolios. The calculations performed for Growth, Growth-Value and Value portfolios are showed in Table 1, the ones performed for Market portfolio are reported in Table 2 and calculations related to Aggressive, Indifference and Defensive portfolios are showed in Table 3.

Table 1. Summary statistics of growth, growth-value and value portfolios

	Year of Portfolio Formation			
	Year 1	**Year 2**	**Year 3**	**Year 4**
Growth portfolios				
Portfolio annual return, *R*p (%)				
SG.	17.45	60.95	20.38	154.43
MG.	65.42	53.15	9.96	36.62
BG.	28.43	10.07	12.46	184.65
S.D., σp (%)				
SG.	5.42	7.31	6.79	11.42
MG.	5.11	4.00	4.07	04.61
BG.	6.44	2.66	5.96	09.99
Beta, $\hat{}\beta$p				
SG.	1.06	0.56	0.42	00.48
MG.	0.83	0.51	0.16	00.10
BG.	0.50	0.47	0.53	01.41
Treynor, $(Rp - Rf)/\beta p$				
SG.	2.32	81.92	12.92	290.08
MG.	60.79	74.12	-30.59	213.31
BG.	26.95	-10.50	-4.83	120.34
Sharpe ratio, $(Rp - Rf)/\sigma p$				

SG.	0.45	6.28	0.79	12.23
MG.	9.87	9.53	-1.24	04.69
BG.	2.09	-1.85	-0.43	16.98
Growth-Value portfolios				
Portfolio annual return, *R*p (%)				
SGV.	-1.06	29.25	-	142.69
MGV.	32.12	27.85	6.48	51.53
BGV.	-2.26	45.77	-24.37	31.51
S.D., σp (%)				
SGV.	2.68	2.02	-	05.98
MGV.	3.81	2.71	2.47	05.31
BGV.	2.53	6.43	10.32	05.35
Beta, $\hat{\beta}$p				
SGV.	0.28	0.11	-	-00.19
MGV.	0.05	0.12	0.03	00.71
BGV.	0.28	0.82	1.03	00.67
Treynor, $(R\text{p} - R\text{f})/\hat{\beta}$p				
SGV.	-57.20	134.59	-	-664.92
MGV.	350.86	108.45	-255.14	51.64
BGV.	-61.72	37.35	-38.41	24.63
Sharpe ratio, $(R\text{p} - R\text{f})/\sigma$p				
SGV.	-5.99	19.01	-	21.36
MGV.	4.49	-13.50	-3.45	06.88
BGV.	-6.83	-10.35	-3.82	03.09
Value portfolios				
Portfolio annual return, *R*p (%)				
SV.	1.12	11.35	-6.91	26.33
MV.	24.18	3.40	16.40	54.99
BV.	2.02	5.33	-2.30	58.28
S.D., σp (%)				
SV.	3.53	5.09	12.20	05.44
MV.	7.32	4.96	5.05	05.50
BV.	3.68	6.48	3.24	08.29
Beta, $\hat{\beta}$p				
SV.	0.90	-0.19	-0.01	00.37
MV.	-0.52	0.86	0.09	00.34
BV.	-0.17	0.93	0.20	00.21
Treynor, $(R\text{p} - R\text{f})/\hat{\beta}$p				
SV.	-15.42	19.01	1719.72	30.87
MV.	-17.74	-13.49	16.02	116.64
BV.	76.38	-10.35	-87.80	209.63
Sharpe ratio, $(R\text{p} - R\text{f})/\sigma$p				
SV	-3.93	-0.72	-1.80	02.08
MV	1.25	-2.34	0.28	07.27
BV.	-3.53	-1.50	-5.35	05.22

Size-adjusted growth, growth-value and value portfolios based on P/B and P/E ratios, are formed each year from 2006 to 2009.

After portfolio formations we have 12 portfolios for each style groups in 4 years. P/E ratio of each stock for year t is average of daily P/E in year t, stock's Beta is the average of monthly beta in 4 years, and Risk free rate is 15% for each year.

We use Tehran Stock Exchange's Main Index (TEPIX) for calculation of market portfolio performance. The summary statistics of market portfolio is reported in Table 2.

