

# INVESTING WITH THE ENEMY

Dr. Steven J. Bates



## INTRODUCTION

Investors in financial markets live with increasing levels of stress and emotional overload as a result of frequent market crises, central bank intervention and geo-political tension. There have been great advances across the financial services spectrum from the creation of collective investment vehicles to the maturity of the hedge fund industry and more recently the democratisation of ETFs, emergence of robo-advisors and intelligently constructed indices. But how should we actually invest our money for a secure future?

When it comes to investing we are often our own worst enemy, driven more by gut feeling than rational process. Following on from the findings of behavioural finance research this article highlights the common investment traps that we should all avoid. Passive or buy-and-hold investing has been proposed as a way to avoid market timing and emotional mistakes but true passive investors probably do not exist. Admitting we are all active investors and delegating to traditional discretionary managers does not fully solve the problem either.

It turns out that in a world of improving financial knowledge, rigorous scientific research and advancing technological evolution, rules-based or systematic active strategies are becoming increasingly more important, and successful.

## ABOUT THE AUTHOR

Steven J. Bates is CEO of QLAB Invest Ltd., a specialist in systematic investment advisory and active index engineering. QLAB's philosophy is to embrace active asset selection and sound risk management principles in order to develop non-subjective investment strategies across asset classes globally. Steven has a Ph.D. in Physics from the University of Cambridge in the UK and CERN in Switzerland.

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## THE ENEMY WITHIN

Individuals naturally believe themselves to be special, perhaps even unique. Yet millions of years of evolution have seen to it that actually, we are all very similar. Our will to survive is encoded in our genes and physiology at a very deep and primitive level. As a result, our brains and hormonal systems function identically. We may have different character traits, beliefs, desires and dreams but underneath all of that, a part of our brain continues to work, effortlessly and tirelessly. The best-selling book *Thinking Fast and Slow* by the Nobel Prize winning psychologist Daniel Kahneman (2011 Allen Lane, Penguin Group) is essential reading on the subject.

The fastest part of our brain, which evolved to keep us alive, reacts automatically to certain inputs. A loud bang, a screech of brakes, a wild animal noise not only grabs our attention but kicks off certain physiological changes. Our pulses quicken, adrenalin is released into our blood and our pupils dilate. This is known as the fight or flight response and it's not something we can control or turn off, it's fully automatic. Humans have evolved this response as it meant being more likely to survive when we first lived on the plains of Africa 2 million years ago.

When it comes to investing, this and other kinds of response affect the way we make financial decisions. The subject of behavioural finance is now mainstream and the resulting biases that investors suffer from are well documented, as shown in Table 1.

Table 1: The main behavioural biases (source *Investopedia.com* and *QLAB Invest*)

<i>Loss aversion</i>	We fear losses more than we appreciate gains which skews our decision making
<i>Over confidence</i>	We over estimate our own abilities and mistake luck for skill
<i>Anchoring / Priming</i>	Recent inputs or stimuli, even unrelated to financial matters, inadvertently affect actions and decisions
<i>Cognitive ease</i>	The brain often takes mental shortcuts known as heuristics which can lead to false conclusions
<i>Recency effect</i>	The mistake of assigning too much importance to the more recent past than looking at longer term statistics
<i>Endowment effect</i>	Assigning more value to something just because we own it
<i>Herding</i>	Following the crowd, either into a market, not wanting to miss out on rising prices (greed) or out of the market wanting to avoid short-term losses (fear)
<i>Panic</i>	The ultimate emotional response, when panic kicks in, humans are capable of almost any irrational behaviour.

What is really interesting, or perhaps most worrying, is that we are often not aware of the biases, nor can we easily control them. You may think of yourself as a cautious, long-term investor and financially literate, but what if your last financial decision had been inadvertently affected without you being aware? If this sounds difficult to believe, many studies have shown all these biases have real effects which can be measured. A great book on the subject called *The Hour Between Dog and Wolf* by John Coates (2012 Fourth Estate) even goes as far as to show the biochemistry of traders on a trading floor has a lasting effect on our economy due to hormonally-driven decisions taken.

Let us now discuss the attempts to remove emotional biases from the investment process.

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## PASSIVE VERSUS ACTIVE

One result of the dangers of being controlled by unseen forces has led many investors to adopt a passive investment stance, meaning buying and holding the market. It is thought that not getting caught out trying to time the market or reacting to emotions can remove behavioural mistakes.

