A quantitative risk indicator for financial products

AFM - the Netherlands Authority for the Financial Markets

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The AFM, the Netherlands Authority for the Financial Markets, is the supervisory authority for the conduct of and the provision of information by all parties in the financial markets in the Netherlands, that is to say the savings, lending/borrowing, investment, and insurance markets. The AFM's objective, as laid down in its Statutes, is 'to promote an orderly and transparent market process, an honest relationship between market players, and the protection of the consumer on the financial markets'.

The AFM ensures that the parties comply with the relevant laws and rules. The AFM also advises the Dutch Ministry of Finance when new laws and rules are being drafted that relate to the supervision of conduct of business in the financial markets. Within the limits set by the Ministry, the AFM can also develop its own rules and regulations.

The AFM's operational objectives are:

- to promote access to the market;
- to promote the proper and correct operation of the market, and
- to maintain all parties' confidence in the market.

These objectives serve not only the interests of those who purchase financial services and products but also the economy as a whole. The general public, the business sector and the government all depend for many activities on the financial products that are offered on the markets. Confidence in the orderly and honest operation of those markets is therefore crucial, which is why proper supervision is very important.

In pursuing its objectives, the AFM is guided by such concepts as integrity, transparency, proper provision of information and equality.
The financial world is vast and many of the AFM's activities therefore focus on the passing on of standards, that is to say promoting greater understanding of the rules among companies and citizens so that they comply with the rules out of conviction. For example, the AFM provides information about new rules, interpretations and general observations. The AFM also asks financial institutions to carry out a self-assessment of whether they are contributing sufficiently to the objectives of supervision. This allows checks to be carried out systematically, namely where there is the greatest risk.

The AFM performs its supervisory role based on four principles, namely perfect knowledge of the facts, legally and economically fair analyses based on these facts, careful and balanced decisions based on the facts and analyses, and clear-cut responses where they are needed.

In those areas where the market can and wants to contribute to supervision, it must actively take this opportunity to do so. This means self-regulation or self-supervision. Supervision is needed when all parties observe that the market itself - that is to say without supervision - is not contributing sufficiently to the objectives of confidence, access and proper operation of the market. In the case of those parts of the financial market where regulation and supervision are necessary, the question is then whether the market players can carry out some or all of the supervision themselves and therefore to what extent is an external supervisory authority required.

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Foreword

Starting from 1 October 2006, the new format for Financial Information Leaflets includes a graphic risk indicator. The evaluation of the old format revealed that consumers require the risks attached to complex financial products to be presented in a clear and visual manner. The abbreviation GUISE stands for *Gemiddelde Uitbetaling In geval van Slechte Eventualiteiten*, which means 'average payout in the case of unfavourable contingencies'. The GUISE was developed for the AFM by CentER Applied Research. Together with industry representatives, a risk indicator has been developed around this methodology.

This report is intended as a background document. It sets out some important preconditions for the risk indicator and explains the composition of the risk indicator and the underlying measure for risks. The report is made up of two parts. The first comprises an explanation of the risk indicator and is intended primarily for interested readers. The second consists of a detailed technical explanation of the measure for risks (the GUISE) and is aimed primarily at readers who wish to determine the risk indicator for a financial product themselves.

1 Introduction

In July 2002, the system of Financial Information Leaflets (FILs) was introduced in the Netherlands. An FIL is an information document that providers of what are referred to as 'complex'[1] financial products are required to draw up. The FIL describes the principal features of the product in question in order to provide prospective consumers with information about those product features, including the financial risk, the yields and the costs associated with the product. The FIL is specifically designed to help consumers in the orientation stage of the buying process.

There were three reasons for introducing the system of FILs. The first reason was the rapid product development on the financial markets. The second was the increasing blurring of boundaries between financial markets. The third was the belief that consumer responsibility in an increasingly dynamic financial arena starts with proper provision of information.

The objectives of the Regulations on the Financial Information Leaflet are as follows:

- The FIL must enable the consumer to gain a basic understanding of what he or she plans to purchase, what obligations are attached to that purchase and what he or she receives in return;
- The information set out in the FIL must enable the consumer to compare complex financial products with one another, even in situations involving different types of products.

This is intended, in part, to ensure that providers of financial products can compete under identical conditions across sectors.

In order to make the information presented in FILs more accessible to consumers, a regulation was introduced on 1 October 2006 to the effect that each FIL must include a graphic risk indicator, as an addition to the qualitative risk indication. That graphic indicator is based on a quantitative estimate of the risk attached to the product. The present document describes the most important considerations underlying the risk indicator and demonstrates how to determine the risk indicator in practice.

[1] When the system of FILs was introduced, this concept was defined as follows: a financial service or financial product consisting of components that belong to different types of financial services or financial products, with the value of at least one of those components being dependent upon the developments on financial markets or other markets.

2 Objective and conditions

2.1 Objective

There are two reasons for including a graphic risk indicator. Firstly, a graphic risk indicator offers consumers insight into the financial risks attached to complex products (see insert: the definition of risk). Secondly, such an indicator enables cross-sector comparison of the risks associated with different products.

The definition of risk

Financial risk consists of multiple dimensions, such as market risk, currency risk, liquidity risk, credit risk and interest risk. Market risk refers to the possibility that the value of an investment will drop over a particular period as a result of the economic situation. Currency risk is a special type of market risk that arises as a result of investing in 'foreign' currencies. The liquidity risk occurs as a result of the possibility that an asset cannot be sold as quickly owing to unfavourable market conditions. The interest risk stems from changes in the interest rate, causing consumers to pay an unforeseen additional amount in interest. This risk arises primarily in connection with mortgage and credit products. Credit risk is defined as the possibility that the investor does not receive his or her financial resources such as the principal or dividends in the manner agreed, for reasons such as bankruptcy of the provider or of the institution issuing the product.

Most risks are incorporated into the risk indicator. There are two important exceptions. The liquidity risk is not taken into account, because it is difficult to quantify in many cases. However, providers must provide qualitative information about this risk. The interest risk that consumers incur when they take out a mortgage or other loan is also disregarded. The term chosen for the interest is generally not an intrinsic product feature (particularly in the case of mortgages) and the risk indicator is intended to serve as an indicator of the risks attached to a product. It naturally remains important for consumers to be made aware of this risk in another fashion, since it is part of the overall picture that the consumer is to be presented.

