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A Post-Modern Portfolio Management Approach on CEE Markets

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Abstract

In this paper we apply two methods based on the Post-Modern Portfolio Management approach to study the risk-adjusted return of 5 major indices from emerging markets in Central and Eastern Europe during the period 2008-2013 on daily data. First, we involve the Sortino ratio. Secondly we propose an alternative method to the Sortino ratio for calculating the risk-adjusted return using a "multipliers method" to determine a global measure of risk.

The Sortino ratio is used to score a portfolio's risk-adjusted returns relative to an investment target using downside risk and it measures the risk-adjusted return of an investment asset, portfolio or strategy. Our proposed alternative method is using the same logic and frame structure as Sortino ratio. However instead of downside risk we use the global risk calculated using multipliers. This is due to the fact that Sortino ratio does not distinguish between sub-cases possible – unrealized return area and loss area (negative return). Because of these we believe that it would be necessary a new method which to refine the results and take and into account the three areas.

Our dataset includes 5 emerging markets: Romania (BET), Hungary (BUX), Czech Republic (PX),

Bulgaria (SOFIX) and Poland (WIG). For each of them we estimate the Sortino ratio of length windows 7, 14, 42 and 10, 21, 60. We used two variants for each target return, namely 2% and 5%. We consider Germany as a benchmark.

After estimating the Sortino ratio and global risk calculated using "multipliers method", we conducted a parallel analysis between Sortino ratio and the proposed alternative method. We split the analysis time span in two sub-periods, 2008-2010 and 2011-2013.

As known, the higher the Sortino ratio, the better the risk-adjusted performance. The risk-adjusted return is influenced by the used target return and the used window. Analyzed data reveals that in case of Sortino ratio, Hungary has the best results and on the other side, Bulgaria has the worst results - regardless the window size or target return. In case of the alternative method, the best results are obtained on Hungary capital market and the worst results on Bulgaria and Poland capital market. Also, the analysis performed on the two sub-periods, 2008-2010 and 2011-2013, highlights the fact that Central and Eastern Europe emerging markets have experienced the crisis of 2008 with a delay.

Keywords: Emerging Markets, Risk-Adjusted Return, Portfolio Choice, Investment Decisions

Introduction

International financial theory highlights the positive impact of market segmentation on international portfolio value. By spreading risks among different countries, investors can minimize the negative effects of market volatility and ultimately yield increased long-term returns. However, the growing presence of co-movements among developed and emerging financial markets is now well documented.

The power of diversification is in theory magnified in the case of emerging markets (Bartram and Dufey, 2001).

Furthermore, specific risks such as political instability and information costs are compensated by higher than average returns. This is due to a faster rate of capital accumulation and faster economic growth than in developed countries. In a seminal study, Harvey (1995) showed that adding an emerging market component to a diversified

developed portfolio would result in a reduction of six percentage points in the total portfolio's volatility while the expected returns remain unchanged.

However, the performance characteristics of emerging markets may have changed as a consequence of recent financial crises and the increased economic and financial integration of emerging markets into the global markets.

The modern portfolio theory (MPT) represented at the middle of the past century a big step forward in the financial literature and the investment practice. The theory put a logic relation between the distribution of return rates and risk of the investment. It considers that investors acts rational in taking decisions about the investment performed, that they have aversion to risk and that the distribution of return rates is following a normal distribution.

In 1959, Harry Markowitz, the "father of modern portfolio theory" published Portfolio Selection in which he proposed that investors expect to be compensated for taking additional risk. And it was argued that an infinite number of "efficient" portfolios exist along a curve defined by three variables: standard deviation, correlation coefficient and return. The efficient-frontier curve consists of portfolios with the maximum return for a given level of risk or the minimum risk for a given level of return.

Sharpe credits Markowitz for taking a personal role in helping shape the doctoral dissertation that led to the capital asset pricing model (CAPM). In Sharpe's words: "The CAPM is built using an approach familiar to every microeconomist. First, one assumes some sort of maximizing behavior on the part of participants in a market; then one investigates the equilibrium conditions under which such markets will clear." Later work from Sharpe gave us the information ratio, a version of which became known as the Sharpe ratio - the first major attempt to create a measure for comparison of portfolios on a risk-adjusted basis. More than 50 years after the paper Portfolio Selection was published in the Journal of Finance, Harry Markowitz's views on MPT are still debated by the influential investment thinkers of our time. MPT is a tricky beast at best and, despite the fact that Markowitz eventually won a Nobel Prize, not everyone is convinced that Markowitz's efficient frontier is the best way to go.

