

Technical Tools And Equity Selection: A Reward/Risk Rating Indicator For The Stock Market Components

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ABSTRACT

In this paper we focus on three issues. First, we analyse which technical concepts can be considered as the main qualifiers of the trend of a stock. Emphasis is applied to an integrated approach that takes into account four different elements: trend direction, trend quality, trend potential and relative strength. Second, we define each one of these elements through adequate technical tools – both traditional and new. Third, we compound these tools into a technical rating model, in order to examine if it is possible – through the only use of technical analysis - to create an indicator for weighting the different reward/risk degrees present in the stock market. The indicator has been subsequently applied to four homogeneous sets of stocks and the consistency of its indications verified, with simple but strict rules, for a multi-year period.

This technical indicator has been called “Reward/Risk Rating” (abb.: RRR), from the concept that is the base of this work.

The Reward/Risk Rating indicator, in the acceptance of this study, is a technical measure created to give a simple and clear value to the theoretical probability of success and/or overperformance of a long - new or existing - equity position.

The results of the empirical analysis will demonstrate that there is a direct correlation between this Reward/Risk Rating indicator and the probabilities that a stock will trade, in the future, at higher prices and/or overperform its benchmark and its lower-rated peers.

1. INTRODUCTION

“More zeal and energy, more fanatical hope and more intense anguish have been expended over the past century in efforts to “forecast” the stock market than in almost any other single line of human action.” (Richard D. Skinner, *Seven Kinds of Inflation*, 1937).

Now, more than seventy years after Skinner’s pronouncement, the zeal and energy are still clearly visible in the inexhaustible search for forecasting techniques to indicate what and when to buy and sell.

In particular, every stock market participant – investor, analyst, money or fund manager – is obviously interested in understanding which stocks are going to be the winners and the losers. If the investor already has a position, his/her desire is to understand if these positions are still good to be held or if they have to be sold or switched. If - instead – the investor is going to open a new position, he/she wants to know where to concentrate attention and investments.

One of the most important tools of technical analysis is to move statistical odds in one’s favour during the decision process and the trading activity. In fact, one of the basic assumptions of technical analysis is that the market itself generates, through prices, enough informations regarding the actual situation and the future perspectives of each single component. During the last decades, the world of technical analysis has done various attempts to extrapolate forms and concepts of technical ranking, but the majority of professionals and investors remains convinced that ranking a stock or a sector as a “buy”, a “sell” or a “hold” is quite exclusively a matter for fundamental analysis. But a simple look at the statistics regarding the average profitability of fundamental calls during the past decade, proves that this conviction is far to be supported by the numbers. The distribution of the rate of success of fundamental calls on single stocks decreases so dramatically during periods of high volatility and trend change, that in the long run they have, on average, not much more probability of success than the bet on a coin flip.

This seems to be a very good argument in favour of the third, more academic school that really denies the validity of both technical and fundamental analysis. This school holds that stock price variations act like “random walk” movements and believes that the future is unpredictable by any known method. Most simply, the theory of random-walk implies that stock price changes have no memory and that the past history of the series cannot be used to predict the future in any meaningful way. It means that even

superior analysts who can consistently and reliably project economic events have no chance of earning extraordinary profits in the market and that the technical analysts using past price data would not succeed in determining future price trends. The academic challenge, as technical analysts, is to contrast this last affirmation.

2. BACKGROUND AND METHODOLOGY

This paper originates mainly from considerations on the works of different authors. It also represents a tentative connection between different concepts and methods, through personal implementations. Therefore, it is dutiful to mention at least the three most influential authors, with reference to their contribution:

- Ian Notley, for his methodological construction and for many concepts utilized in this work: between the others, the division of the trend in stages, the importance of the momentum in defining these stages, the concept of cyclical dominance and the practical application of the stock selection to a portfolio;
- Martin J. Pring, for the works on the stages of the economic cycle and their definition;
- Welles J. Wilder, for the technical studies on relative strength and for the Directional Movement concept and application.

In particular, our work tries to examine if better results, in the ranking process of a group of stocks, can be obtained through the only application of technical analysis. As deMark have already evidenced, filtering markets through quantitative and statistical methods implies – with or without a direct will – an attempt to move technical analysis, or at least some of its parts, towards the stature of a science. This attempt, in our opinion, remains hard and somewhat dangerous, in part due to the utmost importance of psychology in market behaviours, and in part because it should be well kept in mind that - if the term “science” means a direct and constant correlation between cause and effect – neither technical nor fundamental analysis could never be called a science. Technical analysis is fed from many other disciplines: its problems and limits in being defined a “science” are the same that can be found within other fields of human activity (i.e. medicine, engineering) where both objectivity - statistics, data, quantitative methods etc.- and subjectivity – that is decision’s quality - must ultimately live and give their contribution together.

The author’s conviction is that, apart from the possibility of defining technical analysis a science or not, the quantitative way is the correct one to approach markets. As some of the most brilliant minds of the last decades – Wilder, Kaufman, DeMark, Notley and others - have demonstrated with their works, the real plus of technical analysis derives not from its subjective parts and methods, but from an adequate and statistical treatment of price and market action - quantitative analysis - and from its capability to give concrete answers to operative problems. In other words, the main difference that should separate technical analysis from other market approaches lies not in the fact that it analyses prices or graphics instead of economic/fundamental data, but in its strong and natural mathematical relation with the “here-and-now” activity of the market flows, that means trading, money/asset management and real applications. The contribution of this and similar works, relating to technical analysis, is to give further consideration to the most valuable part of our discipline, going toward a continuative research of methods and applications as objective and useful as possible to help investors at any level.

Going back to the root definition of technical analysis, it can be stated that the same aim of moving statistics in one’s favour does not pertain only to traders and investors, but also to equity/fund managers. The real difference between these categories lies in their respective goals and limits: the trader has the main objective to take home trading profits and has mostly a very short (even if flexible) time horizon, while the manager’s action could have different and less linear goals. The most frequent goal, at least relating

to equity and fund managers, is to beat a benchmark: but a fund manager certainly has more limits than a trader and, on average, a much longer term horizon to measure his results (usually year by year).

Direct experience reveals that to beat a benchmark is often as much - if not more - difficult than to gain in absolute terms. The proof comes from the widespread statistics about equity funds: each year, only a slight minority beats the benchmark. That means that their managers have great difficulty to create enough “Alpha” or addeed value. Further investigation clarifies that, in most cases, this inability to beat the benchmark has three main roots: costs (that obviously have no relation with this research), money management and the equity selection process: the latter is the key point of this presentation.

The following process consists in four parts. The first part regards the choice of the model, with specific reference to the technical nature and to the components of the trend (direction, quality and potential). The second part analyses the choice and the application of the technical indicators. The third part explains the construction of the rating indicator (RRR). The fourth part shows the results of a monthly backtesting of the indicator on four different stock aggregates, over a period of five years.

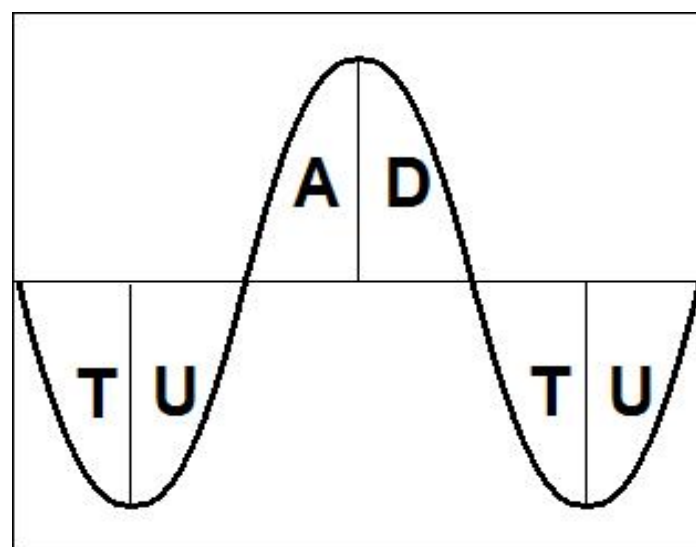
3. CHOICE OF THE MODEL: TECHNICAL NATURE AND COMPONENTS OF THE TREND

Our investigation on the nature and the components of the trend, as qualifiers for the formation of the technical rating of an item, takes origin from two methodologies:

- Notley’s bell-shaped curve model and the classification in four cyclical stages, defined by a momentum oscillator;
- Pring’s division of the economic cycle in six stages and the methodology used for defining the position of each component.

