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Edition Risk Management 1.1



Loss and Risk Preferences of Institutional Investors

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The study, together with the comprehensive scientific appendix,
is available on the Internet at the following address:
www.union-investment.de/institutional
under the section "Information"

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1 Introduction

"It should be clear that the ability of investment managers to understand and manage the risk in their portfolios is of direct benefit to the client. Arguably, a manager's ability to quantify portfolio risks is a strong indication of skill and should positively correlate with their ability to consistently outperform the market. The foundation of successful portfolio construction is predicated on a manager's ability to understand and quantify sources of risk in a portfolio, to size intended exposures appropriately, and to avoid unintended exposures."

In Germany, institutional investors prefer low-risk investment opportunities.

Risk refers to the uncertainty with regard to future developments.

Or the risk of not being able to fulfil a performance promise.

"Institutional investors shy away from risk..."² was the headline in the Frankfurter Allgemeine Zeitung on the 16 September 2005 in its contribution to the investment behaviour of German institutional investors. This statement is indicative of a thoroughly well-known phenomenon. German investors prefer low-risk investment opportunities and sacrifice yield opportunities for these. In contrast to this, Anglo-Saxon investors demonstrate significantly different investment preferences. They prefer a yield-oriented investment and attach secondary importance to risk management in comparison.³

Whereas the term "yield" is clearly defined and therefore easy to understand in capital investment management,⁴ risk awareness and risk acceptance are far more difficult to specify. Individually, they depend on the aims and preferences of the investor and the institutional conditions, such as external and internal investment restrictions.⁵ In general, risk in the area of capital investment refers to the uncertainty regarding future financial results specified by a probability distribution. Risk in this sense therefore measures occurrences of loss or fluctuations in results during normal business operations (Going Concern), depending on the degree of risk. In contrast to this, Dichtl/Petersmeier/Schlenger (2003) define the actual risk in institutional asset management as being the risk of no longer being able to fulfil the assumed performance promises.



"Until now, the literature did not usually distinguish between risk and loss aversion."

Lutz Johanning



"Risk awareness and acceptance are far more difficult to define than the concept of yield or profit."

Christian Funke

They therefore refer to the occurrence of investor-specific worst case losses in particular, which must be distinguished from the going concern risks. Capital investors therefore demonstrate acceptance of both risk and loss. The greater the aversion to risk and loss is, the more the investor is prepared to sacrifice yield in order avoid losses or reduce risk.

It is important to distinguish between the acceptance of risk from the acceptance of loss.

The primary question of this study is derived from the distinction between risk and loss aversion that has not been drawn in the literature until now: ideally, how should, and how is, the actual risk and loss acceptance of investors taken into consideration during capital investment?

Within the scope of this question, the following aims will be pursued in detail:

- Firstly, a product matrix will be derived from the risk and loss preferences of the investors that enables the theoretical assignment of investment products to specific investment preferences (Chapter 2).
- Next, the actual investment behaviour of institutional investors will be described and then compared with the self-assessments and the theoretical product categorisation (Chapter 3).
- Implications for asset management and regulatory practice will be derived from the theoretical and empirical findings (Chapter 4).
- A conclusion of all of the above considerations will be drawn in Chapter 5.



“The question is: how should investors ideally act in accordance with their risk and loss acceptance - and whether they actually do this.”

Bernd Rudolph

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¹ Gottlieb (2003), page 214.

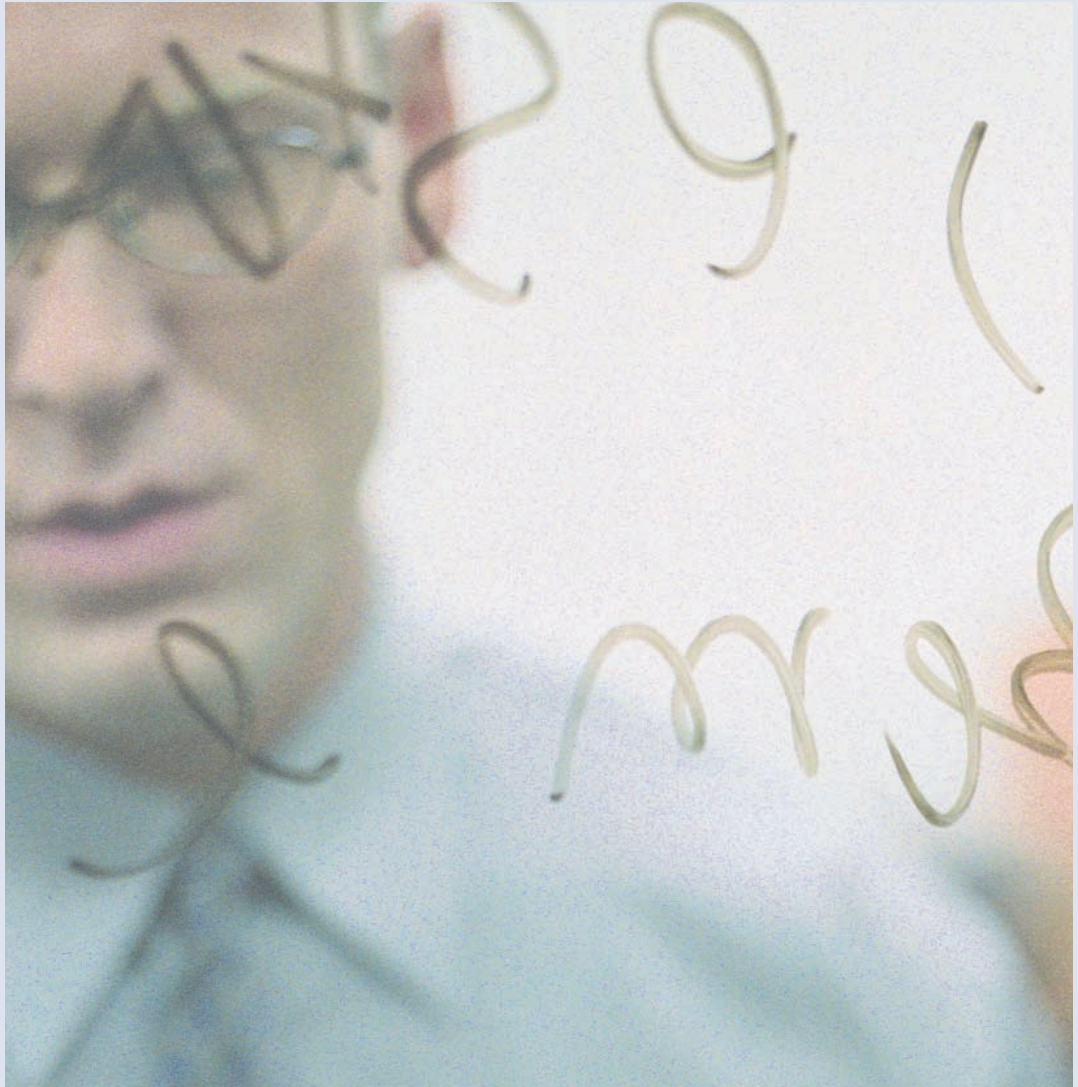
² Beck (2005), page 32. A study of 6000 portfolios of institutional fund investors carried out by the Deutsche Performancemessungs-Gesellschaft (DPG) shows that the investments in fixed-income securities rose in 2005 and now account for 63.1 per cent of all investments.

³ cf. Risk and Performance Management Study www.investit.com.

⁴ Yield refers to the percentage increase in net worth during the investment period. It therefore includes all income components, such as dividends, income from savings and price changes. The market value related yield must be differentiated from the yield at the balance sheet level.

⁵ A life insurer who may not be able to fulfil the assumed performance promises due to losses defines risk differently to a shareholder of a company seeking to maximise the market value, who does not simply understand risk as the potential for loss, but also understands it as the potential for profit. Cf. Dichtl/Petersmeier/Schlenger (2003), page 184.

2 Investment Preferences and Asset Management Products



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2.1 Risk Controlling, Risk and Loss Management

The term risk management has not been clearly defined. It is understood to refer to the process of risk identification, measurement and handling, as well as actual risk positioning. The following delineations between the two terms are used:⁶

1. Risk management refers to the risk positioning carried out by the portfolio manager. Risk positioning is linked to the aim of generating profit, which means that risks that are remunerated with an appropriate risk premium are consciously entered into. When taking on these risks, loss or profit fluctuations will occur during normal business operations (Going Concern).
2. A distinction is made between risk and loss aversion and consequently between risk and loss management. Whereas risk positioning, and therefore the case of normal business operations (Going Concern), is included in risk management, the aim of loss management is to avoid losses of a particular value. From the point of view of the investor, the losses to be avoided would be the ones that would cause considerable damage. They are therefore of an individual, worst case nature. There can therefore be a normal risk-yield preference within the context of loss limitation.
3. The process of identifying, measuring, handling and controlling risk is defined as risk controlling. Risk controlling is a matter of taking measures, such as setting risk limits or launching incentive systems. It is not, however, a matter of actually taking on risks. From the point of view of the investor, risk controlling carried out by asset managers is of particular importance if, as for example in the case of hedge funds, the investments are not transparent and the strategies are very complex or difficult to value. Risk controlling is not the subject of this investigation.

