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Alternative risk premiums – Returns and diversification driver?

Timo Six/Arnd Wiedemann

Authors

Timo Six M Sc
Department of Financial and Banking Management
University of Siegen
Hölderlinstrasse 3
57076 Siegen
Germany
Telephone: +49 (0)271 740 2878
Website: www.banklehrstuhl.de
Email: six@bank.wiwi.uni-siegen.de

Professor Dr Arnd Wiedemann
Department of Financial and Banking Management
University of Siegen
Hölderlinstrasse 3
57076 Siegen
Germany
Telephone: +49 (0)271 740 2664
Website: www.banklehrstuhl.de
Email: wiedemann@bank.wiwi.uni-siegen.de

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Foreword

Dear reader,

Any raise in interest rates in Europe seems to have been put on hold for some time yet. Further reductions in interest rates by the European Central Bank (ECB), most recently in September 2014, the announcement of negative interest rates, the bond-buying programme and adjustments on equities markets are increasingly forcing investors to seek out alternative sources of returns beyond traditional asset classes. The problem is that many of these alternatives are often at the expense of liquidity. If you are going to opt for timberland investment, for example, you need to be in for the long haul.

Given this background, alternative risk premiums offering a high degree of liquidity are particularly attractive. In this year's risk management study published by Union Investment, Professor Arnd Wiedemann and Timo Six from the University of Siegen have examined how alternative risk premiums can be explained from an economic perspective and whether they can be one way of usefully diversifying the portfolios of institutional investors.

The findings of the study highlight a method that can be used as part of an opportunity-oriented risk management system to generate adequate returns, even in these tough conditions.

I hope this study makes interesting reading.

Kind regards

Alexander Schindler

Introduction

1 Introduction

When interest rates are low, investors face the challenge of generating adequate returns from their portfolios. If the low level of interest rates persists, there will be a further deterioration in the situation. Any hopes of an early end to the current interest rate dilemma are continuing to evaporate, not least following the ECB's cut in its key interest rate to a new low of 0.05 per cent at the beginning of September 2014. Given this trend, there is a steadily growing desire to open up new sources of returns. For this reason, alternative risk premiums have recently increasingly become the focus of investor attention.

Alternative risk premiums can be harvested through rule-based investment strategies and promise long-term superior investment returns together with beneficial correlation structures, both between these premiums themselves and in combination with traditional risk premiums such as equity risk premiums. An enhancement of conventional multi-asset portfolios to include alternative risk premiums could therefore provide a way out of the interest rate dilemma or at least help to mitigate the adverse impact.

The objective of this year's risk management study is thus to examine whether investments in alternative risk premiums can, in reality, provide an opportunity to improve portfolio yield and diversification. In specific terms, the study aims to answer the following research questions in particular:

- Do alternative risk premiums generate stable additional returns over the long term and, if yes, is there an economic explanation for their existence?
- What is the correlation between returns from alternative risk premiums among themselves and in comparison with returns on traditional asset classes?
- Can the risk/return profile of a traditional multi-asset portfolio be improved by the inclusion of alternative risk premiums in the portfolio?

The motivation for these questions has come from the findings of this year's investor survey. The survey particularly identified increased pressure on the returns of institutional investors in the current interest rate environment and a desire to tap into new sources of returns. The findings of the survey are presented in detail in section 2.

Section 3 then sets out an analysis of how four selected alternative risk premiums work with the objective of highlighting the economic motives that explain the existence of these premiums. Using this information as a basis, section 4 details an empirical analysis to investigate whether alternative risk premiums were actually able to generate steady returns over the long term in the past. The analysis also focuses on the correlations between returns from alternative risk premiums among themselves and in comparison with returns on traditional asset classes. These evaluations are intended to serve as a basis for demonstrating how diversification effects can be achieved from alternative risk premiums by incorporating these premiums into the design of a portfolio. Finally, the study aims to address the question of whether and (if yes) to what extent the addition of alternative risk premiums to a traditional multi-asset portfolio can lead to an improvement in the risk-return structure of the portfolio.

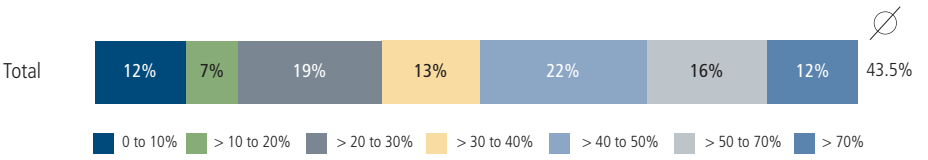
Findings of the 2014 investor survey

2 Findings of the 2014 investor survey

As explained at the beginning, this year's investor survey has identified heightened pressure on the returns of institutional investors. The survey has been carried out by Union Investment each year since 2005. This year's findings are based on a representative telephone survey of 109 institutional investors during the period from 14 April 2014 to 16 May 2014.

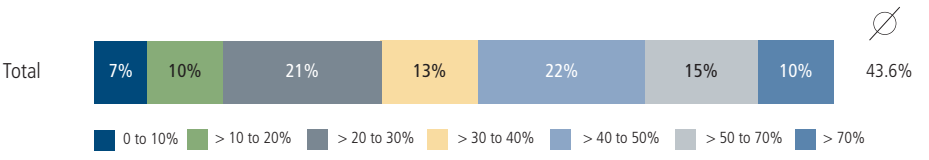
This year, for the first time, the survey participants were asked for an assessment of whether their sectors would be in a position to achieve the investment targets they have set for themselves. Participants were asked for both a short-term assessment covering the coming year and a medium-term view covering a period of four years. Figure 1 shows the assessment for the coming year and Figure 2 the results for 2018.

Figure 1: "In your estimate, in the coming year, how many companies in your sector will NOT achieve the investment targets they have set themselves?"



The results point to the difficulties that companies are experiencing in achieving their investment targets in the persistent low-interest-rate environment. On average, 43.5 per cent of institutional investors in Germany do not expect their sector to reach its investment targets in the coming year.

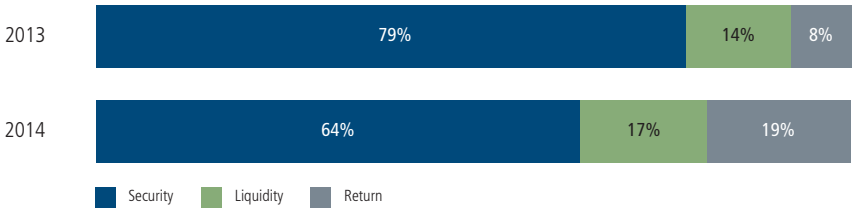
Figure 2: "In your estimate, in 2018, how many companies in your sector will NOT achieve the investment targets they have set themselves?"



The situation will remain difficult, even in the medium term (forecast timeframe is up to 2018). The respondents expect low interest rates to continue and therefore do not see conditions improving. Compared with the results for the coming year, investors expect almost the same number of companies in their sector (43.6 per cent) to fall short of their investment targets in 2018.

Given these results, it is little wonder that there is significant growth in hunger for returns among investors, as shown in Figure 3. The figure of 19 per cent is by some way the highest value since the financial crisis in 2008 (2013: 8 per cent).

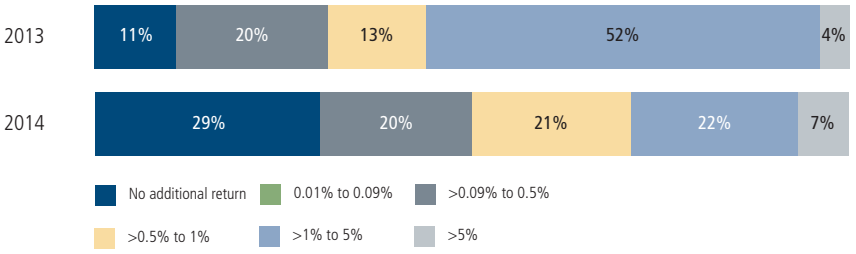
Figure 3: Which of the following aspects of investment is generally the most important for your company when making current investment decisions?



