

# Dead or Alive: Modern Portfolio Theory Based on Financial Analysis

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**Abstract** Currently, there are a lot of criticisms on Modern Portfolio Theory (MPT). Black Swan argument claims that in the event of a financial turmoil, the stock prices move beyond what is expected by normal distribution. This study empirically investigates whether it is possible to apply MPT by using additional criteria. The criteria used in this research are related to financial analysis, a well-known field in corporate finance. The ratios used are debt-to-equity and return on equity. According to the analysis, Modern portfolio theory can be applied by the use of these additional criteria. The analysis with debt-to-equity criterion reveals that Portfolios 3 and 5 which have lower debt-to-equity ratios performed better in the period. The analysis with return on equity reveals that only Portfolio 8 which has 9 companies with ratios larger than 0.2 has positive return whereas the other portfolios have negative returns. The results further show that, while applying MPT with these criteria is perfectly possible and sound, the investor could diversify further by selecting portfolios with higher number of securities and still have better financial ratios. This research to the authors' knowledge brings a novelty by proposing these selection criteria in MPT. The suggested method could be applied by practitioners in this field. This study also targets to bring a new direction to the ongoing debate whether the theory of Markowitz (commonly known as father of Modern Portfolio Theory) is dead or alive.

**Keywords** Debt-to-Equity Ratio, Capital Markets, Corporate Finance, Financial Analysis, Investment, Modern Portfolio Theory, Return on Equity

JEL Classification: D53, G11, G32

## 1. Introduction

A wise investor doesn't will to risk all of his/her wealth by investing all his and wealth in single asset class. Portfolio theory has application in various assets such as bonds, equity, gold, oil and real estate. As Bernstein (1997) points out the roots of portfolio theory could be seen in Shakespeare's play or more specifically in the words of Antonio, merchant of Venice.

*"I thank my fortune for it — my ventures are not in one bottom trusted, nor to one place, nor is my whole estate upon the fortune of this present year."*

However, mathematical foundations of what we today call modern portfolio theory are given by Markowitz (1952). Some of these computations are also available in the methodology section of this study. Accordingly, it is possible to determine an efficient portfolio given previous returns, variances, and covariances of different asset classes.

Later, Sharpe (1966) comes up with what we call Sharpe ratio to measure the performance of a portfolio. Actually, what we do by adding different assets to a portfolio is to try to increase Sharpe ratio as much as possible. Sharpe Ratio could be computed as follows.

$$S_p = \frac{E(R_p) - R_f}{\sigma_p}$$

$S_p$ : Sharpe Performance Ratio of the Portfolio,

$E(R_p)$ : Expected Return of Portfolio,

$R_f$ : Risk free interest rate,

$\sigma_p$ : Risk of portfolio (computed as standard deviation)

The motivation of this paper is to find a selection criteria between a set of portfolios. The selected portfolio should be more efficient in terms of risk and return. An efficient portfolio should have more return for a given level of risk or less risk for a given level of return. These expectations could be set by the investor.

The criteria chosen in this paper comes from financial analysis. In other words, knowledge on portfolio theory and financial analysis are combined in this study.

In financial analysis, a ratio is computed by using the data from various financial statements of a company such as balance sheet (also referred as statement of financial position in IFRS- international financial reporting standards), statement of cash flows and income statement. These ratios represent different quantities such as liquidity, solvency, turnover, profitability and market based indicators. Debt-to-equity and return on equity ratios are used in this research.

In the balance sheet, liabilities and shareholders' equity are used to obtain a company's assets. However, it is up to the company to determine how this is divided between liabilities and shareholders' equity. This is a well-known financial decision in corporate finance and often referred as capital structure.

Yang et al. (2017) point out that trade off theory, pecking order and market timing hypothesis are important in this decision. Trade off theory indicates that one should consider bankruptcy and tax shield effects when holding debt. Pecking order suggest to use internal finance and debt before they issue equity. According to market timing hypothesis, a decline in the price of stock is likely after a stock issue.