The aspect of risk aversion will first be examined in more detail in section 2.2, and then loss aversion in 2.3. Section 2.4 will establish capital investment product requirements from the considerations.

In risk management, risks that are remunerated with an appropriate risk premium are consciously entered into.

Risk management includes the risks of normal business operations (Going Concern).

The aim of loss management is to avoid losses of a particular value – worst case losses.

⁶ cf. Rudolph/Johanning (2000), page 18.

2.2 Risk Aversion and Capital Investment Risks

Variance as the degree of risk also incorporates positive deviations. In practice, risk is regarded as a negative deviation from a target value.

With a standard distribution of security yields, a rational investor can maximise his utility, U , by optimising the following preference function:

$$(1) U = \mu_p - \lambda \cdot \text{Total portfolio risk under restrictions} \rightarrow \text{Max!}$$

The utility value increases with increased anticipated portfolio yields, μ_p , and decreases with increased total portfolio risk. Consequently, risk causes utility to decrease. The total portfolio risk is often measured in asset management as the standard deviation σ_p , or the variance σ_p^2 of the portfolio yield. This degree of risk incorporates the profit fluctuation by the anticipated value and therefore also positive deviations. In practice, however, risk is regarded as a negative deviation from a target value, as it is expressed in degrees of downside risk, lower partial moments or even approximately in terms of value at risk (VaR), for example. This chapter will first deal with variance as the degree of risk. The parameter lambda (λ) represents the risk aversion of the investor. The greater the value, the more averse to risk the investor is.

With regard to restrictions, two types of ancillary conditions must be distinguished from one another:

- Investment restrictions that limit the investment possibilities: position restrictions are included in this, for example. They cause a "downward" shift of the efficiency limit in the μ, σ diagram, which means that only a partly reduced anticipated yield can be generated under conditions that are otherwise identical for the same risk.
- Risk restrictions: These cause the investor to be restricted in his or her portfolio positioning.

The total portfolio risk in (1) consists of various components. Essentially, these involve systematic or market risk. In the case of active portfolio management, they also involve unsystematic, idiosyncratic risk and the estimated risk from the evaluation of the distribution parameters:⁷

$$(2) \text{ Total portfolio risk} = \text{market risk} + \text{unsystematic risk} + \text{estimated risk}$$

Market risk includes the general price change risk, such as the share price, currency, price of raw materials and interest rate movement risk. As a rule, it is measured as the variance of a benchmark yield, σ_b^2 . The unsystematic risk corresponds to the variance of the active yield, σ_e^2 ; σ_e represents what is known as the tracking error.

The estimated risk is designated as the risk that the estimated parameter deviates from the non-observable true parameter of the yield distribution.⁸ It can be demonstrated formally and using simple examples that the yield predictions based on historic yield cycles are very imprecise. These errors of estimation can be reflected in significant changes in optimal portfolio weightings.⁹ Model extensions integrate the estimated risk into portfolio optimisation, in addition to the investment risk. The estimated anticipated value is adjusted by advance information (prior), ϕ and the estimated variance is adjusted by the estimated risk.

⁷ A number of other risks fall within the scope of capital investment, such as contracting party risks, operative risks, settlement, legal, system and liquidation risks, which are no longer picked out as central themes, but can generally be measured.

⁸ cf. Kempf/Memmel (2002), page 896.

⁹ In contrast to this, forecasting errors when estimating the covariances are far more marginal cf. Kempf/Memmel (2002), pages 897–904.

2.3 Loss Aversion and Dynamic Asset Allocation

Dichtl/Petersmeier/Schlenger (2003) define the actual risk in institutional asset management as being the risk of no longer being able to fulfil performance promises made. For a life insurance company, and similarly also for pension funds and company pension systems, this can mean, for example, that profit sharing is cut. The task of risk management on the global level is therefore to avoid devastating capital losses on the total assets level (as a consequence of accumulation of individual risks). Risk management of individual mandates aims to avoid capital losses or capital consumption, in order to exclude negative effects for various decision-makers in the area of capital investments.¹⁰

Risk and loss aversion can differ from one another significantly. However, they are positively correlated due to their intuitive equation.

In the following, these risks will be referred to as investor-specific worst case risks. They must be distinguished from the going concern risks mentioned in the previous paragraph. Accordingly, a distinction will be made between risk aversion and loss aversion in the following. The preference to eliminate life-threatening losses is to be understood by the term loss aversion. With regard to a low aversion to loss, the loss that must be avoided under all circumstances is relatively high. In contrast to this, for a high aversion to loss, it is relatively low.¹¹

Within the context of this loss limitation, the aim of the investor can be to maximise a (going concern) risk-adjusted performance. The investor's approach to risk can therefore be moderate, despite a high aversion to loss. In practice, an implicit distinction between loss and risk aversion can actually be observed if, for example, loss-restricted investors measure their performance using the Sharpe Ratio. A degree of risk that is in no way solely concentrated on losses is used with the standard deviation.

However, due to the intuitive equation of loss and risk, it is possible to assume a positive correlation between loss and risk aversion.



¹⁰ cf. Dichtl/Petersmeier/Schlenger (2003), pages 182–183. The authors consider the tasks of risk management against the background of diverse principal-agent relations in institutional capital investment.

¹¹ Loss aversion therefore always assumes the elimination of great losses. It does not relate to losses that accumulate during normal business operations.

2.4 Classification of Risk and Loss Preferences in the Asset Management Product Matrix

A matrix with product segments results from the combination of risk and loss aversion.

The considerations of the previous section can now be summarised in a product matrix in figure 2.1. Within this matrix, a distinction is made between the three levels of risk aversion (high, medium and low) and the three levels of loss aversion (high, medium and none). Therefore, there are therefore nine product segments in total that are labelled with various loss and risk preferences.

A distinction within loss aversion produces the following preferences for value-securing strategies:

- Investors with **high loss aversion** even avoid losses that are “manageable”. A portfolio insurance strategy (PI) with a high floor for asset security is advantageous. TIPP variation (Time Invariant Portfolio Protection) is an option, whereby the floor is regularly adjusted and the generated profits are also hedged.¹² The loss management of the strategy must ensure the security level. The exposure to be invested in a risky manner is low.
- With regard to **medium loss aversion**, the security limit can be set at a lower level. A CPPI strategy (Constant Proportion Portfolio Insurance) is an option for this preference structure. A greater level of exposure in comparison to the TIPP strategy is managed in accordance with the previous statements, depending on the risk aversion.
- If there is **no aversion to loss**, the capital may be invested without a value-securing limit. The investment is then only determined by the degree of risk aversion.

Depending on the risk aversion, the following statements can be made for the capital investment management of exposure in a theoretical and empirical manner for the three risk components according to equation (2) from Chapter 2.2:

- With regard to **high risk aversion**, the investors prefer a bond-heavy, strongly diversified portfolio (Exposure). Fixed-income securities exhibit the lowest risk of all asset classes. A low portfolio risk can be realised as a result of high diversification. Risk-averse investors also prefer more passive or slightly active investments. Unsystematic and estimated risks in particular can therefore be avoided.
- With regard to **medium risk aversion**, investors select an asset allocation that is comprised of approximately 50 per cent of fixed-income securities, as well as alternative assets and equities. As there is only limited information available for many alternative investments, such as hedge funds and private equity, and these assets are classed as inhomogeneous, the estimated risk must be assessed as high. This leads to a reduction in the ratio of alternative investments relative to a proportion determined on an empirical basis. Investors with a medium aversion to risk accept active bond mandates and passive or slightly active equity mandates.
- With regard to **low risk aversion**, the portfolio consists of equities and alternative assets. The degree of diversification is lower and investment is concentrated on investments with potential for growth. The strategy is characterised by active investments. An investor with low aversion to risk is prepared to take on active risks and estimated risks as well as benchmark risks. With regard to active management, the estimated risk is the greatest, since this risk increases with the number of securities N .¹³

The optimal capital investment products result from the combination of various approaches to loss and risk. With high risk aversion and no loss aversion, for example, strategies that largely free of forecasts or even passive in nature are options, such as pure indexing, minimum variance, constant mix and best-of-n-risky-asset strategies and slightly active strategies. Investments are made almost exclusively in bonds of a homogenous nature. The degree of diversification is markedly high. With regard to high or medium loss aversion and high risk aversion, exposure in the context of the value-securing strategy is managed in accordance with the previous statements.

The low risk and no loss aversion segment is characterised by active equity management. The task of risk management is to ensure the exhaustion of the tracking error budget.

¹² cf. Dichtl/Petersmeier/Schlenger (2003), pages 187–191, for an overview of the dynamic asset allocation strategies.

¹³ The error of estimation increases with the number of securities, N , at a observation period of constant length, T . It can therefore be stated that the probability of observing an investment with a high error of estimation increases as N increases. cf. Drobetz (2003), page 212.

It should be noted that the point of view of the investor is taken into consideration during product classification. If a value-securing strategy is recommended for specific degrees of risk and loss acceptance, it applies to the entire capital investment and not necessarily to individual mandates. Within the context of a multi-manager approach, it would be possible, for example, to allocate individual special mandates that refer to benchmarks to advisors or asset managers and to pursue a value-securing strategy for the aggregate assets within the scope of an overlay management system.