This approach was born out of the Efficient Market Hypothesis first put forward by Eugene Fama and the related Modern Portfolio Theory developed by Harry Markowitz, William Sharpe and others. In simple terms, given all relevant financial information should be publicly available then the markets are in a state of equilibrium, and correctly priced. It is therefore not possible to outperform the market using additional information and skill. Further, diversification between different assets is a genuine free lunch and can be used to create an optimal market portfolio with the highest expected return per unit of risk.

So an investor should hold on to the market portfolio, set fixed weights of positions and reap the long term market returns for their personal choice of risk. However, there are a number of questions which must be answered before building the market portfolio:

1. Which market? Only equities, or other asset classes, domestic or also international?
2. What level of risk to choose, which will drive the weights of various assets to hold?
3. Treatment of stock dividends and bond coupons and what about rebalancing back to starting weights as the positions drift around with performance?

As proponents of the efficient market hypothesis like to point out, if it's not possible to beat the market then simply buy and hold the market. This so-called passive investment approach should allow investors to sleep well not having to worry about making difficult decisions.

But hang on. Before building this great portfolio you have to answer the three sets of questions shown above. These decisions will dictate both returns and risk for a long time to come. Who knows, if we choose one set of answers now, in 10 years we won't have a different view when we have a family, house and kids or move to another country.

Worse still, humans have a nasty habit (bias?) of not being able to leave things alone. I challenge anyone to make a key financial decision now and happily live with it for the next 50 years! Humans by their very nature suffer biases as we have seen. Feelings such as greed and fear as well as loss aversion will, without fail, cause an interaction with this so-called passive plan at some point, rendering it active.

Studies have shown that so-called passive investors do not achieve anything like the returns of the market they are investing in. Due to poorly timed investment decisions, it turns out that returns are on average about 60 – 80% of truly passively holding the market. The term is labelled the “dumb money effect” and an internet search will quickly guide the reader to numerous papers on the subject. This is clear evidence for the absence of passive investors.

However, let us look into the idea of passive investing a little longer, answer the three key questions above and construct a market portfolio that an investor could buy and hold.

## THE MARKET PORTFOLIO

Firstly which markets in terms of asset classes? The three main asset classes are equities, bonds and cash or money market instruments. We shall also include commodities and extend money market instruments to include short-term deposits in foreign currencies, or FX, covering the G10 currencies and for the sake of simplified convention all measured against the USD.

So that's equities, bonds, commodities, cash and FX, but which countries or sub-assets in particular? Given the US stock market is the largest market, representing approximately 50% of global stocks by

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market capitalisation, and is easily the most liquid and cheap to access, we shall limit our study to the US stock market which is also the most powerful gauge of global investor sentiment.

Similarly for bonds we shall simplify the analysis and focus on US Treasury Bonds with 2 years and 5 years to maturity which are still today probably the safest and most liquid investments of all. We shall exclude corporate bonds and for cash we shall simply take the US overnight deposit rate.

For commodities we shall take a broad equally weighted basket as defined by the Continuous Commodity Index or CCI which is one of the very few broad and equally weighted indices, covering some 17 commodities and not biased towards energy related commodities as so many are.

Finally what risk profile to take which will determine the weightings to hold. This ultimately depends on individual investor risk appetite but we have chosen a volatility target of 6% because it is close to the historical volatility of the 5 year US Treasury bond which is considered a relatively safe investment which can keep pace with inflation. Also, when profiled, many investors fall into a “moderate” risk profile which is usually in the range 6 – 8 % volatility.

Using the long-term historical volatility of the asset classes chosen we calculated that the portfolio should be allocated 50% to the riskier assets, i.e. equities and commodities, and 50% to the less risky bonds, cash and FX, in order to achieve the risk target of 6% volatility. Within each part of this balanced portfolio we shall simply equally weight the individual assets. Finally we shall reset the position weights to the target weights on a monthly basis. This is known as rebalancing which is an active technique known to lower risk and drawdowns. This is not an optimal market portfolio that William Sharpe or Harry Markowitz would have proposed, but rather a “naïve” market portfolio without any assumptions about returns or correlations. Interestingly this portfolio has done rather well over time.