It is also clear from Figure 3 that there is still a priority on security despite the substantially lower significance compared with 2013 at 64 per cent (2013: 79 per cent). It can therefore be stated that the relevance of returns has risen significantly but investors are still attaching huge importance to the issue of security.

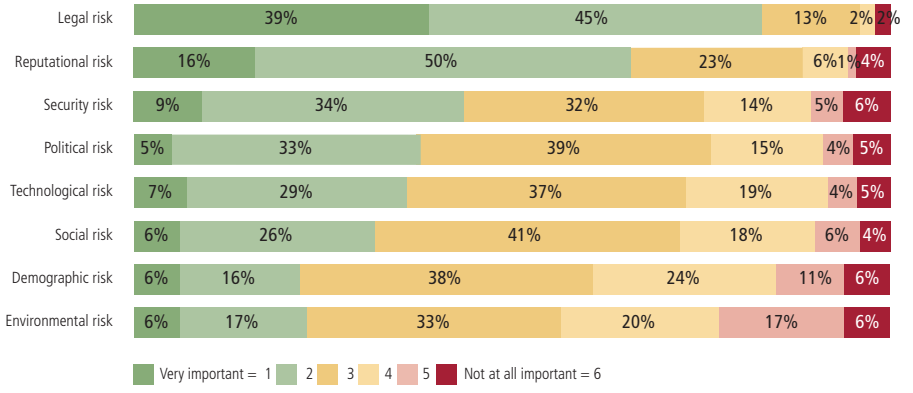
The challenge of generating adequate returns in an environment of low interest rates is even forcing regulatory pressure into the background. As shown in Figure 4, the restrictions are seen as having less impact on returns than in 2013. Only 29 per cent of the respondents believed that they could generate a significant additional return of more than one percentage point if there were no restrictions (whereas in 2013 the figure was still 56 per cent). Of the total respondents, 29 per cent were even of the view that the removal of restrictions would not enable them to generate any additional returns at all (2013: 11 per cent).

Figure 4: What is the additional return that you could generate (in percentage points) if you could operate without internal or external restrictions?



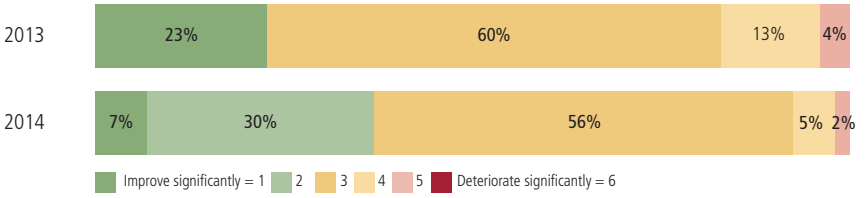
Nevertheless, out of all the general risks involved in investment decisions, legal risk is still considered by investors to play a key role (see Figure 5). The greatest importance is attached to legal risk (top boxes: 84 per cent) and reputational risk (top boxes: 66 per cent).

Figures 5: How important a role do the following general risks play in your investment decisions?



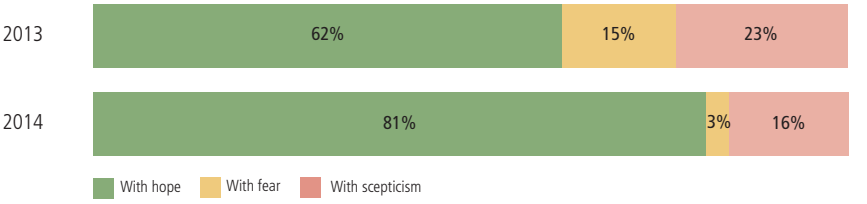
As shown in Figure 6, there is a muted assessment of income prospects. However, respondents' assessment of their own financial situation was substantially more optimistic than in the previous year. Whereas in 2013 only 23 per cent of the respondents were convinced that the financial position of their companies would improve, this figure had already reached 37 per cent in 2014 (top boxes).

Figure 6: Do you think that the financial position of your company will improve or deteriorate in the coming twelve months?



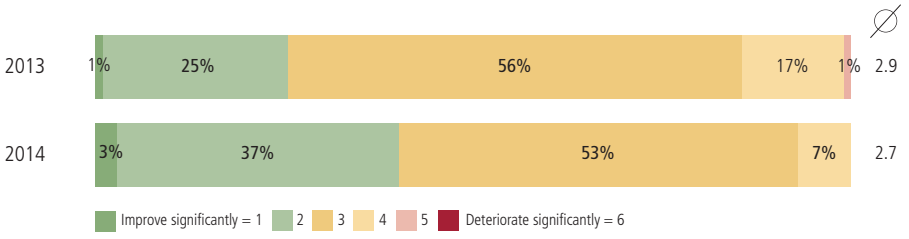
The more optimistic assessment of financial performance is also reflected in a substantially higher percentage of hopeful investors (see Figure 7). In the coming year, 81 per cent of the respondents expect to see positive business trends (2013: 62 per cent).

Figure 7: From a business perspective, do you view the next twelve months with hope, fear or scepticism?



Investors' positive evaluation of the financial position in their own entities is based on a similarly positive assessment of the macroeconomic situation (see Figure 8). Compared with 26 per cent (top boxes) in 2013, 40 per cent (top boxes) in the current year expect to see an improvement, or even a substantial improvement. This is also mirrored in the average score, which improved slightly from 2.9 in 2013 to 2.7 in 2014.

Figure 8: Do you believe that the macroeconomic situation in Germany will improve or deteriorate in the next twelve months?



In summary, the results from this year's investor survey point to the following trends in particular:

- The difficulty that investors face in attaining their investment targets, which has been caused by the persistent low level of interest rates, has resulted in a heightened pressure to achieve returns. This is manifested in a sharper focus on returns in investment decisions.
- Nevertheless, investment decisions are still dominated by the requirement for security.
- Investor expectations regarding their own businesses and the overall economy are considerably more optimistic than in 2013.

Investors are therefore faced, in particular, by the question of how they are going to overcome the interest rate dilemma and which asset classes they can use to tap into any possible positive trends in the future. At the same time, it is imperative that the very sharp focus on safety and security is also incorporated into any decision-making. Can alternative risk premiums offer a solution in this case?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Alternative risk premiums

3 Alternative risk premiums

3.1 CAPM as theoretical basis

The capital asset pricing model (CAPM) provided one of the first theoretical model approaches for explaining the returns accruing to an entity. Under the CAPM, the expected return is represented as follows:

$$R_{i,t} = \underbrace{RF_t}_{\text{Risk-free interest rate}} + \underbrace{\frac{RM_t - RF_t}{\sigma^2_{M,t}}}_{\text{Risk premium per unit of assumed market risk}} \cdot \underbrace{\sigma_{i,M,t}}_{\text{Equity-specific risk (covariance risk)}}$$

$$= RF_t + [RM_t - RF_t] \cdot \beta_{i,t}$$

The expected return on a security is equal to the risk-free interest rate plus a risk premium. The latter is calculated in turn as the product of the beta factor multiplied by the excess return of the market portfolio over the risk-free interest rate. By definition, the market portfolio includes all assets traded in an economy. As there are practical limits for the design of a portfolio of this nature, the market portfolio is generally modelled by broadly based equity indices.[1]

The overall risk in an investment can be subdivided into systematic and unsystematic components. Whereas unsystematic risk is specific to an entity, systematic risk depends on the market concerned and cannot be eliminated by diversification.[2] In the CAPM, the beta factor represents the relative systematic risk. Given that unsystematic risk can be mitigated in full by the structure of the portfolio, investors only receive a risk premium for taking on systematic risk.[3]

Over the last few decades, the CAPM has been continuously refined. In addition to the market beta, further determining factors have been added to the model, facilitating more differentiation in the explanation of the breakdown of returns. For example, an entity size factor and a value factor representing the valuation of an entity can be included in the calculation alongside beta in the conventional CAPM. This means that a greater proportion of portfolio returns can be explained through systematic interrelationships[4]. The benefit that investors can derive from this knowledge is discussed below. In particular, the question that comes to the fore is how an investor can use suitable strategies to capture factor-specific risk premiums.