It is essential to distinguish the total capital investment from individual mandates. Value-securing for the total assets can therefore take place in line with an overlay management system.

The following conclusions can be drawn from these considerations:

1. Due to the estimated risks under otherwise identical circumstances, risk-averse investors have a lower preference for active management.
2. Risk-averse investors have a low preference for new investment classes. They prefer traditional asset classes for which substantial historical price data or information are available.
3. The higher the risk aversion, the greater the diversification of the portfolio.
4. The more stringent investment restrictions (investment limits) are, the greater the “forced” portfolio diversification is, which causes yield losses.
5. The bond ratio decreases with decreasing risk aversion. With regard to medium risk aversion, alternative assets in addition to bonds and a low equity component constitute the best possible allocation of assets. With regard to low risk aversion, the portfolio is dominated by equity investments.
6. Investors with high loss aversion prefer dynamic asset allocation or value securing strategies.
7. There is a positive correlation between risk and loss aversion.

Figure 2.1: Normative Asset Management Product Matrix

		Asset classes and structure of exposure	Loss aversion Decreasing level of security →		
			High	Medium	None
		Hedging strategy	<ul style="list-style-type: none"> PI → TIPP High floor 	<ul style="list-style-type: none"> PI → CPPI Medium floor 	<ul style="list-style-type: none"> Indexing Best of n risky assets Constant mix Minimum variance
Risk aversion Greater importance of restrictions ↓	High	<ul style="list-style-type: none"> High bond ratio High diversification Passive, slightly active Homogeneous investments 			
	Medium	<ul style="list-style-type: none"> Fewer bonds, more equities and AA Active bonds, passive equities, slightly active, unsophisticated AA Medium diversification 			
	Low	<ul style="list-style-type: none"> High, very active equities ratio Low diversification Inhomogeneous investments with potential for growth 			

The product matrix indicates recommendations for investment products and strategies, depending on loss and risk aversion. It relates to normative strategies based on theoretical considerations.

PI=Portfolio Insurance, TIPP=Time Invariant Portfolio Protection, CPPI=Constant Proportion Portfolio Insurance, TE=Tracking Error, AA=Alternative Assets ■ Risk management is of the utmost importance ■ ... highly important ■ ... of lesser importance

3 Empirical Analysis of Risk and Product Preferences of Institutional Investors



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3.1 Multivariate Analysis Approach

In this chapter, the actual risk and loss behaviour of the investors is analysed. The task is to investigate to what extent the theoretical conclusions from Chapter 2, the product matrix developed in Chapter 2.4 in particular, reflect the actual risk and product preferences of institutional investors.

The empirical investigation is based on a survey of 195 institutional investors in the period from 25 July to 12 September 2005. The statistical tool of cluster analysis can be used to analyse the survey data. This enables groups of investors to be identified that are relatively similar to one another with regard to specific variables, but are as different as they can possibly be in comparison to the other groups ("clusters").¹⁵

In order to be able to implement a sensible cluster formation that depicts the risk and product preferences of institutional investors, variables must first be selected, which enable the separation of the groups to be carried out. Two variable groups can be identified:

- **Self-assessment:** The investors' judgement of their own risk and loss aversion and their investment restrictions.
- **Realisation:** Realisation of the risk and loss aversion that can be observed in practice in asset classes, product classes and diversification of the portfolio.

It is possible to investigate these two levels on two different cluster analyses with the relevant variable groups. In connection with this, it is possible to investigate whether or not the self-assessment of the respondents corresponds to the realisation of their risk and loss aversion in their investment strategy.

The findings are based on a survey of 195 institutional investors in the third quarter of 2005.

For the analysis, groups (clusters) were designated that embrace investors with similar behaviour, whereby the groups should be distinguished from one another as much as possible.

¹⁴ Appendix V of this study presents more findings on risk controlling, which, however, are not the subject of this investigation. cf. Chapter 2.1.

¹⁵ For an introduction, see Backhaus et al. (2003), pages 480–542.

3.2 Description of the Variables and Descriptive Findings

The self-assessment level is represented by four variables:

- **Risk aversion:** Self-assessment of risk aversion in capital investment (Question: How do you assess the risk acceptance of your company when making investments, whereby 1 = safe and 5 = speculative); [Average: 1,73].
- **Loss aversion:** Self-assessment of loss aversion of the company in capital investment (Question: Importance of the statement "Avoidance of losses or avoidance of undershooting specific minimum yields", whereby 1 = very important and 6 = not at all important); [Average: 1,96].
- **Avoidance of underperformance:** Self-assessment of the avoidance of underperformance in capital investment (Question: Importance of the statement "Avoidance of underperformance compared with an index", whereby 1 = very important and 6 = not at all important); [Average: 3,35].
- **Restrictions:** Self-assessment average for 13 different internal investment restrictions¹⁶ (Question: Importance of the specified investment restrictions, whereby 1 = very important and 6 = not at all important); [Average: 2,74].

Using the product matrix from Chapter 2.4, three theory-governed aspects of observable risk and product preferences can be identified. Appropriate variables can be constructed for these from the findings of the survey:

- **Asset classes:** Percentage of bonds under own management¹⁷ (metric, 0–100); [Average: 54,93].
- **Investment philosophy:** Percentage of active investment philosophy in capital investment (metric, 0–100); [Average: 50,71].
- **Diversification:** Number of different asset classes with at least five percent portfolio weighting under own management or under the management of a third party (indirectly calculated based on investments in the asset class mix, metric, 1-6); [Average 2.43].

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¹⁶ Similarly, the assessment of external investment restrictions could also be incorporated into the cluster analysis. However, these correlate with 0.52 (significance level one per cent) to the assessment of the internal restrictions, which means that they cannot be used for statistical reasons (problem of multicollinearity).

¹⁷ Ideally, the percentage of bonds would be included in the overall portfolio. As the division between assets under the company's own management and assets under the management of another company is only given accurately for 91 out of 195 observations, this can only be calculated with the loss of half of the observations. In this respect, the proportion of assets under the company's own management is brought in as a reasonable approximation, as assets under the company's own management account for almost 90 per cent of the portfolio.

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¹⁸ The corresponding question was: When deciding on an investment, does risk acceptance play an important role? How do you assess your company? Please answer using a scale from 1 = "Safe - the safety of the investment is of the utmost importance" to 5 = "Speculative - we have very high yield expectations and therefore also take on high risks of loss". The last category 5 was not specified by any of the respondents.

¹⁹ The corresponding question was: I will now read a few statements out to you and would like to know how important these are to you. Please answer on a scale of 1 to 6. 1 stands for "very important" and 6 stands for "not at all important". You can grade your judgement using the values in between.

In the following section, selected descriptive findings with regard to the variables are given. In the assessment of their own **risk acceptance**, the investors are thoroughly conservative: 86 per cent assess themselves as safe or relatively safe (assessment 1 or 2) investors. Differences across the sector can be seen clearly in Figure 3.1. The foundations, for example, are therefore extremely averse to risk (71 per cent with assessment 1), whilst banks and corporates, in comparison, have the highest share of less risk-averse investors.¹⁸

In the survey of the investors, a distinction was made between national and international.

The variables for **loss aversion** and the **avoidance of underperformance** were raised together with three other statements on the importance of fulfilling external requirements, payment obligations and the coverage level.¹⁹ Figure 3.2 depicts the nomination of the two most important categories in the form of a percentage. Interesting differences can be gathered from this graph – There is a high level of agreement for the avoidance of losses and the fulfillment of payment obligations, whilst the avoidance of underperformance compared with an index is less important.

If the statistical interrelationship between risk and loss aversion is measured, the result is that the two variables are connected. The majority of investors therefore see themselves as afraid of risk and averse to loss at the same time. However, the statistical correlation is relatively low at 0.167 (significance level of five per cent). The theoretical discussion in Chapter 2 is therefore also confirmed in that both variables measure different concepts.

The investors were asked to assess themselves as to how prepared they are to take risk. According to this, insurance companies and foundations have the highest risk aversion.