2.2 Conditions

In developing the risk indicator, a number of important requirements had to be met:

- *Focus on consumer needs and perception of risk.* The most important condition was that the risk indicator had to provide for the consumer's needs and risk perception. This means, on the one hand, that the risk indicator should offer the information required and present it in a manner that is understandable and accessible.

On the other, it means that the consumer should interpret the risk information in the correct fashion.

- *A theoretically robust methodology.* In addition, the risk indicator had to be based on a calculation method that is theoretically tenable. This means, among other things, that the methodology should be robust in respect of the degree of distinctiveness of the resulting risk categories and the sensitivity of those categories to the assumptions. The methodology selected should also exclude the possibility of manipulation by providers, as well as being verifiable by the supervisory authority and professional parties.
- *Broad applicability.* The methodology must be such that it can be applied to the entire range of products requiring an FIL. At the same time, it should be ensured that the indicator does justice to product-specific features, e.g. in terms of duration and guarantees.
- *Consistency with the assumptions underlying the FIL system.* The risk indicator is part of the FIL system, and as such must be consistent with the rest of the information presented in the FIL. Inconsistencies might occur if, for example, the risk indicator was not based on the statutory assumptions for other parts of the FIL.
- *Restriction of administrative costs.* The design also had to take into account of the introduction costs and the ease of implementation for the market. Some of the considerations that had to be factored in include how simple the calculations, if any, are to be performed, whether the visualisation is practicable, and what is feasible within the existing system infrastructure and software. Another consideration was how this initiative related to developments in European regulations and other information obligations stemming from laws and regulations.

Conflicts

Obviously, conflicts exist between the various conditions. For example, a balance has to be found between the theoretically 'purest' approach to measuring risks and the consumer's needs: e.g. the problem of providing as accurate a portrayal as possible of the risks associated with a product while also stylising the information. It is unavoidable that relevant information is lost when information is stylised. However, stylisation and aggregation are necessary in order to ensure that the information is understandable and user-friendly. Another example is the consideration of whether or not to permit detailed comparison between products from the same product group, based on the risk indicator. This would call for a more detailed categorisation – differentiated according to investment strategy, for instance – and as such would result in a larger number of risk categories. However, consumer research reveals that this would have a negative impact on the accessibility of the indicator. Moreover, it would detract from the objective to also allow for simple cross-sector comparisons.

Naturally, it is also possible that a conflict will arise between the consumer's needs and the refinement of the methodology on the one hand, and the ambition to limit the administrative costs on the other.

In finding an acceptable compromise, the most important consideration was that the approach chosen must minimise the possibility of the risk indicator giving the consumer incorrect expectations about the financial risks attached to the product.

The consumer's needs and risk perception

Desirability of the risk indicator: The risk indicator must fulfil a need. Implicitly, this means that the indicator must either offer more information than the consumers possesses, or must present that information in a different and more accessible manner, or else both. Independent market research performed prior to the introduction of the FIL system in 2002 already showed that a clear conclusion could be drawn with respect to the desirability of a risk indicator: consumers attach a great deal of importance to a visual presentation of the risks attached to financial products. This was confirmed by more recent research carried out in 2005 in connection with the evaluation of the FIL system. Of the respondents, 63% indicated that they felt the risk indicator to be better than the qualitative descriptions of the financial risks used previously in FILs; only 13% stated a preference for the qualitative description.

Visualisation of the risk indicator: The graphic design of the risk indicator has been tested at length among consumers. These tests considered not only the ease of understanding and accessibility of various visual presentations, but also, and more importantly, how the consumers interpreted them. The tests showed, among other things, that a presentation of an illustration alone is not sufficient – i.e. it has to be accompanied by an explanation or interpretation – and that the number of categories should be limited in order to ensure accessibility.

Risk perception: On the subject of risk perception, the research revealed that consumers associate risk primarily with the possibility of losing some or all of their deposit. That is why most consumers do not wish to see a financial product with which they might lose some or all of their deposit qualified as being 'low risk', even if the possibility of such a loss is minute. As such, safe products are often associated with savings accounts. An important implication of this view of risk is that a risk indicator must also take the costs into account in a product's performance, since costs result in lower payments when the product is terminated. If the costs are higher than the yields realised over a particular period, this may also result in a loss of part of the deposit.

3 Method

Economic literature includes a number of definitions of risk, in quantitative terms. What most of those definitions have in common is that they consist of an element of possibility and an element of impact. Possibility here refers to the possibility of loss (what is the possibility that I will lose some or all of my money?). Impact refers to the size of that loss (how much will I lose?). Examples of quantitative methods for estimating risks include such measures as volatility, Value-at-Risk (VaR) and Expected Loss above VaR (ELVaR). These risk measures are explained below.

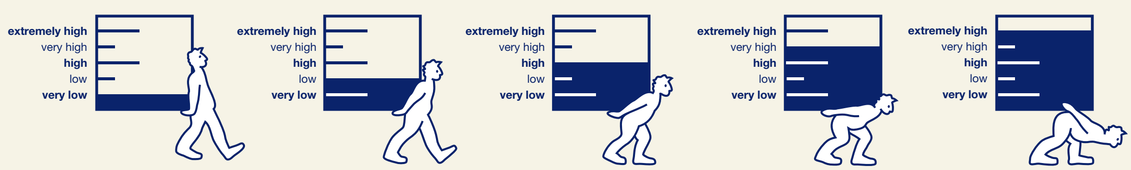
- *Volatility:* Volatility looks at the deviation from the expected yields. Volatility (standard deviation) can be used to determine a reliability interval, of which it can be stated that there is a possibility of p% that the actual yields will fall within the reliability interval. In many cases, p is set at 95%, giving a reliability interval of 95%. This measure of risk assumes a deviation from the mean that can be either negative or positive, and as such relates more to the predictability of the result than to a risk defined as a loss (which is only the case with a negative deviation from the mean).
- *Value at Risk:* The p% VaR is defined as the amount that might be lost with a p% possibility. As such, the VaR takes account of both the element of ‘possibility’ (the p% possibility that the investor incurs a loss) and the element of ‘impact’ (the amount that the investor might lose with a p% possibility). For example, if the 5% VaR is 100,000 euros, this means that in only 5% of the cases will the investor lose more than 100,000 euros. Or, to change this reasoning round, there is a 95% certainty that the maximum loss will be 100,000 euros. There are a number of limitations to the VaR system. For example, it only pertains to the amount that might be lost with a p% possibility, rather than the amount that might be lost with a maximum p% possibility. This means that it is possible for two products with very different risk profiles – for example a standard investment fund and a fund with capital protection– to nevertheless have almost identical VaRs. Another important shortcoming of the VaR is that it is not sub-additive, i.e. based on the VaR measure diversified portfolios are not necessarily less high-risk than non-diversified portfolios.
- *Expected loss above VaR:* The Expected Loss above VaR (ELVaR) is a measure that resolves those shortcomings. The ELVaR, sometimes referred to as the Conditional VaR, states the average loss for all scenarios in which that loss exceeds the VaR. This reflects specific product features, such as capital protection. Moreover, unlike the VaR, the ELVaR allows for sub-additivity.
- *GUISE:* The GUISE (*Gemiddelde Uitbetaling In geval van Slechte Eventualiteiten*, or ‘average payout in the case of unfavourable contingencies’), a risk measure developed by CentER, is derived from the ELVaR. The relationship between the two measures for risk is discussed in section 3.3.

