An empirical approach to Long/Short Equity Market Neutral portfolio management

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Abstract

In 1978, Michael Jensen declared that "there is no other proposition in economics which has more solid empirical evidence supporting it than the efficient market hypothesis". However, market behaviour during the recent financial crisis would appear to debunk his assertion. This article aims to study to what extent financial theory based on the EMH – Efficient Market Hypothesis – is lacking in sociological and psychological considerations in its reasoning, and how investors can factor the behavioural aspect into the management process. Lastly, we aim to highlight the conditions under which the manager of an equity portfolio can generate a positive and steady absolute performance while controlling volatility and correlation parameters.

The market follows its own reasoning

Traditional financial theory is entirely based on the idea that it is possible to set an objectively determined value on companies and their associated assets that reflects the available information. **Two main concepts have developed around this basic premise: the efficiency of markets and rational forecasts.** In short, in a perfectly optimised environment, all arbitrage opportunities are exhausted and investors can neither make profits nor significantly influence prices. The hypothesis of markets' informational efficiency is in fact a straightforward transposition of competition at work in the case of financial markets.

However, these concepts are paradoxical and ambivalent. Indeed, **the paradox is that theoretically, price efficiency eliminates any incentive for individuals to collect information**. If the information is costly, no one will seek it because it is simpler to watch the price. This therefore challenges the use of available information to establish the efficient price. In other words, an informationally efficient price cannot be balanced, since its very existence prompts rational behaviour by investors: in this case, ceasing to collect information and imitating instead, which destroys the fundamentals of efficiency.

To make money on financial markets, it is essential to forecast market trends. This simple idea distances us from fundamental analysis, which considers that the key to generating profits is estimating the fundamental value of companies as accurately as possible. Thus, what counts on the market are prices as they are determined at any given moment and not what they should be. This entails a singular structure that differs from the fundamental analysis model in terms of what it sets as the norm, not the intrinsic value as the objective reality outside the market, but an endogenous variable, which in this case is market consensus. The investor is then confronted with an issue of a different nature, since each individual is trying to work out the average opinion of a group in which everyone is watching each other.

The markets thereby follow a self-referencing logic. Trading occurs at the market price, which expresses the collective subjectivity of players and not an objective value imposed upon them. The self-referencing finance model challenges the rationality of individuals individuals' rationality inserted into the model. Each separate individual is seeking to anticipate and estimate what the others are thinking, thereby putting the entire group in a situation where it is **speculating on itself**. Fortunately, an empirical study shows that this inter-speculative situation can be exited and that it is not infinite. Since the famous Keynesian beauty contest and thanks to much work, notably by Trevsky and Kahneman (1974) and Camerer et Al (2003), it has been shown that an individual attempting to anticipate the rational behaviour of others only uses two or three iterations at most. As such, his initial response is only rarely significantly changed before he makes a final decision, which he estimates to be that of the consensus.

Moreover, the investor's behaviour is considered to be rational and, when it is not understood, deemed to be irrational. The consequence of an efficient market is that the systematic risk tends asymptomatically towards the limit defined by the average covariance of its constituent assets. **The behaviour of the investor therefore always boils down to a rational and calculated arbitrage between risk taking and obtaining a marginal yield.** This is consistent with the Markowitz efficient portfolio theory. This states that the expected yield of an efficient portfolio may be raised at the cost of increasing risk, but the concavity of the curve implies that increasing the variance has diminishing returns. All empirical studies on diversification show that a portfolio of 20 stocks is enough for volatility convergence in an evenly balanced portfolio. This is also proposed by the Black-Litterman model, which produces a set of yield forecasts weighted between market yields and the views of the manager. The model recalls the necessary compromise between the risk of moving away from the benchmark portfolio and the aim of generating higher yields. Thereafter, to correct the faults of the capital asset pricing model (CAPM), Fama and French proposed a three-factor model, including market risk (CAPM beta), market cap risk and Price/Book Value risk, to ensure that a higher return is obtained in compensation.