Financial behavior presents the investor as a person that is reluctant to losses, but not to gains over the minimum expected return. The research of the investor reactions shows that he is in fact interested in obtaining a minimum desired return. Any result below the minimum

desired return is consider a loss, while gains higher than the expected level of return do not constitute a concern (but contrary, they are considered as premium for the courage of investing), the "good surprise" (Tsai, Wang, 2012).

The post modern portfolio theory (PMPT) was developed in the 1980s at the Pension Research Institute (USA) in order to better adapt the MPT to the market reality, including the minimum return rate accepted by the investor in the measurement of risk.

Although MPT remained a significant benchmark in the portfolio theory (Elton, Gruber, 1997, Chen, Tsai, Lin, 2011), the PMPT moves the financial theory and practice a step forward, considering the investor expectations (Nawrocki, 1999, Bawa, Lindenberg, 1977, Fishburn, 1977). Both theories are used within the financial research, but also outside this area. Researchers and business people extend their application to others economic domains (such as real-estate, energy portfolios, other investments except stocks) with interesting results and ways of applying the methods of quantifying risk (Madlener, Glensk, Raymond, 2009, Tsai, Wang, 2012, Hines, 2009).

Since the beginning of the present financial crises, many researchers and portfolio managers revive the question regarding the MPT realism relative to market conditions. Although MPT was preferred and used for decades before financial crises in 2008, the theory was blamed for failing in those moments (Welch, 2010). Investors and researchers start to look for alternative theories that would measure risk (Bertsimas, Lauprete, Samarov, 2004, Patari, 2008).

Until PMPT, the investors were considered as having a rational behavior regarding the investment decision process, all investors having the same expectation related to market future evolution. This concept is modified in PMPT. Investor is considered as having as target a minimum accepted return that insures him the emotional comfort and the investor is concerned the returns lower than his expected benchmark.

The attitude of investor regarding the returns is situated over the expected return rate. This rate is established by the investor in accordance with his own emotional satisfaction, and interests is considered being linear, neutral or even in favor of risk (Fishburn, 1977). These returns do not practically generate losses, but determine premium gains for the investment.

PMPT allows models applied for portfolio management to be more adequate to reality, having higher power in representing the economic reality (Dronin, 2012, Rani, 2012). The information offered is

better suited for the decisional process of managers that evaluate the investment opportunities in a competitive environment (Libby, Fishburn, 1977).

Starting from the basis elements of theory, there are a lot of developments and updates made to PMPT (Plantinga, van der Meer, Sortino, 2001, Kaplan, Knowles, 2004, Galloppo, 2010).

The attitude towards risk depends on the investor affinity to risk (Kaplan, Siegel, 1994). His wish to obtain a higher return implies accepting higher risk, so the minimum accepted return rate is higher. Downside risk is what investors consider to be risky and this became more "popular" among investors (Huang, 2008). The position of the minimum accepted return on the return rates distribution depends on the risk accepted.

Kushankur and Debasish (2012) examine the indian emerging market from 2009 to 2010. The authors find that there is a better risk-adjusted return for Sortino Ratio than for Sharpe ratio and Treynor ratio. Also Washer and Johnson (2013) conclude that the Sortino and the Sharpe ratios are more likely to rank differently and it could be argued that the Sortino ratio is superior to the Sharpe ratio. The same outcome is also supported by Grelck, Prigge et al. (2010) whose study was conducted on data from 1999-2009 on MSCI World Index. The index is designed to measure global developed market equity performance. In most cases portfolio performance improved in a greater extent using Sortino ratio than using Sharpe ratio.

Teherani, Ahmadinia and Hasbaei (2011) tried to analyze the performance of the investment companies listed in Teheran Stock Exchange from 2006 to 2010 by Sharpe Treynor and Sortino ratio. This study has indicated that the Sortino ratio is a more suitable ratio in this case. Using Sortino ratio, Lagoarde-Segot and Lucey (2007) seems to obtain best results in portfolio diversification for Middle East and North African (MENA) stock markets for 1998–2006 periods.