In Notley’s methodology, one of the key concepts is the determination of the cyclic position in each time frame, in relation to a momentum oscillator. There are four possible cyclical positions (see Figure 1):

Figure 1 : the four cyclical positions according to Notley’s methodology

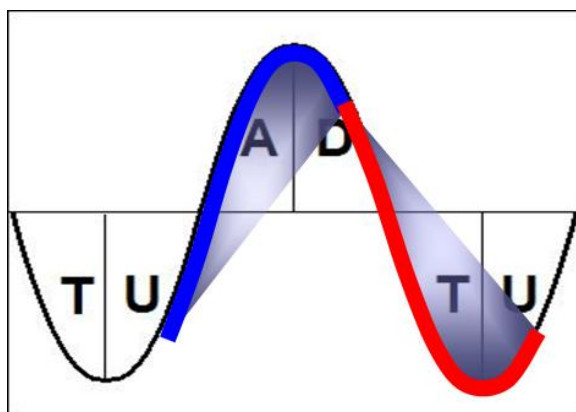


- | | | | |
|------------------------|-----------------|---------------------------|-------------------|
| 1. below zero + rising | → Up (U) | 3. above zero + declining | → Down (D) |
| 2. above zero + rising | → Advancing (A) | 4. below zero + declining | → Terminating (T) |

Each stock universe is then screened and results are expressed in % of the total for each cyclical position.

This concept is extremely useful but with a characteristic that Notley himself considered in the methodology: the concept of “extension”. An extension - in the momentum model - takes place only in two cases: when momentum reverses on the upside from T to U and then returns in phase T (downside extension); or, at the opposite, when momentum reverses on the downside from A to D and then returns in phase A (upside extension). The experience shows that many big moves – especially the tails of a trend in both directions – take place as momentum extensions. The consequence is that the “profitability cycle” of the momentum model somewhat differs from the cycle of momentum itself, in the meaning that momentum is often leading the profitability trend in both directions. Figure 2 shows the difference between the two cycles, momentum and profitability (profitability areas are shaded).

Figure 2 : the four cyclical positions and the profitability areas



Obviously, profitability is not a constant: and this is a key point in taking us to the consideration that momentum position cannot be the only technical qualifier of the trend potential. Notley himself forged the concept of “cyclical dominance”, to limit the potential damage of a simplified utilization of this model. Simply stated, the cyclical dominance is defined calculating which is the couple of near sections that has the prevailing summed percentage.

- Prevailing T+U → bottoming dominance
- Prevailing U+A → bullish dominance
- Prevailing A+D → topping dominance
- Prevailing D+T → bearish dominance

The concept of the temporal intersection of the various components of a trend (in this case, the economic trend) and the concept of a trend leading another, can both be retrieved in Pring's model. This model divides the economic cycle in six stages and establishes “that there is a chronological sequence to the business cycle in which the bull and bear markets of bonds, stocks and commodities are continually rotating. Because there are three markets, and each experiences a peak and a trough, it follows that there are six majors turning points. These may be used to break the cycle into six phases or stages. Each stage has a specific environmental characteristic.” (Pring M.J., *The All Season Investor*; New York: Wiley & Sons, 1992).

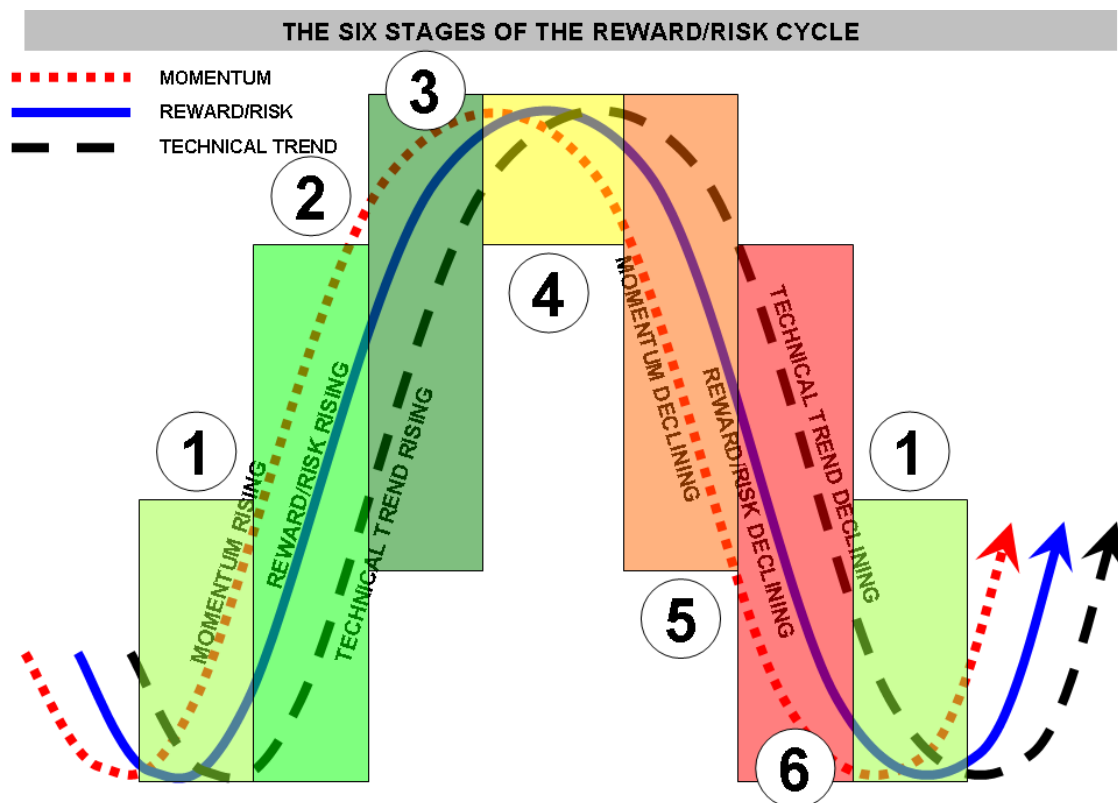
The action of the different components (stock market, economic indicators, interest rates, commodities) follows a similar rhythm, but with a displaced temporal sequence. Each stage is qualified by a different mix of situations, different degrees of reward/risk for each asset class and – in consequence – a different optimal asset allocation. The definition of each stage is not subjective, but linked to the position of a set of indicators.

The integrated observation of Notley's momentum model and Pring's model of economic stages, took us to the consideration that there is a sequence that can be observed in the three main technical components of the trend cycle at each different time level, and that it resembles in many points the sequence of the components of the economic cycle.

The choice has been to amplify Notley's concept of four momentum stages and extend them to six stages that relate in particular to profitability, adding two stages that can better qualify the two critical phases of accumulation and distribution and trying to relieve the problem represented from the extensions. In particular, it has been observed that momentum is often leading/coincidental with the reversal of the trend, while classical trend indicators - like moving averages or Directional Movement - are often lagging. This is clearly not always true, neither it is not a new concept by itself. The dilemma between leading and lagging indicators in the choice of market signals has been widely treated by technicians and researchers and cannot be probably solved if not integrating different time frames, like in Notley's model. The argument, here, is to structure a model that takes into consideration the different combinations of the technical components of the trend. These components are related to the concept of profitability and - ultimately - to a rating that could represent the actual expression of the potential reward/risk ratio of a position for the next future.