Figure 3.1:
Self-assessment of risk acceptance

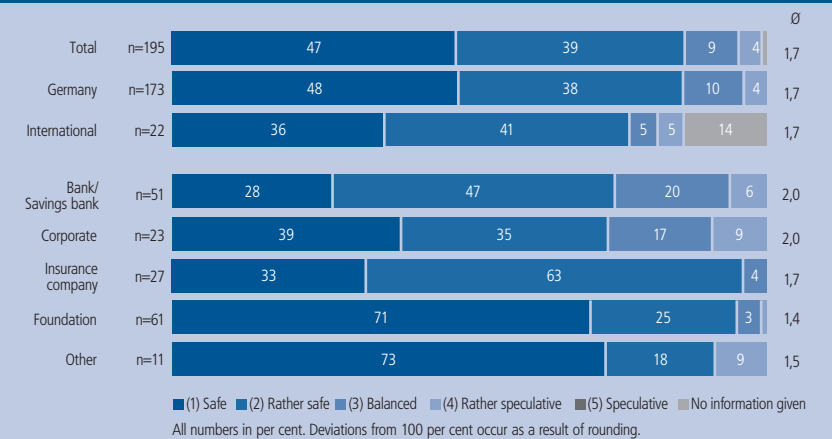
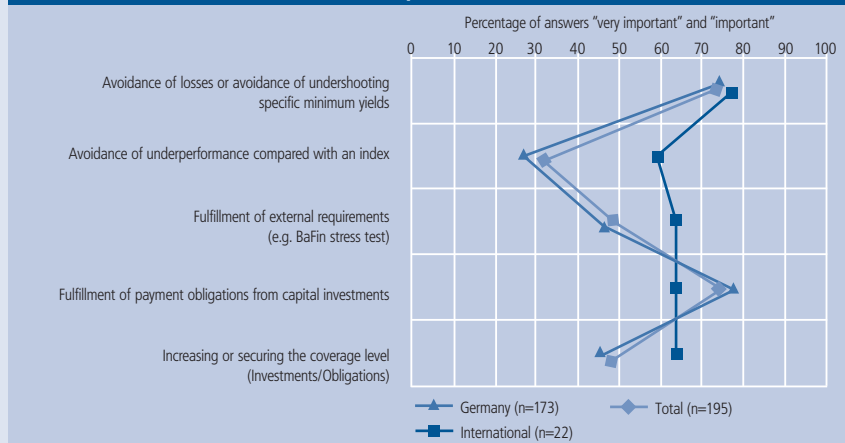


Figure 3.2:
Loss aversion and avoidance of underperformance

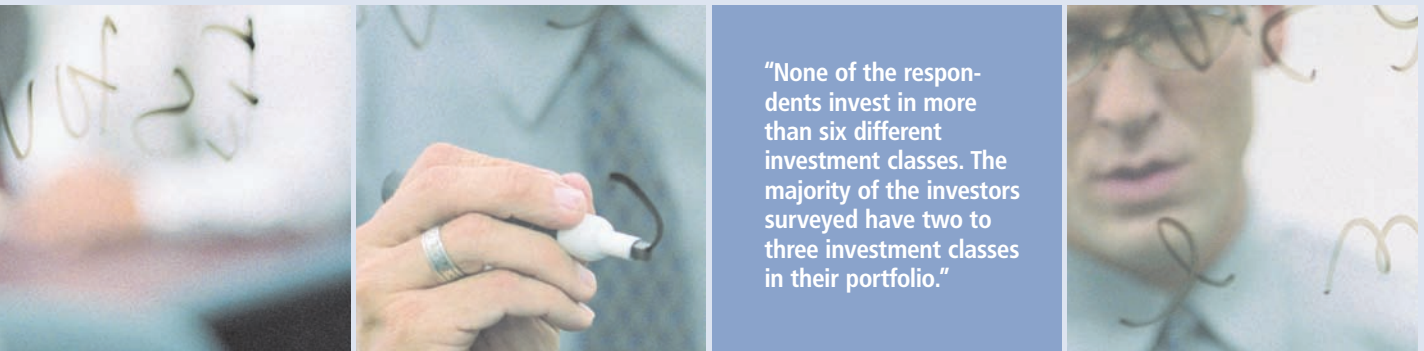


Comparatively lesser importance is attached to the avoidance of underperformance compared with a reference index.

The number of asset classes is a suitable measure of diversification.

The investigation of **asset classes** indicates a significant dominance of bonds, as Figure 3.3 and Figure 3.4 show.²⁰ Furthermore, significant sectoral differences can also be identified. Therefore, the proportion of bonds that held by banks, 81 per cent, is very high, whilst foundations only hold a proportion of 34 per cent and focus on other investments instead. In the case of assets being managed by another company, although the proportion of bonds still dominates, there is a significantly greater proportion of equities in comparison to assets under the company's own management (six per cent versus 28 per cent in total).

A simple measure of the level of **diversification** of each individual investor can be calculated from this data relating to the investments in various asset classes – the number of asset classes used. The resulting variable indicates with a minimum of one and a maximum of six that there are investors that invest in a single asset class, but no investors that invest in more than six different asset classes.²¹ On average, investors invest in 2.63 asset classes, whereby the majority use two or three (32 per cent and 27 per cent of the respondents respectively).



"None of the respondents invest in more than six different investment classes. The majority of the investors surveyed have two to three investment classes in their portfolio."

The investors were asked about the distribution of capital investments under their own management and under the management of another company. When capital investments are managed by the company itself, fixed-income securities dominate.

Figure 3.3: Distribution of capital investments under the company's own management according to asset classes*

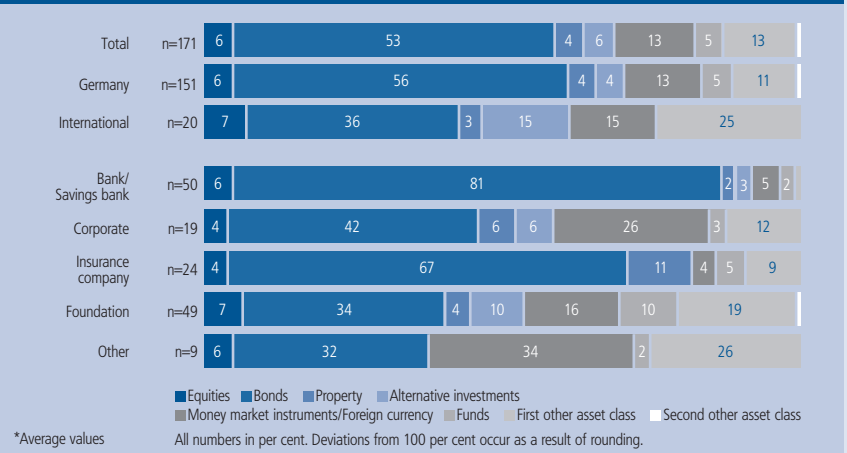
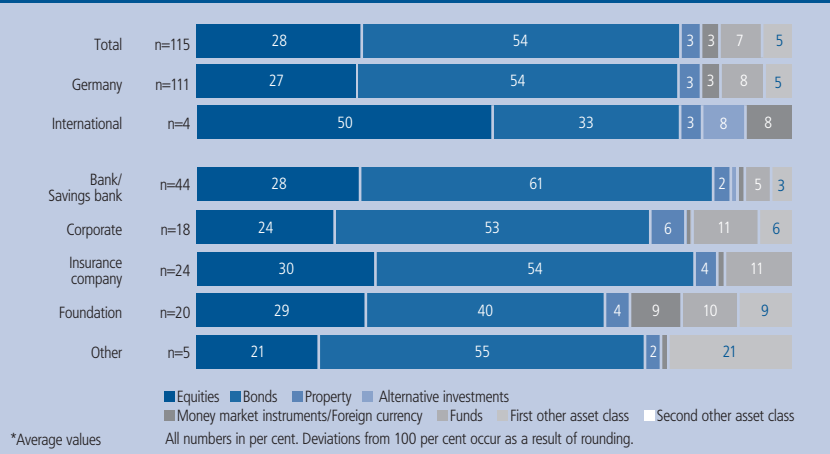


Figure 3.4: Distribution of capital investments under the management of another company according to asset classes*



With regard to capital investments under the management of another company, the proportion of equities increases significantly. On average, institutional investors invest in 2.63 different asset classes at one time.

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²⁰ The corresponding questions were: Do you divide the volumes of capital investments under your own management (or under the management of another company) according to the various asset classes that I am reading out to you now? In each case, please tell me in per cent.

²¹ The maximum that can be theoretically achieved in the survey is the six mentioned investment classes and the three other nominations under other investment classes, which correspondingly means nine. A minimum investment of five per cent is required in order to ensure a sufficient level of "diversification" for the portfolio. Assets that the investor was not able to allocate in the six specified classes are included under "Other". Nominations included credit transactions/notes/mortgages, certificates, raw materials, derivative strategy, private strategy and internal Group investments.

In the distinction between the **investment philosophies**, there are once again interesting differences between the various groups, as Figures 3.5 and 3.6 demonstrate.²² Therefore, international investors tend to prefer active management more often than German investors, whilst the banks prefer a considerably more passive form of management in comparison to other sectors. There are fewer differences between the sectors when assets are managed by another company, but active management is of more importance. Foundations prefer active management of their investments managed by another company to the least extent.

The investors should segment their portfolios according to various investment philosophies. It was indicated that international investors prefer active management in self-management more often than German investors.