Table 2.summary statistics of market portfolio

	Year of Portfolio Formation			
	Year 1	**Year 2**	**Year 3**	**Year 4**
Market portfolios				
Market annual return, *R*m (%)	3.87	2.54	-21.01	57.39
S.D., *σ*m (%)	1.94	3.60	7.27	-36.01
Sharpe ratio, *(R*m − *R*f *)/σ*m	-5.78	-3.46	-4.95	8.77

Table 3. Summary statistics of aggressive, indifference and defensive portfolios

	Year of Portfolio Formation			
	Year 1	**Year 2**	**Year 3**	**Year 4**
Aggressive portfolios				
Portfolio annual return, Rp (%)				
SA.	2.87	47.74	81.97	379.57
MA.	18.66	0.84	-42.95	82.28
BA.	50.26	7.05	-40.81	175.25
S.D., σp (%)				
SA.	8.21	6.89	29.75	21.47
MA.	6.51	11.15	14.20	11.60
BA.	7.44	7.05	13.22	98.37
Beta, ˆβp				
SA.	2.96	1.26	2.51	01.42
MA.	2.34	1.64	1.36	01.67
BA.	2.23	1.69	1.64	01.50
Treynor, (Rp − Rf)/ˆβp				
SA.	-4.09	25.89	32.17	256.10
MA.	1.57	-8.64	-32.49	40.26
BA.	15.80	-4.70	-25.63	106.91
Sharpe ratio, (Rp − Rf)/σp				
SA.	-1.48	4.75	2.71	16.98
MA.	0.56	-1.27	-3.11	05.80
BA.	4.74	-1.13	-3.18	15.93
Indifference portfolios				
Portfolio annual return, Rp (%)				
SI.	-19.67	100.44	-	-
MI.	95.95	28.86	-31.98	75.54
BI.	-3.21	-	22.92	32.76
S.D., σp (%)				
SI.	4.20	10.72	-	-
MI.	12.24	5.52	15.08	05.52
BI.	-	6.18	09.61	08.72
Beta, ˆβp				
SI.	1.00	1.00	-	-
MI.	1.00	1.00	01.00	01.00
BI.	-	1.00	01.00	01.00
Treynor, (Rp − Rf)/ˆβp				
SI.	-34.67	85.44	-	-
MI.	80.95	13.86	-33.23	60.54
BI.	-	-11.79	-24.17	17.76
Sharpe ratio, (Rp − Rf)/σp				
SI.	-8.25	7.97	-	-

MI.	6.61	2.51	-02.20	10.97
BI.	-	-1.91	-02.51	02.04
Defensive portfolios				
Portfolio annual return, *R*p (%)				
SD.	6.64	23.01	01.05	98.37
MD.	30.03	18.31	06.66	36.49
BD.	2.62	22.99	07.94	44.09
S.D., σp (%)				
SD.	1.91	2.15	05.38	00.99
MD.	3.81	2.42	02.14	04.00
BD.	2.59	2.69	04.50	05.20
Beta, $\hat{\beta}$p				
SD.	-0.10	-0.05	0.003	-00.12
MD.	-0.60	0.13	00.03	00.30
BD.	- 0.09	0.27	00.20	00.37
Treynor, $(R\text{p} - R\text{f})/\hat{\beta}$p				
SD.	84.40	-148.83	-56.89	-722.37
MD.	-25.26	24.98	170.35	72.57
BD.	130.85	30.15	33.21	77.74
Sharpe ratio, $(R\text{p} - R\text{f})/\sigma$p				
SD.	-4.38	3.72	-00.04	84.42
MD.	3.94	1.37	02.53	05.38
BD.	-4.78	2.97	01.49	05.59

Size-adjusted aggressive, indifference and defensive portfolios based on β are formed each year from 2006 to 2009.

3.2. Test of hypotheses and results

As the number of firms in samples are not equal , the number of samples(portfolios) is not enough and we dough about their normality ,so we test the hypotheses with the best substitute for t-Test in non-parametric methods, Mann-Whitney Test.

By testing the hypotheses we can compare the performance of market portfolio with performance of growth, growth-value, value, aggressive, indifference and defensive portfolios.

3.2.1. Result of test for performance calculated by Sharp measure:

H.1: Performance of portfolios which formed based on applying traditional variables (growth, growth- value and value stocks) in grid matrix are higher than market portfolio performance.

For testing these hypotheses we test sub hypotheses 1.1, 1.2 and 1.3.

H 1.1: Performance of growth portfolios is higher than market portfolio.

$$1 - \begin{cases} H_0 = \mu_G \leq \mu_{Mp} \\ H_1 = \mu_G > \mu_{Mp} \end{cases}$$ Where:

$\mu_{G=}$ Average performance of growth portfolio and
$\mu_{Mp=}$ Average performance of market portfolio

As the p-value is 0.026[a1] for the Mann-Whitney (1-tailed) test, H_0 is not significance at the 0.05 level
(1-tailed) and rejected so we conclude that the performance of growth portfolio is higher than market portfolio.