Although the ELVaR (and the GUISE) is a pure risk measure from a technical point of view, this approach is not entirely consistent with the way consumers perceive risk. As noted previously, consumers primarily associate risk with the possibility of losing some or all of their deposit. It follows that the possibility of losing some or all of the deposit should be an important criterion in classifying the risk associated with a product.

That is why the new risk indicator is a combination of the GUISE and the level of guarantee. This brings together the best of both worlds: it uses a technically pure measure and it takes consumer perception into account. This chapter addresses the elements making up the risk indicator separately. Section 3.1 describes the risk indicator, Section 3.2 discusses the adjustment made for consumer perception, and Section 3.3 concerns the GUISE. Sections 3.4 and 3.5 then describe the parameters and periods to maturity to be used for determining the risk indicator.

3.1 Risk indicator

The risk indicator combines GUISE with the level of guarantee. There are five risk categories, ranging from ‘very low’ to ‘very high’. The risk indicator is represented graphically, showing a figure ‘carrying a heavier burden’ as the risk becomes higher. The illustration below shows the graphic risk indicators for the five risk categories.



Products that do not include guarantees are assigned to risk categories based on a distinction between growth products and debt products. The reason for this distinction is that consumers of debt products are not primarily interested in whether or not their deposit will be returned but instead in whether they can pay their debts at the end of the day. The GUISE is expressed as a percentage of the deposit or the debt. The table below can then be used to look up the category in which a particular product falls.

	Growth product	Debt product
Very low	Payment of deposit completely guaranteed	Repayment of debt fully guaranteed
Low	Payment of 80% or more of deposit guaranteed; *AND* GUISE percentage of 95% or greater	Repayment of 80% or more of debt *AND* GUISE percentage of 90% or greater
High	Less than 80% of deposit guaranteed; *AND* GUISE percentage of 90% or greater	Less than 80% of debt guaranteed; *AND* GUISE percentage of 80% or greater
Very high	GUISE percentage between 75% and 90%	GUISE percentage between 65% and 80%
Extremely high	GUISE percentage less than 75%	GUISE percentage less than 65%

The following examples serve to illustrate this categorisation.

Example 1

Product A invests in shares. There are no costs and no guarantee. The initial deposit is €1000 and the product has a term of 5 years. The GUISE for Product A after 5 years is €567. This means that after 5 years, in the 10% of worst cases, an average of €567 of the initial €1000 will be paid out. Product A has a GUISE percentage of €567/€1000 = 56.7%. Since no guarantee is offered, Product A falls in the 'extremely high' risk category.

Example 2

Product B also invests in shares, has no costs, and has a term of 5 years. The initial deposit is €1000. The product offers a guarantee for the full deposit (€1000). The GUISE for this product is €1000, since even in the worst case €1000 will be paid. The GUISE percentage is 100% with a fully guaranteed deposit, meaning that Product B falls in the 'very low' risk category.

3.2 Guarantee

Since consumers associate risk with the possibility of losing some or all of their deposit, they regard products that offer a full or partial guarantee as inherently less high-risk than products without guarantee. This has been taken into account in the design of the risk indicator. Only products that offer guarantees can be assigned to the 'very low' or 'low' risk categories. There are two levels of guarantee: full guarantee and a guarantee of 80% or greater. A distinction is also made between growth products and debt products in the determination of the level of guarantee.

Growth products

Growth products are all products for which an amount is deposited at the start or periodically, based on which an amount is paid out at the end of the term (or else amounts are periodically paid out). The level of guarantee for growth products is related to the deposit and can be one of two possibilities:

- full guarantee on the deposit: if €1000 is deposited (including initial costs) and €1000 is guaranteed, the product offers full guarantee and falls within the 'very low' risk category;
- 80% or more of the deposit is guaranteed: for some products, the net deposit is greater than the nominal value (for example in the case of an issue at 102%). In such cases, no full guarantee is given, although more than 80% of the deposit is guaranteed. As a result, such products are assigned to the 'low' risk category.

Debt products

Debt products are products under which a loan is taken out. Examples include mortgages, but also personal credit that is paid off using investments. The level of guarantee for debt products is related to amount of the debt, and can also be one of two possibilities:

- Full guarantee on the debt: a mortgage debt of €200,000 with a guarantee of €200,000 offers full guarantee, meaning that the product falls within the 'very low' risk category;
- 80% or more of the debt is guaranteed: a mortgage debt of €200,000 with a guarantee level of €180,000 offers a guarantee for 90% of the debt, meaning that the product falls within the 'low' risk category.

Guarantees may only be taken into consideration in determining the risk indicator if the institution issuing the guarantee is subject to capital sufficiency supervision[2], ensuring that the credit risk is implicitly taken into account.

3.3 GUISE: average payout in the case of unfavourable contingencies

As noted previously, GUISE stands for *Gemiddelde Uitbetaling In geval van Slechte Eventualiteiten* ('average payout in the case of unfavourable contingencies'). It represents the expected payment that a consumer receives if the prices of an investment develop unfavourably. In concrete terms, this means, 'What do you get from this product, on average, in the 10% of worst case scenarios?'

The assumption underlying the calculation of the GUISE is that yields from the product or the underlying value of the product (in the case of derivatives) are distributed normally[3]. The density function, as it is called, of the normal distribution has the familiar bell curve, as shown in the following illustration:

[2] These are all institutions to which the Dutch Central Bank has issued a licence under the Dutch Act on the Supervision of the Credit System (Wet toezicht kredietwezen) (Section 1(j) of the Further Regulations on Financial Services (Nadere Regeling financiële dienstverlening)).