An extremely simplified idea of individuals' behaviour has grown up around such models. For the most part, just one variable is taken into account: **risk aversion**. Once the extent of this has been identified, **the decision-making process is determined by intensive use of the rationality hypothesis**. The efficiency hypothesis only stands up with another hypothesis, by which individuals only apply a fundamental approach to analysis and valuation.

However, market prices do not systematically provide reliable investment signals. Under some circumstances, stock market prices may reflect unstable market patterns, interspersed with bubbles and crashes, and under other circumstances may reflect a more ordinary pattern driven only by fundamentals. **Financial markets are the focal point for collective trends** in which investors' decisions, forecasts and representations are transformed by the action of others and the market, which are aspects that traditional financial theory neglects.

Under certain conditions, the investor, which financial theory claims to have made predictable and intelligible, feels, thinks and acts completely differently from how might have been expected, when part of crowd that is behaving with a crowd mentality. Schiller's couplet springs to mind: "*Jeder, sieht man ihn einzeln, ist leidlich klug und verständig, sind sie in corpore, gleich wird euch ein Dummkopf daraus"* . [Everyone, seen by himself, is passably shrewd and discerning; When they're *in corpore,* then straightway you'll find he's an ass.]

The crowd is extraordinarily easily led and credulous, it has no powers of reasoning and believes that the improbable does not exist. It thinks in a series of pictures that lend themselves to association, as if the individual had given free rein to their imagination, without rational intervention to check to what extent this conforms to reality. Crowd mentality is mainly subject to two characteristics: **the inhibition of free will to make decisions and emotional amplification**. The mentality of the individual lost in the crowd undergoes profound changes under the crowd's influence. Emotions are exaggerated, while the intellect is greatly reduced and narrowed, one swelling and the other shrinking as each individual in the crowd assimilates itself to all the others.

The investor might have to operate in times of great exuberance that do not appear to follow the reasoning of his traditional analysis criteria. **The forming of speculative bubbles that give rise to financial crises is traditionally associated with the irrational nature of the crowd, whereas these collective trends are actually rationally founded.** This rationality can be described as the succession of **three forms of imitation**, which may be called: **informational mimicry, self-referencing mimicry and normative mimicry**. The primary aim of a financial market structure is to create consensus, to make shared beliefs emerge, whereas without this collective trend, there would simply be an infinite variety of idiosyncratic ways to anticipate the future. In this context, the investor lets himself be guided almost entirely by his subconscious. All the explanations given by authors that have written about sociology and crowd psychology boil down to the same notion, whatever they may call it, which can be summed up in the magic word **suggestion**, of which **imitation** is simply a consequence.

Informational mimicry, the first stage in this type of behaviour, may be summed up in the adage**: "They must know what they're doing".** For an investor, this particular imitation consists of copying because he assumes that someone else is more knowledgeable about the situation. This is illustrated by the impact of opinion leaders and "gurus". Informational imitation is ambivalent: it is rational as long as only a few individuals imitate it, it becomes irrational if everyone follows suit. This stage characterises the shift from boom to euphoria.

Self-referencing mimicry is the next stage of the process and can be summed up by the notion: "It is a shame to be the only wise guy". It applies to individuals who do not believe in this objective setting of prices. For them, the price simply reflects the majority opinion of the market and not the consequence of analysing the fundamentals of the asset concerned. Fundamental analysis carries little weight with those who see prices in this way. As such, it is not the fundamental information on companies that matters, but the way the market interprets it. The market's interpretation of objective factors, the source of consensual opinion, then sometimes requires innovative theoretical support to justify itself. This brings us to normative mimicry.

Normative mimicry describes this particular need, which is ultimately approved of by the group. In finance, this normative mimicry most often finds expression in each major speculative period in a set of economic and financial considerations that gain currency to become "politically correct", shaping the way that investors see the market and the economy, mostly without them actually realising it. To justify the eye-watering prices, they hail the arrival of a new paradigm that renders all previous constraints and, above all, valuations obsolete. All too often in this context, the catchphrase is**: "This time, it's different".**

