

Risk. Management. Reward.

The New Zoology of Investment Risk Management

Traditional investment paradigms are tilting. Active risk management seems more important than ever.



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Content

- 5 **Black Swan: Be prepared for the unpredictable**
- 6 **The “Buy-and-Hold” principle no longer the only valid argument**
- 6 **Traditional risk models fail in practice**
- 7 **Saying goodbye to Homo economicus ...**
- 7 **... means goodbye to perfect markets.**
- 9 **Swans are not (only) white**
- 12 **Dealing with “black swans”**
- 13 **“New baskets” with alternative investment solutions**
- 15 **Risk management**
- 16 **Risk management as a criterion for allocation**
- 18 **Understand. Act**
- 18 **The Omega Factor of Investment**

Imprint

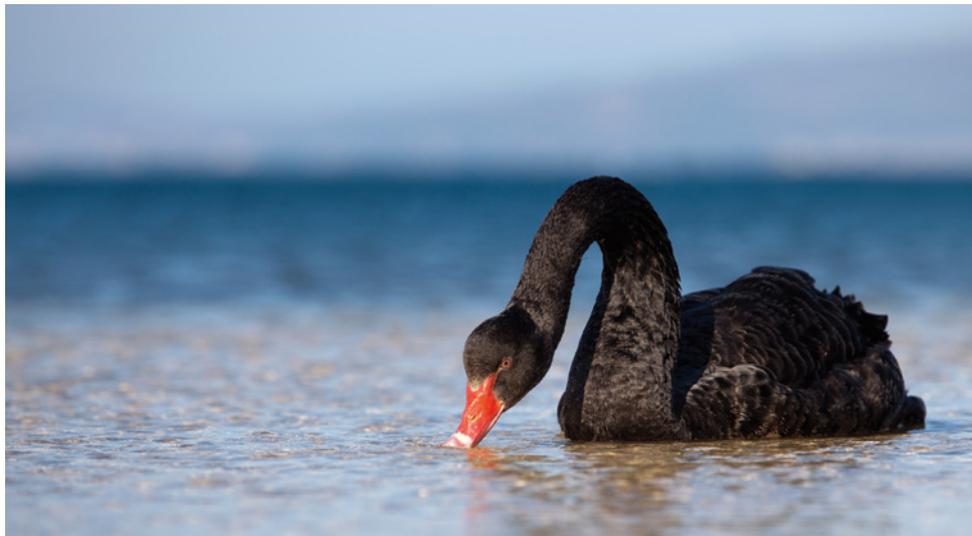
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The New Zoology of Investment Risk Management

Markets are efficient and investors are rational – that is the consensus view, at any rate. But how can we differentiate between facts and dogma? Are traditional investment risk models an adequate representation of extreme events (so-called black swans)?



Imagine that you are a contestant on “Who Wants to Be a Millionaire?” You’ve made it nearly all the way, and the host asks you the million-dollar question: “What was the name of the last wife of the last emperor of China?” You draw the 50/50 joker, leaving two alternatives: B. “Li Shuxian” and C. “Wang Jung”. How do you choose?

Welcome to investment risk management! Portfolio management is essentially risk management. And it is only our knowledge of possible risk that allows us to help manage actual risk. Key insights:

- The financial market crisis – the black swan – has turned traditional investment paradigms on their head.
 - The “Buy-and-Hold” principle does not seem to be the only valid argument when investing.
 - Traditional risk models may not adequately represent risk.
 - The financial crisis 2008 as well as the European debt crisis in 2011 have revealed short-term weaknesses in diversification.
- The assumptions of conventional risk models, such as normal price distributions, constant parameters and perfect markets, are fairy tales.
- While the old saw “Don’t put all your eggs in one basket” still has validity in the world of finance, diversification alone cannot prevent losses.

- Modern investment solutions (“new baskets”), alternative asset classes or absolute return strategies, generate additional return opportunities for investors that are broadly independent of fluctuations.
- The use of rule-based risk management allows extreme risks to be avoided while generating optimized profiles for investors, depending on their preferences.
- Investing today means investing holistically, from Alpha to Omega. The objective is to:
 - take advantage of the market expertise of the active manager to generate Alpha;
 - use the market risk premiums (Beta);
 - limit the exposure of investments (beyond Beta) to market risks to the greatest extent possible with either market-neutral strategies and/or with rule-based risk control.

→ This is the Omega factor of investment.

Risk analysis for the million-dollar question on “Who Wants to Be a Millionaire?”

Let’s take another look at the initial situation of your million-dollar question on “Who Wants to Be a Millionaire?” What is your risk as a participant? You can play it safe by walking away with EUR 500,000. Or you risk a guess. You either win EUR 1,000,000 or your winnings fall back to EUR 16,000, provided you did not play the additional joker. The statistical expected value, at EUR 508,000 ($50\% \times \text{EUR } 1,000,000 + 50\% \times \text{EUR } 16,000$), is EUR 8,000 higher than the safe variation. Rationally speaking, you should “gamble”.

Unfortunately, unlike in quiz shows or the classical coin toss, risk analysis is not quite so trivial in portfolio management. Real-life economic interconnections are complex. Capital markets are often unpredictable and emotions are involved. The latest financial market crisis and European debt crisis have demonstrated to investors how important investment risk management is.

Black Swan: Be prepared for the unpredictable

A zoological curiosity, a challenge for risk management: “Black swans” are a metaphor for unpredictable events that defy all expectations and overturn the most carefully calculated normal Gaussian distributions.

The latest financial market and European debt crises also qualify as black swans that have overturned traditional investment paradigms and allowed for the establishment of new ways of thinking.

- The “Buy-and-Hold” principle does not seem to be the only valid argument when investing.
- **Traditional risk models** may not adequately represent risk.
- The financial crisis 2008 as well as the European debt crisis in 2011 have revealed short-term weaknesses in **diversification**.

The current financial market crises underscore this: The globally linked financial markets are increasingly marked by non-linear developments, that is, structural changes in the global economy occur more and more frequently, bringing with them the risk of chain reactions and upheavals on the global capital markets. Investors have to be prepared for the unpredictable. This also means that investors must break with old patterns of thinking and that traditional risk models (e.g. the traditional portfolio theory after Markowitz) must be subjected to critical evaluation.

Let’s take a look at traditional investment paradigms.