The resulting scheme and the division of the reward/risk cycle in six stages is shown in the following Figure 3:

Figure 3 : the six stages of the reward/risk cycle and its components



The process of defining the position of each stage, takes into account three factors: (1) trend direction and (2) trend quality, that together form the technical trend; (3) momentum. The logic is that momentum often anticipates/leads the technical trend and that a deterioration in the quality of the technical trend often anticipates, in both directions, corrections and inversions. This is even more true and less deceptive – as Notley has always sustained - when analysing a universe of equities with a bottom-up approach (i.e. grouped by sectors). We can summarize in the scheme below (Table 1) the stages of the trend, their technical characteristics and the connected theoretical profitability in retaining/opening long positions:

Table 1 : the six stages of the trend and their characteristics

STAGE	TECHNICAL CHARACTERISTICS	DEFINITION	AVERAGE REWARD/RISK
1	Momentum → NEUTRAL TO POSITIVE Technical Trend → NEGATIVE TO NEUTRAL	ACCUMULATION	MEDIUM → HIGH
2	Momentum → POSITIVE Technical Trend → NEUTRAL TO POSITIVE	EXPANSION	HIGH
3	Momentum → POSITIVE TO NEUTRAL Technical Trend → POSITIVE	SPECULATION	HIGH → MEDIUM
4	Momentum → NEUTRAL TO NEGATIVE Technical Trend → POSITIVE TO NEUTRAL	DISTRIBUTION	MEDIUM → LOW
5	Momentum → NEGATIVE Technical Trend → NEUTRAL TO NEGATIVE	CONTRACTION	LOW
6	Momentum → NEGATIVE TO NEUTRAL Technical Trend → NEGATIVE	CAPITULATION	LOW → MEDIUM

This scheme represents the model that we follow in the construction of the rating, for what concerns the trend and momentum components. The next chapters of the paper are devoted to recognize the technical tools to be used for specifically defining each component and the correspondent weight to be ascribed.

4. CHOICE AND APPLICATION OF TECHNICAL INDICATORS

Four technical factors have been selected to compose the rating for each stock:

1. Trend direction
2. Trend quality
3. Momentum direction
4. Relative strenght

The first three factors derive from the concepts examined in the previous chapter. Relative strenght is a qualifier that is appliable only when a benchmark is present. Each factor has been defined and rated through an adequate technical tool.

4.1 - Trend direction

Trend direction and trend quality represent together the technical trend. Trend direction has been defined through the combined utilization of Wilder's Directional Movement and weighted moving averages. The trend is qualified "positive" - and weighted +1 - when there is the concurrence of three factors:

- $Diplus(5)$ is above $Diminus(5)$
- 6 period weighted moving average of the stock is above 12 period weighted moving average of the stock
- 6 period weighted moving average of the stock is above its own 6 period weighted moving average

When the opposite is true, the trend is qualified "negative" and weighted -1. All the remaining situations are qualified as "neutral" and weighted 0. Remember that the model works on a monthly time frame: each coefficient choice has therefore been done in consequence.

Trend direction - Metastock formula = $If((PDI(5) > MDI(5) \text{ AND } Mov(C,6,W) > Mov(C,12,W) \text{ AND } Mov(C,6,W) > Mov(Mov(C,6,W),6,W)), 1, If((PDI(5) < MDI(5) \text{ AND } Mov(C,6,W) < Mov(C,12,W) \text{ AND } Mov(C,6,W) < Mov(Mov(C,6,W),6,W)), -1, 0))$

4.2 - Trend quality

It is essentially represented by directionality. Therefore, it has been ranked as trend direction (as defined above), plus a qualifier that is represented by the ADX(5), that must be above its 3 periods weighted moving average to be defined “directional”. A trend that is qualified “positive with quality” is weighted +1; a trend that is qualified “negative with quality” is weighted -1. All other occurrences are weighted 0.

Trend quality - Metastock formula = $\text{If}((\text{PDI}(5) > \text{MDI}(5) \text{ AND } \text{Mov}(\text{C},6,\text{W}) > \text{Mov}(\text{C},12,\text{W}) \text{ AND } \text{Mov}(\text{C},6,\text{W}) > \text{Mov}(\text{Mov}(\text{C},6,\text{W}),6,\text{W}) \text{ AND } \text{ADX}(5) > \text{Mov}(\text{ADX}(5),3,\text{W})),1,\text{If}((\text{PDI}(5) < \text{MDI}(5) \text{ AND } \text{Mov}(\text{C},6,\text{W}) < \text{Mov}(\text{C},12,\text{W}) \text{ AND } \text{Mov}(\text{C},6,\text{W}) < \text{Mov}(\text{Mov}(\text{C},6,\text{W}),6,\text{W}) \text{ AND } \text{ADX}(5) > \text{Mov}(\text{ADX}(5),3,\text{W})), -1,0))$

At a first glance, this could appear as a reiteration of the same concept. In fact, the sum of the two concepts – trend direction and trend quality (directionality) – takes to dividing the technical trend in five degrees (Table 2):

Table 2 : the five degrees of the technical trend and their weight

Trend positive and directional	+2 (+1,+1)
Trend positive and not directional	+1 (+1, 0)
Trend neutral	0
Trend negative and not directional	-1 (-1, 0)
Trend negative and directional	-2 (-1,-1)

4.3 - Momentum

While the definition of trend direction and trend quality as “technical trend” results quite intuitive, a more articulated problem is represented by momentum. The reason is that momentum – in the model’s construction – is decisive not only for the calculation of the rating, but also to define the position in the trend cycle. Consequently, the model needed a momentum oscillator that was at the same time enough stable to avoid the trend noise, but enough reactive to feel the trend change, at least in the majority of occurrences. To meet these criteria, we created a new oscillator, called Composite Momentum (abb.: CM).

CM is a slightly smoothed simple average between two other oscillators that have the same band width but different behaviours, called XTL (lagging/coincidental) and Key (leading).

XTL is the first component. It is simply the 3 period moving average of a classical (5,3) stochastic. This oscillator is smooth enough to follow the development of the trend but has many false signals in presence of linear trends and sometimes lacks of reactivity in presence of sudden trend changes. For its mathematical construction, “XTL” is an oscillator that works within a [-100/+100] band. It is the lagging/coincidental part of our Composite Momentum oscillator.

XTL - Metastock formula = $(\text{Mov}(\text{Stoch}(5,3),3,\text{S})) * 2 - 100$

The “Key” oscillator is the second component; it was officially presented by the author in the 1998 IFTA Conference in Rome. It derives from a research aimed at finding a tool that could be sensitive not only to cyclical moves, but that could react also in trading ranges, to better understand the development of running/horizontal corrections. Its aim is to show both waves of buying/selling and overbought/oversold situations that are somewhat hidden by the price action and by the strenght/weakness of the trend, like for example the horizontal corrections in linear or semilinear trends. It is constructed as the difference between Dplus and Diminus at 5

periods, where Diplus and Diminus are calculated not directly on price, but on a momentum oscillator based on the difference between two simple moving averages at 3 and 9 periods.

The basic formula is: $\text{Key} = [\text{Diplus}((\text{Mov3}-\text{Mov9}),5) - \text{Diminus}((\text{Mov3}-\text{Mov9}),5)]$

This construction seems linear to be written, but it was originally programmed in a totally different software environment (CompuTrac in DOS) and it has been quite complicated to write it correctly in MetaStock language.