[3] To be precise, the geometric yields are assumed to be distributed normally. As a result, the mathematical yields and prices are distributed log-normally.

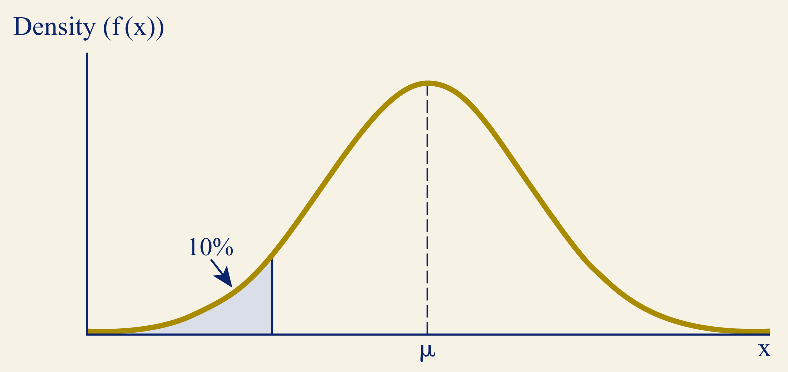


Figure 1 Density function of the normal distribution

The area under the graph equals 100%. The shaded area in Figure 1 corresponds to a 10% possibility. The GUISE for that area cannot be derived directly from this figure, but are based on the cumulative distribution function of the normal distribution shown in Figure 2.

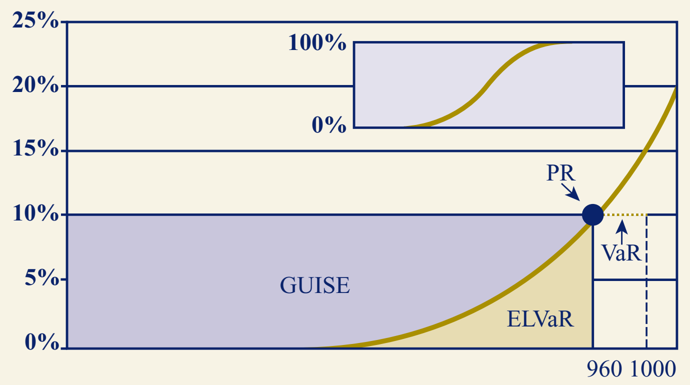


Figure 2 Cumulative distribution function, VaR, ELVaR and GUISE

The insert in Figure 2 shows the form of the cumulative normal distribution. The precise form depends on the parameters of the normal distribution. The possibility of an unfavourable outcome is in the left tail of the distribution, regardless of the precise measure of risk. As such, Figure 2 zooms in on that left tail. All risk measures described above, with the exception of volatility, are shown in Figure 2.

The ‘old’ format for FILs required that a pessimistic yield (PR) be included, i.e. the yield corresponding to the amount for which there is a 10% possibility of payment. For example, in Figure 2, there is a 10% possibility that €960 will be paid out. If the product has a one-year term, the corresponding pessimistic yield is -4%. This is the yield that was shown in the old-format FILs. There is a close correlation between the PR and the VaR measure, which shows the amount for which there is a 10% possibility of loss and is therefore the same as the deposit less the pay-out corresponding to the pessimistic yield. In the example given above, the VaR is €1000 - €960 = €40.

The GUISE represents the average payment that will be made with a possibility of no more than 10%, and is determined by the area above the graph (Figure 2). This measure is linked to the ELVaR, which represents the loss that will be incurred with a possibility of no more than 10% and corresponds to the area below the cumulative distribution function. The sum of the GUISE and the ELVaR matches the pessimistic yield (deposit less the Value-at-Risk). The GUISE was chosen for the new FIL format because an indication of the pay-out in the case of unfavourable contingencies corresponds more closely to consumers' risk perception than the amount that might be lost.

An important reason for using the GUISE (instead of the pessimistic yield or VaR) is that it takes the full tail of the distribution into consideration, rather than simply one point on that distribution. In this respect, it takes specific product features into account, such as guarantees and capital protective constructions. This is shown in Figure 3.

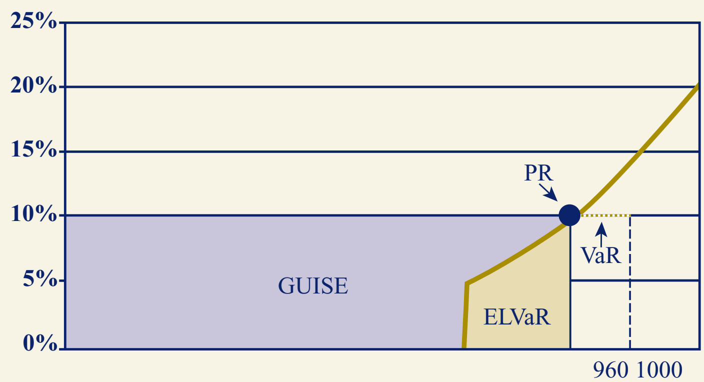


Figure 3 The advantage of the GUISE

The distribution in the figure corresponds to a product with a guarantee for part of the deposit. The risk associated with such a guaranteed product is unlike that associated with products that do not offer guarantees (such as the product shown in Figure 2). The pessimistic yield and the VaR are not expressed. The GUISE (and the ELVaR) take those factors explicitly into account.

3.4 Parameters

The principal parameters for calculating the GUISE are the expected yield and the volatility of that yield. Those parameters[4] are different for each type of investment: the expected yield from investments in shares, and the corresponding volatility, will be higher than is the case with bonds. The parameters that are to be used for calculating the GUISE are laid down in the Further Regulations on Financial Services (*Nadere Regeling Financiële Dienstverlening* – NRfd). There are a total of six investment categories, which are shown in the table below with the corresponding expected yields and volatilities.

	Return	Volatility	Volatility including currency risk
Deposit	3.7%	0.6%	10.4%
Bonds	4.2%	4.4%	11.3%
Property	6.7%	11.8%	15.7%
Mix fund	6.2%	12.9%	16.6%
Shares	8.3%	25.5%	27.5%
Emerging Markets	8.3%	30.5%	32.2%

Table 1 Return and volatility per investment category

There are only six investment categories, which is a simplification of reality. A more detailed breakdown into investment categories might more closely reflect the diversity of investment strategies or the skills of individual fund managers. However, an important reason for a more general division into investment categories was the possibility to compare products (see objectives and conditions). If a fund has sufficient history, it may use its historic yields and volatility. Depending on the fund's term of existence, the following situations are possible:

1. The fund has existed for less than four years: the fund's own history may not be used, but instead the prescribed yields and volatilities must be applied.
2. The fund has existed for 20 years or more: the fund's own history must be used.
3. The fund has existed for four years or more, but less than 20 years: the fund's history must be used for the historic yields for the years that the fund has existed, with the prescribed yields being used for the remaining years. The volatility must be based on the fund's history, without any additional data.