The “Buy-and-Hold” principle no longer the only valid argument

A look at equity performance over the last 10 years from mid-June 2002 to mid-June 2012 shows clearly that investors could only hardly make money with stocks. Thus the annual return over the period was only 1.9% in the S&P 500 Index. Even worse was the situation in the previous periods, when equity investments led to wealth destruction. As measured by the S&P 500 for US equities, they lost about 7% per annum for the period from 1999 to March 2009. This is an extraordinary negative performance, a black swan, and the worst 10-year performance by the S&P 500 in nearly 200 years! (see chart 1)

Now, what are investors to make out of this? First, this shows that investment recommendations like that of financial expert André Kostolany to “buy shares and take some sleeping pills: when you wake up, you’ve made money” will have to be examined more critically. Particularly in volatile capital markets, the priority should be to critically analyse markets and to be able to flexibly react to market conditions using active management. Taking profits and

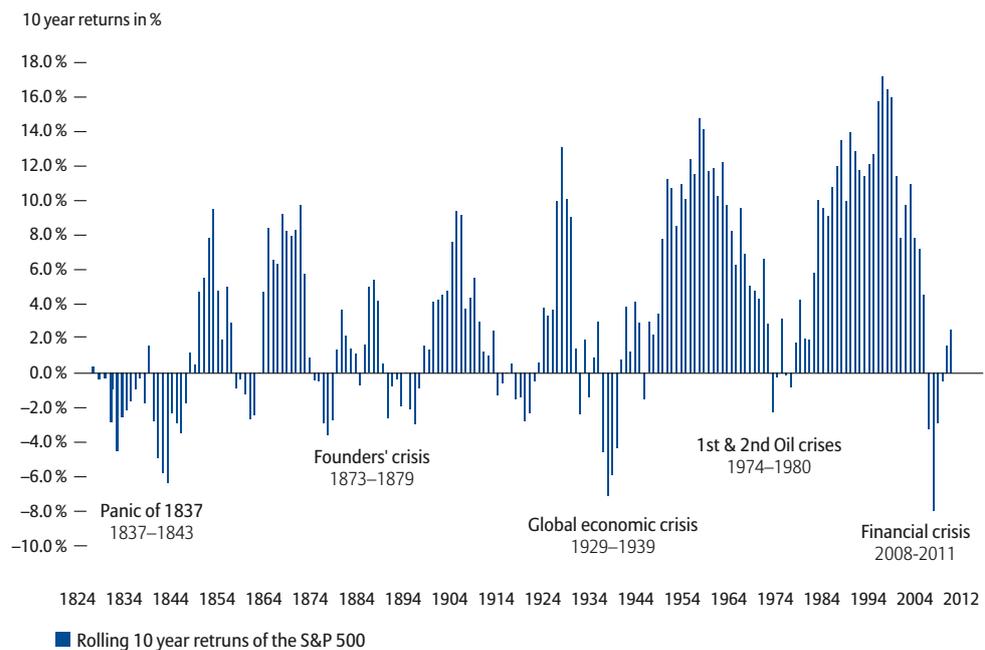
limiting losses are investment paradigms that should not be quickly overturned.

In addition, price developments on the equity markets over the past 10 years have shown that it pays for investors to swim against the current, if they have the courage: sell while a lot of people are still buying and buy when the panic is at its peak.

Traditional risk models fail in practice

The (financial) world that conventional risk models claim to prepare us for has little to do with the actual world we live in. While classical financial risk models and valuation tools from finance textbooks, such as Markowitz portfolio theory, the Modigliani-Miller corporate finance theorem and the Black-Scholes derivatives calculation formula, do help us better understand the context, they do not adequately represent real risks. This was demonstrated clearly by the latest financial crisis and European debt crisis. Worst of all, extreme risks are systematically undervalued, primarily owing to the non-reality based underlying assumptions used in the models.

**Chart 1: “Long-only” principle no longer useful
There have always been black swans on the capital markets**



Source: Datastream; Allianz Global Investors Capital Markets & Thematic Research, as of July 2013

The basic assumptions:

1. Market participants are **purely rational and are all equal**
2. Modern portfolio theory is based on the premise of a **perfect market**
3. Price changes follow a **normal distribution**
4. Price changes are **statistically independent of one another**
5. Correlations/Beta values/volatilities/risk-free interest rates are **constant**.

But are these assumptions true?

Saying goodbye to Homo economicus ...

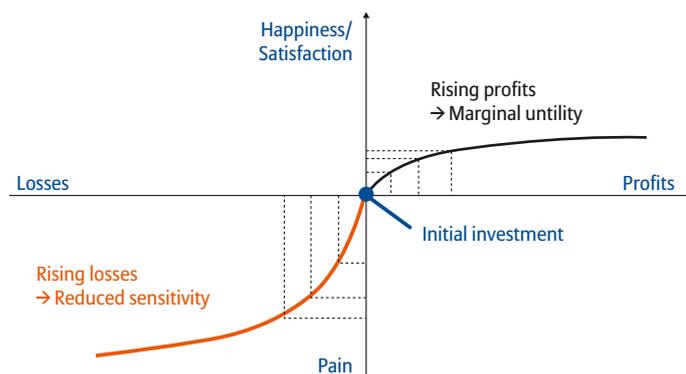
Economic actors, and especially investors, act rationally. They try to maximise utility while remaining emotionally uninvolved. That, at least, is the reigning paradigm of Homo economicus, the benchmark for financial models.

One thing is certain. Rationality is one basis for human action, but not the only one. The evolutionary structure of our brains, a mix of emotions and cold calculation, is a point against the basic assumption of the current theory. We are humans, not Vulcans. Unlike Mister Spock on the Starship Enterprise, emotional factors also influence our decisions.

Among other things, the latest financial market crises expose a broad range of typical investor behavioural patterns, so-called anomalies, which are described in "Behavioural Finance". These anomalies violate the basic assumption of rational behaviour. They include the herd mentality, as well as over-confidence, which makes us believe that we can control events that are beyond our control. Another example is hindsight bias, which is when we look back and think that we did indeed see the crisis coming.

And finally, investors are usually risk averse and do not act rationally. Increasing losses are given more consideration than additional returns (presented as a graph in Chart 2).

Chart 2: Investor aversion to loss



Source: Andrew W. Lo "The Adaptive Markets Hypothesis", 2005; Allianz Global Investors Capital Markets & Thematic Research

... means goodbye to perfect markets.

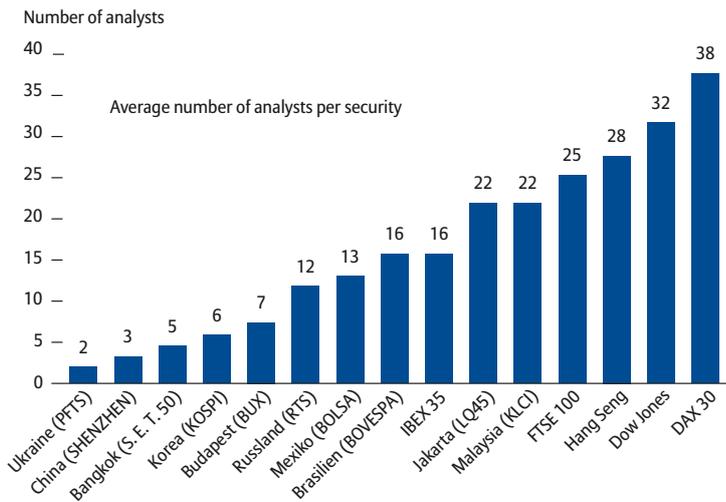
But how can markets be perfect when the market participants do not act on a purely rational basis? This is a contradiction that cannot be resolved. At best, the perfect-market hypothesis serves as a crutch.