**Figure 2:** The Indexed performance and statistics of the naive market portfolio, starting at value 1000 December 1980, to 31 January 2016

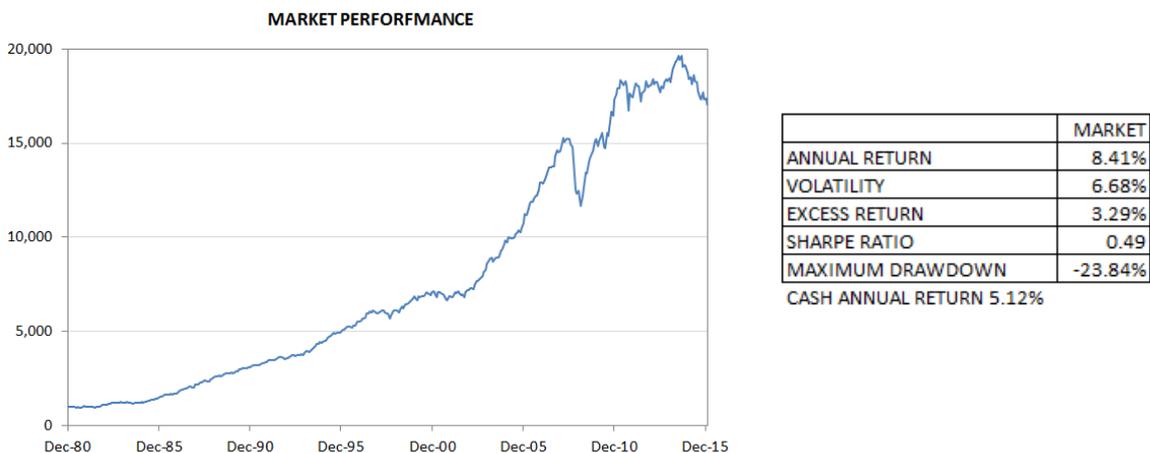


Figure 2 shows the performance and risk of the naive market portfolio<sup>1</sup>. All figures are based on total returns, assuming dividends and coupons are reinvested. Firstly the good news: annualised return is 8.4%. Long term volatility is 6.7% and excess return as defined by the annualised return over the rate of cash is a healthy 3.3%. The Sharpe ratio which is the excess return divided by volatility is about 0.5 which is not bad. This portfolio has outperformed inflation by about 5% a year on average so has grown an investor’s wealth in real terms quite considerably over this period of 35 years.

Now the bad news: the shorter-term volatility, measured over rolling periods of 12 months, shows high instability, see Figure 3. This means that monthly returns can become quite erratic at times which makes

<sup>1</sup> Trading slippage has been excluded, however this portfolio can be traded very cheaply using exchange traded futures, in our experience around 0.2% per year (source QLAB Invest)

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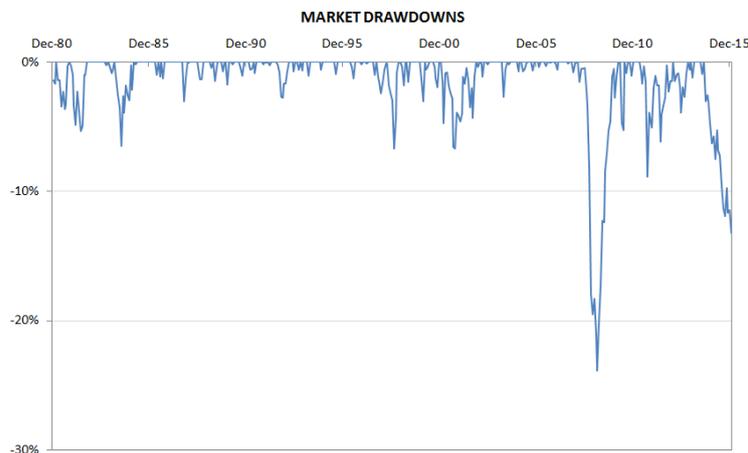
investors nervous. Unsurprisingly this market portfolio has been particularly volatile the last few years during the most recent crisis.

**Figure 3:** The 12 month rolling volatility of the market portfolio



Figure 4 shows the drawdowns which are how much money has been lost at any point in time from the previous highest point and are what investors react to most. There are frequent losses approaching -10% and one very severe loss of -24%. Without rebalancing the worst drawdown would have been -34% indicating the usefulness of the technique. The long term volatility of 6.7% does not give an indication of the size of the worst drawdown. Under the assumption of normal or Gaussian distribution of returns, drawdowns of this size should not happen with great frequency and these events are sometimes referred to as “left tail events” or “black swans”. Actually to a scientist it shows evidence that financial markets do not follow the normal distribution and it is dangerous to assume they do.