As indicated by Fabozzi and Peterson (2003), Debt-to-equity ratio is a quantified representation of capital structure. Debt-to-equity ratio is obtained by the formula below.

$$\text{Debt-to-equity ratio} = \frac{\text{Total Liabilities}}{\text{Total Shareholders' Equity}}$$

Alawneh (2019) another form of leverage which is known as operating leverage is also important in stock selection. According to this study, buying stocks on Amman Stock Exchange based on net investment cash flows is recommended.

Return on equity (ROE) is the other criteria used in this study. As stated by Ross et. al. (1990), this ratio is a representation of the unit profitability of capital provided by shareholders. This also indicates the performance of the management of that specific company. Return on equity is computed by the formula below.

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Total Shareholders' Equity}}$$

The rest of the study is organized as follows. The next section is a collection of some works related to this study. In the section main focus of the paper, scope of the research and methodology is given. In the solutions and recommendations, solutions for both debt-to-equity and return on equity and investment decision are available. In the discussion section, the results of the research is elaborated. The conclusion section includes the final remarks.

## 2. Background

There are many studies which used mean variance optimization (MVO) in Istanbul Stock Exchange. The method of Markowitz is mean variance optimization. This means, he used mean for return and variance for risk. In this study standard Modern Portfolio Theory procedure is followed but it is perfectly possible to use other measurements for risk such as Value at Risk.

Kucukkocaoglu (2002) also applied the standard procedure. By the use of MVO, efficient portfolios are obtained. The research period is 1999. Closing prices of stocks in ISE30 and ISE100 (these are the bluechip indices in Istanbul Stock exchange) indices are used in this study.

In the universe of assets, there are many risky assets and an assumed risk-free asset. If a straight line is drawn (this is called capital market line- CML) from risk free asset to efficient frontier so that it barely touches (tangent) the efficient frontier (it is a set of portfolios where there is maximum return for a given level of risk and minimum risk for a given level of return), a tangent portfolio (optimal) is obtained.

Topal and Ilarslan (2009) applied this technique in ISE30 index. They formed an equally weighted portfolio by the use of MVO. They geometrically showed the tangent portfolio and proved that it is optimal.

The number of securities in a portfolio has always been a concern. If too few assets are used, then there is probably not enough diversification. And if the number is too high, then the costs increase.

Tosun and Oruc (2010) wanted to test what is the ideal number of securities for an investor to hold in ISE30 index. They assumed rational investors who seek minimum risk and maximum return only. The result shows that 6 securities provide adequate diversification.

As mentioned previously MVO is a commonly used technique in asset management, however, it is not the only technique. There are many ways to measure return and risk so there are several other techniques.

Particle swarm optimization (PSO) is an alternative technique. Alagoz and Kutlu (2012) used PSO in ISE. They also tried MVO and compared the results. The results interestingly generated asset weights similar in both

studies.

Artificial neural networks (ANN) is also an alternative technique. This technique is also applied with a high frequency in capital markets.

Yavuz et al. (2015) used 140 securities listed in ISE. The research period is 2010. They used asset size, market capitalization, shareholders' equity and volume of trade. By the use of ANN, they computed the optimal portfolio. The results of the analysis show that shareholders' equity criteria gave the best result.

Sharpe performance indicator (Sharpe ratio) is as explained very important in portfolio theory and practice. Portfolios with higher Sharpe ratios are superior to others.

Kandemir and Aytakin (2017) used Sharpe Performance indicator in ISE Industry Index. They used 45 stocks. The research period is between 2009 and 2014. Mean variance optimization technique is applied in this study. Standard Markowitz procedure was proven to be accurate in this study.

### 3. Main Focus of the Study

#### Presentation of the Scope of the Research

This study analyzes two different criteria to effectively set up and compute different portfolios. The selected criteria are debt-to-equity ratio and return on equity. Both of these are well known computations in financial analysis. The details of the computation of these ratios are given in the following section.