At best, the perfect-market hypothesis serves as a crutch.

Information efficiency, another basic assumption of the perfect-market theory, also brings this point home. Depending on the version of the theory, information efficiency assumes that all information is known and already priced in. If this complete information efficiency did exist, fundamental analysis would not result in any outperformance. If all information were known to everyone at the same time, it would be valued in the same way and incorporated directly into pricing.

But in this case, who analyses companies and makes information available for valuation? Wouldn't whoever undertakes an analysis have an advantage before the information is priced in?

Chart 3: Active management – added value through fundamental analysis



Source: Bloomberg; Allianz Global Investors Capital Markets & Thematic Research, as of July 2013

Just as important: how is information distributed and how does it become relevant to prices? This varies greatly depending on the equity markets, as measured, for example, on the number of analysts. Each security listed on the DAX has about 38 analysts, while a

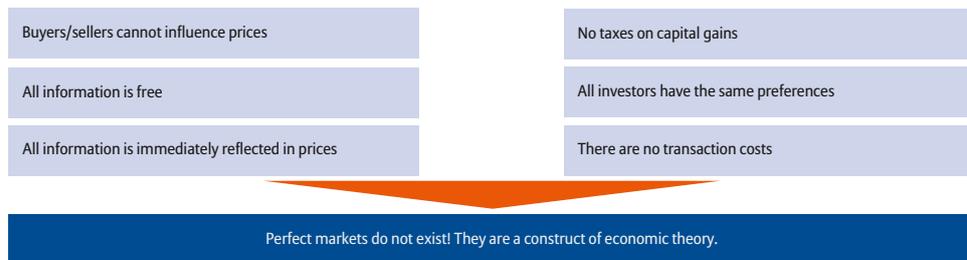
security on the Shenzhen B equity index China has just 3 analysts.

The efficient markets theory would also mean that investment styles are obsolete. However, there are clearly phases in which small capitalized stocks (“small caps”) sharply outperform large caps, and vice-versa. During certain periods, value style (value shares) does better than growth style (growth shares), and vice-versa. One of our studies has even shown that in the past, independent of observable market phases, the value style was able to outperform over the long term.

Other restrictions of a perfect market, such as tax-free capital gains, identical investor preferences and a financial world with zero transaction costs, make it clear that perfect markets are mythical creatures, no more than a construct of economic theories.

Investors are not purely rational, markets are not perfect, and swans are not (only) white. We have to rethink.

Chart 4: Perfect market – a fairy tale



Source: Allianz Global Investors Capital Markets & Thematic Research



Swans are not (only) white

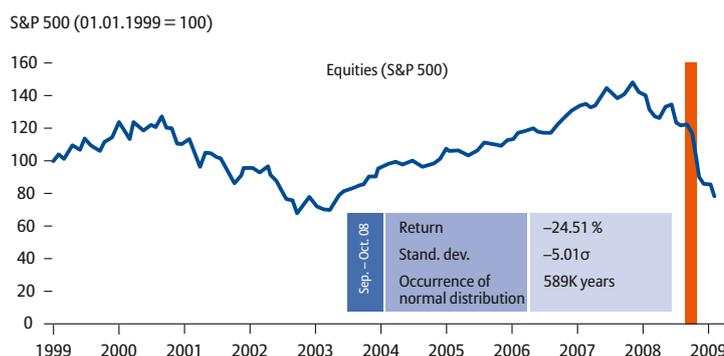
Black swans exist. They live in Australia, and when Europeans first visited that continent, they had to let go of what had been considered a truism for generations (“Swans are always white.”). Since their discovery, black swans have been considered to be a model of an unpredictable event that turns conventional thinking upside down when it occurs. Nassim Taleb’s bestseller “The Black Swan” brought this phenomenon back into general awareness.

The European debt crisis is a black swan, as was the financial market crisis or the Technic Media and Telecommunication bubble (“TMT bubble”) and Black Friday in 1929. Black swans are more common than generally thought and than one would assume based on the normal distribution. As a result, the assumption made by traditional risk models that price changes have a normal distribution (the so-called Gaussian normal distribution) is also unable to pass the “practice test”. A normal distribution means that price fluctuations of securities are evenly distributed around their (historical) statistical averages. In reality, however, they do not fall within a bell curve pattern. Instead, they fluctuate irregularly. This model broadly excludes so-called “fat-tail risks” (extreme risks which are not sufficiently captured by the standard normal distribution) for expected price changes. This is an error. If you manage risk applying the assumptions of normal distribution, the European junk bond crash in September/October 2008 was an event that should only occur once every 247 million years. And the simultaneous crash of the S&P 500 is something that should happen about every 600,000 years. Time does indeed fly. The history of the financial markets is the history of financial market crises.

And weak market days occur more frequently during times of crisis. It’s no wonder, then, that once investor confidence has been broken it usually takes some time before the next recovery takes off. The upshot of this is that markets have a memory, and the assumption that price changes are statistically independent has only restricted application. In contrast with a coin toss, previous price changes on the capital markets play a role, as is very nicely

illustrated in the volatility index VIX (calculated on the basis of the S&P 500 Index) in Chart 6. If there is a substantial amount of market turbulence, there is a high probability that subsequent periods will also experience high market volatility. Phases of increased price fluctuation occur with increasing frequency, as could again be seen recently.

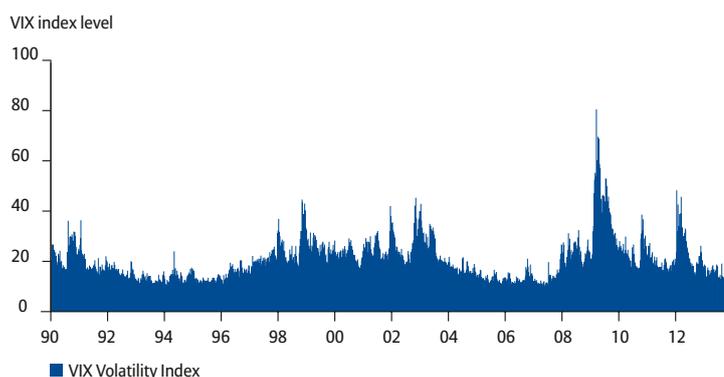
Chart 5: Normal distribution significantly underestimates actual risk



Source: risklab (100% subsidiary of Allianz GI) on the basis of Bloomberg data; Allianz Global Investors Capital Markets & Thematic Research, as of August 2012

Dishearteningly, these assumptions of perfect markets, rational market participants, normal distributions, etc., are the very assumptions on which many Nobel Prize winners base their theories. Markowitz, Sharpe, Scholes, and others – traces of these major thinkers can be found in risk models and valuation tools. The storm that swept across the capital markets during the economic, the financial and most recently the European debt crisis made very clear how fragile the constructs of conventional risk models were. It could even be said that they laid the intellectual groundwork for the financial market crisis 2008.