Key oscillator - Metastock formula =

$\text{MOM} := \text{Mov}((\text{Mov}(\text{C},3,\text{S}) - \text{Mov}(\text{C},9,\text{S})),1,\text{E}) / \text{Mov}(\text{C},3,\text{S}) * 100;$

$\text{Mov}(((\text{Ref}(\text{Sum}(\text{If}(\text{MOM} > \text{Ref}(\text{MOM},-1),\text{MOM}-\text{Ref}(\text{MOM},-1),0),5),-1) - (\text{Ref}(\text{Sum}(\text{If}(\text{MOM} > \text{Ref}(\text{MOM},-1),\text{MOM}-\text{Ref}(\text{MOM},-1),0),5),-1)/5) + \text{If}(\text{MOM} > \text{Ref}(\text{MOM},-1),\text{MOM}-\text{Ref}(\text{MOM},-1),0)) /$

$(\text{Ref}(\text{Sum}(\text{Abs}(\text{MOM}-\text{Ref}(\text{MOM},-1)),5),-1) - (\text{Ref}(\text{Sum}(\text{Abs}(\text{MOM}-\text{Ref}(\text{MOM},-1)),5),-1)/5) + \text{Abs}(\text{MOM}-\text{Ref}(\text{MOM},-1))) * 100) -$

$\text{Abs}(((\text{Ref}(\text{Sum}(\text{If}(\text{MOM} < \text{Ref}(\text{MOM},-1),\text{MOM}-\text{Ref}(\text{MOM},-1),0),5),-1) - (\text{Ref}(\text{Sum}(\text{If}(\text{MOM} < \text{Ref}(\text{MOM},-1),\text{MOM}-\text{Ref}(\text{MOM},-1),0),5),-1)/5) + \text{If}(\text{MOM} < \text{Ref}(\text{MOM},-1),\text{MOM}-\text{Ref}(\text{MOM},-1),0)) /$

$(\text{Ref}(\text{Sum}(\text{Abs}(\text{MOM}-\text{Ref}(\text{MOM},-1)),5),-1) - (\text{Ref}(\text{Sum}(\text{Abs}(\text{MOM}-\text{Ref}(\text{MOM},-1)),5),-1)/5) + \text{Abs}(\text{MOM}-\text{Ref}(\text{MOM},-1))) * 100)), 3, \text{E})$

For its mathematical construction, “Key” is an oscillator that works within a [-100/+100] band. The Key oscillator is the leading part of the CM oscillator.

The CM oscillator is a smoothed average of the two. It is applied in the ranking model in two different explorations and defines both momentum direction and momentum position. Momentum is ranked “positive” and weighted +1 when Composite Momentum is rising and vice versa.

Momentum direction - Metastock formula and weight =

$\text{CM} := \text{Mov}((\text{Fml}(\text{"Key"}) + \text{Fml}(\text{"XTL"}))/2,2,\text{E});$

$\text{If}(\text{CM} > \text{Ref}(\text{CM},-1)), 1,$

$\text{If}(\text{CM} < \text{Ref}(\text{CM},-1)), -1, 0))$

Momentum position - Metastock formula =

$\text{CM} := \text{Mov}((\text{Fml}(\text{"Key"}) + \text{Fml}(\text{"XTL"}))/2,2,\text{E});$

$\text{If}(\text{CM} < 0 \text{ AND } \text{CM} > \text{Ref}(\text{CM},-1)), 1,$

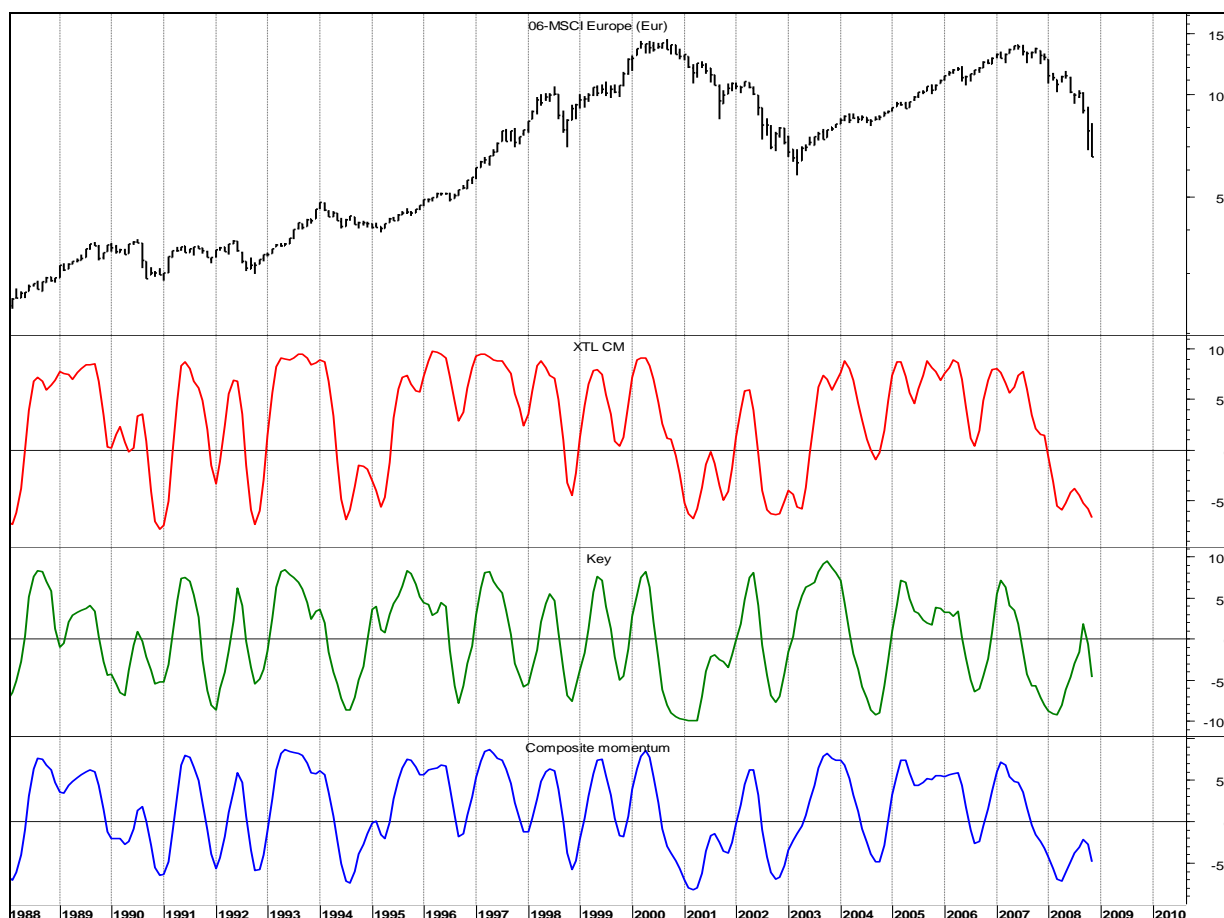
$\text{If}(\text{CM} > 0 \text{ AND } \text{CM} > \text{Ref}(\text{CM},-1)), 2,$

$\text{If}(\text{CM} > 0 \text{ AND } \text{CM} < \text{Ref}(\text{CM},-1)), 3,$

$\text{If}(\text{CM} < 0 \text{ AND } \text{CM} < \text{Ref}(\text{CM},-1)), 4, 0))$

The different behaviour between the three oscillators – the two components and the Composite Momentum – can be better appreciated in the graph below (Figure 4), that shows an alternance between cyclical and linear moves in the monthly trend of the MSCI Europe Index. Thanks to the contribution of the Key oscillator, the Composite Momentum works particularly well in individuating Stage 1 and Stage 4 situations (see the 2002 and 2007 periods), as well as low risk buying junctures in linear or semi-linear trends (see all the period 1996-1999 and the two junctures in 2004 and 2006). Simply stated, the Composite Momentum puts together the qualities of its two components.