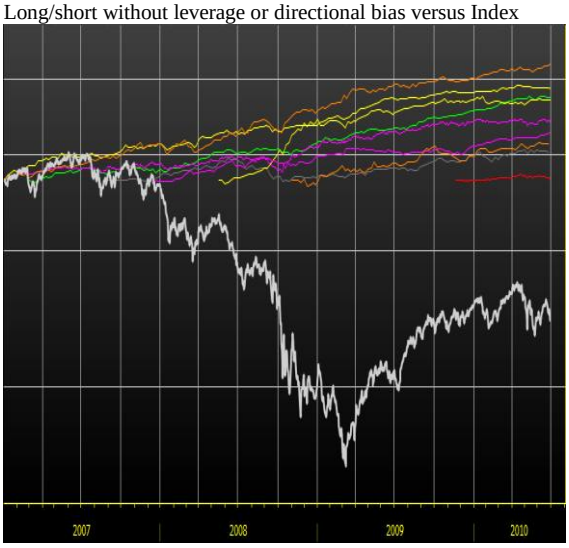
During the euphoric period, many investors can see information encouraging them to hold back without actually altering their behaviour. This means that an enormous underground swell of mistrust builds up without anyone seeing it because of copycat behaviour. Understandably, such a situation can potentially lead to serious instability. The sudden revelation of even minor public information to fan the unexpressed fears of market players can lead to a fully-fledged stampede. All those who were in doubt try to unwind positions at the same time. On the basis of such a mode, the market's overreaction to an unexpected drop in prices therefore becomes intelligible and rational.

To sum up, the ambivalence of imitation helps to explain why the mimicry strategy can rationally spread until it leads to price inefficiency. Later, even though the price signal is then disconnected from fundamental, continued mimicry then has devastating impact: the market is euphoric and the bubble inflates. No one, watching prices rise, takes any notice of the doubts they may have personally and above all does not understand that they are shared by others. Finally, the sudden shift in the market brought about by a public announcement, even of poor informational quality, reveals to all the stakeholders, leading to the simultaneous expression of all the pent-up fear, and the bubble bursts.

Consequently, in such an environment, the fund manager must have the freedom to open long or short positions to take advantage of all opportunities and not passively submit to periods of falling prices. **Short positions help to extend the generation of alpha while increasing the Sharpe ratio**, by actively setting up underweightings, reinvesting the cash from short positions in new long positions contributing marginal additional alpha, and by neutralising inefficient correlations by setting up high performance long/short pairs. This is highlighted by Leibowitz & Bova in their 2006 article: "Alpha returns and active extensions".

However, many long/short portfolios perform very negatively over bear periods and are very closely pegged to traditional indices. To avoid these situations, the management of these both long and short positions must have absolutely zero net exposure to the market, without leverage elsewhere. An empirical study of reports on management and absolute performance of long/short funds managed in Paris in recent years shows fairly clearly that only those who respect these criteria of zero net exposure and controlled gross exposure have managed to navigate the various crises of volatility and asset price correlation over the period. The two charts below show the trend of these various funds compared to the EuroStoxx600 since January 2007, distinguishing between a set of funds that remained neutral to the market and another that structurally shows a strong directional bias. The differences in performance and volatility emerge very clearly.