Chart 6: Market memory



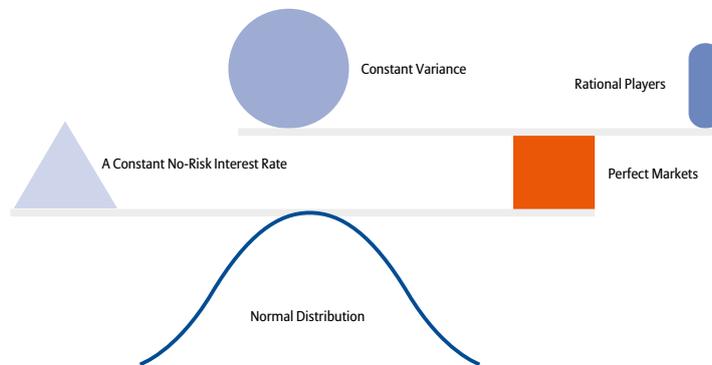
Source: Datastream; Allianz Global Investors Capital Markets & Thematic Research, as of July 2013

Chart 7: Risks are not adequately reflected Assumptions of traditional risk models do not stand up to reality

| Assumptions ... | → | ... but |
|---|---|--|
| 1. Market participants are purely rational and are all equal. | → | The risk profile of an investor is usually asymmetrical, i.e. losses are weighted more heavily. |
| 2. Price changes are statistically independent of one another. | → | Market memory; turbulent times subside slowly. |
| 3. Correlations/Beta values/volatilities/risk-free interest rates are constant. | → | Correlations and risk-free interest rates are unstable. The factors used in financial models are not constant. |
| 4. Price changes follow a normal distribution. | → | Normal distribution significantly underestimates actual risk. The investor bears the "tail risk". |
| 5. Modern portfolio theory is based on the premise of a perfect market. | → | Perfect markets do not exist. They are a construct of economic theory. |

Source: Allianz Global Investors Capital Markets & Thematic Research

Chart 8: Conventional risk models – fragile constructs



Source: Schroy, John Oswin, "Fallacies of the Nobel Gods: Essay on Financial Economics and Nobel Laureates"; Allianz Global Investors Capital Markets & Thematic Research

As Abraham H. Maslow, one of the founders of humanistic psychology, said: "If the only tool you have is a hammer, you tend to see every problem as a nail." We couldn't have said it better ourselves.

"Don't put all your eggs in one basket"

It seems that capital markets do not fit into the Gaussian bell curve model any more than individual securities or asset classes actually possess stable correlations. Quite the contrary. Correlations are not stable. Chart 9 provides a colour scale of the correlations for different asset classes (indices). The darker blue the squares are, the lower the correlation of the indices. So if no major price upheavals are seen during "normal times", then the returns on bond and equity indices have a low correlation (blue). The regional indices also show a low degree of correlation during these market phases (light red). Low or negative correlations between asset classes used for risk diversification disappear just when they are needed most – in times of crisis (bear

"If the only tool you have is a hammer, you tend to see every problem as a nail."

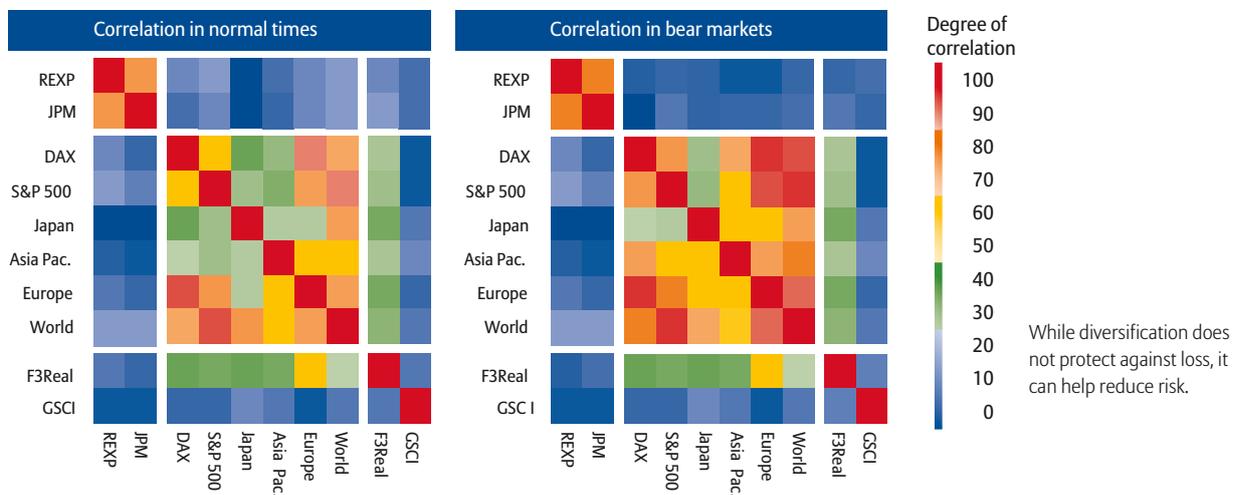
Abraham H. Maslow

markets). The correlation matrix changes colour as seen in Chart 9: mostly red.

The diversification effect that was sought decreases. Another investment paradigm is on the verge of being overturned in the wake of the financial market crisis 2008.

Diversification of investments can also help avoid “cluster risks”. In order to maximise the market risk premiums of different asset classes, investors should distribute their money equally across multiple baskets. Over time, investment classes turn in varying performances. The best example is 2008, when the financial crisis was peaking. For example, that year prices of government bonds in industrialised nations rose by an average of 18%, and gold by 8%, while equities, down 40%, experienced their weakest year since the global economic crisis of 1931 (see Chart 11).