Figure 4 : MSCI Index Europe (monthly data): comparison between the behaviour of the Composite Momentum oscillator and its two components, XTL and Key



4.4 - Relative strenght

Market action and statistics indicate that many widely diffused market timing and stock selection tactics (i.e. to buy, at least for a part of the portfolio, the most oversold / less overbought stocks, or the stocks that have the better average fundamental rating) not only does not imply a better performance, but often exactly the opposite. Much better results are obtained through a disciplined strategy of continuously positioning and overweighting stocks that, i.e., can be defined as “strong”, that means showing superior relative strength. This is a well known and widely applied tactic, present in hedge funds strategies and even in long-only funds, at least regarding the sector’s over/underweighting strategy.

In the acception presented here, relative strength is the value that results from the division (ratio) between each stock’s monthly closing price and the index/benchmark monthly closing price. Experience and statistics reveal that relative strength trends are often much clearer, linear and persistent than the price trends of the underlying stocks. In our model’s construction, to define relative strenght we evaluate the last 6 months of the ratio.

Within this six-months time frame, two distinct periods have been taken into account: (1) the whole period, for the longer term (LT RS); (2) the last three months period, for the short term (ST RS). Two operations follow. The first is to screen the actual position of the ratio within its last 6 periods’ range, dividing LT Relative Strenght into 5 categories as follows in Table 3:

Table 3 : Long Term Relative Strenght – classification and weight

LT RS classification	LT RS definition	LT RS Weight
Very Strong	Actual ratio is the highest of the last 6 periods	+2
Strong	Actual ratio is in the upper third of the last 6 periods' high-low range	+1
Neutral	Actual ratio is in the central third of the last 6 periods' high-low range	0
Weak	Actual ratio is in the lower third of the last 6 periods' high-low range	-1
Very Weak	Actual ratio is the lowest of the last 6 periods	-2

This operation gives us the structural (strategical) position of the relative strenght for each item.

The second operation consists in screening the actual position of the ratio, but just for what regards the last three periods (ST Relative Strenght). This gives us a further qualifier for neutral situations and some more clues about tactical divergences and potential impending changes in the trend of relative strenght. We divide the results of this screening in three categories as follows (Table 4):

Table 4 : Short Term Relative Strenght – classification and weight

ST RS classification	ST RS definition	ST RS Weight
Strong	Actual ratio is in the upper third of the last 3 periods' high-low range	+1
Neutral	Actual ratio is in the central third of the last 3 periods' high-low range	0
Weak	Actual ratio is in the lower third of the last 3 periods' high-low range	-1

Matching the weight of the two temporal degrees of relative strenght, leads to a range of combinations that goes from +3 to -3 and that defines mathematically every relative strenght situation. This combinations will be applied in the rating model.

5. THE REWARD/RISK RATING INDICATOR: CONSTRUCTION AND INTERPRETATION

WEIGHT OF THE COMPONENTS AND RATING CALCULATION

The Reward/Risk Rating indicator has been constructed to identify which stocks are the best candidates within a defined universe (index, sector).

The different components of the rating model are weighted according to the following Table 5:

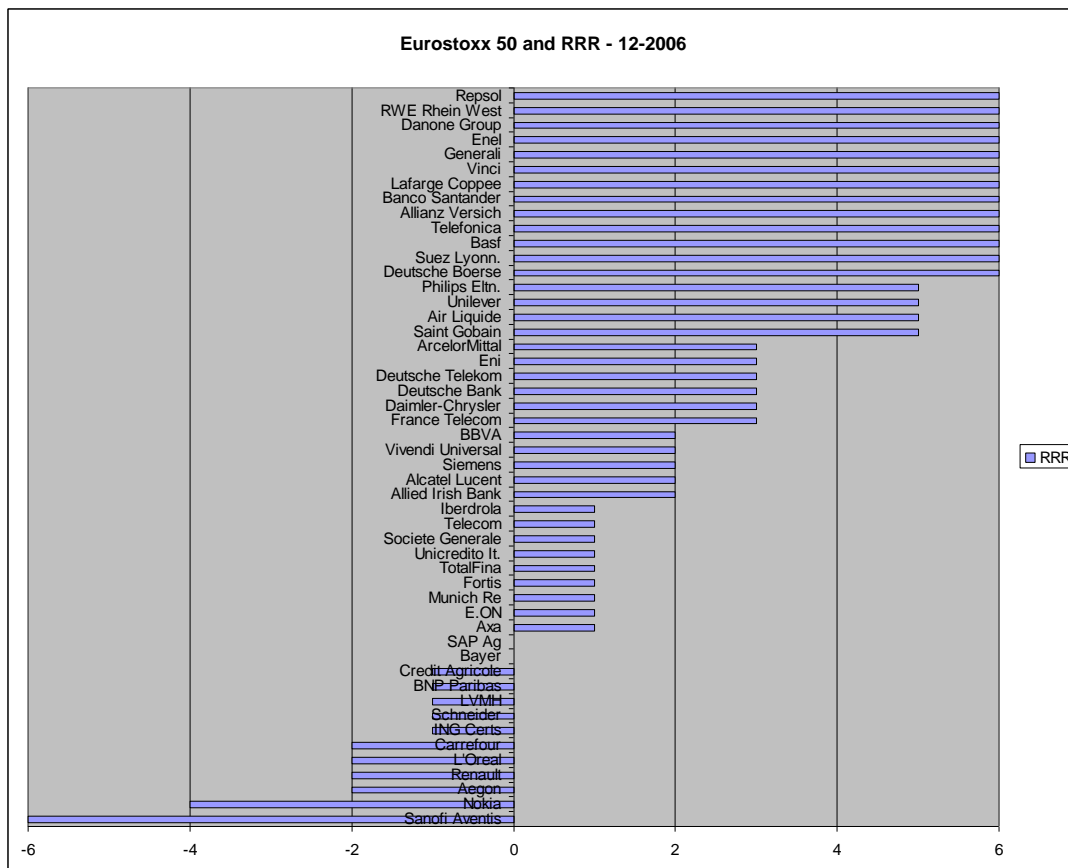
Table 5 : Reward/Risk Rating calculation: components, tools and weight range

COMPONENT	TECHNICAL TOOL	WEIGHT RANGE
Trend direction	Weighted Moving Averages and Directional Movement	From +1 to -1
Trend quality	Weighted Moving Averages, Directional Movement and ADX	From +1 to -1
Momentum	Composite Momentum oscillator	From +1 to -1
Relative Strenght	Sum of LT and ST Relative Strenght position against benchmark	From +3 to -3

The Reward/Risk Rating of each stock can therefore range from a maximum of +6 to a minimum of -6, where positive numbers identify situations that have a theoretical higher potential of gain and/or overperformance and vice versa.