Figure 3.5: Distribution of capital investments under the company's own management according to investment philosophies

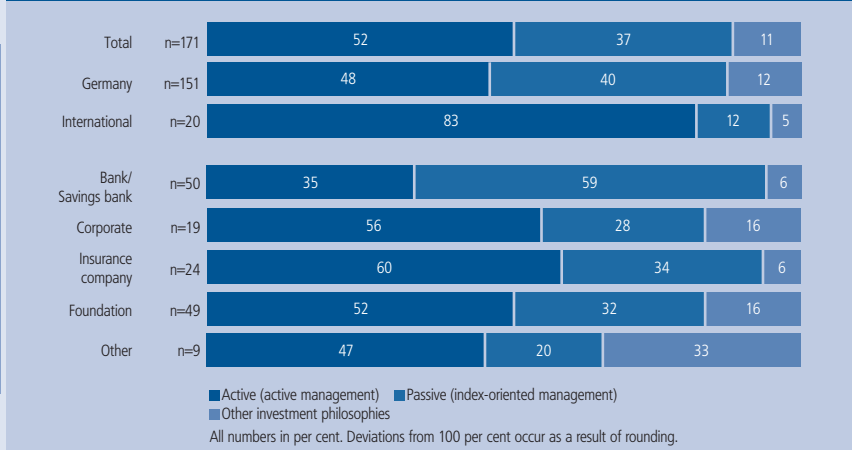
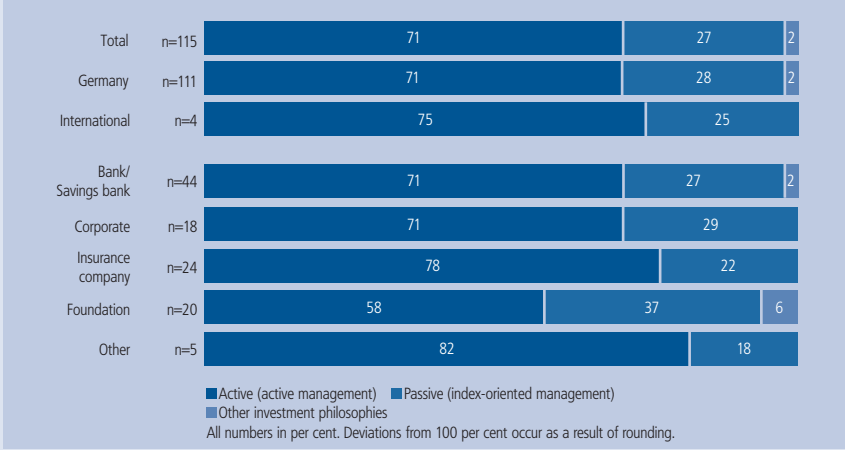


Figure 3.6: Distribution of capital investments under the management of another company according to investment philosophies



With regard to assets being managed by another company, active management predominates for all investors.

²²The corresponding question was: Do you divide the volumes of capital investments under your own management (or under the management of another company) according to the various investment philosophies that I am reading out to you now? In each case, please tell me in per cent.

3.3 Cluster Analysis of the Self-Assessment of Institutional Investors

In the cluster analysis using the self-assessment variables for internal restrictions, risk aversion, loss aversion and avoidance of underperformance, there is a relatively clear division of the sample into four different groups, as the statistical heterogeneity increases most clearly in the transition from the four cluster solution to the three cluster solution. There are interesting cluster differences in the four appointed variables, which facilitates the allocation of the groups. By interpreting the averages (in brackets), it is possible to conclude the following:

- **Cluster 1 (59 investors):** Above average restrictions (2.50), clearly above average risk and loss aversion (1.32 and 1.27) and above average avoidance of underperformance (2.31).
- **Cluster 2 (39 investors):** Clearly below average restrictions (3.15), above average risk aversion (1.49), above average loss aversion (1.51), avoidance of underperformance hardly of importance (4.90).
- **Cluster 3 (19 investors):** Below average restrictions (3.04), highest risk aversion (1.21), but lowest loss aversion (4.05) and avoidance of underperformance of low importance (4.68).
- **Cluster 4 (45 investors):** Slightly above average restrictions (2.59), clearly below average risk aversion (2.69), below average loss aversion (2.38), above average avoidance of underperformance (2.80).

The self-assessments produce four groups that can be clearly distinguished from one another.

²³ What is known as an “elbow” is produced in a graphical representation of the degree of heterogeneity (standard error of prediction). Cf. Backhaus et al. (2003), page 524. The cluster analysis was carried out using Ward’s Clustering Algorithm and the squared Euclidean distance proximity measure. For the advantages of the Ward procedure, see Backhaus et al. (2003), pages 516–518.

²⁴ When the terms under or above average are used in the following, these should always be understood in terms of content rather than mathematically. The assessment variables are all scaled in such a way that lower values signify higher importance. Therefore, for example, “above average” risk aversion corresponds to a low average of these variables compared with the coverage and vice versa.

Clusters 1 and 2 demonstrate the highest risk and loss aversion, whereas the members of cluster 2 are restricted by fewer investment restrictions.

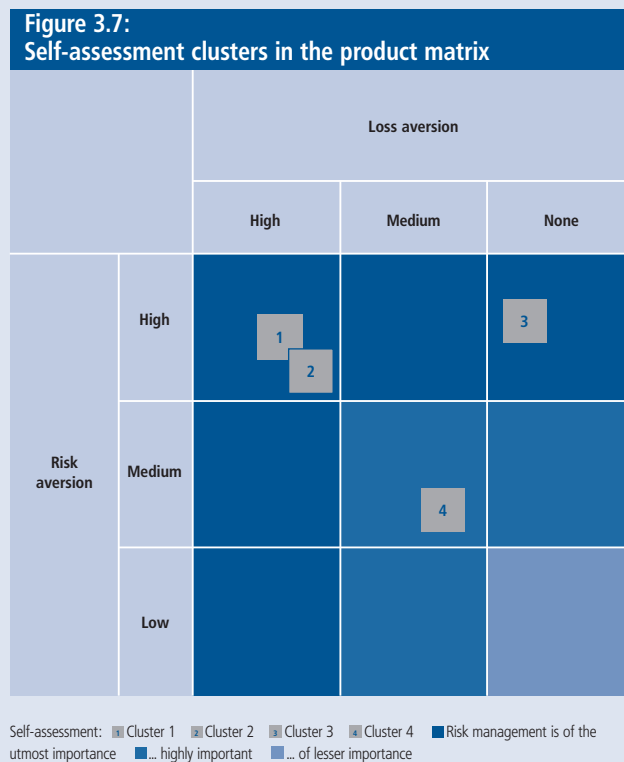
Cluster 3 confirms the distinction between risk and loss aversion with its distinctive position.

Yield-oriented investors can be found in cluster 4.

Figure 3.7 arranges the four clusters in the product matrix from Chapter 2.4. **Cluster 1** and **cluster 2** demonstrate relatively similar assessments with regard to their risk and loss aversion. However, there are significantly greater investment restrictions for cluster 1 and there is a focus on the performance of an index, whilst cluster 2 feels less restricted and the avoidance of underperformance is also not assessed as being as important. The two clusters together demonstrate the highest risk and loss aversion and cluster 1 assesses itself as even more cautious in both the direct assessment and the indirect effect of restrictions. According to these findings, these clusters would be arranged in the top left of the product matrix from Chapter 2.4.

Cluster 3 assesses itself as having the highest risk aversion of all four groups. At the same time however, it has the lowest loss aversion and therefore clearly distances itself from the other groups. This confirms the theoretical considerations in Chapter 2 and the distinction made there between risk and loss aversion. A further characteristic of cluster 3 is the low level of focus on an index. Accordingly, this cluster would be arranged in the top right of the product matrix from Chapter 2.4.

Cluster 4 is the group of institutional investors who assess their risk and loss aversion as clearly below average. Consequently, it therefore includes more yield-oriented investors. However, a slightly above average importance of restrictions can be observed and an above average avoidance of underperformance compared with an index. This group would be best located in the middle of the matrix from Chapter 2.4.



In the illustration, the self-assessment clusters are integrated into the product matrix.

In an analysis of the clusters according to sectors, clear trends can be seen (see Table 3.1): Almost three quarters of banks are allocated to either cluster 1 or 4, that is to say the clusters with the highest (cluster 1) or the lowest (cluster 4) combination of risk and loss aversion. Accordingly, the banks can be split into two groups: high risk and loss averse banks (clusters 1 and 3 with almost half of all banks) and less risk and loss averse banks (cluster 4 with almost four ninths of banks). Very similarly, the corporates are arranged in either cluster 1 or cluster 4. In contrast to this, when observing the two other sectors, foundations and insurance companies demonstrated a relatively high risk aversion and a clear predominance in clusters 1 and 2 (over two thirds of all insurance companies and over three quarters of all foundations).

After this analysis, the question was raised as to what extent a cluster analysis using variables that represent the observable risk and product preferences of investors leads to a similar group formation as the cluster analysis carried out in this chapter. This is particularly interesting, as the last row of the product matrix from Chapter 2.4 with proportionately lower risk aversion is not occupied by any of the clusters according to the self-assessment. This raises the question of whether this reflects reality or whether the relevant investors have possibly given a self-assessment that does not reflect their actual investment behaviour.



Table 3.1:
Sectors and self-assessment clusters

Sector	Cluster				
	1	2	3	4	
Banks	18	9	7	25	59
Corporates	8	3	3	8	22
Foundations	21	16	4	6	47
Insurance companies	8	9	4	4	25
Other	4	2	1	2	9
Total sample	59	39	19	45	162

The self-assessment clusters are split up according to sectors in the table. Around 60 per cent of the respondents can be assigned to the security-oriented clusters 1 and 2.