3.2 Value premium

In the basic version of the CAPM, the risk premium on an equity share equates to the expected excess market return multiplied by the beta factor. Beta is the figure for systematic risk; this risk depends on the market and cannot be eliminated through portfolio design. Therefore, in the basic version of the CAPM, the amount of the risk premium is explained exclusively by the beta factor.

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1 See Nöll/Wiedemann (2008), p. 228.
2 See Copeland et al. (2005), p. 152 et seq.
3 See among others Sharpe (1964), p. 425 et seq.
4 See Bambaci et al. (2013), p. 7.

The approach used by Fama and French (1993) applies greater factor differentiation. To explain the risk premium, they use a three-factor model, represented formally as follows:[5]

$$R_{i,t} = RF_t + b_{i,t} \cdot [RM_t - RF_t] + s_{i,t} \cdot SMB_t + h_{i,t} \cdot HML_t$$

In the Fama-French three-factor model, the expected return R for asset i at time t is also based on a risk-free interest rate plus a risk premium. In this case however, the risk premium is determined by three factors. The first part of the equation is similar to the CAPM and equates to the excess return on the market portfolio weighted with the three-factor beta. In this model though, two additional factors not present in the basic version of the CAPM are used to explain the risk premium:

1. The size factor represents the difference in returns from diversified portfolios comprising small and large companies in terms of market capitalisation (SMB = small minus big). The next section sets out a detailed explanation of the size factor.
2. The value factor represents the difference in returns from diversified portfolios comprising companies with high and low book-to-market ratios (HML = high minus low).

The value factor had been identified back in the 1970s as a potential indicator of positive equity performance in the future. The value premium is derived from empirically observed data showing a positive relationship between equities that are undervalued compared with their book values and their future expected returns.[6]

The economic justification for the existence of the value premium can be based on three different approaches:

Table 1: Approaches for explaining the value premium

Explanation approach	Author(s)
Low market player expectations	Chan/Chen (1991) Fama/French (1992)
Low flexibility	Zhang (2005)
Behavioural finance	Barberis/Huang (2001)

In the approach taken by Chan and Chen (1991), and by Fama and French (1992), efficient markets are used as the basis for the explanation. From the market viewpoint, a low market price reflects lower expectations in terms of future surpluses generated by an enterprise. These lower expectations are penalised by the market through higher capital costs, which in turn means a higher return from an investor perspective.[7]

In the second explanation approach, it is argued that companies with a low valuation compared with their competitors are unable to respond as flexibly to unforeseen environmental trends and in return must pay the investor an additional premium as compensation for the risk.[8]

[5] See Fama/French (1993), p. 24.
[6] See Fama/French (1992), p. 441.
[7] See Fama/French (1992), p. 428.
[8] See Zhang (2005), p. 86.

In the context of behavioural finance, the existence of the value factor is also seen as a result of investor expectations. If investors expect a rising equity price as a result of a low market-to-book ratio, they will tend to invest in these equities, leading to an increase in demand and therefore to rising prices.[9]

The historical observation that undervalued equities tend to generate better performance in the future than overvalued equities can be used as the basis for an investment strategy. To generate risk premiums resulting from the value factor, investors must buy equities with a low market-to-book ratio and short sell equities with a high ratio.[10]

3.3 Size premium

As described in the previous section, the size factor is one of the additional factors (together with the value factor) in the Fama-French three-factor model, these two additional factors not forming part of the traditional CAPM.[11] The size factor represents the empirical observation that small or smaller companies (in terms of market capitalisation) generate higher returns than large companies. The size factor is independent of the other factors. In particular, it is independent of the value factor.[12]

As shown in the previous section, the size risk premium in the Fama-French model is expressed by the SMB (small minus big) factor and is calculated on the basis of the difference in returns from diversified portfolios with small and big caps.

A large number of research papers have been written, setting out reasons for the existence of the size risk premium. Table 2 summarises the most important research:

Table 2: Approaches for explaining the size premium[13]

Explanation approach	Author(s)
Higher systematic risk	Fama/French (1993)
Information asymmetry	Zhang (2006)
Lower liquidity	Amihud (2002)

From the perspective of an efficient market, smaller companies are subject to higher systematic risk than larger companies and must therefore pay an additional return to their investors.[14] This argument in favour of the size factor is supported by the fact that smaller enterprises are subject to fewer disclosure requirements. The resulting asymmetry in terms of information must be compensated by an additional return.[15]

[9] See Barberis/Huang (2001), p. 35.
[10] See Bambaci et al. (2013), p. 7.
[11] See Fama/French (1992), p. 432.
[12] See Banz (1981), p. 17.
[13] Based on Bambaci et al. (2013), p. 7.
[14] See Fama/French (1993), p. 5.
[15] See Zhang (2006), p. 105 et seq.

Further evidence supporting the existence of the size factor can be found in connection with available liquidity. In smaller companies, there tends to be less available liquidity than in larger enterprises.[16] For example, Amihud (2002) shows that smaller firms tend to be subject to a higher level of insolvency risk and that this risk must be compensated with a higher premium.[17]

A strategy for exploiting the size factor can be pursued simultaneously with a strategy to capture risk premiums based on the value factor. For example, smaller company equities from a normalised index can be purchased and equities from larger companies sold.

3.4 Momentum premium

As demonstrated in the previous sections, the Fama-French three-factor model extends the conventional CAPM so that it includes the value and size factors. Carhart (1997) applies an additional enhancement in the form of the momentum factor. The four-factor model resulting from this enhancement is represented in equation form as follows:

$$R_{i,t} = RF_t + b_{i,t} \cdot [RM_t - RF_t] + s_{i,t} \cdot SMB_t + h_{i,t} \cdot HML_t + w_{i,t} \cdot WML_t$$

The additional WML (winners minus losers) factor is based on the difference in returns from diversified portfolios comprising earlier winners and earlier losers.[18]

The momentum factor reflects the impact from higher returns generated on equities with a strong performance track record. In other words, observed data tends to suggest that winners will continue to be winners in the future, whereas losers will remain losers.

The significance of the momentum factor has been examined in numerous studies and its importance demonstrated for both the US and European markets.[19] In 1993, Jegadeesh and Titman published a paper in which they were able to show the existence of the momentum factor for various periods from three to twelve months in the US market.[20] These are also the typical periods used in an analysis of past performance for the purposes of assembling momentum portfolios. Rouwenhorst (1998) shows that, for the European market, a momentum strategy (long position of earlier winners, short position of earlier losers) could have generated a return of approximately 1 per cent per month over the years 1978 to 1995.[21]

The approaches for explaining the existence of the momentum risk premium are based on two different considerations:

Table 3: Approaches for explaining the momentum premium[22]

Explanation approach	Author(s)
Behavioural finance	Barberis/Shleifer/Vishny (1998)
Cash flows triggered by investment funds	Vayanos/Woolley (2010)

[16] See among others Amihud (2002), p. 31 et seq.
[17] See Amihud (2002), p. 47.
[18] See Carhart (1997), p. 61.
[19] See among others Jegadeesh/Titman (1993), p. 65 et seq and Rouwenhorst (1998), p. 267 et seq.
[20] See Jegadeesh/Titman (1993), p. 67.
[21] See Rouwenhorst (1998), p. 268.
[22] Based on Bambaci et al. (2013), p. 7.