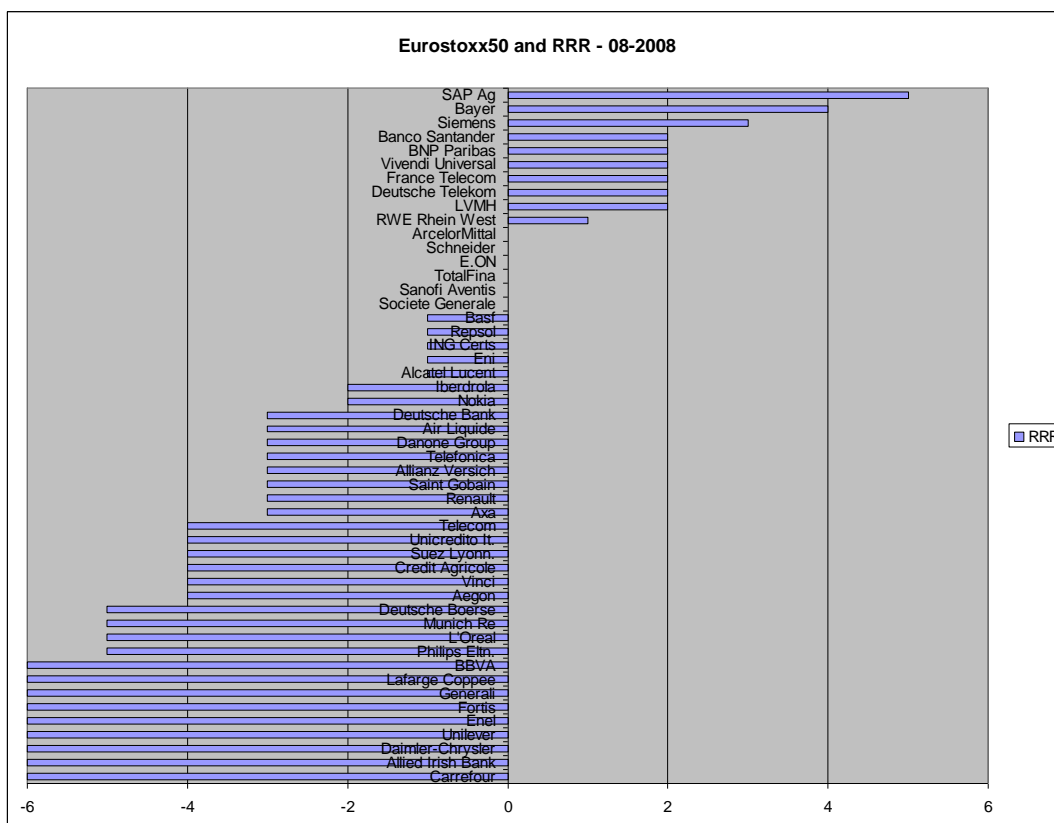
As an interpretation tool, a reading of the indicator between -1 and +1 must be evaluated as neutral; a reading from +2 to +4 is positive; a reading above +4 is very bullish, because it implies both positive technical trend and positive relative strength. The opposite applies for negative readings. The Reward/Risk Rating indicator can be used not only for identifying the best candidates, but also for measuring the inner health and the overall reward/risk situation of the market. Below we see two examples. The first (Figure 5) relates to a clearly bullish phase, December 2006. We see that – apart from the indications on the single stocks – the RRR distribution has a sharply bullish bias or dominance, with half of the stocks showing a RRR of 3 or plus and a limited number of stocks with negative RRR readings. This means that the positive trend of the market (in this case, the Eurostoxx50) is well sustained by a large group of its components, and therefore it has a strong probability to continue, as in fact happened until February 2007.

Figure 5 : The Eurostoxx50 components and their Reward/Risk Rating as of December 2006 (bullish dominance)



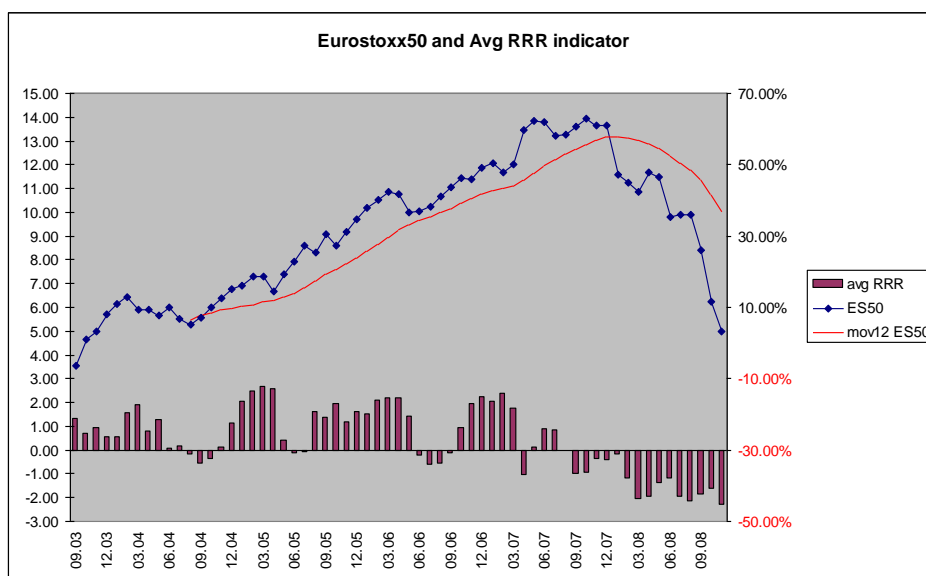
The second case (Figure 6) relates to a month of relative calm during a strong bearish phase, August 2008. The graph shows how the RRR distribution changes totally from the previous example and has a sharply bearish bias or dominance, with more than half of the stocks showing a RRR of -3 or minus and a limited number of stocks (20% of the components) with positive RRR readings. The negative pattern of the market finds confirmation in the weakness of both the technical trend and the relative strength of its components: therefore, the trend had a strong probability to continue, as in fact happened during the September-November decline.

Figure 6 : The Eurostoxx50 components and their Reward/Risk Rating as of August 2008 (bearish dominance)



As a consequence, calculating the average RRR of its components is a tool for monitoring the inner health of a market. This can help to identify positive and negative trends (when the average RRR is above/below zero) and market extremes. The chart below (Figure 7) shows the correlation between the Eurostoxx50 and the RRR average of its components, during the 2003-2008 period.

Figure 7 : The Eurostoxx50 index (blue line) and the Reward/Risk Rating average of its components (histogram)



An example of indication that can be extrapolated from the observation of this last chart, is the non-confirmation signal (hidden distribution) that took place in 2007, when the last two tops of the bull market were not confirmed by the RRR, as expression of the

decreasing “inner quality” of the trend of its components. Such a divergence appears in its full evidence during the September-October 2007 rally, when the rise in the index was not sustained by a sufficient inner breadth, as shown by the negative readings of the RRR indicator. This is a typical example of Stage 4 pattern, as discussed above in chapter 3. Our latest data explorations – December 2008 – show a negative reading of -2.52 for the average RRR of the Eurostoxx50. This is one of the lowest historical readings on our database. The interpretation that can be given on the base of the model is double. First, the selling pressure is still extremely strong and there is no sign of positive divergence or accumulation: the majority of the stocks is still positioned in Stage 5 and will pass to Stage 6 only in case of a rebound sharp enough to lower the negative directionality. Second, in absolute terms the reading of -2.52 is very low: it means that the odds of a technical rebound, big or long enough to take the average RRR toward the zero (neutrality) level after a prolonged permanence in negative territory, become exponentially higher month by month.

6. TEST AND EMPIRICAL RESULTS

The Reward/Risk Rating is an indicator, not a trading system. A frequent limit in the utilization of technical indicators is that there are few hints about their real efficiency. Therefore, the test and the empirical analysis have been performed to verify whether this indicator is efficient or not. The analysis has been conducted on four different aggregates of stocks, over a 5-year time frame (September 2003 – mid November 2008).

6.1 – Software and Database

The model and the indicator have been programmed on Metastock and Excel: Metastock explorations have been transferred to Excel spreadsheets and then elaborated through algorithms. All Metastock and Excel formulas and explorations are shown, directly in the paper or in separate files, as well as the month-by-month detailed results of the tests.

The database is end-of day and comes from an official italian data provider (ADB). It has been integrated, where necessary, with Bloomberg data. Monthly compression has been used to achieve results that were coherent with the logic of the model, to systematically filter trend noise and simplify the comprehension and evaluation of the results.