Methodology and Data

The Sortino ratio measures the risk-adjusted return of an individual asset or a portfolio:

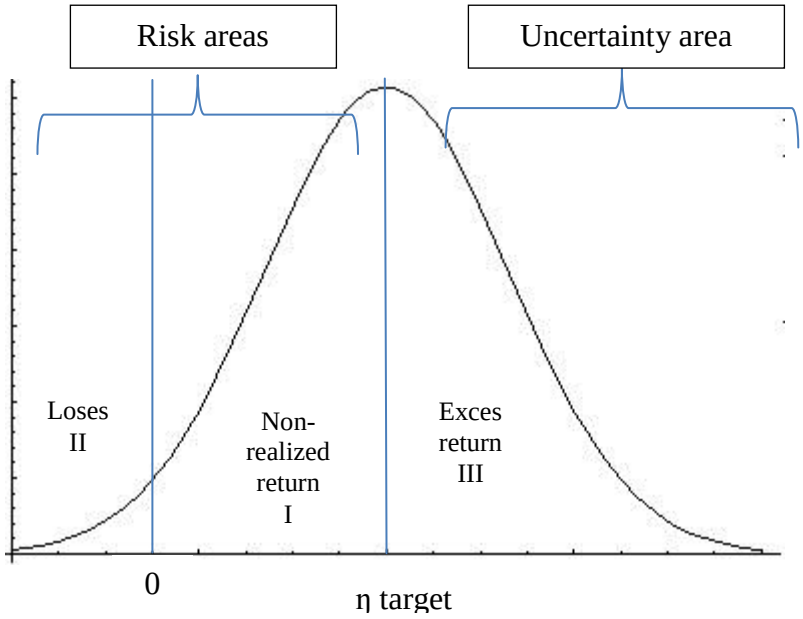
$S = (R – T) / DR$, where:

- R is the realized return of the asset or portfolio
- T is the minimum accepted return (MAR or ŋ target) and
- DR is the downside deviation as measured by the standard deviation of negative asset or portfolio returns (If $R < T$ then (R-T), 0 otherwise)

However, it only concerns itself with returns that fall below a user-specific minimum or required rate of return (minimum accepted return – MAR or ŋ target). In other words, it measures the excess return against the risk of failing to achieve the minimum return.

Our main argument is resumed by figure no. 1.

Fig. no. 1. Areas of return



Although Sortino Ratio differs from the other risk-adjusted return measures, which treat upside and downside volatility equally, it can be noted that the Sortino does not make a distinction between zone I and zone II (see figure no.1), i.e between the loses and non-realized return.

Relative importance of the two areas of risk (unrealized return area and loss area) varies depending on the risk profile of the investor thus:

(a) the more the investor will have a greater appetite for risk, the greater will be predisposed to pursue the effective returns as close to the target return. Also he will look into a more undifferentiated manner the two risk areas;

(b) the more the investor will have a pronounced aversion towards risk, the recording of a loss will be felt as having a wider negative connotation in relation to cases of unrealized return.

Because of these we argue that it might be necessary to develop a new method in order to refine the results and take into account the areas.

AM= (R – T) / GR*100, where:

R is the realized return of the asset or portfolio

T is the minimum accepted return (MAR or ŋ target)

GR is the global risk calculated using multipliers

Since Sortino ratio does not distinguish between sub-cases possible – unrealized return area and loss area (negative return), we propose an alternative method which is using the same logic and frame structure as Sortino ratio. The difference is that instead of downside risk we use the global risk calculated using multipliers. To these areas are assigned different weights wich reflect the risk profile of the investor.

Global GR is calculate as follows: first we calculate multipliers m1, m2, m3 with the "Objective" method – based on market information:

(a) we select a "short" window – w1, a "medium" window – w2 and a "long-run" window – w3 (w1<w2<w3)

(b) we compute Sortino ratios for w1, w2, w3

St=(R – T) / DRt (If R < T then (R-T), 0 otherwise)

(c) we calculate m1, m2, m3

m1 = 1 + |Sw1|/|Sw1| + |Sw2| + |Sw3|

m2 = 1 + |Sw1| + |Sw2| / |Sw1| + |Sw2| + |Sw3|

m3 = 1 + |Sw1| / 2 / |Sw1| + |Sw2| + |Sw3|

Then we calculate global risk as follows:

GR=Rt=$\sqrt{\sum_{i=t-w+1}^{t} ri}$

$$r\,t=\begin{cases}[m1*(\eta target-\eta t)]^{2}, & \eta t >= 0,\ \eta t <= \eta\ target\\ [m2*(\eta target-\eta t)]^{2}, & \eta t < 0\\ [m3*(\eta t-\eta target)]^{2}, & \eta t > \eta\ target\end{cases}$$

m2>m1>m3>1

ŋt = ln (closing price t/closing price t-1) * 100

After we calculated the global risk, we calculate AM ratio: AM= (R – T)/ GR. We keep in mind that for each area of the 3 we have a weight of the area as multipliers m1 (non-realized return), m2 (loses) and m3 (exces return) that were included in the calculation of global risk and they actually reflect investors' risk aversion.