Chart 9: The diversification investment paradigm is on the verge of being overturned

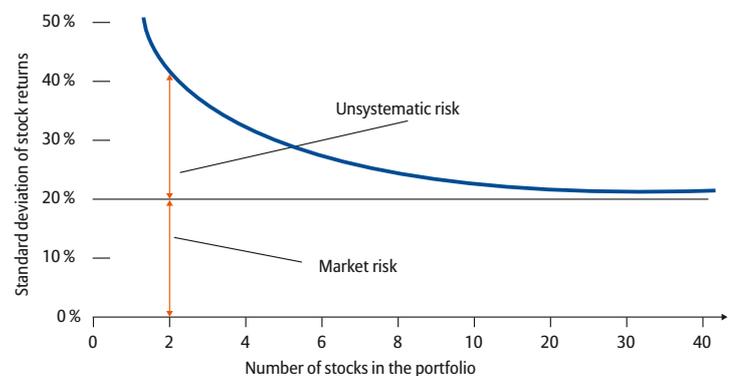


Source: risklab (100% subsidiary of Allianz GI); Allianz Global Investors Capital Markets & Thematic Research

So the old saw “Don’t put all your eggs in one basket” still has validity in the world of finance. While diversification does not protect against loss, it can help reduce risk. With securities that are not completely correlated with one another, an investor can potentially reduce the price fluctuations in his portfolio without reducing return by diversifying his assets (risk diversification effect). In the end, what remains in a completely diversified portfolio is market risk (compare Chart 10). Risk reduction without limiting opportunities – diversification seems to be the only “free lunch” on the capital markets.

The market recovery in 2009 also favoured certain asset classes, with emerging markets equities up 73%, easily outpacing other investments.

Chart 10: Diversification: “It’s the only free lunch”



Source: Dr.-Ing. Hans-Markus Callsen-Bracker, Martin Grädler “Risikomanagement und Kapitalmarkt”, Allianz Global Investors Capital Markets & Thematic Research

Chart 11: Diversification can reduce risk

Ranking of annual returns of different asset classes in %

| Place | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---------|--------|--------|--------|-------|-------|-------|--------|-------|--------|-------|-------|--------|-------|
| 1 | 61.45 | 10.34 | 12.27 | 37.10 | 16.88 | 55.04 | 22.36 | 26.07 | 17.79 | 73.44 | 38.33 | 14.78 | 30.07 |
| 2 | 22.16 | 6.93 | 5.23 | 30.02 | 9.12 | 44.88 | 18.60 | 22.60 | 8.45 | 24.19 | 27.48 | 12.09 | 16.81 |
| 3 | 10.04 | 6.87 | 1.29 | 7.42 | 8.26 | 34.81 | 10.74 | 19.76 | 1.62 | 23.18 | 23.47 | 10.80 | 16.71 |
| 4 | 9.28 | 4.60 | 0.14 | 4.54 | 3.69 | 27.59 | 3.16 | 18.86 | -3.55 | 23.16 | 19.82 | 7.96 | 14.34 |
| 5 | 1.80 | 2.94 | -2.52 | 1.13 | 2.74 | 27.36 | 1.07 | 1.85 | -6.31 | 22.61 | 16.91 | 5.40 | 9.36 |
| 6 | 0.15 | 1.93 | -4.02 | 0.43 | 2.18 | 21.83 | -1.71 | -0.06 | -33.88 | 15.46 | 15.76 | 3.45 | 3.95 |
| 7 | -6.62 | -7.25 | -20.24 | -1.50 | 1.49 | 11.74 | -4.15 | -3.20 | -42.67 | 9.52 | 13.82 | 1.87 | 3.06 |
| 8 | -9.53 | -17.75 | -34.42 | -4.74 | -0.97 | 7.71 | -5.23 | -4.15 | -44.78 | 0.97 | 13.37 | -14.69 | -0.26 |
| 9 | -25.92 | -28.93 | -43.06 | -4.79 | -2.56 | 0.40 | -24.69 | -4.37 | -50.76 | -1.27 | 1.49 | -15.44 | -1.68 |
| Average | 6.98 | -2.26 | -9.48 | 7.73 | 4.54 | 25.71 | 2.24 | 8.60 | -17.12 | 21.25 | 18.94 | 2.91 | 10.26 |



Source: Datastream, Allianz Global Investors Capital Markets & Thematic Research, Benchmarks used: Equities Germany: MSCI Germany TR, Equities USA: MSCI USA TR, Equities Emerging Markets: MSCI EM TR, Government Bonds Industrialised Countries: JPM Global Govt. Bond Index TR, Emerging Markets Bonds: JPM EMBI Global Composite TR, Global Corporate Bonds: BofA ML Broad Corp. Index TR, Real Estate: Real Estate Price Index Germany Bulwien, Commodities (ex. precious metals): S&P GSCI Non. Precious Metals TR, Gold: €/troy ounce, Hedge Fund (all strategies): Credit Swiss/Tremont Hedge Fund Index NAV, Hedge Fund (market neutral): CS/Tremont Market Neutral Hedge Index NAV; all indices currency-adjusted to EUR (TR = Total Return Index, NAV = Net Asset Value), based on annual data as of end 2012

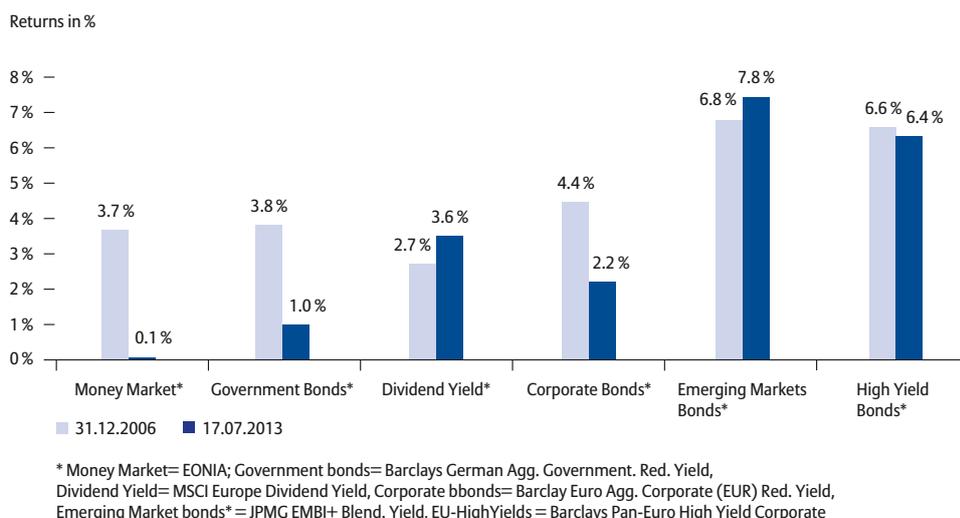
The takeaway for investors on all this should be that diversification is more important than ever when making investments. Diversification is the first and simplest form of risk management. However, the recommendation of “Don’t put all your eggs in one basket” doesn’t help if multiple baskets could fall off the same lorry at the same time. New baskets and new tools and/or new risk models must be incorporated into the investment process.