[4] The parameters were determined by Tilburg University. The method is based on the returns and volatilities provided by Dimson, Marsh & Staunton (Triumph of the optimists: 101 Years of Global Investment Returns, Princeton University Press) with additional relevant series of indexes. For a detailed description of this method, please refer to Appendix 1.

This can be represented using the following formula:

μ	=	μFB	if the fund has existed for less than 4 years
	=	μFB * (20-i)/20 + μF*i/20	if the fund has existed for 4-19 years
	=	μF	if the fund has existed for 20 years or more
σ	=	σFB	if the fund has existed for less than 4 years
	=	σF	if the fund has existed for 4 years or more

in which:

μFB, σFB are the standard parameters as used in the FIL system, *and*

μF is the average fund yield, *and*

σF is the standard deviation of the fund yield.

$$\mu_F = \frac{12}{n} * \sum_{j=1}^{n} r_j$$, and

$$\sigma_F = \sqrt{12} * \sqrt{\sum_{j=1}^{n} \frac{(r_j - \mu_F)^2}{n-1}}$$ in which

(6)

r_j rj = the monthly return in history month j, and

n: = 48, i.e. the number of months of history (4 years * 12 months)

If scenario (2) or (3) applies, the fund parameters must be determined as follows:

The historic yields and historic volatility are calculated differently from one another. Calculating the historic yields requires a long history and is based on a 20-year period. The degree of volatility varies greatly. Using an extended period would assume the degree of volatility to be constant. Using a short period for calculating the degree of volatility would result in a great deal of statistical uncertainty. By way of a compromise, a 4-year timeframe has been chosen for calculating the degree of volatility.

3.5 Terms

If a product has a fixed contractual term, the GUISE can be calculated for that term. If it does not, a prescribed term must be used, which varies per product. The term is unrelated to the 20-year timeframe used for determining the fund's history, which is used solely to generate a reliable estimate of average yield and volatility. Risk indicators must be given not only for the full term, but also for in the case of premature termination. The NRfd also contains statutory terms for that situation.

3.6 'Everyman'

The Financial Information Leaflet format uses the concept of Everyman. This means that the risk indicator (and the rest of the FIL) is based on a series of prescribed assumptions and is not geared to the profile of the individual consumer. Everyman is a 35-year-old non-smoking male. The reason for using this concept is that studies show that consumers wish to have a FIL at an early stage in the buying process. The personalised FIL used until 1 October 2006 was generally drawn up at the same time as the quote or contract documentation. At this stage in the buying process their choice is generally already made, making it too late for the FIL to serve as an orientation document in that process.

There are financial products with flexible attributes. For example, a consumer may have the freedom to choose from a selection of investment funds. Because the FIL is meant as an orientation document, and the individual selection is not known in the orientation stage, the provider must draw up a FIL using the product characteristics that are most representative for this particular provider and product. The NRgfo gives more detailed guidance on how to deal with this situation.

4. Method for calculating the GUISE

As described above, the GUISE provides the answer to the question, ‘What does this product yield on average in the 10% of least favourable contingencies?’ which it does by examining the area above the cumulative distribution function. To calculate the GUISE precisely, the integral over the quantile of the normal distribution must be calculated, which proves difficult in many cases. Various methods can be used to determine the GUISE without having to calculate the integral, which vary in numerical accuracy and complexity. For example:

1. The GUISE can be determined using Monte Carlo simulation, whereby a large number of scenarios from the yields distribution of the underlying value or values are generated, after which the GUISE is determined by taking the average value of the financial product in those scenarios.
2. The GUISE can be determined by determining the value of the financial product for a large value of N for pessimistic scenarios occurring with possibilities of 10/N%, 20/N%, … , 10% and taking the average of the results.
3. The GUISE can be determined by taking the weighted average value of the financial product in the pessimistic scenarios occurring with possibilities of 10%, 5% and 1%.

Using the method of simulation for determining the GUISE corresponds most closely to the definition. If the number of projected scenarios is large enough, this approach approximates the precise value of the GUISE in each construction. However, this method requires some programming, and as a result it is not the simplest of the three possibilities to implement. The use of the second method can best be illustrated by an example. Product A is an investment fund investing in a diversified share portfolio without currency risk.

	0.5%	1%	1.5%	….	8.5%	9%	9.5%	10%	Approximation of the GUISE
Product A	657	714	753	….	984	994	1004	1014	885

The table shows the values for N = 20 that result in the possibility of even lower values, of 0.5%, 1.0%, 1.5%, 2.0%, …, to 10%. These values can be obtained directly from the assumption specified previously that the annual geometric returns are independently normally distributed. The GUISE after 5 years for Product A is the unweighted average of the 20 values calculated in this fashion. This average is an accurate approximation of the GUISE. The third way to approximate the GUISE is even simpler to implement. Merely determining the consequences of unfavourable scenarios occurring with 1%, 5% and 10% possibilities generally provides a way to obtain an accurate approximation of the GUISE by taking the weighted average of those three values. Figure 4 reveals that the value of the GUISE can be approximated closely using the following formula:

$$GUISE = 0.3125 \cdot x_{0.01} + 0.4375 \cdot x_{0.05} + 0.2500 \cdot x_{0.10}$$

where
$x_{0,01}$ is the value of the 1% possibility scenario (1% quantile)
$x_{0,05}$ is the value of the 5% possibility scenario (5% quantile)
$x_{0,10}$ is the value of the 10% possibility scenario (10% quantile)

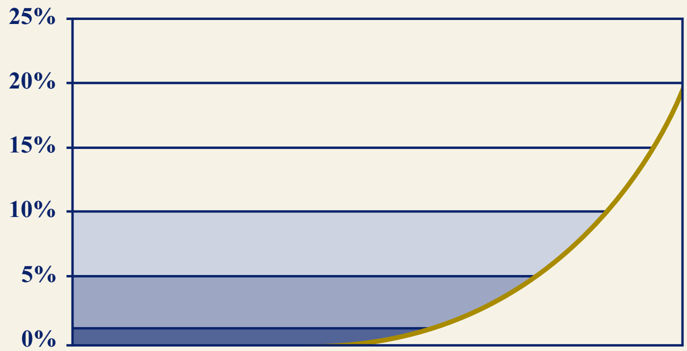


Figure 4 Approximation of the GUISE

In Figure 4, this three-point approximation of the GUISE is shown graphically. The combined trapeziums have an area that is a close approximation of the actual GUISE. The weights of 0.3125, 0.4375 and 0.25 stem directly from the calculation of the area of the trapeziums. This three-point approximation is by far the simplest to use and represents the least burden for financial institutions. As such, this approach is adopted wherever possible. In the few instances in which this three-point approach cannot be used to calculate the GUISE, simulation techniques can be applied.