The emerging markets that we consider are represented by Romania (BET), Hungary (BUX), Czech Republic (PX), Bulgaria (SOFIX) and Poland (WIG). For each of them we estimate the Sortino ratio of length windows 7, 14, 42 and 10, 21, 60. We used two variants for each target return, namely 2% and 5%. We consider Germany (DAX) as a benchmark. The daily closing prices of the stock indices have been selected through the www.quotenet.com and www.investing.com. The time period examined spans from October 2008 to October 2013 and the number of observations in the sample for each index is 1073.

Results and discussion

After estimating the Sortino ratio and alternative method ratio, we conducted a parallel analysis between Sortino ratio and the proposed alternative method. We split the analysis time span in two sub-periods, for 2008-2010 and, respectively, 2011-2013. Then we try to determine the rank of each country regarding the risk-adjusted return by Sortino and alternative method.

After conducting this parallel analysis between Sortino ratio and alternative method ratio, we will try to determine a rank for each country. The goal is to see which of the two methods generate more refined and accurate results in accordance with the observed reality. If a country has the best results, will receive a 6 and if he has the worst results will receive a 1.

Table no. 1. Sortino Ranking on sub-periods (2008-2010, 2011-2013)

Rank 2008-2010 w=42 tr=2%	w=42 tr=2%	w=42 tr=5%	w=60 tr=2%	Average rank 2008-2010	**Rank 2011-2013** w=42 tr=2%	w=42 tr=2%	w=42 tr=5%	w=60 tr=2%	Average rank 2011-2013
Romania	5	5	5	5	**5**	3	3	3	3	**3**
Hungary	6	6	6	6	**6**	6	6	6	6	**6**
Czech Republic	4	4	4	4	**4**	4	4	4	4	**4**
Bulgaria	1	1	1	1	**1**	1	1	1	1	**1**
Poland	2	2	2	2	**2**	2	2	2	2	**2**
Germany	3	3	3	3	**3**	5	5	5	5	**5**

The first sub-period, 2008-2010, after Sortino Ranking, first position and best results are attributed to Hungary, followed by Romania, Czeck Republic, Germany, Poland. The last position is occupied by Bulgaria. Regarding the situation for the second sub-period, 2011-2013, Hungary

remains on first position. On the second position ascend Germany, followed by Czeck Republic, Romania, Poland and the last position is kept occupied by Bulgaria. Basically you can see that Romania and Germany exchange places between them in the two sub-periods.

Table no. 2. Alternative method Ranking on sub-periods (2008-2010, 2011-2013)

Rank 2008-2010	w=42 tr=2%	w=42 tr=2%	w=42 tr=5%	w=60 tr=2%	Average rank 2008-2010	**Rank 2011-2013** w=42 tr=2%	w=42 tr=2%	w=42 tr=5%	w=60 tr=2%	Average rank 2011-2013
Romania	6	6	6	6	**6**	4	3	4	3	**4**
Hungary	6	5	5	5	**5**	5	5	5	5	**5**
Czech Republic	4	4	4	3	**4**	3	2	3	2	**3**
Bulgaria	3	3	4	4	**4**	1	1	1	1	**1**
Poland	1	1	1	1	**1**	2	4	2	4	**3**
Germany	3	2	2	2	**2**	6	6	6	6	**6**

In Table no. 2 we can see that the first sub-period, 2008-2010, after alternative method Ranking, first position and best results are attributed to Romania, followed by Hungary, Czeck Republic, Bulgaria, Germany. The last position is occupied by Poland.

Regarding the situation for the second sub-period, 2011-2013, on the first position we have Germany. On the second position remains Hungary, followed by Romania, Poland, Czeck Republic and Bulgaria.