Most of the theories relating to the existence of the momentum risk premium stem from behavioural finance research. Both overreaction and underreaction of investors to certain events, such as ad hoc announcements, are considered to be causes. The reasons may lie in investors' exaggerated opinion of themselves, prudence, or an aversion to realising losses.[23]

The momentum factor also arises from cash flows triggered by investment funds. This may occur where negative corporate data leads to a response among funds holding equities in the companies concerned. Let us take as an example equities that are downgraded to a non-investment-grade rating. As a consequence, funds (such as pension funds) that are prohibited from holding such equities by their investment guidelines are forced to sell the equities concerned. This has the effect of reinforcing the negative trend for the equities involved still further.[24]

An investment strategy focusing on the momentum risk premium can be pursued in parallel with strategies aimed at exploiting the two other risk premiums. Previous winners in a normalised index are bought and the losers sold short.

3.5 Low risk premium

The low risk factor relates to the likewise empirically observable relationship between low volatility or beta factors and high excess returns. This factor is the complete opposite of the assumption in the CAPM that higher volatility and higher risk are compensated with a higher expected return. Nevertheless, studies have proved this apparently contradictory relationship.[25]

A paper by Baker, Bradley and Wurgler covering the US equities market shows that, in the period from 1968 to 2008, portfolios with lower volatility significantly outperformed those with higher volatility. One US dollar invested in 1968 in the portfolio with the lowest volatility would have turned into 59.55 US dollars by 2008. In contrast, the portfolio with the highest volatility would have generated substantially lower growth. Over the same period, this latter portfolio would only have led to a value of 10.12 US dollars.[26] In essence, portfolios in which the beta factor was analysed instead of volatility produced the same results.[27] Similar research findings could also be obtained for the global market.[28]

The approaches for explaining the low risk premium again stem for the most part from behavioural finance, which has demonstrated an irrational investor preference for assets with high volatility. The higher demand for volatile assets drives up market prices. In turn, this leads to lower expected returns. The converse is true for assets with low volatility, i.e. these assets are subject to higher expected returns.[29]

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[23] See among others Barberis/Shleifer/Vishny (1998), p. 332 et seq.
[24] See Vayanos/Woolley (2011), p. 3.
[25] See Baker/Bradley/Wurgler (2011), p. 40.
[26] See Baker/Bradley/Wurgler (2011), p. 41.
[27] See Baker/Bradley/Wurgler (2011), p. 42.
[28] See among others Chan/Karceski/Lakonishok (1999), p. 953, and Jagannathan/Ma (2003), p. 1668.
[29] See Baker/Bradley/Wurgler (2011), p. 45.

The irrational preference for assets with higher volatility can be explained by the following approaches:

Table 4: Approaches for explaining the low risk premium[30]

Explanation approach	Author(s)
Preference for lotteries	Kahneman/Tversky (1979) Mitton/Vorkink (2007)
Excessive self-confidence	Cornell (2009) Amihud (2002)

One possible approach to explaining this phenomenon is provided by the example of lotteries. First let us look at the notion of loss aversion introduced by Kahneman and Tversky.[31] The following example involving a lottery comparison is a good illustration of the fear of losses. In a first lottery, an investor can win 110 euros or lose 100 euros with equal probability. The expected value for this lottery is 5 euros (50% * 110 euros + 50% * –100 euros). However, because of the possibility of a significant loss, this lottery appears less attractive than a second lottery in which, with a very low probability of 0.12 per cent, 1,000 euros can be won, but otherwise one euro is lost. Although the second lottery involves an expected value of just 0.20 euros (0.12% * 1,000 euros + 99.88% * –1 euro), this option is subjectively perceived as more attractive.[32]

Mitton and Vorkink demonstrate in their paper that buying a low-price but very volatile equity share is very similar to the second lottery described above. There is a slim chance that the equity could double or even multiply in value, but there is a far greater possibility that the equity could lose its value entirely.[33]

Increased demand for volatile assets can also be explained by the symbolic nature of some of these assets. It is for this reason that people also tend to invest in rather speculative, new technologies.[34] For example, the Microsoft IPO in 1986 involved significant prospects of gains. The same also applied to the Facebook stock market flotation.

Cornell (2009) shows that some investors, particularly institutional investors such as hedge funds, help to increase the demand for volatile assets by overestimating their own capabilities.[35] This applies especially in periods of volatile market activity, as investor expectations differ widely from the performance of shares in such times, which then reinforces the effect of the exaggerated self-confidence.[36]

An investment strategy to obtain the benefits from the risk premium associated with low risk can be implemented in the same way as the strategies previously referred to above. Investors must buy equities in a normalised index that are associated with low volatility and at the same time sell equities with high volatilities.

[30] Based on Bambaci et al. (2013), p. 9.
[31] See Kahneman/Tversky (1979), p. 263.
[32] See Baker/Bradley/Wurgler (2011), p. 44.
[33] See Mitton/Vorkink (2007), p. 1259 ff.
[34] See Baker/Bradley/Wurgler (2011), p. 44.
[35] See Cornell (2009), p. 29.
[36] See Cornell (2009), p. 27.

Empirical investigation of alternative risk premiums

4 Empirical investigation of alternative risk premiums

4.1 Descriptive analysis

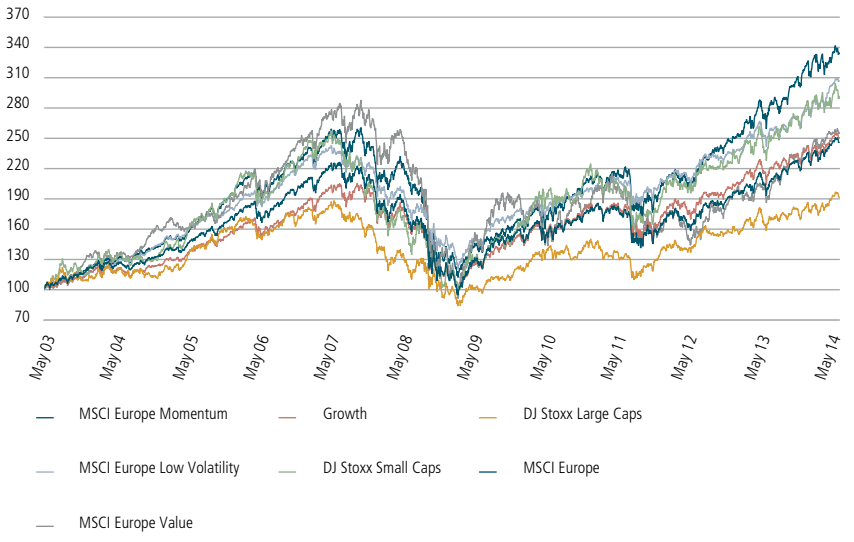
The previous section focused on the basic concept and the theoretical approaches to explaining a selection of alternative risk premiums. In particular we were able to set out the economic reasons for the existence of the value, size, momentum and low risk premiums. In the following sections, we now need to carry out an empirical investigation of the characteristic features of the alternative risk premiums presented above. As explained in the previous section, the alternative risk premiums can be harvested by simultaneously taking out a long and short position. In the context of this study, we will draw on the strategies and indices shown in Table 5 in order to determine the alternative risk premiums.

Table 5: Indices used to determine the alternative risk premiums[37]

Premium	Long position	Short position
Value	MSCI Europe Value	MSCI Europe
Size	DJ Stoxx Small Caps	DJ Stoxx Large Caps
Momentum	MSCI Europe Momentum	MSCI Europe
Low risk	MSCI Europe Low Volatility	MSCI Europe

The investigation is based on daily data. Since 30 May 2003, common daily base data has been available for the listed indices. Figure 10 shows the indexed historical performance of the indices for the available common data history. This performance forms the basis of the following investigations.