Long/short without leverage or directional bias versus Index



Long/short with leverage and directional bias versus Index

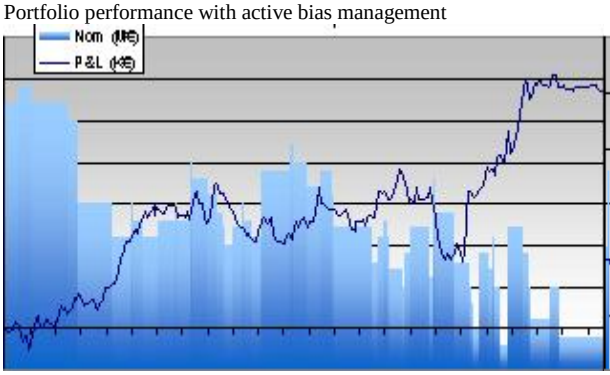
Source : Bloomberg

Know yourself

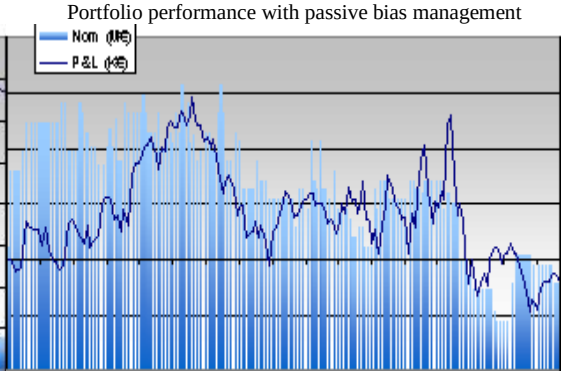
Apart from mastering traditional financial theory and understanding how market mechanisms work, investors must also make constant and detailed examinations of their own behaviour. Behavioural biases are a major cause of poor performances, even when the financial mechanisms are properly understood. **They can be divided into three groups: biases related to the individual, those related to processing of information and those related to decision-making.**

The following charts highlight the differences in performance over 12 months between two portfolios with the same market exposure constraints and benefiting from the same access to information, but with the first managed with analysis of the main behavioural biases and the second managed while treating them passively.

Portfolio performance with active bias management



Portfolio performance with passive bias management



Socrates taught the importance of self knowledge. In the absence of systematic introspective measures, the investor risks **bias towards overconfidence**. The main reflection of overconfidence is to forecast the future using only ones own estimates, due to supreme confidence in ones intellectual qualities and conviction that one is better than peers. The most characteristic reaction is then to blame failure on bad luck as opposed to lack of talent. Another general consequence of this behaviour is **bias towards confirmation,** i.e. only listening to those who are of the same opinion and therefore refusing to debate or challenge the applied assumptions, which then dangerously appear to be obvious. This egotistical approach can also lead to **bias towards forgetfulness**, whereby the individual does not learn from past mistakes due to systematic repression and without awareness of experiencing failure. Lastly, these behavioural biases are often associated with a refusal to rejoice in the good fortune of others or even to derive satisfaction from their misfortune. In this context, the pressure on short term performance and frequent comparison to the benchmark lead to a permanent quest for outperformance, of which one consequence is the creation of momentum and mimicry phenomena that often destroy value. As such, incapable of enjoying the success of rivals, the investor's discernment is altered.

In modern financial markets, the processing of information, much more than access to information, has become a discriminating factor. Investors may have to contend with two types of behavioural deviance: greed or laziness. There may be a **bias towards too much information**, since a wealth of information does not necessarily mean relevant information. This mistake is attributable to the market efficiency theory and the conviction that it cannot be beaten if one is party to information that others are not. What actually counts is what is done with the information rather than how much one collects. By the same token, too much contact with the management of listed companies is not absolutely necessary in the management process other than to distinguish oneself and thereby justify hyperactivity. It is also important not to underestimate the ability of corporate management not to give (or sometimes not even to have) pertinent information, or give erroneous information. Lastly, a process based on investment committee meetings assumes that the collective cancels out the different biases and will be a source of constructive criticism. Yet it seems that in this context, it is always the last to speak who seems to be right and carries the decision. Reality therefore shows that group investment meetings are often a source of underperformance and that an abundance of skills does not necessarily lead to improved skill. At the opposite end of the scale to this hyperactive collection of information, some individuals adopt a more passive approach and make do with the information that is brought to them. This then becomes a **bias towards acceptance**, which entails not asking the reason that prompts a third party to transmit information and is tantamount to not performing the necessary checking and validation. The investor's profession consists of betting on stories provided by intermediaries. To be sceptical

about these stories is a fundamental rule. To accept them without checking is to invite setbacks and disillusionment.