The test has been conducted on four different aggregates:

- the Eurostoxx50 index and its actual 50 components
- the italian S&P MIB index and its actual 40 components
- the swiss SMI index and its actual 20 components
- the S&P 500 ishares and the 10 ishares of its sectorial components

We use the term “actual” because during the period under examination (2003-2008), the indexes have had some changes in their inner composition. We decided to utilize the more recent composition for the test and not to consider these changes, for two reasons. First, the changes regarded only few stocks and do not impact substantially the results; second, the stocks that were substituted during the test period were - in most cases - weaker than the rest of the market and therefore they would have not been considered by the model for long positions.

When a stock does not have enough data to be tested, it is simply removed for the previous periods from the database. Even this occurrence regards to a very limited number of stocks and only two aggregates (S&P MIB and SMI): we consider that this survivorship bias does not affect the overall results.

6.2 – Test Rules and Constraints

The coefficients of the indicator and its components are fixed. The model is not optimized. The first operation is the calculation of the Reward/Risk Rating indicator for each stock, at the close of each month.

Trading rules are then established as follows:

- I. Buy, at the open of the first trading day of each month, those stocks that, at the close of the previous month, have the highest Reward/Risk Rating.
- II. Sell every long established position at the close of each solar month.
- III. Proceed again operating rule I.

Constraints:

- Portfolio is always full invested (even in the most negative period, there is always – due to relative strenght diversification – a group of “best candidates”).
- Stocks are equally weighted.
- No stop loss or stop profit action is taken.
- A slippage/commission rate of -0.20% for each month is considered.
- When a group of stocks has equal rating, the discriminating factor is the momentum position.

Rules and constraints are simple, close and vinculating and - far from trying to maximize the results - they only try to evidence if the Reward/Risk Rating indicator has enough efficiency. Following these rules and constraints, we extrapolate for each group of stocks three baskets that are compounded by the best rated 10%, 20% and 30% and then compare the results with the benchmark and with the arithmetic average of the same group of stocks.

6.3 – Test Results

The results of the test on the selected baskets are evaluated through the following methods:

- total return
- average monthly return
- average yearly return
- rolling 12 months return
- % of positive months
- % of months better than benchmark
- tracking Error
- information Ratio

The following tables (Table 6 to 9) show the test results for each group of stocks.

Table 6 : Eurostoxx50 – test results and total return chart

	Best 10%	Best 20%	Best 30%	Eurostoxx50	Avg stock
total return	129.70%	47.81%	15.15%	3.12%	-1.35%
avg monthly return	2.06%	0.76%	0.24%	0.05%	-0.02%
avg yr return	24.70%	9.11%	2.89%	0.59%	-0.26%
avg rolling 12m return	28.74%	14.89%	9.41%	8.41%	8.60%
% positive months	74.6%	65.1%	63.5%	60.3%	61.9%
% months > bmk	76.2%	68.3%	55.6%	=	=
Tracking error	2.81%	2.18%	1.61%	=	=
information ratio	0.72	0.33	0.12	=	=

Table 7 : S&P MIB – test results and total return chart

	Best 10%	Best 20%	Best 30%	S&P MIB	Avg stock
total return	194.47%	68.48%	16.72%	-15.94%	-3.67%
avg monthly return	3.09%	1.09%	0.27%	-0.25%	-0.06%
avg yr return	37.04%	13.04%	3.18%	-3.04%	-0.70%
avg rolling 12m return	49.54%	21.08%	12.32%	4.74%	6.53%
% positive months	76.2%	63.5%	57.1%	55.6%	55.6%
% months > bmk	82.5%	69.8%	60.3%	=	=
Tracking error	4.20%	2.58%	2.02%	=	=
information ratio	0.80	0.52	0.26	=	=

Table 8 : SMI – test results and total return chart

	Best 10%	Best 20%	Best 30%	SMI	Avg stock
total return	146.60%	89.51%	46.72%	10.22%	13.62%
avg monthly return	2.33%	1.42%	0.74%	0.16%	0.22%
avg yr return	27.92%	17.05%	8.90%	1.95%	2.59%
avg rolling 12m return	31.90%	21.46%	13.63%	6.79%	9.30%
% positive months	68.3%	61.9%	58.7%	57.1%	55.6%
% months > bmk	73.0%	61.9%	58.7%	=	=
Tracking error	4.12%	3.00%	2.33%	=	=
information ratio	0.53	0.42	0.25	=	=

Table 9 : ishares, Sectors and S&P500 – test results and total return chart

	Best 30%	S&P500	Avg sector
total return	10.00%	-11.05%	6.64%
avg monthly return	0.16%	-0.18%	0.11%
avg yr return	1.90%	-2.10%	1.26%
avg rolling 12m return	9.68%	4.61%	8.70%
% positive months	58.7%	61.9%	58.7%
% months > bmk	63.5%	=	=
Tracking error	2.09%	=	=
information ratio	0.16	=	=

6.4 – Evaluation of the Results

The test has been conducted on a period that has been characterized both by intermediate and major trend changes and by a strong sectorial rotation. The four stock aggregates that have been used, have deeply different characteristics:

- the number of their components;
- the currency;
- the inner composition, by capitalization and by sector weight;
- the volatility, both for the benchmarks and the components.

This diversity permits to evaluate if the indicator could be applied - without losing consistency - to different situations. We consider that the empirical results have been positive. The samples extracted through the indicator obtained total returns that are better than their benchmarks. Even more important, the results have a coherent and solid distribution: “10% best” samples have higher returns than the “20% best” ones and so on. The same applies to all the other methods of evaluation: average monthly and yearly return, average rolling 12 months return, number of positive months and number of months better than benchmark (this last comparison has the exception of the sectors vs. S&P i-shares test: but this failure can be explained by the restricted sample – only ten elements). Tracking error and information ratio show readings that confirm the solidity of the results. In absolute terms, the return of the upper sample (10% best) compared with the benchmark is remarkable, as can be seen in following exhibits (Figures 8, 9, 10, 11).