**Figure 4:** The market drawdowns show performance below high water mark



Now, here’s the problem: to achieve the great long term results that this market portfolio can deliver, the investor would have had to stay fully invested for 35 years. That’s quite some discipline.

What tends to happen is that an investor experiences a drawdown, say of between -10 and -20%, and then gets nervous and changes their investment plan by selling. Selling after losses, close to low points can mean missing out on a part of the recovery and this has a negative impact on compound returns. The nervousness is due to loss aversion and fear which can be an extremely strong emotion to deal with.

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So whilst this market portfolio is not bad for very long term investors with nerves of steel, it is not suitable for the vast majority of investors who will tend to review performance over shorter timeframes and be tempted to intervene from time to time.

So, given we have established that the truly passive investor is a very rare animal indeed, and that the vast majority of investors are actually active, it is important to look into two key investment styles, and to once again, see if investors can avoid behavioural traps.

## DISCRETIONARY VERSUS SYSTEMATIC

A discretionary investment process is run by a person or persons and is based on their discretion to invest as they see fit. Of course they may follow a structured and disciplined approach, for example selecting investments from a predefined investment universe or benchmark and using a number of measures to decide what to buy or sell, e.g. valuation, economic forecasts, analyst reports. Indeed, in addition to great experience and “seasoned judgement”, they may even make use of quantitative tools. But at the end of this deliberation they simply decide, or possibly vote if part of an investment committee, to enter into, or exit, an investment. The vast majority of investment processes at banks, asset managers and pension funds are run like this, where an investment committee will deliberate over how to invest *your* money.

So what is wrong with this approach? Well, when you consider that people are human after all we already know that they will experience feelings, emotions and biases which they are not in control of, and may not even be aware of, which can sway their decision making process.

If you think that a group of experienced, professional individuals cannot be fooled in such a way, think again. Studies have shown it is even possible to induce such effects without the person being aware. For example in 2006 researchers managed to affect the decision making of Judges when commenting on what sentence a shoplifter ought to receive. The judges were asked to roll a (loaded) dice before saying what they thought the sentence should be. Those rolling higher numbers consistently gave a longer sentence, a classic example of anchoring or priming<sup>2</sup>. So just imagine an investment committee of people discussing how much of a new investment to buy had been inadvertently primed on their way to the meeting. They wouldn't even be conscious of this mistake.

Furthermore, whilst we might like to think we can follow a disciplined process and have controls and procedures in place which aim to prevent such things, it would be almost impossible to conceive that given the same set of circumstances, inputs, research, analysis etc. that an investment committee would make exactly the same decision time and time again, i.e. that they were consistent.

Systematic investing, on the other hand, is rules based, essentially automated. This ensures discipline because if the same set of inputs are presented to the process the same outcome or decision will always result. A systematic investment process might actually follow the same structured research and analysis that a discretionary process uses, except that a computer carries out the decision making steps. Of course, the computer doesn't decide anything, rather a group of people first determine what the rules should be to make a given investment and then have the rules coded into a computer programme to ensure the decision cannot be influenced by any emotional or behavioural biases.

Systematic investment processes are all around us. Many stock indices follow precise rules about which stock should be in the index and with what size, for example based on market capitalisation<sup>3</sup>. The rules are agreed by a committee, and then a computer programme calculates the weights and resulting performance. This is not to say that a single set of rules can be designed that should be applied for ever

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<sup>2</sup> Birte English, Thomas Mussweiler and Fritz Strack, “Playing Dice with Criminal Sentences: The Influence of Irrelevant Anchors on Experts' Judicial Decision Making”, *Personality and Social Psychology Bulletin* 32 (2006): 188-200.

<sup>3</sup> There are many ways that stock weights can be determined and inclusion/removal of some stocks can be subject to an index committee decision, but generally the rules are usually fairly rigid so that in principle anyone can calculate the stock weights and thus performance of the index

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more and never challenged. Just as with discretionary processes, systematic processes may need adjustment from time to time. The key difference is that a systematic process can be thoroughly tested using real historic and simulated data over decades of time and the results analysed in a non-emotional and evidence-based way.