Figure 9: Historical performance of the analysed indices



Source: Union Investment, own calculation, MSCI und Datastream

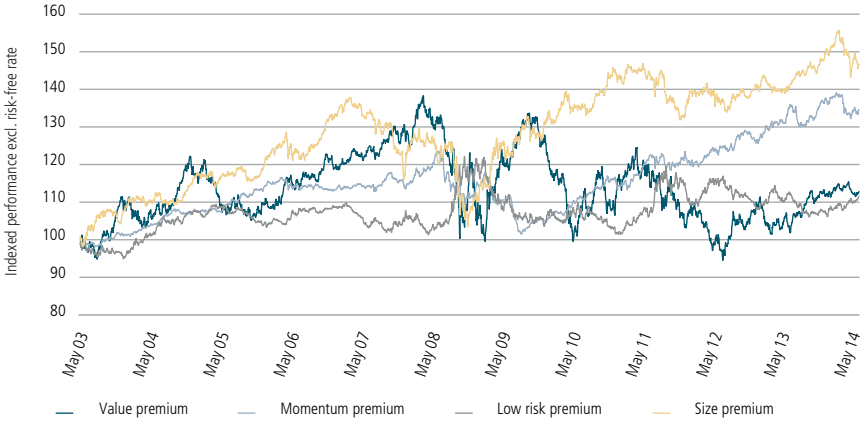
Figure 9 clearly illustrates the bisection of the performance chart by the financial crisis. Whereas prices rose relatively steadily up to the middle of 2007, they then took a deep plunge with the onset of the financial crisis. A period of rising prices has prevailed again since 2009 although the trend was briefly interrupted by the crisis in the eurozone in 2011. Since then the performance of the equity market has been very positive. However, the steady uptrend now appears to have come to a halt for the time being in response to the recent

[37] Whereas indices from the MSCI Europe family of indices are used to determine the value, size and low risk premiums, the DJ Stoxx Small Caps and DJ Stoxx Large Caps indices have been selected for determining the size premium. The reason behind this approach is that the MSCI Small Cap Index includes some securities that are not included in the broader MSCI Europe Index and that have a very low market capitalisation.

deteriorating conditions in the global economy and the growing uncertainty caused by political crises. Another striking feature of the chart is the highly distinctive correlation between the performance of all the indices shown. This is evident both in the periods of growth and in the downturns.

If the alternative risk premiums had been determined using the long and short strategies listed in Table 5, the indexed performance of the value, momentum, low risk and size premiums over the period from May 2003 to May 2014 would have been as shown in Figure 10.

Figure 10: Indexed performance of the alternative risk premiums



The positive performance of all four premiums is clearly visible. Whereas the size premium and the momentum premium generated significantly higher returns in the second half of the analysis period, it is noticeable that the low risk premium in particular was extremely stable. These observations are confirmed by Table 6, which shows the returns, excess returns, volatility and Sharpe ratio for the alternative risk premiums over the analysis period. The Sharpe ratio is defined as excess returns per unit of volatility.

Table 6: Key figures for returns from alternative risk premiums

	Momentum premium	Low risk premium	Size premium	Value premium
Return (% p.a.)	4.84	3.30	5.79	3.88
Excess return (% p.a.)	2.66	1.12	3.61	1.70
Volatility (% p.a.)	4.34	6.38	7.68	11.45
Sharpe ratio	0.61	0.18	0.47	0.15

Both momentum and size premiums show very high Sharpe ratios of 0.61 and 0.47 respectively. The Sharpe ratios for the low risk premium (0.18) and the value premium (0.15) are substantially lower.

It should be especially emphasised that an investment in these alternative risk premiums is on a liquidity-neutral basis because it involves long/short strategies. The returns from the alternative risk premiums therefore represent excess returns, i.e. returns in excess of the risk-free rate. In contrast, an investment in traditional risk premiums always involves tying up liquidity in an amount equivalent to the investment volume. An adjustment is therefore required in order to ensure a proper comparison between the returns from alternative risk premiums and those from traditional risk premiums. This adjustment can be applied either by adding an average money market interest rate to the average excess returns on the alternative risk premiums or by subtracting this average money market interest rate from the average returns on the traditional risk premiums. The aver-

age money market interest rate per annum for the analysis period was 2.18 per cent. In this study, we have adjusted the returns on the traditional risk premiums so that the returns shown only represent the risk premiums attained in excess of the risk-free money market rate.

Whereas a strong correlation could be identified from the chart in Figure 9 showing the performance of the indices used as the basis for extracting the alternative risk premiums, there is manifestly no such correlation between the trends in the performance of the alternative risk premiums illustrated in Figure 10. The opposing trend in the performance of the low risk premium stands out noticeably, especially in the crisis year of 2008. This visual impression is confirmed by Table 7, which presents the correlation matrix for the returns from the alternative risk premiums.

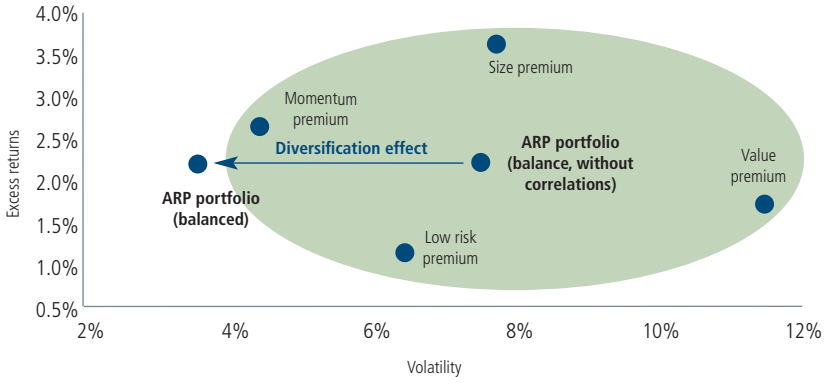
Table 7: Correlation matrix for returns from alternative risk premiums

	Value premium	Momentum premium	Low risk premium	Size premium
Return (% p.a.)	1.00	–0.19	–0.42	0.05
Excess return (% p.a.)		1.00	0.11	0.15
Volatility (% p.a.)			1.00	–0.01
Sharpe ratio				1.00

There are consistently only very low correlations between the returns. The figure is even negative between the momentum and value premiums (–0.19) as well as between the low risk and value premiums (–0.42).

Given the very low interdependency between the returns from the alternative risk premiums, the creation of a portfolio comprising the individual alternative risk premiums would be a good way of exploiting the diversification potential. The extent to which the diversification effects are actually achieved on the basis of the low correlations is illustrated by Figure 11.

Figure 11: Diversification effects in a balanced ARP portfolio



The (excess) return risk diagram plots the excess returns and the volatility for the individual alternative risk premiums. A simple balancing process is used to aggregate the premiums in the alternative risk premium (ARP) portfolio. Each premium therefore accounts for one quarter of the overall portfolio. The excess returns/volatility coordinates for the ARP portfolio are located at the centre of the plots for the four risk premiums on the assumption that the returns for all the alternative risk premiums have a perfect positive correlation with each other; in other words, for the purposes of creating the portfolio, the correlation coefficient between the alternative risk premiums is assumed to be one. In this scenario, no diversification effects can be obtained.

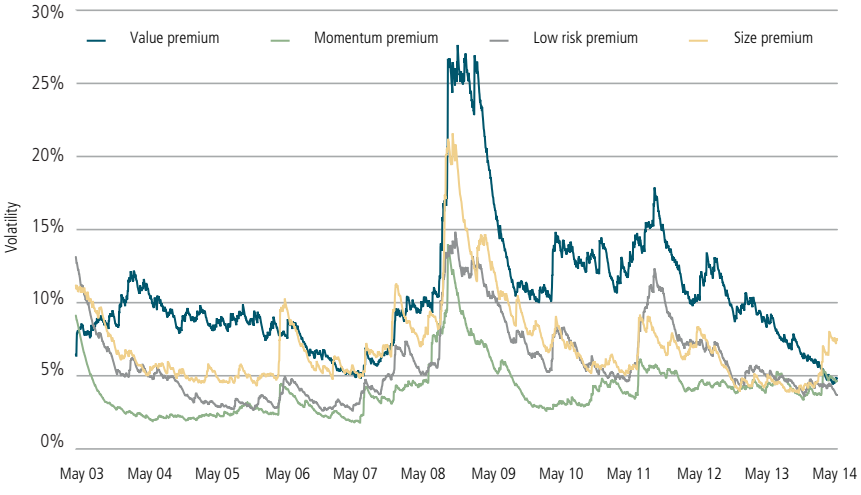
The portfolio volatility for this special scenario can be determined using a method similar to that used to determine the expected portfolio (excess) return, i.e. by calculating the average of the individual volatilities weighted by the proportions of the individual premiums. Based on the data available here, the portfolio volatility for the balanced alternative risk premiums assuming a perfect positive correlation between returns is 7.46 per cent. The expected excess return is 2.28 per cent.