The data is taken from ISE 30 Index (locally known as BIST 30) which covers 30 bluechip stocks in Istanbul Stock Exchange (ISE). Daily closing prices of the stocks are used for the year 2018. There are however some stocks which were traded less than 251 days or were traded in other indices of ISE during the period. For the sake of validity of the study, these stocks were excluded. As a

result, 27 stocks which meet the criteria are used in the study.

The goal of the research is to investigate whether the portfolios with minimum risk and maximum return could be obtained by using these criteria.

#### Methodology

Modern portfolio theory is used in this research. For a portfolio of N assets, the return of the portfolio is calculated by the formula below.

$$E(R_p) = \mu = \sum_{i=1}^N w_i \mu_i$$

$E(R_p) = \mu$ : Expected Return on the Portfolio invested,  
 $\mu_i$ : Expected Return on security(asset) i.

Risk is measured by variance or standard deviation. Portfolio variance of a portfolio with N assets is calculated by the formula below.

$$\sigma^2 = \sum_{i=1}^N \sum_{j=1}^N w_i w_j \sigma_{i,j}$$

$\sigma^2$ : Risk of the portfolio, variance

$\sigma_{i,j}$ : Covariance between securities (assets) i and j.

$w_i$ : Weight of security i in the portfolio,

$w_j$ : Weight of security j in the portfolio,

N: Number of securities in the portfolio

### 4. Solutions and Recommendations

#### Debt/Equity Based Portfolios

Debt to equity ratios of the selected companies listed on Istanbul Stock Exchange (ISE 30 index) are computed with the data available in financial statements. The debt to equity ratios for the companies are given in Table 1.

**Table 1.** Debt to Equity Ratios for the Companies

TICKER	COMPANY	TOTAL LIABILITY	TOTAL SAHREHOLDERS' EQUITY	DEBT-TO-EQUITY
SISE	SISE CAM	37,950.00	13,159,048.00	0.0029
ASELS	ASELSAN	786,037.00	9,381,588.00	0.0838
KOZAL	KOZA ALTIN	348,544.00	3,799,385.00	0.0917
KOZAA	KOZA MADENCİLİK	399,936.00	1,986,828.00	0.2013
EREGL	EREĞLİ DEMİR CELİK	12,527,485.00	30,314,526.00	0.4133
DOHOL	DOĞAN HOLDİNG	3,947,919.00	7,309,101.00	0.5401
EKGYO	EMLAK KONUT GMYO	10,235,752.00	12,916,104.00	0.7925
BIMAS	BİM MAĞAZALAR	5,435,934.00	3,167,198.00	1.7163
TCELL	TURKCELL	26,711,721.00	14,802,682.00	1.8045
TKFEN	TEKFEN HOLDİNG	7,611,125.00	4,165,070.00	1.8274
PETKM	PETKİM	8,452,870.00	4,129,789.00	2.0468
KRDMD	KARDEMİR (D)	4,145,651,428.00	2,008,683,000.00	2.0639
TAVHL	TAV HAVALİMANLARI	14,584,731.00	7,004,175.00	2.0823
THYAO	TÜRK HAVA YOLLARI	77,792,000.00	36,639,000.00	2.1232
PGSUS	PEGASUS	9,949,439,888.00	4,562,974,000.00	2.1805
ARCLK	ARCELİK	20,149,199.00	8,961,332.00	2.2485
KCHOL	KOC HOLDİNG	78,317,471.00	32,323,610.00	2.4229
TOASO	TOFAS OTO. FAB.	9,295,244.00	2,946,180.00	3.1550
TUPRS	TÜPRAS	30,089,898.00	7,436,509.00	4.0462
TTKOM	TÜRK TELEKOM	28,744,908.00	5,522,642.00	5.2049
YKBNK	YAPI VE KREDİ BANK.	289,964,292.00	40,302,177.00	7.1948
AKBNK	AKBANK	310,894,569.00	43,183,580.00	7.1994
GARAN	GARANTİ BANKASI	352,266,759.00	46,473,281.00	7.5800
ISCTR	İS BANKASI (C)	444,292,464.00	46,589,031.00	9.5364
VAKBN	VAKIFLAR BANKASI	257,236,041.00	26,692,436.00	9.6370
SAHOL	SABANCI HOLDİNG	315,290,475.00	28,780,512.00	10.9550
HALKB	T. HALK BANKASI	359,605,180.00	28,294,502.00	12.7094