Self-assessment: ■ Cluster 1 ■ Cluster 2 ■ Cluster 3 ■ Cluster 4

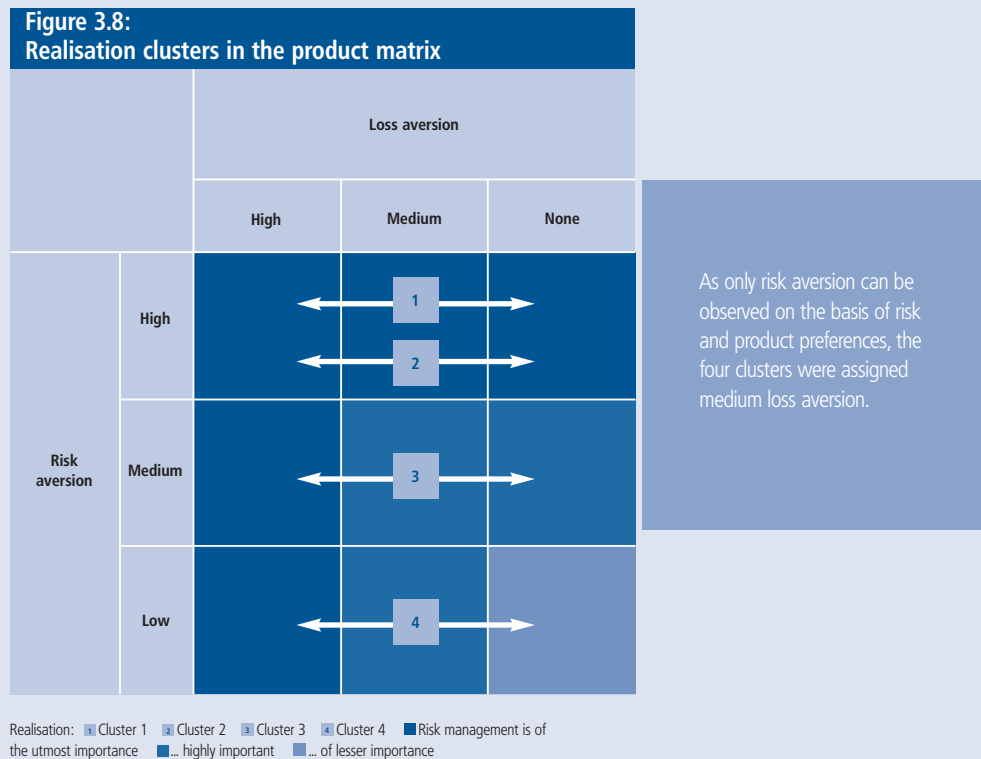
3.4 Cluster Analysis of the Observable Risk and Product Preferences

Just as in the self-assessment, four clusters are also produced for observable risk and product preferences.

In the cluster analysis for the variables of observable risk and product preferences, there is a clear division of the sample into four different groups, as in the first cluster analysis. By interpreting the averages (in brackets) for the three appointed variables of diversification, bond ratio and passive share, it is possible to conclude the following:

- **Cluster 1 (63 investors):** Slightly above average diversification (2.6 per cent), clearly above average bond ratio (80.4 per cent) and an above average, passive (barely active) investment strategy (14.4 per cent).
- **Cluster 2 (48 investors):** Above average diversification (2.7 per cent), above average bond ratio (76.4 per cent) and a purely active investment strategy (99.6 per cent).
- **Cluster 3 (30 investors):** Below average diversification (2.2 per cent), hardly any bonds (4.7 per cent) and above average, passive (barely active) exposure (14.7 per cent).
- **Cluster 4 (21 investors):** Clearly below average diversification (1.8 per cent), hardly any bonds (1.4 per cent) and almost a purely active investment strategy (99.6 per cent).

If these findings are now linked to the product matrix derived from theory in Chapter 2.4, it is possible to allocate the different groups relatively stringently according to their observable risk aversion.²⁵ This is depicted in Figure 3.8, where all clusters are displayed in the middle column, due to the loss aversion test not being possible.



²⁵ It is not possible to determine the actual, observable loss aversion, as detailed information regarding the products used would be necessary for this.

Cluster 1 represents the companies that are most averse to risk and loss, that largely invest in bonds, pursue a passive investment strategy and have a high degree of diversification. The cluster is assigned to the top row of the highest risk aversion in the product matrix from Chapter 2.4. The relevant groups from Chapter 3.3 are clusters 1, 2 and 3, as exact allocation according to risk aversion is not possible.

In comparison to cluster 1, **cluster 2** pursues a significantly different, that is to say active, investment philosophy. According to the theoretical conclusion, the significantly higher level of diversification from cluster 2 is a sign of higher risk aversion. The bond ratio is, however, somewhat lower than in cluster 1. It is possible to assign this cluster to the first row in the product matrix from Chapter 2.4 as well, whereby the active management and the somewhat lower bond ratio suggest a somewhat lower risk aversion. This group would also correspond to clusters 1, 2 and 3 picked out in Chapter 3.3, without a more precise allocation being possible.

In contrast to this, it would be possible to position **cluster 3** in the second row of the product matrix from Chapter 2.4, as there is a significantly lower bond ratio and the other investments are managed passively. In addition to this, the below average diversification of the investors in cluster 3 suggests a lower risk aversion than clusters 1 and 2. This group would correspond to cluster 4 from Chapter 3.3.

Cluster 4 contains the group of investors with the highest risk acceptance. They concentrate on few asset classes and actively manage their portfolio yield. They are assigned to the last row in the product matrix and would not have an equivalent from the cluster analysis of self-assessment variables, as none of the clusters could be assigned to this row. This is evidence of the fact that some investors assess themselves as more risk averse than they demonstrate with their actual risk and product preferences.

In the formation of the clusters according to sectors, some clear trends of industry correlation can be seen (see Table 3.2). Almost two thirds of all banks are assigned to cluster 1, the diversified, passive risk avoiders, and a further quarter to cluster 2, the diversified, active risk minimisers. As a result, the banks demonstrate extremely risk averse capital investment behaviour. A clear correlation can be seen for insurance companies as well. Exactly four fifths of insurance companies belong to risk averse clusters 1 or 2. In contrast to this, foundations and corporates demonstrate a relatively even distribution over the four clusters.

Table 3.2:
Sectors and realisation clusters

Sector	Cluster				
	1	2	3	4	
Banks	36	16	3	4	59
Corporates	5	8	6	3	22
Foundations	12	10	14	11	47
Insurance companies	8	12	4	1	25
Other	2	2	3	2	9
Total sample	63	48	30	21	162

Realisation: Cluster 1 Cluster 2 Cluster 3 Cluster 4

For more than two thirds of the respondents, the actual risk aversion is high.

3.5 Comparison of the Cluster Formation and Conclusion

In the direct comparison of the self-assessment of the investors with the observed risk and product preferences, there are some clear deviations.

A simple comparison of the cluster formation can be carried out by means of a contingency table of the cluster allocations of the individual investors.²⁶ In the diagram in Table 3.3, all fields with a theoretically "correct" equivalent of cluster affiliations, as they were derived in the two previous sections on the basis of theoretical assessments, are highlighted with a dark colour. The other observations deviate from this allocation. It must be taken into consideration that a precise definition can never be fully given. This is due to measurement uncertainty and the necessary use of approximations for constructs such as "risk aversion" and "loss aversion", which are difficult to measure.²⁷

It can be observed that those investors that demonstrate a relatively low aversion to risk in reality (cluster 4 in column 4) mainly belong to the high risk and loss averse clusters 1 and 2 (rows 1 and 2) or the highest risk averse cluster 3 (row 3), according to their self-assessment. This is a clear indication that some investors assess themselves as more risk averse than is reflected by their actual risk and product preferences in reality, as the investors in cluster 4 have a low bond ratio, actively manage their capital investments and are relatively focused on few asset classes. This cluster is dominated by foundations (11 out of 21 investors according to Table 3.2), which therefore clearly assess themselves incorrectly. This impression is confirmed by an analysis of realisation cluster 3. It is comprised of almost 50 per cent of foundations (14 out of 30 according to Table 3.2). Foundations therefore need to receive advice with regard to the assessment of risk aversion and their actual investment behaviour.

The table shows, however, that the opposite is also possible. Investors from the least risk averse cluster 4 (row 4) according to the self-assessment demonstrate extremely risk averse investment behaviour due to the fact that they belong to clusters 1 and 2 from the realisation cluster analysis (columns 1 and 2). This could be due to the fact that cluster 4 from the self-assessment has above average restrictions and is therefore "forced" to make risk averse capital investments. Banks in particular can be found in this cluster (25 out of 45 investors according to Table 3.1), which are subject to a number of external restrictions (e.g. Basel II, BaFin) and consequently convert these to internal restrictions for their own capital investment. Nevertheless, there may also be the need to advise banks as to what extent consistency between self-assessment and actual investment behaviour can be achieved with regard to capital investment.

All in all, it is possible to conclude from the analysis that there is no really similar cluster formation from the self-assessment and realisation of risk and product preferences. Everything indicates that a fraction of the investors assess themselves as more averse to risk and loss than they are in reality, and vice versa.

This could be due to a false self-assessment that does not reflect reality or an inadequate product range in the investment strategy that does not reflect the risk preferences. Aside from reverting to assessment or decision-making deficits, there is however a rational explanation.

For almost four per cent of the respondents, the actual investment behaviour deviated from the self-assessment by two clusters. More than 20 per cent make significantly more risky investments than intended.