The choice of whether to use the three-point approach or simulation depends on two dimensions: the periodicity of the deposit and the linearity of the product.

- *Periodicity:* With some products, a single sum is deposited upon commencement (e.g. single-premium life insurance), while other products require amounts to be deposited every year or every month (such as regular-premium investment insurance). The moment and frequency of the deposit affects the accrual of capital and as such the payment in unfavourable scenarios. As a result, the method of calculating the GUISE for products with one-off deposits differs from the method used for products with periodic deposits.

- *Linearity:* The second dimension, the product's linearity, also affects the manner in which the GUISE is calculated. Products are defined as being linear if the geometric yield of the product is described accurately with a normal distribution. This implies that linear products are products without derivates. If a product is invested partially in options, for example, no payments will be made unless the option is in the money. This cannot be described using a normal distribution. The GUISE for products with derivatives cannot be calculated in the same way as the GUISE for products without derivatives.

Based on these two dimensions, products can be divided into four categories. For each of these categories the GUISE must be calculated using a different method.

1. Single deposit, linear product
2. Single deposit, non-linear product
3. Periodic deposits, linear product
4. Periodic deposits, non-linear product.

The GUISE for linear products can be calculated using a mathematical approximation. Different approaches have to be used for products with single deposits and product with periodic deposits. Non-linear products (i.e. all products that use one or more derivatives) have to be simulated. The only exception to this rule concerns guaranteed products, with a guarantee on the date of maturity whose value is refunded to the consumer in the case of premature termination.

The calculation methods used for each of these four categories are described below. The GUISE for the first three categories of products can also be calculated using the Risk Indicator Application with which the AFM has provided the market[5]. The calculation methods presented below are the same as those used in that application, and as such will yield identical results. The application cannot be used to calculate the GUISE for non-linear products with periodic deposits, the principal reason being that there is a great diversity in non-linear products, making them less suitable for a standardised application.

GUISEs for growth and debt products are calculated in the same way. The difference between these types of products is expressed in the way in which the GUISE is 'translated' to the risk indicator.

[5] *This application can be downloaded from the AFM website (www.afm.nl/consumer).*

4.1 Linear products with a single deposit

Examples of linear products with a single deposit include investments in investment funds, single-premium investment insurance and annuities that commence immediately, if those products only invest in the six investment categories set out in Table 1. If they also invest in derivates (such as options), the product falls into the category of non-linear products with a single deposit. What all these products have in common is that single deposits are made, that capital is accrued through investments and that capital is built up at the end of the term. The ways in which that capital is paid out vary: some products provide single payments, while others pay out monthly or annually. The manner of payment at the end of the term does not affect the GUISE, which is based on the capital accrued at the end of the term, regardless of the way in which that capital is paid out.

With linear products with a single deposit, the GUISE is simple to calculate. The value of the payments with possibilities of 1%, 5% and 10% can be determined for any given year with a single calculation, after which Formula (1) can be used to calculate the GUISE in the manner presented below:

$$x_{0.01} = (I - IK) \cdot e^{\left(H \cdot \left(\mu + \log(1-dk) + \frac{z_{0,01} \cdot \sigma}{\sqrt{H}}\right)\right)} \cdot (1 - UK)$$

$$x_{0.05} = (I - IK) \cdot e^{\left(H \cdot \left(\mu + \log(1-dk) + \frac{z_{0,05} \cdot \sigma}{\sqrt{H}}\right)\right)} \cdot (1 - UK)$$

$$x_{0.10} = (I - IK) \cdot e^{\left(H \cdot \left(\mu + \log(1-dk) + \frac{z_{0,10} \cdot \sigma}{\sqrt{H}}\right)\right)} \cdot (1 - UK)$$

In which

I = deposit

H = number of years to maturity

μ = expected yield

σ = volatility

dk = recurring costs (percentage)

UK = withdrawal charge (percentage)

IK = entry charge (absolute amount)

$z_{0.01}$ = 1% quantile of the standard normal distribution

$z_{0.05}$ = 5% quantile of the standard normal distribution

$z_{0.10}$ = 10% quantile of the standard normal distribution

Example 3

Product A requires a single deposit of €1000 and has no associated currency risk. The entry charge is €20 and 1% is withheld every year for recurring costs. The product invests wholly in shares and offers an average mathematical yield of 8.3% and a volatility of 25.5%, as shown in Table X on page X. The product has a term of 20 years. The GUISE for Year 20 is calculated as follows:

$$x_{0,01} = (1000-20)\cdot e^{20\cdot\left(0{,}083+\log(1-0{,}01)+\frac{z_{0,01}\cdot 0{,}255}{\sqrt{20}}\right)}\cdot(1-0) = 333$$

$$x_{0,05} = (1000-20)\cdot e^{20\cdot\left(0{,}083+\log(1-0{,}01)+\frac{z_{0,05}\cdot 0{,}255}{\sqrt{20}}\right)}\cdot(1-0) = 646$$

$$x_{0,10} = (1000-20)\cdot e^{20\cdot\left(0{,}083+\log(1-0{,}01)+\frac{z_{0,10}\cdot 0{,}255}{\sqrt{20}}\right)}\cdot(1-0) = 977$$

$$GUISE = 0.3125\cdot x_{0.01} + 0.4375\cdot x_{0.05} + 0.2500\cdot x_{0.10} = 631$$