Based on literature review, the following portfolios are used for debt/equity criterion in the study.

- 5 companies with the highest ratios,
- 5 companies with ratios between 1,5 and 2,
- 5 companies with the lowest ratios,
- 17 companies with ratios higher than 2,
- 10 companies with ratios lower than 2.

According to this criteria, the portfolios are prepared. 5 different portfolios are given below in Table 2.

**Table 2.** Portfolios Based on Debt-to-Equity Criteria

PORTFOLIO	TICKER	COMPANY	DEBT-TO-EQUITY RATIO
PORTFOLIO 1 (5 companies with the highest ratios)	HALKB	T. HALK BANKASI	12.7093
	SAHOL	SABANCI HOLDİNG	10.9549
	VAKBN	VAKIFLAR BANKASI	9.6370
	ISCTR	İŞ BANKASI (C)	9.5364
	GARAN	GARANTİ BANKASI	7.5799
PORTFOLIO 2 (5 companies with ratios between 1,5 and 2)	KRDMD	KARDEMİR (D)	2.0639
	PETKM	PETKİM	2.0468
	TKFEN	TEKFEN HOLDİNG	1.8274
	TCELL	TURKCELL	1.8045
	BIMAS	BİM MAĞAZALAR	1.7163
PORTFOLIO 3 (5 companies with the lowest ratios)	EREGL	EREĞLİ DEMİR CELİK	0.4133
	KOZAA	KOZA MADENCİLİK	0.2013
	KOZAL	KOZA ALTIN	0.0917
	ASELS	ASELSAN	0.0838
	SISE	ŞİŞE CAM	0.0029
PORTFOLIO 4 (17 companies with ratios higher than 2)	HALKB	T. HALK BANKASI	12.7094
	SAHOL	SABANCI HOLDİNG	10.9550
	VAKBN	VAKIFLAR BANKASI	9.6370
	ISCTR	İŞ BANKASI (C)	9.5364
	GARAN	GARANTİ BANKASI	7.5800
	AKBNK	AKBANK	7.1994
	YKBNK	YAPI VE KREDİ BANK.	7.1948
	TTKOM	TÜRK TELEKOM	5.2049
	TUPRS	TÜPRAŞ	4.0462
	TOASO	TOFAŞ OTO. FAB.	3.1550
	KCHOL	KOÇ HOLDİNG	2.4229
	ARCLK	ARÇELİK	2.2485
	PGSUS	PEGASUS	2.1805
	THYAO	TÜRK HAVA YOLLARI	2.1232
	TAVHL	TAV HAVALİMANLARI	2.0823
	KRDMD	KARDEMİR (D)	2.0639
	PETKM	PETKİM	2.0468
PORTFOLIO 5 (10 companies with ratios lower than 2)	TKFEN	TEKFEN HOLDİNG	1.8274
	TCELL	TURKCELL	1.8045
	BIMAS	BİM MAĞAZALAR	1.7163
	EKGYO	EMLAK KONUT GMYO	0.7925
	DOHOL	DOĞAN HOLDİNG	0.5401
	EREGL	EREĞLİ DEMİR CELİK	0.4133
	KOZAA	KOZA MADENCİLİK	0.2013
	KOZAL	KOZA ALTIN	0.0917
	ASELS	ASELSAN	0.0838
SISE	ŞİŞE CAM	0.0029	

The portfolios' expected returns and risks are calculated based on Modern Portfolio Theory literature. The results are

presented in Table 3.