However, a market capitalisation weighted stock index, although active in terms of sizing of stock positions, is not a sophisticated investment process and contains nothing in terms of risk management. If all stocks go down at the same time, the investor faces the full downside risk of the market.

So, can a systematic investment strategy be created to actively manage weights across a market portfolio to both outperform it and deliver a lower risk of loss?

## A SYSTEMATIC INVESTMENT STRATEGY

There are some well documented properties of financial markets which can be researched thoroughly and also be exploited to manage risk, and they are listed in Table 2.

**Table 2:** Some measurable properties of financial markets (*source QLAB Invest*)

<i>Momentum Effect</i>	If prices have been moving in a certain direction for a given time, there can be persistence and the prices can continue to move in the same direction for some time to come, and this is due to investor herding, a behavioural bias
<i>Auto-correlation of risk</i>	Risk in the near future is somewhat correlated to risk in the recent past, again due to human behaviour: investor fear and recency effect
<i>Correlations vary</i>	Correlations of different assets over the long term are usually less than 1, meaning you can achieve diversification by holding a mixture of different assets, however over the shorter term, assets can and do frequently all move in the same direction, again linked to investor herding or fear, so this must be taken into account
<i>Risk premium</i>	There is evidence for assets having a risk premium meaning returns are higher than the risk free rate, and over time prices do go up due to factors such as GDP growth, inflation as well as effects linked to demographics, which supports a long-only approach to investing, i.e. time in the market is more important than timing the market
<i>Left-tail risk</i>	Risk assets exhibit non-normal behaviour and are subject to sharp reversals or losses without warning due to fear and panic amongst investors.

So we can now go back to our market portfolio and define a set of rules aiming to exploit these characteristics. The approach is to hold a subset of the market, investing only in those assets which show the strongest momentum aiming to benefit from price increases and avoid price declines. More formally we calculate the risk-normalised relative momentum between pairs of competing assets, e.g. equities and bonds and use a statistically robust measure of momentum to determine whether an asset or sub-asset should be held or not. In practice equities are broken down into sectors, the commodity market into individual commodities and FX into individual FX pairs to provide more moving parts and diversification.

Next, a separate and robust risk management process determines the weights of the assets to hold. We cannot stress how important the portfolio construction approach is. Due to the general lack of predictability in asset prices, the assumption must be that the portfolio held will not behave as expected, and that market shocks can happen at any time without warning. So a risk budgeting approach is used which takes into account the likelihood of stressed or high correlations as well as accounting for non-normality in market returns (left tail risk). A number of other risk management techniques are then

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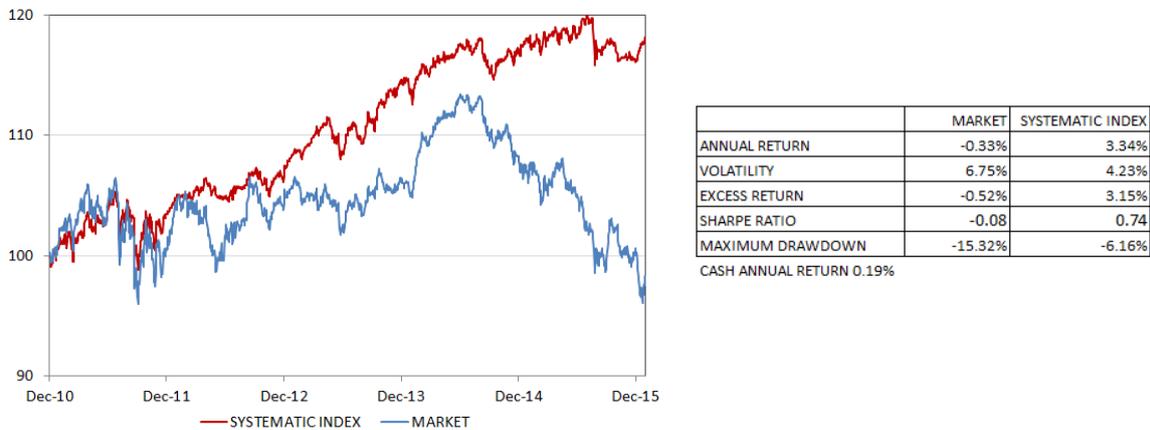
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applied such as single and aggregate position size limits and rebalancing rules. It is important to stress that there is no asset allocation benchmark or set of neutral weights but rather the weights vary from zero to predefined maxima.