In the case of premature termination, only the factor H changes in the formula, and the GUISE for Year 10 is:

$$x_{0,01} = (1000-20)\cdot e^{10\cdot\left(0{,}083+\log(1-0{,}01)+\frac{z_{0,01}\cdot 0{,}255}{\sqrt{10}}\right)}\cdot(1-0) = 312$$

$$x_{0,05} = (1000-20)\cdot e^{10\cdot\left(0{,}083+\log(1-0{,}01)+\frac{z_{0,05}\cdot 0{,}255}{\sqrt{10}}\right)}\cdot(1-0) = 539$$

$$x_{0,10} = (1000-20)\cdot e^{10\cdot\left(0{,}083+\log(1-0{,}01)+\frac{z_{0,10}\cdot 0{,}255}{\sqrt{10}}\right)}\cdot(1-0) = 723$$

$$GUISE = 0.3125\cdot x_{0.01} + 0.4375\cdot x_{0.05} + 0.2500\cdot x_{0.10} = 514$$

Using this method, the GUISE can be calculated for any given year (for the end of the term and upon premature termination). Whether the GUISE for a product is calculated at the end of the term or in the case of premature termination does not matter. Figure 5 shows the Guise for Example 3 from Year 1 to Year 20. A pattern is clearly visible in the figure: after dropping for several years, the GUISE rises once more. The precise shape of the figure depends chiefly on the volatility of the underlying value. As the volatility increases, the number of years for which the GUISE drops will increase, after which the GUISE will rise less rapidly. The GUISE for deposits is the only type that does not drop first, but immediately rises above the amount of the deposit. The GUISE for share products (as in Figure 5) will not rise above the deposit during the maximum period of 30 years stipulated in the regulations.

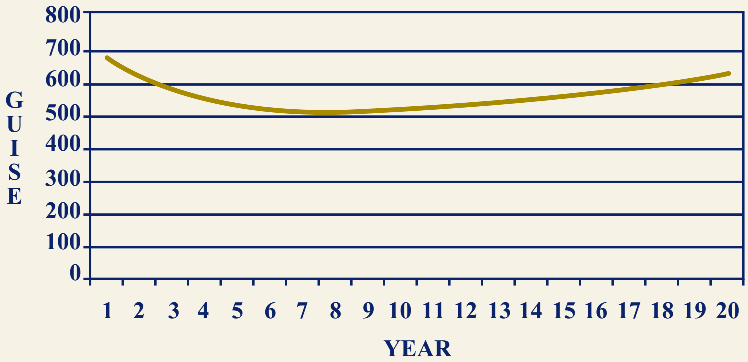


Figure 5 GUISE pattern for linear products with single deposits

Table 1a in Annex 4 to the Further Regulations on the Market Conduct Supervision of Financial Enterprises (Nadere Regeling gedragstoezicht financiële ondernemingen – Nrgfo) sets out the GUISE for linear products with single deposits in all investment categories. The table is also included in Appendix 2. The GUISEs in the table have been calculated in the manner described above for products to which no costs are attached. Consequently, institutions must make adjustments for the costs of their products. One-off costs charged at the end of the product's term can be deducted directly from the GUISE. To incorporate recurring charges in the calculation of the GUISE, the GUISE must first be translated into a pessimistic yield, after which the recurring costs can be deducted from that pessimistic yield as a percentage of the capital accrued, after which the GUISE can be recalculated. The following formula can be used for translating the GUISE into the pessimistic yield:

$$PR = \left(\frac{GUISE}{I}\right)^{\frac{1}{n}} - 1$$

in which

PR = pessimistic yield

N = term

I = deposit

Table 1b in the NRgfo shows the pessimistic yields associated with the GUISEs from Table 1a. That table and the formula for the pessimistic yield shown above are added as clarification. If formula 2 is used for calculating the GUISE, the pessimistic yield need neither be calculated nor used. Formulas 1 and 2 result in identical GUISEs.

[6] *This table corresponds to Table 5a of the NRfd. The NRfd is replaced by the Nrgfo on 1 January 2007.*

4.2 Non-linear products with single deposits

Products such as investment funds, single-premium investment insurance and annuities commencing directly can also belong to the category of non-linear products with single deposits, if they invest not only in one or more investment categories but also in derivatives (such as options). An example of such a product is a 'click' fund which protects a certain level of the investment. Guaranteed products in which the deposit is guaranteed, for instance, are also examples of non-linear products with single deposits.

A mathematical approach to the GUISE cannot be used for all these products. The mathematical approach can only be used for products that guarantee a fixed amount upon maturity, which amount is determined when the product is purchased, e.g. an investment fund that guarantees the deposit. There is no simple method for calculating the GUISE for products whose guaranteed value is determined during the term (such as click funds) and that therefore depends on the investment's value. Monte Carlo simulation is the solution for such situations.

For products that guarantee a fixed amount upon maturity, the calculation of the GUISE should distinguish the GUISE at the end of the term and the GUISE for premature termination. The values $x_{0.01}$, $x_{0.05}$ and $x_{0.10}$ are calculated differently in those two scenarios. The GUISE can be determined using Formula 1.

GUISE upon maturity

The values $x_{0.01}$, $x_{0.05}$ and $x_{0.10}$ can never be less than the guaranteed value. They are calculated by taking the maximum of the guaranteed value and their value disregarding the guarantee.

$$x_{0.01}(Guarantee) = \max\left(GW, (I - IK) \cdot e^{\left(H \cdot \left(\mu + \log(1-dk) + \frac{z_{0.01} \cdot \sigma}{\sqrt{H}}\right)\right)} \cdot (1 - UK)\right)$$

$$x_{0.05}(Guarantee) = \max\left(GW, (I - IK) \cdot e^{\left(H \cdot \left(\mu + \log(1-dk) + \frac{z_{0.05} \cdot \sigma}{\sqrt{H}}\right)\right)} \cdot (1 - UK)\right)$$

$$x_{0.10}(Guarantee) = \max\left(GW, (I - IK) \cdot e^{\left(H \cdot \left(\mu + \log(1-dk) + \frac{z_{0.10} \cdot \sigma}{\sqrt{H}}\right)\right)} \cdot (1 - UK)\right)$$

In which

I = deposit

H = number of years to maturity

μ = expected yield

σ = volatility

dk = recurring costs (percentage)
UK = withdrawal charge (percentage)
IK = entry charge (absolute amount)
$z_{0.01}$ = 1% quantile of the standard normal distribution
$z_{0.05}$ = 5% quantile of the standard normal distribution
$z_{0.10}$ = 10% quantile of the standard normal distribution
GW = amount guaranteed to be paid, from which any costs and charges have already been deducted.

The NRfd does not include a table showing this GUISE, since the guaranteed value may differ for every product.