		Realisation				Total
		Cluster				
Self-assessment	Cluster	1	2	3	4	Total
		1	25	15	13	
2	11	10	11	7	39	
3	7	6	1	5	19	
4	20	17	5	3	45	
Total		63	48	30	21	162

Self-assessment: ■ Cluster 1 ■ Cluster 2 ■ Cluster 3 ■ Cluster 4

Realisation: ■ Cluster 1 ■ Cluster 2 ■ Cluster 3 ■ Cluster 4

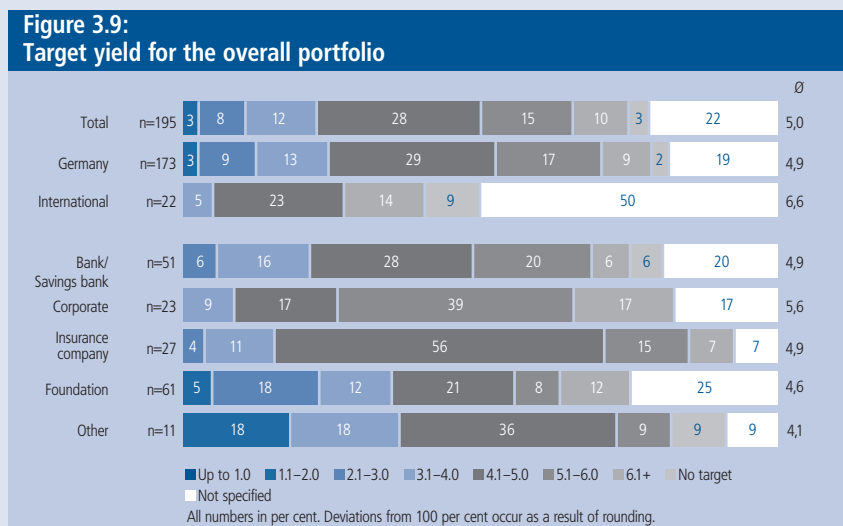
Where the fields are dark-coloured, self-assessment and realisation correlate.

Therefore, the slightly risk averse behaviour in practice could be due to the targets of capital investment. As Figure 3.9 shows, the target yield for the overall portfolio lies at five percent on average, but some sectors even seek significantly higher values.²⁸ It therefore seems plausible that a more risky investment strategy than actually corresponds to the company's own risk and loss aversion is necessary in the current capital market situation in particular.²⁹

Ambitious target yields increase the pressure on the risk profile.

The key findings of this chapter are as follows:

1. The investors assess themselves as highly averse to loss and risk at the same time. Foundations have the highest aversion to risk, banks and corporates are less risk averse to some extent.
2. This aversion to risk is increased by internal investment restrictions.
3. The empirical findings confirm the distinction between loss and risk aversion. There is a positive correlation of only 0.16 between them both.
4. Based on self-assessment and actual investment behaviour, four groups of investors are formed, which can be integrated into the asset management product matrix and analysed accordingly.
5. The self-assessment of the investors does not always match the actual investment behaviour. Many banks assess themselves as less averse to risk than they demonstrate with their capital investments. For foundations, the opposite is true: they demonstrate high risk acceptance, to some extent, although they assess themselves as highly risk averse.



The investors were asked about their target yield for the overall portfolio per year. International investors have the highest target yield at 6.6 per cent.

Left hand page:

²⁶ Appendix VIII of this study compares the groups of both cluster analyses with descriptive statistics on the variables of the other respective cluster analysis.

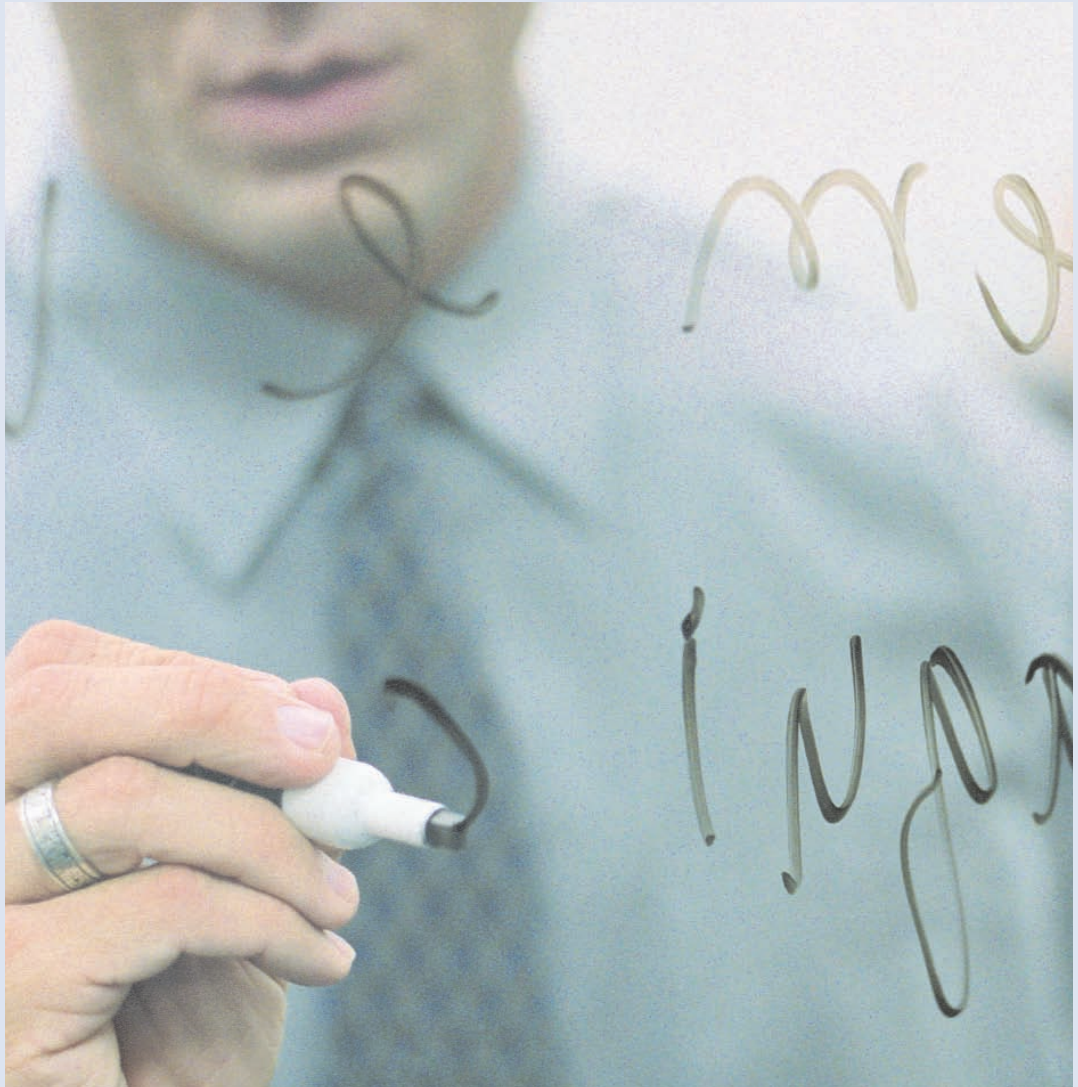
²⁷ It is not just the self-assessment variables that are subject to this criticism. The actual realisation of risk aversion is also not so easy to measure. It is therefore possible using an overlay management system, for example, to control the overall portfolio with regard to risk and loss aversion, despite a low bond ratio and active management.

Right hand page:

²⁸ The corresponding question was: How high is your target yield for the overall portfolio in per cent per year?

²⁹ Between the individual clusters, there is however no significant difference with regard to target yields. Contrary to the relevant intuition, the target of risk averse cluster 1 from Chapter 3.4 is even higher than that of the significantly less risk averse cluster 4. There is no difference between cluster 1 and cluster 4 from Chapter 3.3.

4 Implications for Asset Management and Regulatory Practice



On the basis of the product matrix in Chapter 2.4, it becomes clear how loss and risk preferences influence the product decision. In investment practice, there is currently no clear distinction between loss and risk preferences. Herein lies the danger that the investors select products that do not correspond, or only to a small extent, to their risk and loss preferences. The empirical findings substantiate this hypothesis.

Therefore, the need for investment practice consulting can be derived from the study findings. Investment advisors, asset consultants and also asset managers should support investors when deriving loss and risk preferences from their business objectives and shed light on suitable mandate structuring. Within the scope of asset allocation studies, the consequences (yield losses) of loss and risk preferences, as well as external and internal investment restrictions, must be identified.

The product range of asset managers must be adapted to be compatible with the investment preferences of the investors. If stable risk and loss preferences can also be observed over time, the launch of preference funds is recommended, which are tailored to specific preference segments in accordance with the product matrix. Such preference funds, in which the capital investments of several investors can be bundled together, can be offered on the market more cost-effectively than individual fund solutions due to synergy effects.

Furthermore, the study findings imply that a capital market regulation should be based on the worst case, but not on going concern risks. A worst case regulation was put into effect rudimentarily in Principle I, according to which banks must hold equity capital for the risks in the trading book that is commensurate to at least triple that of the value at risk (VaR). It is possible to assume that the going concern variable Value at Risk should be transformed by the multiplier into a worst case variable. Within the scope of the stress tests required by the supervisory authorities, the banks have to identify and present the portfolio losses for various worst case scenarios and which measures will be taken to reduce risk or maintain equity capital in such cases.