**Table 3.** Expected Return and Risk of the Portfolio Based on Debt-to-Equity

PORTFOLIO	EXPECTED RETURN (%)	VARIANCE (%)	STD DEVIATION (%)
PORTFOLIO 1	-0.1254	0.0500	2.2350
PORTFOLIO 2	-0.0210	0.0235	1.5336
PORTFOLIO 3	0.0472	0.0361	1.8990
PORTFOLIO 4	-0.1023	0.0284	1.6844
PORTFOLIO 5	0.0276	0.0207	1.4376

### Return on Equity Based Portfolios

Return on Equity ratios are calculated using the financial statements of the companies in this research. The results are available in Table 4.

**Table 4.** Return on Equity Values for the Companies

TICKER	COMPANY	NET INCOME	TOTAL SHAREHOLDERS' EQUITY	RETURN ON EQUITY
TTKOM	TÜRK TELEKOM	-3,719,313.00	5,522,642.00	-0.6735
ARCLK	ARÇELİK	661,806.00	8,961,332.00	0.0739
TCELL	TURKCELL	1,373,077.00	14,802,682.00	0.0928
HALKB	T. HALK BANKASI	2,920,607.00	28,294,502.00	0.1032
THYAO	TÜRK HAVA YOLLARI	3,899,000.00	36,639,000.00	0.1064
YKBANK	YAPI VE KREDİ BANK.	4,465,769.00	40,302,177.00	0.1108
ISCTR	İŞ BANKASI (C)	5,777,911.00	46,589,031.00	0.1240
EKGYO	EMLAK KONUT GMYO	1,789,728.00	12,916,104.00	0.1386
AKBNK	AKBANK	6,163,065.00	43,183,580.00	0.1427
PGSUS	PEGASUS	653,223,000.00	4,562,974,000.00	0.1432
KCHOL	KOÇ HOLDİNG	4,903,846.00	32,323,610.00	0.1517
VAKBN	VAKIFLAR BANKASI	4,169,689.00	26,692,436.00	0.1562
GARAN	GARANTİ BANKASI	7,275,404.00	46,473,281.00	0.1566
SAHOL	SABANCI HOLDİNG	4,541,952.00	28,780,512.00	0.1578
EREGL	EREĞLİ DEMİR ÇELİK	5,106,577.00	30,314,526.00	0.1685
TAVHL	TAV HAVALİMANLARI	1,196,609.00	7,004,175.00	0.1708
SISE	ŞİŞE CAM	2,439,830.00	13,159,048.00	0.1854
KRDMD	KARDEMİR (D)	381,658,000.00	2,008,683,000.00	0.1900
KOZAA	KOZA MADENCİLİK	404,661.00	1,986,828.00	0.2037
ASELS	ASELSAN	2,295,175.00	9,381,588.00	0.2446
TKFEN	TEKFEN HOLDİNG	1,222,895.00	4,165,070.00	0.2936
KOZAL	KOZA ALTIN	1,131,881.00	3,799,385.00	0.2979
PETKM	PETKİM	1,280,575.00	4,129,789.00	0.3101
TUPRS	TÜPRAŞ	2,440,089.00	7,436,509.00	0.3281
BIMAS	BİM MAĞAZALAR	1,113,002.00	3,167,198.00	0.3514
TOASO	TOFAŞ OTO. FAB.	1,428,177.00	2,946,180.00	0.4848
DOHOL	DOĞAN HOLDİNG	4,287,363.00	7,309,101.00	0.5866

Based on knowledge in corporate finance literature, the following portfolios are used for return on equity criteria in this research.

- 5 companies with the highest ratios,
- 5 companies with the lowest ratios,
- 9 companies with ratios higher than 0,2,
- 18 companies with ratios lower than 0,2.