If the assumption of a perfect positive correlation between returns is disregarded and the historical correlations from Table 7 are factored into the calculation of portfolio volatility instead, the new portfolio volatility value is 3.47 per cent. As the amount of the portfolio excess return is not subject to interdependencies, its value remains unchanged at 2.28 per cent. The coordinates for the balanced ARP portfolio in which the portfolio volatility has been calculated using the historical correlations are therefore 3.47 per cent and 2.28 per cent. This point is also plotted in Figure 11.

The distinctive diversification effect arising from the low correlations between the returns on the alternative risk premiums stands out very sharply. If a portfolio with balanced weightings is created, the figure for portfolio volatility is even lower than that for the volatility of the returns from the momentum premium, which otherwise has the lowest volatility of all the alternative risk premiums in the analysis at 4.34 per cent. The portfolio volatility can therefore be reduced to a level that is lower than that of the lowest volatility for the returns on the individual premiums themselves.

In summary, we can state that significant diversification potential arises from the low correlations between the returns on the alternative risk premiums. Even with simple balancing of the premiums, significant risk diversification effects can be achieved. However, if the alternative risk premiums are balanced on a static basis, this can result in serious imbalances in the risk structure of the ARP portfolio over the course of time. This problem is illustrated by Figure 12.

Figure 12: Volatility of returns on alternative risk premiums over time



The chart shows the trends in the volatility of the returns from the four alternative risk premiums since May 2003. The heteroscedasticity of the volatilities is clearly visible. In other words, the volatilities are not constant but fluctuate over time. In the data set analysed here, a dramatic leap in volatility is especially noticeable during the height of the financial crisis.

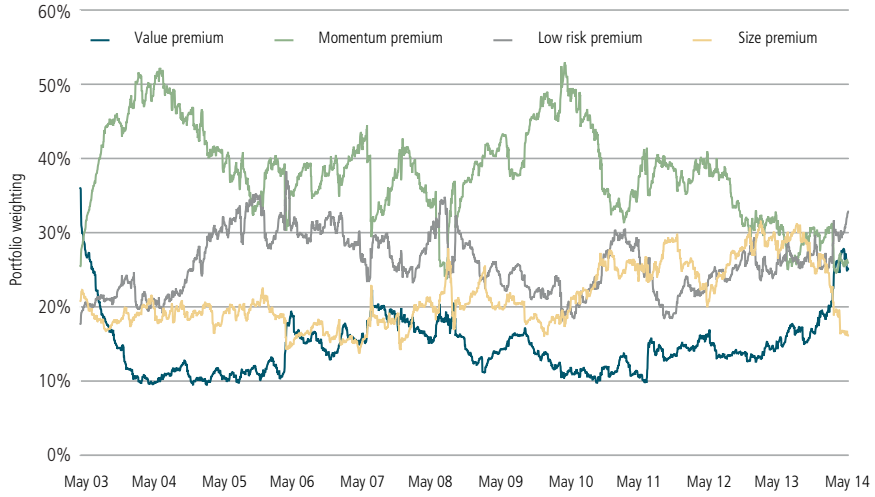
If the portfolio weightings for the individual premiums are fixed on a static basis as applied above in the balancing of the premiums, the fluctuations in volatility over the course of time also lead to fluctuating risk structures over time. As shown in Figure 12, the volatilities, which were determined using the exponentially weighted moving average (EWMA), remained very close together over the period from May 2003 to May 2007.[38] The risk structure was therefore roughly balanced at this time. As is also apparent from Figure 12, the volatility of the returns on the value premium saw the sharpest rise in the financial crisis. This led to a shift in the risk structure of the portfolio. The value premium accounted for a dominant proportion of the overall risk.

Dynamic risk-oriented allocation systems address this weakness in static capital-weighted allocations. Risk-weighted systems aim to balance the risk among the individual portfolio components. An estimate of the expected returns on the assets, which is usually associated with a great deal of uncertainty, is not required.[39] Traditional portfolio optimization procedures following the Markowitz portfolio theory also respond very sensitively to the underlying estimation of expected returns and this can lead to extreme portfolio weightings.[40]

In contrast, the focus in risk-based allocation systems is on the portfolio risk and on the diversification in the portfolio. In these systems, there is an allocation of risk and not, as in traditional systems, an allocation of capital. Within the group of risk-weighted allocation systems, a number of different systems are used. As this study is concentrating on alternative risk premiums, we have not included any discussion of the advantages and disadvantages of the individual systems and simply draw attention to the existing literature on the subject.[41] For the purposes of subsequent discussion in this study, the risk parity approach was used as the basis for creating a risk-weighted portfolio comprising alternative risk premiums. The resulting portfolio weights for the data set in our analysis are shown in Figure 13. The portfolio was rebalanced on a daily basis.

[38] The volatility calculation using EWMA was based on $\lambda = 0.975$.
[39] See Michaud (1989), p. 32 et seq.
[40] See Black/Litterman (1992), p. 28.
[41] A detailed analysis can be found for example in Roncalli (2014), p. 149 et seq. A critical analysis of risk-based allocation techniques can be found in Inker (2010) among others.

Figure 13: Portfolio weights using the risk parity approach



It can clearly be seen from Figure 13 how the portfolio weights for the alternative risk premiums fluctuate over time. A constant risk structure is achieved by adjusting the weightings each day. Figure 14 shows the risk-(excess) return combination for the ARP portfolio created using the risk parity approach. The diagram format used to present the data is the same as the one used in Figure 11.

Figure 14: Diversification effect in the ARP portfolio weighted using the risk parity approach

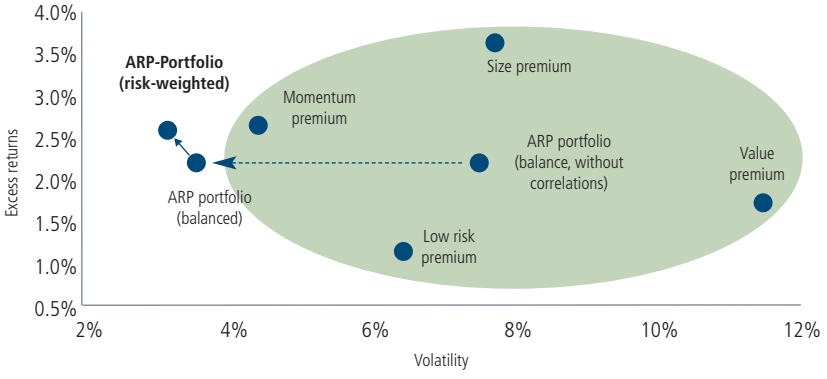


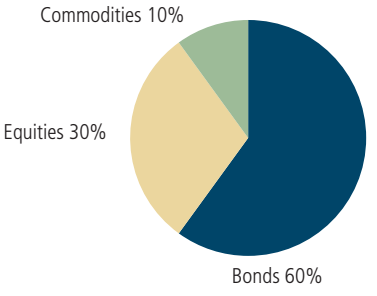
Figure 14 demonstrates that the achievable diversification effect is further enhanced by the risk weighting and the daily rebalancing. The volatility of the risk-weighted ARP portfolio is 2.88 per cent. At the same time, the excess returns have risen from 2.27 per cent to 2.51 per cent and a better risk-return combination has therefore been achieved overall.