Given the portfolio will be changed periodically as conditions change, this is a reactive process, not a predictive process, a subtle difference. Put it another way, as long as assets go up in price, keep holding them, and if they go down, don't hold them. It turns out one of the best ways to manage risk is to occasionally not hold an asset, or any asset at all. Thus a 100% cash holding can occur on occasion.

Finally, the investment rules must be implemented without the possibility to introduce behavioural biases and the way to do this is to package the strategy into an active index. Figure 6 shows the performance and statistics of such a systematic index<sup>4</sup> versus the market portfolio since it went live in January 2011 and Figure 7 shows the drawdowns. There is clear evidence for outperformance with a lower level of volatility and drawdown risk. Consequently the Sharpe ratio is greatly improved. Interestingly the market portfolio is currently in a large drawdown whilst the strategy is close to all-time-high showing the effectiveness of the active management.

**Figure 6:** Live systematic index performance compared to the market, 31 Dec 2010 – 31 Jan 2016



**Figure 7:** Live systematic index drawdowns compared to the market

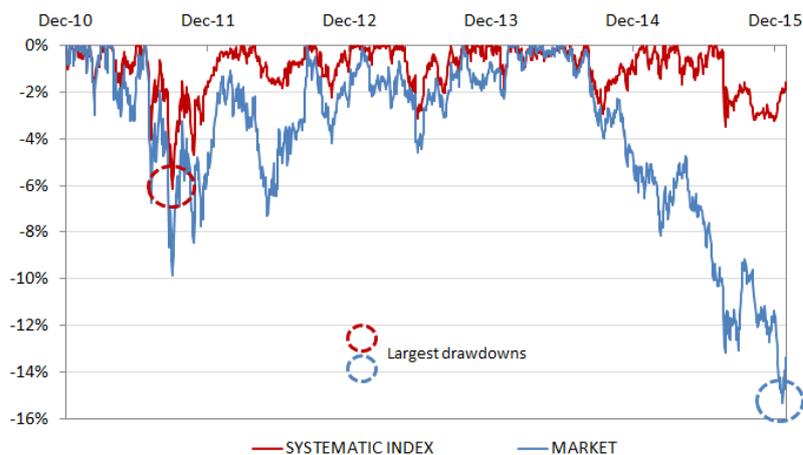


Figure 8 shows the asset allocation of the strategy over a longer timeframe, including simulation back to the start of year 2000. The associated performance of the naïve market and the strategy are shown on the right hand scale. When assets are performing poorly the allocation moves away from these assets in search of better relative performance. Not only does this cause an exit of equities during bear markets but

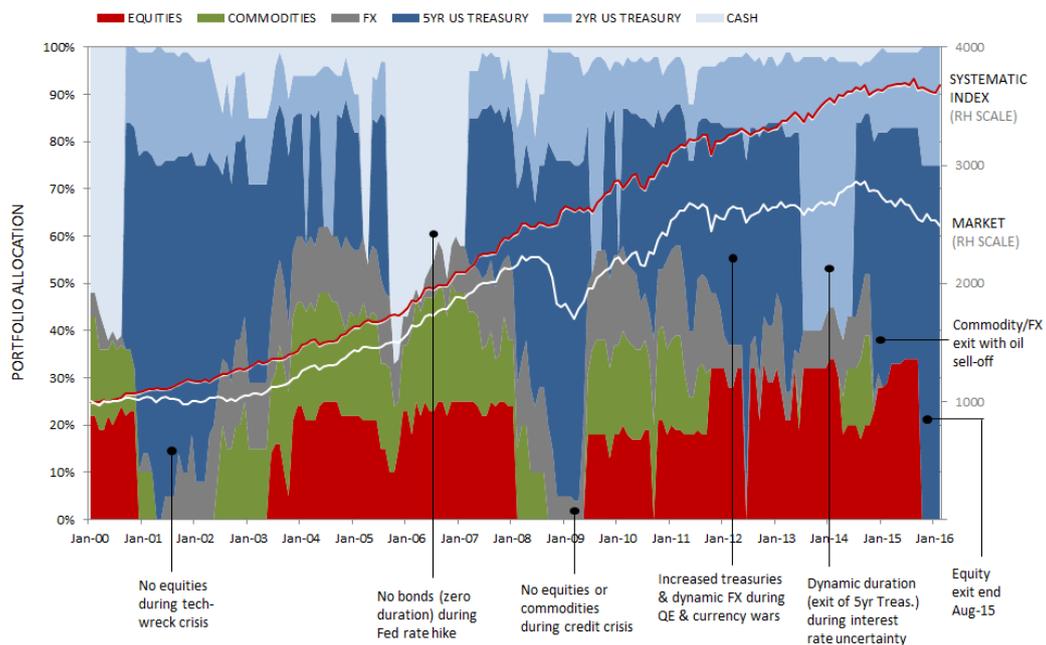
<sup>4</sup> QLAB Asset Allocation Index, source Bloomberg (ticker QLABQAA)