Apart from the permanent task of introspection and due diligences required in the collection and processing of relevant information, it is also worth analysing the biases that concern taking action, i.e. opening or closing a position in the market. Although it is obvious that doing nothing is already a management action, the first bias that investors must contend with regarding management action is the **bias towards inaction**. Indeed, it has been observed that the individual tends to indulge in the comfort of not taking a decision. The reason for this situation is often the surfeit of points of view expressed during collegiate meetings and the inability of the participants to decide between them. Furthermore, in tricky periods or in times of intense stress, the individual is automatically confronted with two major biases. The **impact bias** is such that there is a natural tendency for the investor to overestimate the influence of intensely emotional situations on his own sentiments and judgement and therefore to underestimate his own endurance and capacity to resist. It is actually much easier to react in the heat of the moment than the investor thinks, but above all, often events perceived as being very important at the time only have minor consequences in the long run. Conversely, the **bias towards empathy** entails always underestimating the influence of intense situations on our choices and decision making and therefore overestimating our ability to remain calm under stress. The majority of investors claim to have no emotional link to their positions in the market and to be able to let go as soon as there is a major warning. Yet experience empirically shows that their reaction is often completely different when the first profit warning actually occurs, for example. Lastly, at the opposite of the spectrum to these situations where inaction is either a management choice or the result of a bias, there is the **bias towards mimicry**, whereby an investor will follow a trend because it is attracting others and believes in an alleged truth simply because it is shared, therefore becoming hyperactive, but without discernment or necessary filters of analysis and judgement.

To correct these biases, the investor must hold three main values in order not to affect his performance. The first of these values is **humility,** which implies an approach whereby one does not assume at first sight to comprehend the surrounding environment, that assumes that this environment is complex and not obvious and that the truth is not about to be revealed in some Maieutic fashion. Indeed, exegesis must be thorough, which means not basing ones choices on one's own analysis and judgement alone, considering them to be the only relevant ones. This prevents us slipping into overconfidence and forgetfulness. **Cynicism** is essential in this process; consisting of always questioning why a third party is giving you information. The street features intermediaries who are purveying stories, where as the investor must make decisions based on facts and figures, not stories. Lastly, **scepticism** is the quality that prevents an investor following trends just because others are and believing in alleged truths just because they are commonly acknowledged. Obviously, cynicism and scepticism should be applied constantly, including to one's own ideas in order to apply discernment at all times**.**

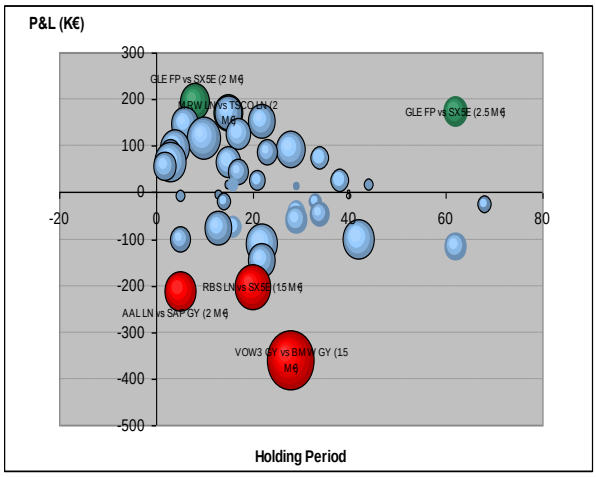
A great number of management errors may be laid at the door of a bias towards inaction. Nevertheless, although it is crucial to overcome this bias and therefore **take action**, extreme **discipline is required when doing so**. As we have just seen, the study of psychology shows that human nature tends to overestimate the influence of intense emotional situations on judgement (impact bias) whereas we are more inclined to underestimate the influence of such situations on our decisions (empathy bias). A consequence of this bias towards inaction is the risk of non-rotation, which is a scourge to be avoided at all costs. A recent article (KJ Cremers & Antti Martijn Petajisto, 2009) highlights the idea of active risk (active share), showing that