Table no. 3. Sortino Ranking and alternative method Ranking on the entire period (2008-2013)

	Sortino Rank w=42 tr=2%	w=42 tr=2%	w=42 tr=5%	w=60 tr=2%	Average Sortino Rank	**Alternative Method** w=42 tr=2%	w=42 tr=2%	w=42 tr=5%	w=60 tr=2%	Average Alt. Meth. Rank
Romania	3	3	3	3	**3**	5	6	5	6	**6**
Hungary	6	6	6	6	**6**	6	5	6	5	**6**
Czech Republic	4	4	4	4	**4**	3	3	3	3	**3**
Bulgaria	1	1	1	1	**1**	1	2	1	2	**2**
Poland	2	2	2	2	**2**	2	1	2	1	**2**
Germany	5	5	5	5	**5**	4	4	4	4	**4**

If we consider the whole analyzed period (2008-2013), Sortino Rank positions Hungary on the first place, but the second comes Germany. Then follows the Czeck Republic, Romania, Poland and Bulgaria.

Regarding alternative method Rank for the entire period (2008-2013), first place is awarded to Hungary and Romania. The following positions are occupied by Germany, Czech Republic, Bulgaria and Poland.

Table no. 4. Sortino Ranking vs. Alternative Method Ranking

	Sortino Ranking			**Alternative Method Ranking**		
	2008-2010	**2011-2013**	2008-2013	2008-2010	**2011-2013**	2008-2013
Romania	5	**3**	3	6	**4**	6
Hungary	6	**6**	6	5	**5**	6
Czech Republic	4	**4**	4	4	**3**	3
Bulgaria	1	**1**	1	4	**1**	2
Poland	2	**2**	2	1	**3**	2
Germany	3	**5**	5	2	**6**	4

Here we have the ranking for the entire analyzed period (2008-2013). In case of Sortino Ranking - Hungary has the best ranking. Germany gets the second place and Romania is on the 4th place. This happens even though in the first sub-period (2008-2013) Romania had a ranking of 5, while Germany had a ranking of 3 and in the next sub-period (2011-2013) Romania had a ranking of 3, while Germany had a ranking of 5. The other countries keep the same positions they had in the two sub-periods.

Regarding the alternative method ranking, Poland and Bulgaria has the lowest ranking: 2. Although Romania has a ranking of 6 in the first sub-period and a ranking of 4 in the next sub-period and Hungary has a ranking of 5 for the both sub-periods, at the level of the entire period (2008-2013) – best ranking is obtained by Hungary and Romania. Just as in the case of Sortino ranking, Bulgaria and Poland have the worst ranking. Both for Czech Republic and Germany, their ranking has decreased by one unit in comparison with Sortino Ranking.

Conclusions

Our main purpose regarding this paper was to propose an alternative method for risk-adjusted return which distinguishes between the following possible sub-cases – unrealized return area and loss area (negative return). In case of the alternative method that we propose for these two areas are assigned different weights which reflect the risk profile of the investor.

The two methods, both based on the Post-Modern Portfolio Management approach, have been applied to study the risk-adjusted return of the 5 major indices on CEE emerging markets. These gave us an overview of the situation of Central and Eastern European emerging markets during the period 2008-2013. For both, Sortino ratio and alternative method, we have obtained better results for the first sub-period, 2008-2010, and worse results for the second sub-period, so as in case of window size of 42 or 60 just as in case of 2% and 5% target return.

We noticed that the risk-adjusted return is influenced by the used target return and the used window for both Sortino ratio and alternative method. In case of the same window used, difference is made by target return. If target return is smaller, we have better results in comparison with higher target return on the same window length. If the target return increases for the same given window length, we obtain worse Sortino ratio results. On the other side if we increase the size of window, but keep the same target return, we have in almost all cases better result that in case of smaller window's length.

Our main results highlight the fact that in case of Sortino ratio, Hungary has best ranking. It also obtains best Sortino ratio and best risk-adjusted returns, while Bulgaria takes the prize for worst results and worst risk-adjusted returns. This is conserved for the two countries on the two sub-periods (2008-2010 and 2011-2013), as well as during the entire study (2008-2013).

Regarding alternative method, best results are attributed for the first sub-period (2008-2010) to Romania followed by Hungary and the worst results went to Poland. In the second sub-period (2011-2013), Germany gets the first place, followed by Hungary. On the last place is situated Bulgaria. For the whole period, Hungary and Romania have the best ranking and Bulgaria and Poland have the worst ranking.

If we look comparatively we notice that in most of the cases both methods place Hungary on the first place with best results and best risk-

adjusted return, while Bulgaria and Poland seems to have the worst risk-adjusted return.

As a general conclusion resulting from the comparison of the two methods of measuring risk - Sortino and alternative method - there are some clear evidences that alternative method could offer a better measure of risk, more flexible and adapted to the investment process reality. Further research should provide better methodological insides, for instance by explaining in greater details the choice of multipliers values.

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