Figure 8 : Eurostoxx50 index and selected RRR samples: total return chart

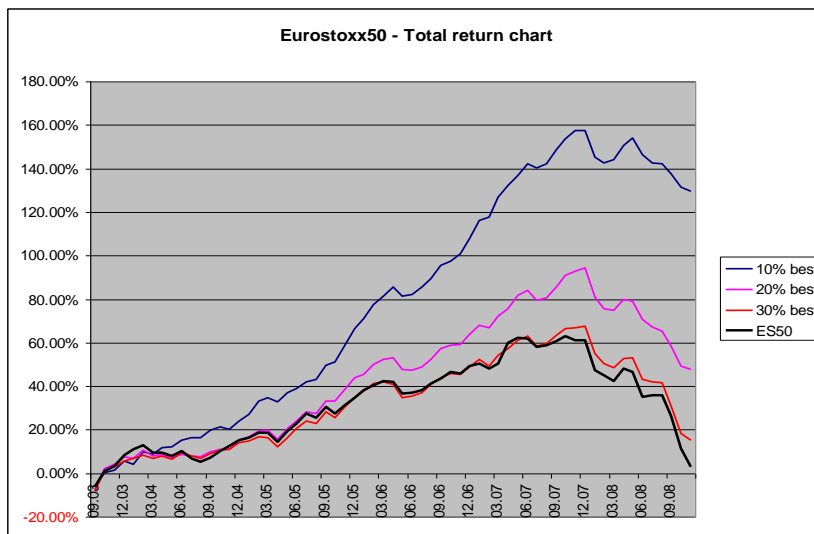


Figure 9 : S&P MIB index and selected RRR samples: total return chart

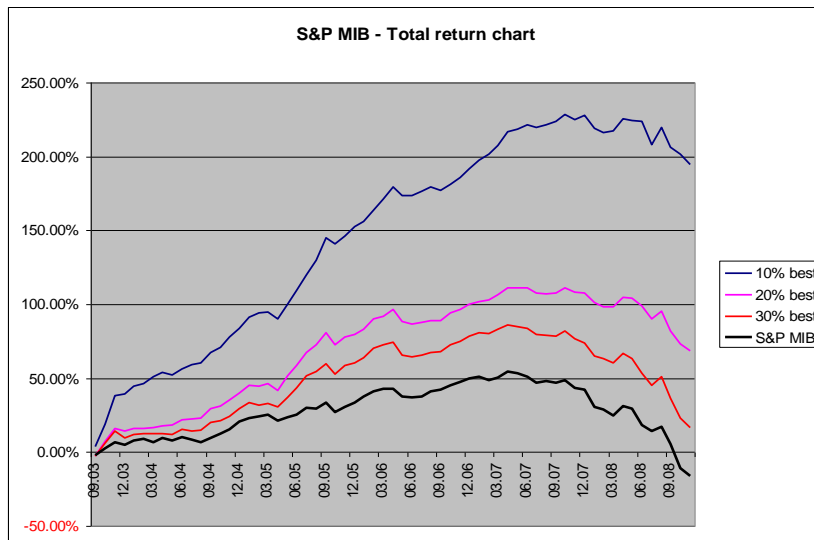


Figure 10 : SMI index and selected RRR samples: total return chart

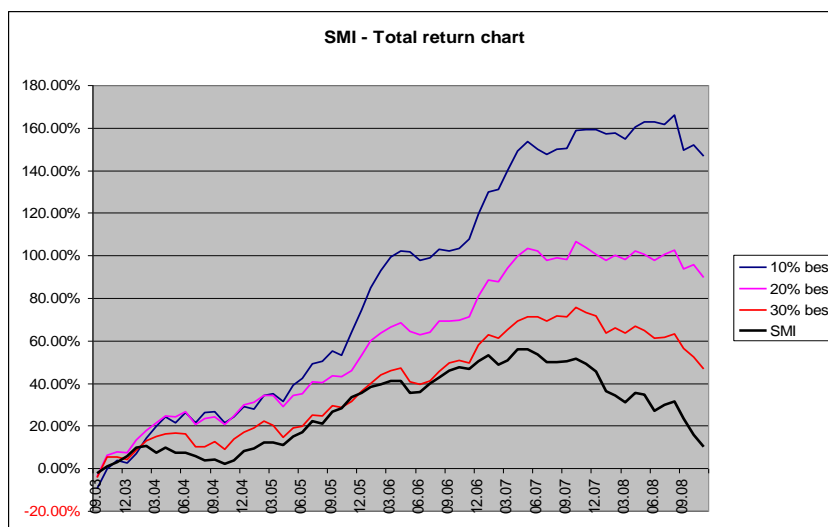
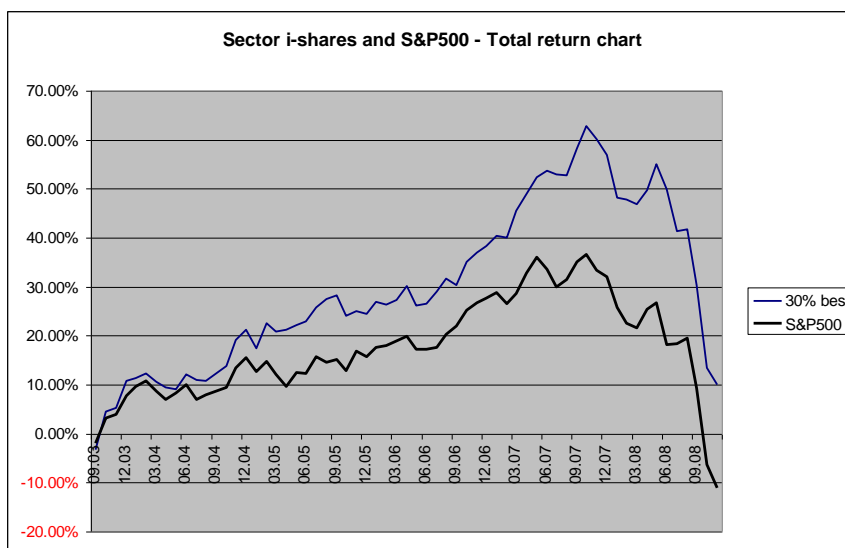


Figure 11 : S&P500 index i-share and selected RRR sample: total return chart



Another interesting consideration regards the correlation between the average profitability and the six stages of the trend.

As per the definition stated in chapter 4, each stage of the trend is characterized by a combination of trend direction, trend quality and momentum position. Consequently, in each of the six stages the indicator has a defined oscillation range (between the highest and lowest possible level) and an average level, as shown in Table 10.

Table 10: the Reward/Risk Rating range in each stage

STAGE	TECHNICAL CHARACTERISTICS	REWARD/RISK RATING RANGE
1	Momentum → NEUTRAL TO POSITIVE Technical Trend → NEGATIVE TO NEUTRAL	Max → +4 Min → -4 Avg → 0
2	Momentum → POSITIVE Technical Trend → NEUTRAL TO POSITIVE	Max → +6 Min → -2 Avg → +2
3	Momentum → POSITIVE TO NEUTRAL Technical Trend → POSITIVE	Max → +4 Min → -3 Avg → +0.5
4	Momentum → NEUTRAL TO NEGATIVE Technical Trend → POSITIVE TO NEUTRAL	Max → +3 Min → -5 Avg → -1
5	Momentum → NEGATIVE Technical Trend → NEUTRAL TO NEGATIVE	Max → +2 Min → -6 Avg → -2
6	Momentum → NEGATIVE TO NEUTRAL Technical Trend → NEGATIVE	Max → +3 Min → -4 Avg → -0.5

It can be observed that the average Reward/Risk Rating is positive only in two stages (2 and 3), while it is negative in the three descending stages and neutral in stage 1. This contrasts the commonly accepted concept that stock selection is the panacea to escape negative market phases. Statistically, if seen through the lens of the RRR model, stock selection has concrete probabilities to create positive returns and alpha when the average market is in stages 2 and 3, while in the other stages a benchmark tracker has a better reward/risk.

7. CONCLUSIONS

In this paper we focused on the creation – through the only use of technical tools - of a rating indicator that can be helpful to identify the different reward/risk degrees present in the stock market. The result has been a technical indicator called “Reward/Risk Rating”, that is compounded by four components: trend direction, trend quality, momentum and relative strength. This indicator has been subsequently applied and the consistency of its indications tested and examined. The results demonstrate that there is a strict and direct correlation between the Reward/Risk Rating indicator and the probabilities that a stock will trade in the future at higher prices and/or overperform its benchmark and its lower-rated peers. This is particularly true when considering not a single stock, but a basket of the upper rated stocks. Another useful tool of the indicator is connected to the breadth analysis, especially to the identification of the internal divergences between the average Reward/Risk Rating of a group of stocks (as the components of an index) and the index itself. Nevertheless, we found some limitations. Because of its basic trend-following nature, this indicator gives its best during established or sideways trends, allowing to clearly identify the group of leading stocks. For its own construction, it tends to fail during quick reversals, both on the upside and the downside. The first month of a counter-trend correction is often the worst case scenario for this type of indicator and its signals, because corrections tend also to reverse the whole set of conditions of the previously prevailing trend, relative strength included. Apart from these limits, the results have been confirmed by all methods of evaluation and seem sound enough to escape any charge of randomness: instead, they seem to confirm one of the basic statements of technical analysis, that is that prices contain – if not all – surely enough informations to allow a correct identification of the more profitable and/or less risky situations.

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