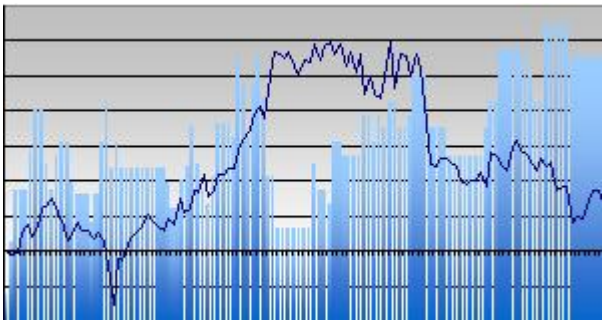
it can help to predict the performance of active managers. The active risk is calculated by adding the absolute net positions of a fund compared to its benchmark index, then dividing the result by two. On the basis of this calculation method, Cremers & Petajisto divided the US fund landscape into three segments: i/ funds with an active risk of over 80%, considered to be stock-pickers; ii/ funds with active risk representing 20 to 60%, classified as closet indexers, for which the management is benchmarked but active, and iii/ those for which the active risk is less than 20%, considered to be pure index funds. A study of the active risk of 2,647 US funds confirmed that small funds tend to be actively managed more than large funds. There is also a high proportion of closet indexers. Indeed, if all the funds were considered to be separate, the combined active risk would only be 30%. The most edifying conclusion of the Cremers and Petajisto study is the following: the various levels of active risk have a predictive value in terms of the funds' yields, with funds harbouring the most active risk significantly outperforming there benchmark indices, whether on a gross or net basis. More precisely, funds belonging to the highest quintile of active risk exceeded their respective benchmark indices by 1.13% net of costs. In the context of the debate between active and passive management, the meaning of this result is clear: **many so-called active managers underperform simply because they are not active enough**. Furthermore, managers using their convictions to pick stocks significantly different from their benchmark are more likely to outperform.

Discipline is one way to overcome this empathy phenomenon, which makes a decision that seems simple and rational to start with ultimately impossible to implement with hindsight when the theoretical context that had been imagined suddenly becomes real. The best example is the strict compliance with loss limits , or "stop loss", which entails mandatory unwinding of a position when losses exceed an amount that could endanger the portfolio as a whole.

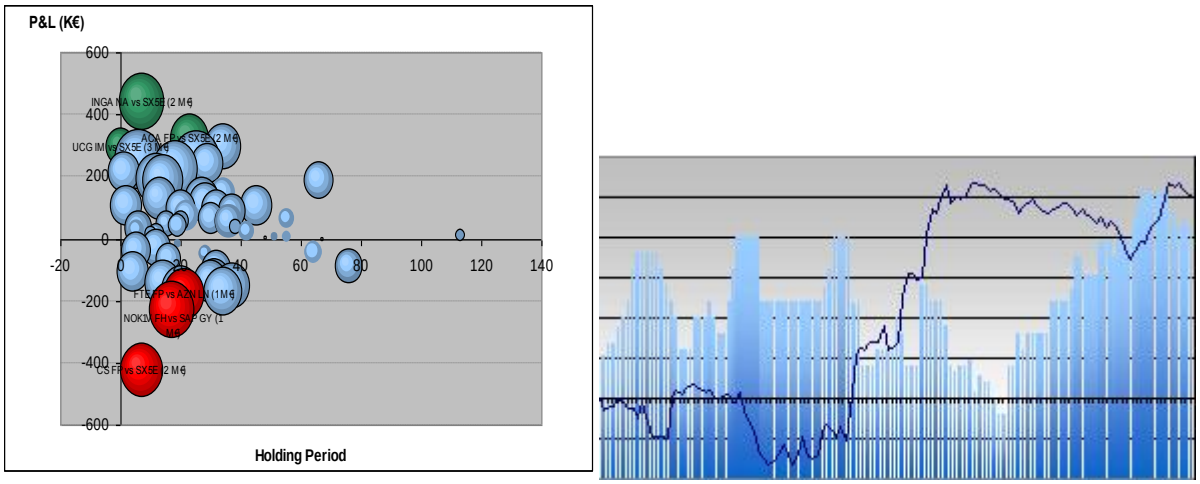
The two charts below show all the positions of two portfolios that are more or less disciplined in respecting the stop loss as well as their respective performances. The nominal of each position is represented by the size of the bubble, the ordinate axis indicates the capital gain or loss while the abscissa represents the amount of time the position was held. Since the second chart does not show a significant concentration of bubbles towards the right and below the abscissa, it demonstrates greater discipline and consequently a more optimised performance.