Dealing with “black swans”

The recent European debt crisis and financial market crisis make it clear that investors have to be prepared for the unpredictable. Market participants need to learn to deal with “black swans” more effectively. However, “avoiding risk at all costs” does not need to become the principle investment guideline to satisfy investors’ need for security. The problem is that security – in the form of investments on the money market or in top-rated government bonds – is “expensive”, particularly during and immediately after a crisis. That is, the interest earned on low-risk investments is very low. Chart 12 illustrates this in a return comparison of different asset classes over the years 2006 to 2013 including the periods of the recent financial crises. Yields decreased dramatically compared to the year 2006. Additionally taking into account an inflation rate of 1.6% (between June 2012 and June 2013, source: eurostat) in the euro area, these two investment vehicles in fact generate a negative real return. To put this into an

Chart 12: Safety is costly
Yield comparison today vs end of 2006



Past performance is not a reliable indicator of future or fund results;
 Source: Datastream, Allianz GI Global Capital Markets & Thematic Research

exaggerated nutshell, it can be concluded that using a risk averse investment actually destroys money instead of earning it.

As former German Federal President Walter Scheel once stated: “Nothing happens without risk, but without risk nothing happens.”

The art of modern investment solutions and risk models is to tame risk while opening up potential returns on investment.

“New baskets” with alternative investment solutions

Alternative assets as well as advanced return strategies are one opportunity for investors to add “new baskets” to their investment accounts that can’t fall off by the same lorry at the same time.

Alternative asset classes can help you broaden your investment universe with an eye towards correlation structure and making better use of potential for diversification. Here are a few examples:

- **Volatility** as an asset class. This allows investors to systematically profit from risk premiums by selling implied volatility compared to realised volatility. The fluctuation of major trading indices (such as EuroStoxx50, S&P500) forms the main basis for making decisions. Volatility trading aims to develop a position or a portfolio whose value depends, to the greatest extent possible, on the change in volatility alone – not the change in the underlying asset.

- **Infrastructure investments:** Investments ranging from basic project financing and holding a stake in a wide range of conventional infrastructure projects (such as motorways) through to renewable energy. The asset class is divided into two different segments: Debt and Equity. Debt has the general risk/return profile of a corporate bond, whereas Equity corresponds to the role of an equity investor in infrastructure projects. Thanks to the investments’ largely calculable, long-term cash flows, this asset class offers relatively constant returns that are largely independent from developments on capital markets, even though illiquidity can pose a risk.

The art of investment: tame risks while opening potential returns

- **Currencies:** Investments in foreign currencies or currency baskets (such as emerging markets currencies) can be an attractive way for investors to create uncorrelated additional income. Carry trades are a strategy often used to generate such profitable currency positions. Carry trades pursue a strategy of borrowing a low-yield currency (short position) while investing in a higher-yield currency (long position).

- **Advanced Return/Hedge Funds strategies:** These strategies aim to limit portfolio risks (downside risk) with the help of diversification, derivatives or short positions. They also focus on generating long-term positive returns in nearly every market situation. In contrast to traditional “long-only investments”, they result in income opportunities in both bull and bear markets. Their goal is usually to generate higher income than government bonds with a comparable risk profile, but without government bonds’ explicit sensitivity to interest rates.

Diversification with alternative asset classes alone is not sufficient for an efficient risk limitation over time. Since the characteristics of risky investments in times of stress can change, it is difficult for investors to find protection from liquidity risks or bad decisions by the portfolio manager (Alpha risk). This requires, among other things, that investors integrate dynamic risk management in making investment decisions.

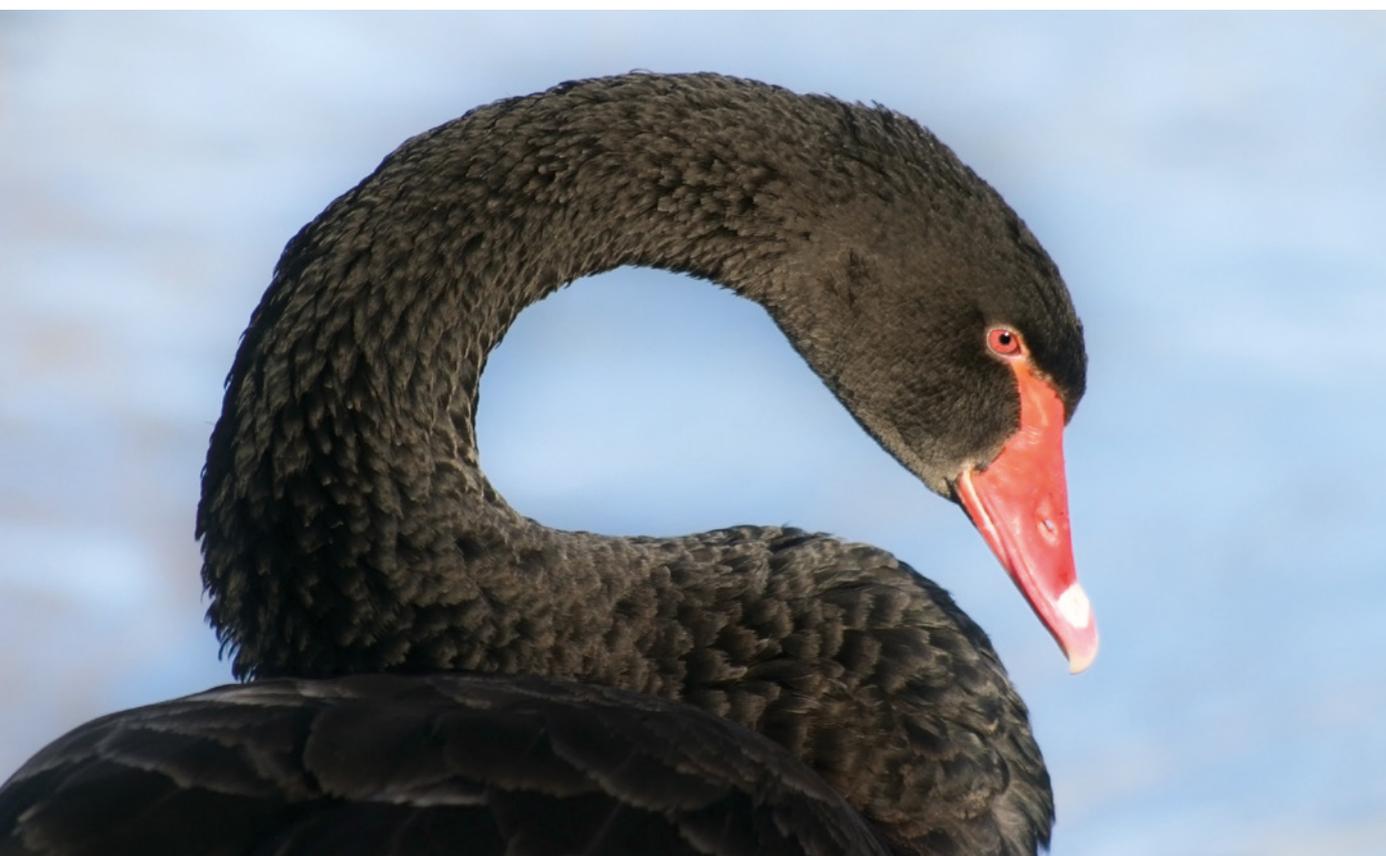
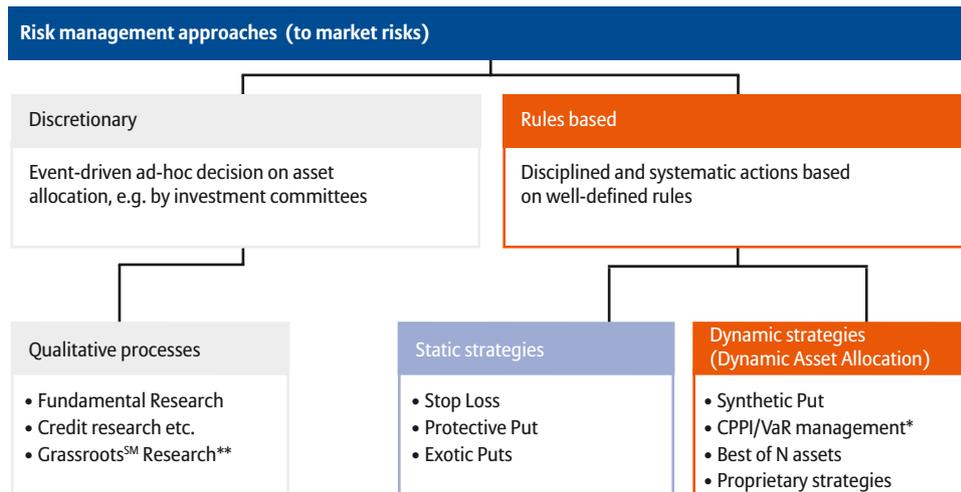