Following this criteria, the portfolios are determined. Calculation results and the four portfolios are given in Table 5.

**Table 5.** Portfolios Based on Return on Equity Criteria

PORTFOLIO	TICKER	COMPANY	RETURN ON EQUITY
PORTFOLIO 6 (5 companies with the highest ratios)	PETKM	PETKİM	0.3101
	TUPRS	TÜPRAŞ	0.3281
	BIMAS	BİM MAĞAZALAR	0.3514
	TOASO	TOFAŞ OTO. FAB.	0.4848
	DOHOL	DOĞAN HOLDİNG	0.5866
PORTFOLIO 7 (5 companies with the lowest ratios)	TTKOM	TÜRK TELEKOM	-0.6735
	ARCLK	ARÇELİK	0.0739
	TCELL	TURKCELL	0.0928
	HALKB	T. HALK BANKASI	0.1032
	THYAO	TÜRK HAVA YOLLARI	0.1064
PORTFOLIO 8 (9 companies with ratios higher than 0,2)	KOZAA	KOZA MADENCİLİK	0.2037
	ASELS	ASELSAN	0.2446
	TKFEN	TEKFEN HOLDİNG	0.2936
	KOZAL	KOZA ALTIN	0.2979
	PETKM	PETKİM	0.3101
	TUPRS	TÜPRAŞ	0.3281
	BIMAS	BİM MAĞAZALAR	0.3514
	TOASO	TOFAŞ OTO. FAB.	0.4848
	DOHOL	DOĞAN HOLDİNG	0.5866
PORTFOLIO 9 (18 companies with ratios lower than 0,2)	TTKOM	TÜRK TELEKOM	-0.6735
	ARCLK	ARÇELİK	0.0739
	TCELL	TURKCELL	0.0928
	HALKB	T. HALK BANKASI	0.1032
	THYAO	TÜRK HAVA YOLLARI	0.1064
	YKBNK	YAPI VE KREDİ BANK.	0.1108
	ISCTR	İŞ BANKASI (C)	0.1240
	EKGYO	EMLAK KONUT GMYO	0.1386
	AKBNK	AKBANK	0.1427
	PGSUS	PEGASUS	0.1432
	KCHOL	KOÇ HOLDİNG	0.1517
	VAKBN	VAKIFLAR BANKASI	0.1562
	GARAN	GARANTİ BANKASI	0.1566
	SAHOL	SABANCI HOLDİNG	0.1578
	EREGL	EREĞLİ DEMİR ÇELİK	0.1685
	TAVHL	TAV HAVALİMANLARI	0.1708
	SISE	ŞİŞE CAM	0.1854
	KRDMD	KARDEMİR (D)	0.1900

**Table 6.** Expected Returns and Risks of the Portfolios Based on Return on Equity

PORTFOLIO	PORTFÖYÜN BEKLENEN GETİRİSİ (%)	PORTFÖYÜN VARYANSI (%)	PORTFÖYÜN RİSKİ (STD SAPMASI) (%)
PORTFOLIO 6	-0.0188	0.0206	1.4351
PORTFOLIO 7	-0.0796	0.0342	1.8503
PORTFOLIO 8	0.0250	0.0208	1.4424
PORTFOLIO 9	-0.0938	0.0285	1.6894

Finally, the expected returns and risks of these portfolios are calculated based on Modern Portfolio Theory. The results of these computations are given in Table 6.

### Investment Decision

The results based on debt-to-equity criterion show that Portfolios 3 and 5 have positive return. (0,0472 and 0,0276 respectively), whereas Portfolios 1, 2 and 4 have negative returns. (-0,1254, -0,0210, and -0,1023 respectively) Portfolio 1 has negative return and also the highest risk. Portfolio 5 has lower risk and return (still positive) when compared to Portfolio 3. It could be recalled that Portfolio 3 includes 5 companies with lowest debt-to-equity and Portfolio 5 has 10 companies with the ratio lower than 2. While both portfolios are investable a risk averse investor could well chose the more diversified but still low debt-to equity Portfolio 5.