Performance of a strategy without respecting the stop loss





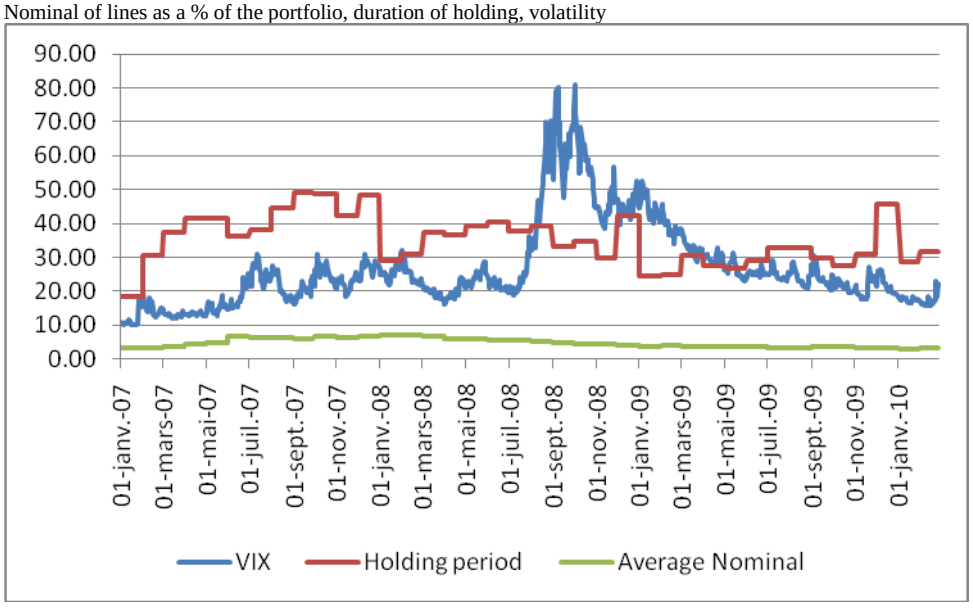
Performance of a strategy respecting the stop loss



The other factors that should be controlled to optimise performance are the **length of time the position is held and the nominal of the trades**. Strict discipline in the optimal application of these structuring factors helps to prevent the assimilation of undesirable biases in the positions and not to generate inopportune correlations.

An empirical study of a varying sample of 70 to 200 long/short portfolios from January 2007 to the end of June 2009 shows that the optimum holding period for a position fluctuates around 35 days and varies according to market volatility. Furthermore, the optimal size of each position compared to the overall portfolio is a shade under 5%, bringing us back to the empirical conclusion that a portfolio is perfectly diversified with around 20 lines. For the same period, the following chart shows the trend in holding duration as well as the relative weight of each line for the sample analysed and market volatility.