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also a low duration or interest rate risk stance when rates rise quickly such as in the mid 2000's or during 2013 when the first "taper tantrum" occurred.

**Figure 8:** The active asset allocation, simulated 2000 – 2010, live from 2011



Whilst the live and simulated statistics provide good evidence that this active strategy works, there are other important considerations, namely:

- It is all too easy to tune systematic strategies to historic data and benefit from hindsight, so any systematic strategy engineer should be able to demonstrate how they have not calibrated or optimized the strategy to historic data, a problem known as curve-fitting
- The strategy should be tested using real and simulated historic data going much further back in time to judge how the strategy would behave in different market environments, there will be times when a single strategy does not perform so well, which is acceptable. Be wary of strategies which always look good as this can be evidence for curve-fitting
- Live index track record should be compared to pre-live simulation, although any strategy will have periods or more or less success, and this can be tested by looking at rolling statistics measured over medium term windows of say 3 years
- Theoretical track records of performance should account for the costs of implementation due to the higher turnover than a buy-and-hold approach, and the strategy shown above is calculated net of about 0.3% per year to account for this
- Track records of live traded accounts or instruments such as funds should be compared to the theoretical track record as final evidence things are working
- Whilst a single systematic strategy can show robustness on its own, an investor should always diversify between different investment approaches in their overall portfolio.

One of the benefits of systematic strategies over discretionary strategies is that these tests can be performed at all. Systematic strategies can be tested in an evidence based way over decades of real and simulated market data. Discretionary strategies can only be judged by their live track records, which may be long, but represent only a single path through history. Further, testing for consistency of discretionary strategies over different market crises is only possible if the strategy was live during that crisis. Whilst care needs to be taken in assessing so-called "back-tests" of systematic strategies, if done scientifically they can provide valuable information.

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## SUMMARY

We may be our own worst enemy when it comes to investing, so how can we “invest with the enemy” without being affected by behavioural traps that have been heavily researched and induced on demand?

First we must accept, human beings having evolved over millions of years, and we are not well adapted to financial survival in the modern world. Despite our best intentions we tend not to be able to leave things alone and thus active management is the only form of investing whether by accident or design.

There is a solution however, and a relatively small part of the overall investment landscape known as systematic investing can provide the discipline needed to navigate the volatility and cycles of the financial markets in the years to come.

The effectiveness of such a strategy is shown in Figure 9. The 1 year returns of the strategy (y-axis) are shown against the 1 year returns of the market (x-axis). A conventional tracker ETF passively following the market would give the investor all the upside and all the downside, as shown by the blue dotted line.

Since the strategy sells falling assets, the downside can be largely avoided whilst the upside capture is still good. This asymmetry is called convexity, and is what investors actually want due to their loss aversion.

The aim is not to beat the market all the time, but specifically beat the market when it goes down. When the market is performing well there is true alpha, meaning the strategy can outperform, but does not do so all the time, the alpha can occasionally be negative over 1 year. Most investors would accept this if both the market and active strategy show good absolute performance. When the market is going down on the other hand, there is strong outperformance, and it is this “crisis alpha” which protects investor capital and delivers better returns than the market over the long term due to the compounding effect.

The result of this is that the investor experiences less dramatic drawdowns which gives them the peace of mind to stay invested, a good way to achieve their long term investment goals.

Ironically perhaps, an investor in a well behaved active and systematic strategy can actually be more passive and stay invested, knowing that their investment strategy comes with risk management included.

**Figure 9:** The rolling returns of the active strategy versus the market portfolio show convexity