H 1.2: Performance of value portfolios is higher than market portfolio.

$$2 - \begin{cases} H_0 = \mu_V \leq \mu_{Mp} \\ H_1 = \mu_V > \mu_{Mp} \end{cases}$$ Where**:**

$\mu_{V=}$ Average performance of value portfolio and
$\mu_{Mp=}$ Average performance of market portfolio

As the p-value is 0.166 for the Mann-Whitney (1-tailed) test, H_0 is significance at the 0.05 level (1-tailed) and there is no evidence for its rejection, so we conclude that the performance of value portfolio is not higher than market portfolio.

H 1-3: Performance of growth-value portfolios is higher than market portfolio.

$$3 - \begin{cases} H_0 = \mu_{GV} \leq \mu_{Mp} \\ H_1 = \mu_{GV} > \mu_{Mp} \end{cases}$$ Where**:**

$\mu_{GV=}$ Average performance of growth-value portfolio and
$\mu_{Mp=}$ Average performance of market portfolio

As the p-value is 0.314 for the Mann-Whitney (1-tailed) test, H_0 is significance at the 0.05 level (1-tailed) and there is no evidence for its rejection, so we conclude that the performance of growth-value portfolio is not higher than market portfolio.

H.2: Performance of portfolios which formed based on applying new variables (Aggressive, Indifference and Defensive Stocks) in grid matrix are higher than market portfolio performance.
For testing these hypotheses we test sub hypotheses 2.1, 2.2 and 2.3.

[1]- [a] Denotes significance at 5% level.

H 2.1: Performance of aggressive portfolios is higher than market portfolio.

$$1 - \begin{cases} H_0 = \mu_A \leq \mu_{Mp} \\ H_1 = \mu_A > \mu_{Mp} \end{cases}$$ Where**:**

$\mu_A =$ Average performance of aggressive portfolio and
$\mu_{Mp} =$ Average performance of market portfolio

As the p-value is 0.045[a] for the Mann-Whitney (1-tailed) test, H_0 is not significance at the 0.05 level
(1-tailed) and refused so we conclude that the performance of aggressive portfolio is higher than market portfolio.

H 2.2: Performance of defensive portfolios is higher than market portfolio.

$$2 - \begin{cases} H_0 = \mu_D \leq \mu_{Mp} \\ H_1 = \mu_D > \mu_{Mp} \end{cases}$$ Where**:**

$\mu_D =$ Average performance of defensive portfolio and
$\mu_{Mp} =$ Average performance of market portfolio

As the p-value is 0.091 for the Mann-Whitney (1-tailed) test, H_0 is significance at the 0.05 level (1-tailed) and there is no evidence for its rejection, so we conclude that the performance of defensive portfolio is not higher than market portfolio.

H 2.3: Performance of indifference portfolios is higher than market portfolio.

$$3 - \begin{cases} H_0 = \mu_N \leq \mu_{Mp} \\ H_1 = \mu_N > \mu_{Mp} \end{cases}$$ Where**:**

$\mu_N =$ Average performance of indifference portfolio and
$\mu_{Mp} =$ Average performance of market portfolio

As the p-value is 0.140 for the Mann-Whitney (1-tailed) test, H_0 is significance at the 0.05 level (1-tailed) and there is no evidence for its rejection, so we conclude that the performance of indifference portfolio is not higher than market portfolio.(See Table 4 , for details)

Table 4. Test statistic for Sharp calculated performance

Test Statistics

	Growth	Value	Aggressive	Defensive	Indifference	Growth-value
Mann-Whitney U	8.000	16.000	10.000	13.000	11.000	20.000
Wilcoxon W	18.000	26.000	20.000	23.000	21.000	30.000
Z	-1.940	-0.970	-1.698	-1.334	-1.080	-0.485
Asymp. Sig. (1-tailed)	.026	0.166	.045	0.091	0.140	0.309

4. Conclusion

Given the above findings we can conclude the following. First, results of H1.1, H1.2, H1.3 and H2.1, H2.2, H2,3 hypotheses shows that if the portfolio performance calculated by sharp measure, growth (shahmansouri (2008) reported higher performance than market portfolio for growth portfolio) and aggressive portfolios have higher performance than market portfolio and there is no evidence of higher performance for value, growth-value, defensive and indifference portfolios .This provides evidence that both traditional and new grid matrixes have capability of finding portfolios with performance higher than market portfolio performance.

Second, results of H3.1, H3.2, H3.3 and H4.1, H4.2, H4, 3 hypotheses shows that if the portfolio performance calculated by Treynor measure, only growth portfolio has higher performance than market portfolio and there is no evidence of higher performance for value, growth-value, aggressive, defensive and indifference portfolios .This provides evidence that only traditional grid matrixes have capability of finding portfolios with performance higher than market portfolio.

Finally, the results of this study show that use of grid matrix strategy with various variables for portfolio analysis can help the portfolio managers using active portfolio management strategies to make optimal decisions in portfolio formation and evaluation.

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