Chart 13: Basic approaches to risk management



Source: Allianz Global Investors

* CPPI = Constant Portfolio Proportion Insurance; VaR = Value at Risk

** GrassrootsSM Research is a division within the Allianz Global Investors group of companies that commissions investigative research for asset-management professionals. Research data used to generate GrassrootsSM Research reports are received from reporters and field force investigators who work as independent, third party research providers, supplying research that is paid for by commissions generated by trades executed on behalf of clients.

Risk management

Modern investment solutions, that control portfolio risks actively, should be able to reliably mitigate the risk, without sacrificing potential yields. There are three main approaches to active investment risk management (see Chart 13):

1. **Discretionary approaches:** Event-related measures for risk mitigation, e.g. in strategy meetings based on fundamental research.
2. **Static rules-based approaches:** Disciplined and systematic action in accordance with clearly defined rules to limit losses.
3. **Dynamic rules-based approaches:** Disciplined and systematic action in accordance with clearly defined rules to limit losses, taking into account fundamental factors.

Discretionary approaches are less reliable for protection against price risks. The decisions made during strategy meetings, for example, are often situational, giving rise to the danger of taking unsystematic risk due to emotional behavior. The application of rule-based risk controlling approaches therefore seems necessary.

In general, with rule-based risk management approaches a distinction can be drawn between static and dynamic approaches, as shown in Chart 13. Both static and dynamic

approaches ultimately pursue the same objective – to generate the investor’s desired target profile, such as high opportunities for participation in conjunction with improved risk protection. But there are various paths that can be followed to this end.

An options-based procedure is usually used with **static approaches**. A classical variation of this strategy class is the protective put, that is, the combination made up of a risky asset (e.g. an equity investment) with the simultaneous purchase of a put option. Approaches that go beyond this basic strategy may make the use of exotic options, for example. A disadvantage of this strategy is that, on average, costs are higher than with the dynamic approach¹. This is especially true during crisis phases, with higher implicit volatility and the higher put premiums that go along with that. Another disadvantage is implementation. For a balanced portfolio with different investment classes, it is usually very difficult to find appropriate and fairly priced options with high liquidity.

The more efficient alternatives are dynamic risk management approaches.

These approaches generate the desired target profile using rule-based allocation adjustments (e.g. equity weightings) over time. As a rule, the allocation adjustment takes place through corresponding liquid (and thus cost-

¹ See Kraus, J./Zagst, R. (2008), Stochastic Dominance of Portfolio Insurance Strategies – OBPI versus CPPI, accepted for publication in Annals of Operations Research.



² Extreme Value Theory uses a type of probability distribution that is much more reliable than the normal distribution for estimating extreme risks of financial market yields.

³ A Value at Risk of EUR 10 million held for one year and with a confidence interval of 95% means that the possible loss of the portfolio under observation will not exceed, during that year, the amount of EUR 10 million, with a probability of 95%.

⁴ Test calculations of risklab (a 100% subsidiary of Allianz Global Investors) on different example portfolios.

efficient) futures contracts. There are also a large number of different management approaches in this strategy class.

The best-known of these is Constant Portfolio Proportion Insurance (CPPI strategy). In its simplest form, weighting in a risky, opportunity-rich investment class (e.g. equities) is managed as a (constant) multiple of the current risk budget (difference of portfolio value and discounted minimum portfolio value). This strategy is pro-cyclical, meaning it reacts, for example, to price increases on the equity market with an active increase in the weighting of equities. In general, this pro-cyclical behaviour generates returns, because on average most investment classes exhibit slight trending behaviour. In volatile market phases without clear trends, however, the classic CPPI approaches have weaknesses. Various refinements have been added to the method.

One possibility are dynamic processes for managing portfolios that are considerably more comprehensive than a classic CPPI approach. Such Portfolio Insurance Strategy approaches use the Extreme Value Theory² to take into systematic consideration the possibility of the occurrence of black swans. Similar methods are also taken into consideration to estimate extremely rare catastrophes, such as tanker accidents.

So-called trading filter algorithms are used to try to optimise trading costs in volatile lateral markets. The particular advantage of such Portfolio Insurance Strategies versus a classic CPPI is the increased strength of returns

resulting from the inclusion of active management approaches, effective trading filters as well as the more efficient allocation of the available risk budget over time.