As an interim conclusion, it can be stated that alternative risk premiums do generate positive excess returns over the long term. The low correlations between the returns on alternative risk premiums also offer attractive diversification opportunities. Based on the characteristics of alternative risk premiums described above, the addition of alternative risk premiums to a traditionally structured multi-asset portfolio could therefore lead to an improvement in the risk-return structure of the portfolio. This scenario is examined in the next section.

4.2 Effects of adding alternative risk premiums to a traditional multi-asset portfolio

This section focuses on an examination of the effects from adding the risk-weighted ARP portfolio determined in the previous section to a traditional multi-asset portfolio. As a basis for the analysis, we have assumed the traditional portfolio illustrated in Figure 15. This portfolio can be viewed as a typical and therefore representative multi-asset portfolio.

Figure 15: Structure of a traditional multi-asset portfolio



Core eurozone gov. bonds	10.0%
German covered bonds	10.0%
Periph. eurozone gov. bonds	10.0%
High-grade corporates	15.0%
High-yield corporates	10.0%
EM government bonds	5.0%
Equities, industrialised countries	25.0%
Equities, EM	5.0%
Precious metals	2.5%
Industrial metals	2.5%
Energy	5.0%

As shown in Figure 15, the composition of the multi-asset portfolio is 60 per cent fixed-income bonds, 30 per cent equities and 10 per cent commodities. A further breakdown of the three principal categories can also be seen in Figure 15.

Table 8 shows the correlation matrix for the returns from the traditional portfolio and from the ARP portfolio introduced in the previous section.

Table 8: Correlation matrix for the assets in the traditional portfolio and the ARP portfolio

	Gov. bonds, core EWU	German covered bonds	Gov. bonds, EMU periphery	High-grade corpo-rates	High-yield corpo-rates	EM gov. bonds	Equities, Indus-trialised countries	Equities EM	Precious metals	Industrial metals	Energy	ARP-portfolio
Gov. bonds, core EMU	1	0.88	0.38	0.82	–0.07	0.06	–0.31	–0.24	0.05	–0.18	–0.17	0.18
German covered bonds		1	0.38	0.90	–0.04	0.12	–0.27	–0.20	0.06	–0.15	–0.14	0.17
Gov. bonds, EMU periphery			1	0.38	0.04	0.18	–0.06	–0.07	0.06	0.04	0.01	0.11
High-grade corporates				1	0.04	0.22	–0.21	–0.10	0.07	–0.10	–0.10	0.17
High-yield corporates					1	0.17	0.17	0.14	0.02	0.08	0.08	–0.01
EM gov. bonds						1	0.32	0.43	0.23	0.31	0.23	0.04
Equities, industrialised countries							1	0.69	–0.02	0.29	0.28	–0.43
Equities, EM								1	0.08	0.32	0.27	–0.19
Precious metals									1	0.46	0.32	0.17
Industrial metals										1	0.42	–0.04
Energy											1	–0.02
ARP portfolio												1

Whereas there is a very strong positive correlation among, in particular, fixed-income securities with a low default risk (investment-grade government bonds from core EMU countries, German covered bonds (pfandbriefs)), lower correlations are observable between fixed-income securities and commodities (precious metals, industrial metals, energy). Overall, it is possible to state that the returns for the individual sub-indices within the higher-level asset classes of bonds, equities and commodities predominantly exhibit substantial, positive correlations. The correlations between the sub-indices of the broader asset classes tend to be significantly lower and offer greater potential for risk diversification. When the ARP portfolio is included in the analysis, the very low and in some cases even sharply negative correlations with all the sub-indices within all the higher-level asset classes are especially striking.

Table 9 shows the excess returns, volatility and the Sharpe ratio for the returns from the individual asset classes included in the traditional multi-asset portfolio and from the ARP portfolio.

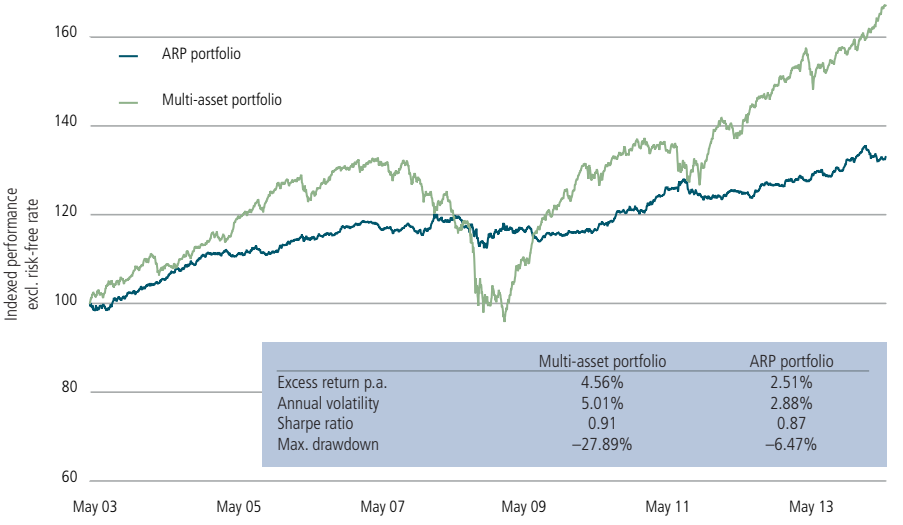
Table 9: Comparison of key figures for returns on asset classes

	Gov. bonds, core EWU	German covered bonds	Gov. bonds, EMU periphery	High-grade corpo-rates	High-yield corpo-rates	EM gov. bonds	Equities, Indus-trialised countries	Equities EM	Precious metals	Industrial metals	Energy	ARP-(Risk parity)
Excess return (% p.a.)	2.36	2.09	2.21	2.16	3.55	6.08	5.73	11.07	11.51	9.04	8.48	2.51%
Volatility (% p.a.)	3.77	2.47	5.56	2.59	12.10	6.02	15.26	19.26	22.38	25.49	31.49	2.88%
Sharpe ratio	0.63	0.84	0.39	0.83	0.29	1.01	0.38	0.57	0.51	0.35	0.27	0.87

If the returns for the sub-indices in the traditional multi-asset portfolio are compared with those of the ARP portfolio, it is noticeable that all the sub-indices under equities and commodities, and also some of the sub-indices under bonds, exceed the ARP portfolio in terms of excess return. However, the higher return is accompanied by greater risk (which in some cases is dramatically higher) such that, except in the case of emerging markets government bonds, the ARP portfolio has the most favourable Sharpe ratio.

Figure 16 presents a comparison of historical performance for the traditional multi-asset portfolio and the ARP portfolio.

Figure 16: Historical performance of the multi-asset portfolio and the ARP portfolio

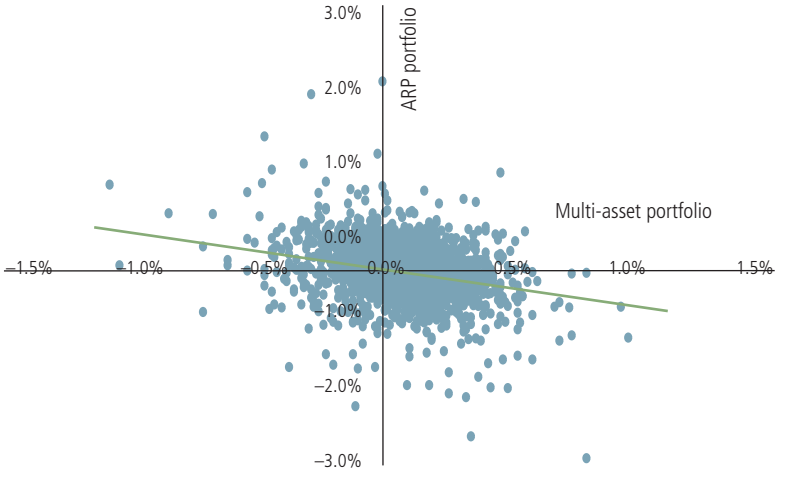


	Multi-asset portfolio	ARP portfolio
Excess return p.a.	4.56%	2.51%
Annual volatility	5.01%	2.88%
Sharpe ratio	0.91	0.87
Max. drawdown	–27.89%	–6.47%

Whereas the multi-asset portfolio generated a higher excess return on average (4.56 per cent), this was accompanied by sharper fluctuations. Nevertheless, the Sharpe ratio for the multi-asset portfolio was 0.04 better than that for the ARP portfolio. The extent to which the risk in the multi-asset portfolio was greater than that in the ARP portfolio is demonstrated both by the higher volatility, which was 1.74 times greater in the multi-asset portfolio, and by the maximum drawdown. The latter represents the maximum cumulative loss for a portfolio in a period and the value of –6.47 per cent for the ARP portfolio was substantially better than the value for the multi-asset portfolio (–27.89 per cent).