Whilst this regulatory approach satisfies the aims of the bank supervisory authorities in principle, the design of the Derivatives Ordinance to limit the use of derivatives in investment funds seems to be inappropriate. The Derivatives Ordinance is also based on the VaR and accepts the quantitative requirements of Principle I. It aims to make the use of derivatives as flexible as possible, but to limit the risk (VaR) of a fund to double that of a comparable investment free of derivatives at the same time. The Derivatives Ordinance also requires stress tests to be carried out. Significant costs are inflicted upon the fund industry by the Derivatives Ordinance, which are not pitted against discernable additional profits. Although the VaR is suitable to determine the risk of a fund in principle, it would not require this additional key figure.³⁰ It would be appropriate to define investor or fund-specific loss limits that cannot be violated. The stress tests should then cater for these loss limits. Furthermore, the use of derivatives could be made far more flexible by taking qualitative criteria into consideration.

In addition to this, the specification of investment limits would satisfy neither the requirements of the regulator nor the business objectives of the investor. As a rule, investment limits force greater portfolio diversification, which is, however, associated with a significant yield loss. The investors surveyed therefore estimate that they would be able to generate 1.5 percentage points more yield without internal investment restrictions and 1.6 percentage points more without external investment restrictions. At the same time, however, investment restrictions are not always able to avoid worst case losses. It would be more suitable in this case to restrict the regulation to the identification of investor-specific worst case loss limits and to stress tests coordinated with this. This would directly address the actual objective of the supervisory authorities.

All in all, the survey shows that a great deal of importance is attached to the identification of risk and loss preferences in capital investment management. Asset managers can therefore generate significant added value for the investors if they offer a risk and loss management system in tune with the investment objectives.

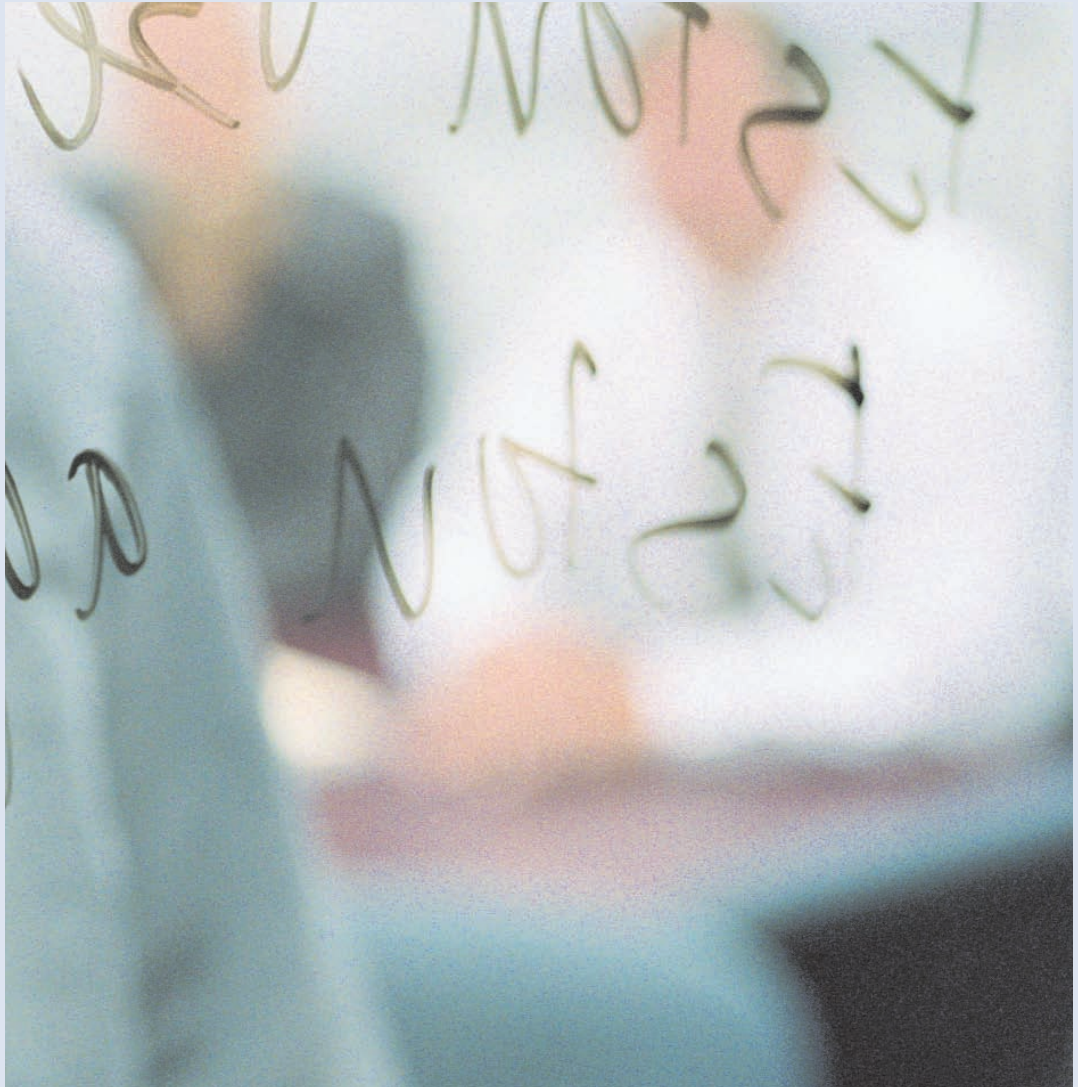
There is not a clear enough distinction between loss and risk preferences in practice. It is here that the need for consultancy is shown.

The product range of the asset managers should be adapted to the investment preferences.

External investment restrictions often result in yield losses. Supervisory regulations should be considered.

³⁰ For the use of VaR in the context of the Derivatives Ordinance, see Johanning/Werner (2004).

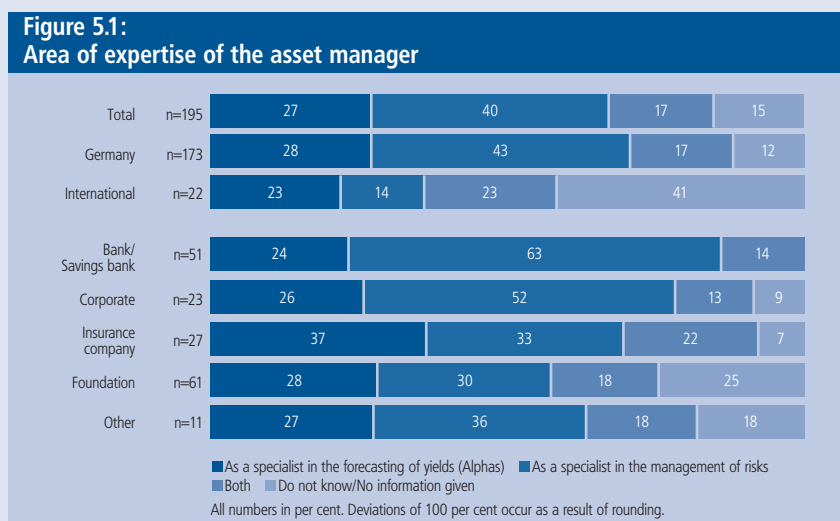
5 Summary and Conclusion



On the basis of the survey findings, the primary question of the study as to how risk and loss acceptance are and should be taken into consideration during capital investment, can be answered as follows:

- The theoretical discussion substantiates the distinction between loss and risk aversion. Loss aversion demonstrates the preference to avoid investor-specific worst case losses. Within the context of loss avoidance, risk aversion can exist. Risk aversion demonstrates the preference for going concern risks that the investor must take to generate yield.
- Various combinations of investment products can be derived from loss and risk aversion, which are classified in the scope of the asset management product matrix. The products are distinguished from one another with regard to the security level and, depending on risk acceptance, the investment classes, investment philosophy (active or passive) and the portfolio diversification.
- The empirical findings show that the investors predominantly assess themselves as highly averse to loss and risk at the same time.
- However, this is not always confirmed by actual investment behaviour during capital investments. There are differences between self-assessment and investor behaviour for foundations and banks in particular.
- Consequently, the need for consultancy with regard to the realisation of risk and loss aversion of institutional investors in capital investment can be identified. The use of a theoretical specification, such as the asset management product matrix, can be helpful for this.
- It must be established for regulatory practice that investment restrictions can lead to unnecessary, but significant yield losses, which can be avoided by an investor-specific regulation on the basis of the worst case loss.

The survey has shown that the management of the most diverse investment risks in capital investment is highly important. This assessment is also confirmed by the findings of the market survey. In response to the question as to whether they regard the asset manager to be a specialist in risk management or yield forecasting,³¹ the majority of investors assess the asset manager to be a risk manager (40 per cent versus 27 per cent). However, there are interesting differences. German investors tend to view asset managers as specialists in risk management, whereas yield management is seen as the specialism of asset managers by international investors (see Figure 5.1).



Institutional investors primarily regard their asset managers as specialists in the management of risks and less as specialists in forecasting yields.

³¹ The corresponding question was: Do you regard asset managers to be specialists in the forecasting of yields (Alphas) or specialists in the management of risks?

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