According to the results based on return on equity; Portfolio 8 has a positive return(0.0250) ; whereas Portfolios 6, 7 and 9 has negative returns (-0.0188,-0.0796, -0.0938 respectively). Portfolios 7 and 9 which have negative returns also have higher risks than that of Portfolio 8 which has positive return. Despite having 5 highest ratios of Return on Equity, Portfolio 6 has negative return. However Portfolio 8 which has 9 companies with ratios larger than 0,2 has positive return. Therefore Portfolio 8 can be selected for investment purpose.

## 5. Discussion

This study has an empirical analysis on Istanbul Stock Exchange, ISE 30 which is an index on 30 bluechip stocks. The research period is 2018. The research to authors knowledge brings a novelty to the MPT literature by proposing financial analysis based selection criteria. The ratios used are debt-to-equity and return on equity.

According to the results, efficient portfolios could be selected when financial analysis based selection criteria is added to MPT. Therefore it is possible to say minimum risks and maximum return portfolios could be selected even when these criteria is added. Further benefits is discussed in the conclusion section of the study.

Returning to the results, the first part of the analysis is debt-to-equity. Both Portfolios 3 and 5 generate positive returns. It is important to note that both of these portfolios

are low debt-to-equity (D/E) portfolios. Therefore during the period, low D/E portfolios (lower risk) performed better. The difference between these portfolios are D/E ratios are lower in average in Portfolio 3 but there are fewer companies. The not so low D/E portfolio 5, has lower risk due to the fact that it has more assets with low correlations.

So risk averse investor should go for Portfolio 5, even Portfolio 3 has better D/E ratios, due to the fact that Portfolio 5 is more diversified.

The other analysis is MPT applied with return on equity(ROE) criterion. It is important to note that only Portfolio 8 generated positive return during the period. This is due to the fact that it has high ROE, and is more diversified. It should be emphasized that investor should be cautious even when using financial analysis based criteria on MPT. Blindly picking stocks that have best ratios does not generate best returns. Investors should go for diversified portfolios which should yet have better ratios. Again, in the analysis Portfolio 6 had best ratios but had negative return.

## 6. Conclusions

All theories in economics come with assumptions. Modern portfolio theory also has many assumptions and seemingly works in an ideal word. However, applications over years show that the theory is pretty sound and is still part of corporate finance and investment books.

There are however ongoing and increasing number of criticisms on MPT. Some even say that the theory is dead. One of the popular criticisms is black swan argument. One of the assumptions of the MPT is that it assumes the returns of the assets are normally distributed. But in times of a financial turmoil, say 2008, the correlations between asset classes increase, and the assets lose value more than what is expected by the normal distribution.

The motivation of this paper is to bring another dimension to the ongoing discussions. Is it possible to generate efficient (high return / low risk) portfolios by adding selection criteria to the theory? The proposed criteria is financial analysis based, more specifically debt-to-equity and return on equity ratios.

For the selected data, it could be said that these criteria could well generate efficient portfolios. Moreover, in authors' opinion, it is also preferable to standard MPT. Since if you are risk averse investor who try to minimize

losses in times of a financial turmoil, you can add fundamental criteria which is not subject to normal distribution. This study brings a new alternative technique to the investor, and adds a new dimension to the ongoing debates whether the MPT is dead or alive.

The portfolios are all selected from the same index. Therefore it can be said that the alternate portfolios are benchmarks. The stocks are different based on risk and return characteristics although they are in the same index. A different analysis may include international comparisons to these stocks in an attempt to find international benchmarks with similar risk and return characteristics.

Like every novelty, for this to be universally accepted, it should be tested hundreds of times in different markets and time horizons. Different time period comparisons couldn't be included due to space limitations. The suggested portfolios vary based on volatility of the market during the period.

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