Nominal of lines as a % of the portfolio, duration of holding, volatility



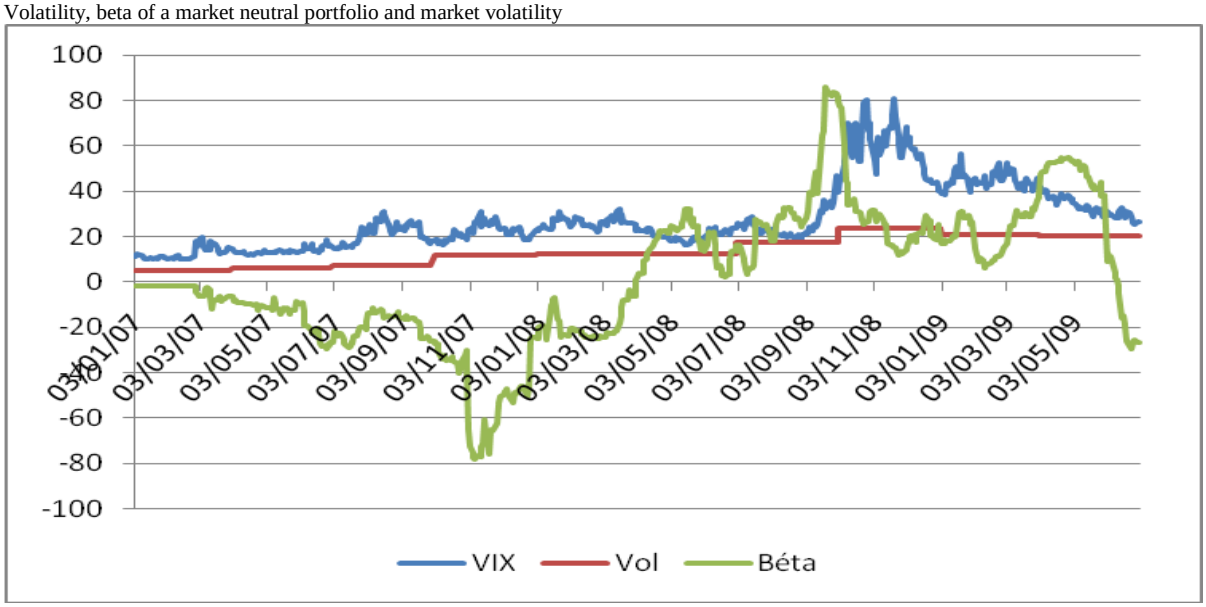
Conclusion

The award of the Nobel Prize for Economics in 2002 to Daniel Kahneman at last recognised the contribution of behavioural finance. Apart from the traditional thinkers concered with modern finance such as Harry Markowitz, Eugene Fama, Kenneth French, Fisher Black and Robert Littermann, for further reading we would also suggest James Montier (*Behavioural Investing*, 2007), André Orlean (*Comprendre les foules spéculatives*, 2001), but also Sigmund Freud (*Group psychology and analysis of the ego*, 1921) and Gustave Le Bon (*The Crowd: a study of the popular mind*, 1921). This article is not a part of the academic debate, but rather aims to show to what extent the investor must show profound humility when contending with the complexity of market mechanisms and show himself to be **pragmatic**, **thorough and discerning** in his management process, in order to control performance and not to endanger it inopportunely. Consequently, he must be attuned to all the signals from the market, whatever their source and nature (fundamental, technical, non-financial, etc), while remaining absolutely agnostic to all the various approaches and without blindly trusting any given source.

It is possible to produce a satisfactory absolute performance in an equity portfolio from simply respecting some structural principals. Before constructing a portfolio, a manager must **identify the macroeconomic trends** and the various **transversal** themes that drive the market in order to understand the environment. The aim is to properly understand the source of market trends in order to take advantage of them but **without taking risks** on what their future trends might be. A study in 1991 by Brinson, Singer and Beebower links performance and sector allocation. Contrary to popular belief, the performance of a portfolio does not rely entirely on allocation. The study has been misleadingly used by proponents of passive index management. Conversely, Nuttall and Nuttall in 1998 then Ibbotson and Kaplan in 2000 redefined its conclusions: indeed, when the markets representative of asset classes in which a portfolio is invested rise, the value of the portfolio increases. At last, financial theory makes sense again: when the tide rises, so does the boat, so what is important is to detect that the tide has begun rather than betting on its existence. Moreover, although the elimination of risk when building up a scenario is a prerequisite for high-performance management, betting on **strong convictions** in the choice of positions that make up a portfolio is just as important. Active stock picking based solely on a fundamental approach generates alpha and is **low volatility**. A portfolio that has been properly diversified in terms of style also has better de-correlation than regional or sector approaches and can reduce its volatility by a factor of seven compared to the index representing the market in which it is invested (Amenc, Martellini, 2002).

The portfolio must therefore be structured with **long/short positions, without leverage**, and with **zero net exposure**. This implies no directional bias, yet still taking advantage of the various market trends. Nevertheless, neutral exposure does not mean that the portfolio's sensitivity is zero. The following chart shows the volatility trend and the beta of a totally market-neutral portfolio, during a period featuring volatility spikes. Even though the average beta is 2.2%, i.e. close to zero, and although the portfolio's volatility is less than a third of the market's volatility overall, the fact remains that these parameters vary enormously over the period.

Volatility, beta of a market neutral portfolio and market volatility



Consequently, to manage these fluctuations, this portfolio will be **actively and dynamically managed**, with **strict discipline**, particularly with regard to respecting loss limits, holding period and nominal of the trades. The charts below show the type of performance as well as the volatility profile that such management can deliver over a period, even though it included the financial crisis.

Performance and volatility of a long/short portfolio applying the principles described