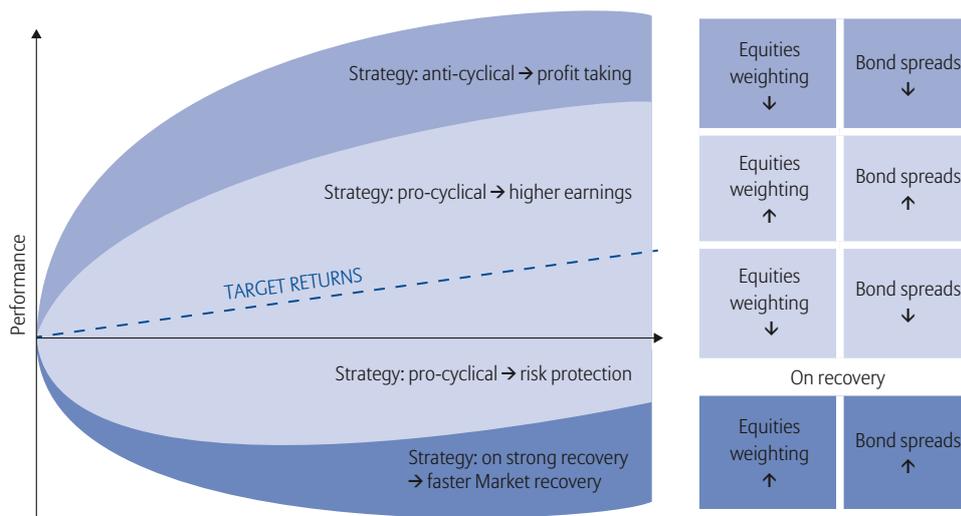
Dynamic risk management can be also used for modern multi-asset solutions with soft lower floors. In this case, while investors are not guaranteed a fixed minimum portfolio value, they will have significantly higher levels of security in weak markets as compared to classic balanced solutions. To this end, a number of dynamic approaches are used that target an improvement in Value at Risk (VaR)³ or other downside risk measures, such as Conditional Value at Risk. Examples for this class of strategies could be identified as more complex Dynamic Strategy Systems. Unlike the CPPI strategy, such strategies combine pro-cyclical and anti-cyclical elements, using an active management approach. The result could be a more attractive return profile for the investor. As tests have shown, the returns of such combined Dynamic Strategy Systems – in comparison with a classic equity/bond benchmark – are able to outperform, with significantly higher security and stability.⁴

Intelligent, dynamic risk management processes proved themselves during the recent financial crises. It was seen that the investor can attain high levels of security in weak markets while substantially profiting from the market recovery that so far has taken place at the end of each financial and economic crisis. Simultaneously modern methods in portfolio management can reduce or even eliminate the costs that occur when applying classic value protection strategies.

Risk management as a criterion for allocation

A new way of taking risk into account as part of the investment process is to use risk as a key criterion for allocation. Modern investment strategies are accordingly distinguished by risk no longer being viewed as the result of portfolio allocation. Instead the risk in the portfolio as a whole is predefined as an objective and component of the investments made by these portfolios. This results in risk not being managed after the investment process,

Chart 14: Dynamic Strategies



Source: Allianz Global Investors

as is usually the case, but directly as part of the decision-making process at the asset allocation stage.

The principle behind this idea can easily be explained. The investment process includes, as a predefined stipulation, various ranges of risk/volatility within which the overall risk in the portfolio is free to move. These may be broken down into various categories from risk-averse to risk-taking, such as defensive, conservative, moderate or growth. A risk-parity approach also is possible, under which asset classes are broken down in the portfolio by their risk weighting. Based on the risk targets, the individual potential investments are then selected for the portfolio, with the covariances of the asset classes being taken into account. Allocation accordingly involves greater significance being given to the contributions to risk made by the asset classes than to their contributions to returns. This does not generally mean a change to the structure of the investment process, which can always continue to be composed of specific elements, such as strategic or dynamic asset allocation.

The advantages of such a strategy are obvious: risk becomes transparent and theoretically a fixed target figure in any calculations. These new investment concepts therefore deal with two aspects from the outset: firstly, risk becomes an investment objective or predefined target/target figure; and secondly, the risk involved is made clear to investors in advance. Decisions on investing money can therefore be made in these cases on the basis of willingness to take risks. Indirectly, however, this will also determine the opportunities for the returns that can be achieved. This is because the link between risk and return does not change. The higher the risk that is selected, the better the opportunities for higher returns. On the other hand, also higher losses have to be expected when taking higher risks.

In addition, there are new approaches to strategy which take risk in the portfolio as a whole into account as a key criterion for allocation within predefined risk corridors. This means that managing risk becomes an integral part of the asset-allocation decision-making process.

Investing from Alpha to Omega

In the broad view, this means for investments:

1. Investors will have to adjust to higher volatility of market cycles. It will be more difficult to generate returns from stock price gains alone. What's needed is active management – timing – to generate performance from volatility.
2. As for **Active Management** itself, the pursuit of Alpha (i. e. excess returns over the market segment) is promising when markets are inefficient.
3. Strict investment processes that assist in the recognition and elimination of typical human behaviour patterns are an essential component of active management. "Out-smart Yourself" is the investment motto.
4. Shifting correlations mean that the idea of diversification needs to be revisited. The principle of not putting all of your eggs in one basket still applies, but the baskets need to be arranged in such a way that they won't all fall off the same lorry. This applies to the selection of asset classes. The starting point is the selection of a combination of stocks and bonds, which are then managed using absolute-return strategies that seek a "beyond Beta" – partially independent of market fluctuations.
5. "Buy and hold" would hardly be the optimal strategy, if one bears black swans in mind. Instead, what is needed are risk-management rules that can be applied flexibly to the current situation. You could start out

with stop-loss strategies and then continue with professional portfolio-management and risk-management methods. Risk-management methods that could be used include CPPI-based ("**Constant Proportion Portfolio Insurance**") capital protection strategies as well as intelligent and dynamic procedures of risk controlling.

6. In addition, there are new approaches to strategy which take risk in the portfolio as a whole into account as a key criterion for allocation within predefined risk corridors. This means that managing risk becomes an integral part of the asset-allocation decision-making process.

The Omega Factor of Investment

Investing today means investing holistically, from Alpha to Omega.

The objective is to:

- take advantage of the market expertise of the active manager to generate Alpha;
- use the market risk premiums (Beta);
- to the greatest extent possible, limit the exposure of investments (beyond Beta) to market risks with either market-neutral strategies and/or with rule-based risk control.

→ This is the Omega factor of investment.

Dennis Nacken, Hans-Jörg Naumer

Suggested reading

Benoit B. Mandelbrot, Richard L. Hudson (2004): "The (Mis)behavior of Markets"

Daniel Kahneman and Amos Tversky (1979):

"Prospect theory: An analysis of decision under risk"

Peterson, Richard L. (2007), "Inside the Investor's Brain", New Jersey

Nassim Nicholas Taleb (2008): "The Black Swan"

Nassim Nicholas Taleb (2012): Antifragile – Things That Gain from Disorder"

Wikipedia.org on behavioural economics and prospect theory:

http://en.wikipedia.org/wiki/Behavioral_economics

http://en.wikipedia.org/wiki/Prospect_theory

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- Portfolio Health Check®: Preparing for „Financial Repression“

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- International monetary policy in the era of financial repression: a paradigm shift
- Financial Repression and Regulation: Paradigm Shift for Insurance Companies & Institutions for Occupational Retirement Provision
- „Silent Deleveraging or debt haircut?“
 - that is the question
- Financial Repression – A silent way to reduce debt
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- Two minds at work

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