Table 8, which shows the correlation matrix for the returns from the individual sub-indices in the multi-asset portfolio and from the ARP portfolio, already suggests that there may be significant potential for diversifying risk by adding the ARP portfolio to the traditional multi-asset portfolio. The scatter plot in Figure 17 showing the returns from both the ARP portfolio and the traditional multi-asset portfolio also clearly highlights the negative correlation in graphic form.

Figure 17: Correlation between the returns from the traditional multi-asset portfolio and those from the ARP portfolio



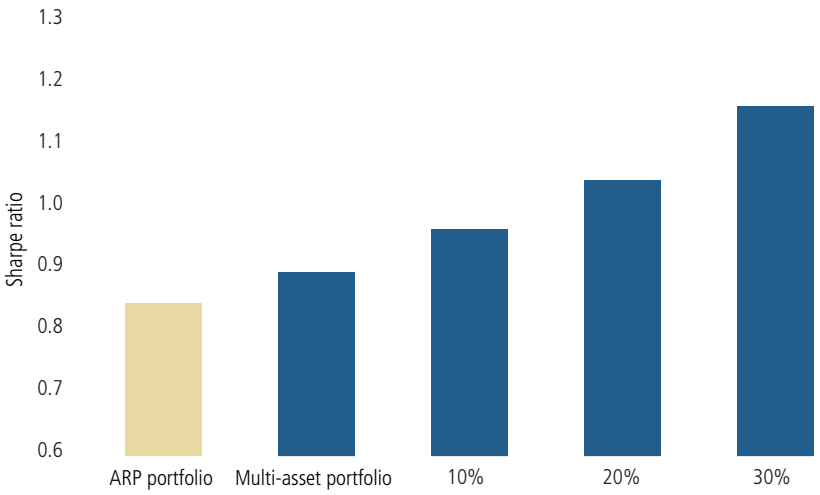
The correlation coefficient is significantly negative, amounting to –0.32. By adding the ARP portfolio to the traditional multi-asset portfolio, it is therefore reasonable to expect that considerable risk diversification effects could be achieved. Figure 18 illustrates the impact on the key figures of return, excess return, volatility and maximum drawdown from the addition of the ARP portfolio such that it then accounts for 10 per cent, 20 per cent and 30 per cent of the traditional multi-asset portfolio.

Figure 18: Addition of the ARP portfolio to the traditional multi-asset portfolio

			ARP portfolio's proportion of total portfolio		
	ARP portfolio	Multi-asset portfolio	10%	20%	30%
Return p.a.	4.69%	6.75%	6.54%	6.33%	6.13%
Excess return p.a.	2.51%	4.56%	4.36%	4.15%	3.95%
Annual volatility	2.88%	5.01%	4.42%	3.86%	3.33%
Max. drawdown	–6.47%	–27.89%	–25.45%	–22.95%	–20.37%

The risk-mitigating effects of the addition are clearly identifiable. Even an addition such that the ARP portfolio then accounts for 10 per cent of the total portfolio reduces the volatility by 0.59 percentage points. The maximum drawdown improves by 2.44 percentage points. The greater the proportion of the total portfolio accounted for by the addition, the greater the effect. The disproportionate fall in risk compared with the loss of excess return as a result of the addition leads to an improvement in the Sharpe ratio, as shown in Figure 19.

Figure 19: Change in the Sharpe ratio in relation to the addition of alternative risk premiums as a proportion of total portfolio



With an ARP proportion of the total portfolio at 10 per cent, the Sharpe ratio rises from 0.91 in the original multi-asset portfolio to 0.97. This outcome is remarkable in that, influenced by the exploitation of the risk diversification effects, this Sharpe ratio is greater than the Sharpe ratio for either of the two original portfolios. As the proportion of the total portfolio accounted for by the ARP portfolio increases, the Sharpe ratio also increases, at least initially. However, the effects of further additions tail off again once a certain threshold has been reached.

The investigation described in this section has been able to demonstrate the risk-mitigating effects from adding the ARP portfolio to a traditional multi-asset portfolio. These effects arise from the very favourable correlation structure for returns from the ARP portfolio and for those from the sub-indices in a classic multi-asset portfolio. Although the detailed findings are heavily dependent on the structure of the multi-asset portfolio in question (because very low correlations could be observed between the returns from the ARP portfolio and the returns from all the sub-indices – see Table 8), they do lead us to the conclusion that similarly significant or more pronounced effects could be observed for alternative multi-asset portfolio structures.

Conclusion

5 Conclusion

The focus of this year's risk management study was on alternative risk premiums, the motivation for which came from the findings of the 2014 investor survey. The study demonstrated the basic concept of alternative risk premiums and described possible economic approaches for explaining the existence of the four alternative risk premiums for equities analysed in the study. It then carried out an empirical investigation of the selected risk premiums.

First, the historical performance of the individual alternative risk premiums was examined in isolation. A particularly striking feature was the very low level of correlation between each of the individual risk premiums. This led to the creation of a portfolio comprising the four alternative risk premiums. The study then investigated the effects arising from the addition of this portfolio to a traditional multi-asset portfolio. The study was able to demonstrate that, given the very favourable correlation structure, benefits could be drawn from the very strong risk diversification effects resulting from the addition of the alternative risk premium portfolio.

Although the findings are necessarily dependent on the specific composition of the underlying multi-asset portfolio, the very low correlations between the returns from the ARP portfolio and all the sub-indices in the multi-asset portfolio mean that it is reasonable to expect similar effects for alternative weightings. It is not only the size of the possible risk diversification effects (manifested in particular by an increase in the Sharpe ratio for the mixed portfolio) that is remarkable, but also the fact that these effects have been achieved exclusively with alternative risk premiums on equities. This limitation was applied to keep the analysis manageable.[42] However, investors have a choice of far more alternative risk premiums than the four analysed in this study. In particular, they could also consider alternative risk premiums from other asset classes (FX carry premium, volatility premium and so on). This suggests that there may be far greater diversification opportunities than those described here.

It is precisely the search for returns in the current environment of low interest rates that is leading to alternative risk premiums. Alternative risk premiums are not in any way a passing fad; they have been discussed by academics for a very long time and have been the subject of detailed academic research for numerous markets. In addition, alternative risk premiums offer the advantage of investing in familiar, liquid markets and can be easily recorded in risk management systems. A large number of empirical analyses (including ours!) have demonstrated astonishingly stable returns, including during, and precisely in, times of crisis. Investments in alternative risk premiums can therefore be used effectively to support diversification in traditional multi-asset portfolios. The extent to which such investments are added to these portfolios must be decided on a case-by-case basis and particularly depends on the structure of the original portfolio and the investor-specific attitude to risk.

[42] In addition, a long data history was available, ensuring that we could obtain sound results.

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Contact

Union Investment Institutional GmbH
Wiesenhüttenstrasse 10
D-60329 Frankfurt am Main
Germany
Tel.: +49 69 2567 7652
Fax: +49 69 2567 1616

www.union-investment.com

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