GUISE upon premature termination

Calculating the GUISE upon premature termination requires an assumption to be made about the value of the guarantee before maturity: with guaranteed products, a put option is purchased when the term commences, from which the guarantee can be paid. In the case of premature termination, the value of that option is paid to the investor. If the value of the option is not paid to the investor, the GUISE upon premature termination can be determined using Formula 2.

This means that the GUISE for guaranteed products upon premature termination consists of two components: one for the value of the investment and one for the value of the guarantee. Formula (3) shows both these components:

$$x_{0.01} = \left((I - IK) \cdot e^{\left(H \cdot \left(\mu + \log(1 - dk) + \frac{z_{0.01}\sigma}{\sqrt{H}} \right) \right)} + NP \cdot P_{0,01} \right) \cdot (1 - UK)$$

$$x_{0.05} = \left((I - IK) \cdot e^{\left(H \cdot \left(\mu + \log(1 - dk) + \frac{z_{0.01}\sigma}{\sqrt{H}} \right) \right)} + NP \cdot P_{0,05} \right) \cdot (1 - UK)$$

$$x_{0.10} = \left((I - IK) \cdot e^{\left(H \cdot \left(\mu + \log(1 - dk) + \frac{z_{0.01}\sigma}{\sqrt{H}} \right) \right)} + NP \cdot P_{0,10} \right) \cdot (1 - UK)$$

in which
I = deposit
IK = entry charge (absolute amount)
H = number of years from commencement
μ = expected yield
σ = standard deviation (volatility)
dk = recurring costs (percentage)
z_j = value of the standard normal distribution for point j (j = 1%, 5%, 10% point)

UK = withdrawal charge (percentage)

NP = number of puts

P_j = value of the put option

The first component is identical to the calculation of the GUISE for products without guarantees. The second component determines the value of the guarantee. That value can be calculated for any given moment using the formula of Black & Scholes,[7] which is as follows:

$$P_j = X \cdot e^{-r \cdot T} - S_j + S_j \cdot N\left(\frac{\log\left(\frac{S_j}{X}\right) + \left(r + 0{,}5 \cdot \sigma^2\right) \cdot T}{\sigma\sqrt{T}}\right) - X \cdot e^{-r \cdot T} \cdot N\left(\frac{\log\left(\frac{S_j}{X}\right) + \left(r - 0{,}5 \cdot \sigma^2\right) \cdot T}{\sigma\sqrt{T}}\right)$$

in which

r = risk-free interest rate

T = number of years to maturity

s = standard deviation (volatility)

S_j = value of the investment in quantile j (j = 1%, 5%, 10%)

X = exercise price.

The value of the investment in each of the quantiles is calculated as follows:

$$S_{0,01} = \left(I - IK\right) \cdot e^{H \cdot \mu + z_{0,01} \cdot \sigma \cdot \sqrt{H}}$$

$$S_{0,05} = \left(I - IK\right) \cdot e^{H \cdot \mu + z_{0,05} \cdot \sigma \cdot \sqrt{H}}$$

$$S_{0,10} = \left(I - IK\right) \cdot e^{H \cdot \mu + z_{0,10} \cdot \sigma \cdot \sqrt{H}}$$

in which

H = number of years from commencement

μ = expected yield

σ = standard deviation (volatility)

I = deposit

IK = entry charge

z_j = value of the standard normal distribution for point j (j=1%, 5%, 10%).

[7] *The formula of Black & Scholes is a method used for valuing options, and is described in Hull and other places, J.C., Options, Futures and other Derivatives, Prentice-Hall International, 2000.*

It is important to note that the recurring costs must be accounted for in the exercise price.

$$X = GW \cdot e^{-1 \cdot looptijd \cdot \log(1-dk)}$$

GW = guaranteed value
looptijd = term of the product
dk = recurring costs (percentage)

Since there are costs and charges, it is not necessary to purchase a full option. If there are no recurring costs, a full option will be purchased.

$$NP = e^{looptijd \cdot \log(1-dk)}$$

NP = number of put options that has to be bought

Example 4

Product B requires a single deposit of €1000. The entry charge is €20 and recurring costs of 1% are withheld annually. The product is invested entirely in shares, offering an average geometric yield of 8.3% and a volatility of 25.5%. The product has a term of 20 years. At the end of those 20 years, the deposit is guaranteed. The GUISE for Year 20 is calculated as follows:

$$GUISE_B = \max(GUISE_A, Guaranteed.value) = \max(631{,}1000) = 1000$$

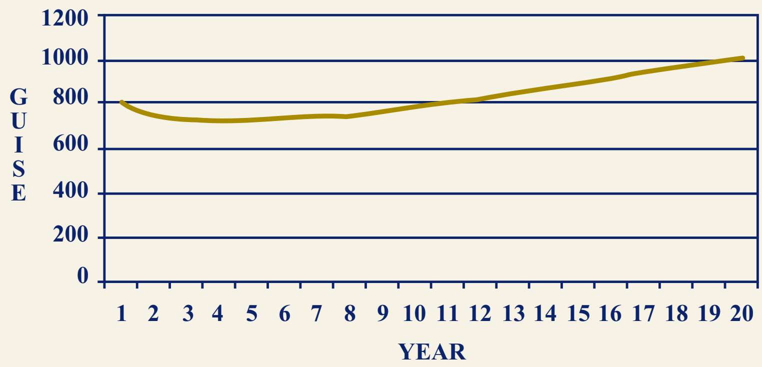
The guaranteed value is €1000, while the GUISE for the same product without guarantee is identical to the GUISE for Product A (€631). The GUISE for Product B is then the maximum of these two values, viz. €1000.

If the product is terminated prematurely, the value of the guarantee has to be calculated, in which case the GUISE calculation is as follows:

>>

$$GUISE_B = \left(GUISE_A + NP \cdot P\right) \cdot \left(1 - UK\right)$$
$$NP = e^{20 \cdot \ln(1-0{,}01)} = 0{,}818$$
$$X = 1000 \cdot e^{-20 \cdot \ln(1-0{,}01)} = 1223$$
$$S_{0,01} = (100-20) \cdot e^{10 \cdot 0{,}083 + z_{0,01} \cdot 0{,}255 \cdot \sqrt{10}} = 344$$
$$S_{0,05} = (100-20) \cdot e^{10 \cdot 0{,}083 + z_{0,05} \cdot 0{,}255 \cdot \sqrt{10}} = 597$$
$$S_{0,10} = (100-20) \cdot e^{10 \cdot 0{,}083 + z_{0,10} \cdot 0{,}255 \cdot \sqrt{10}} = 800$$
$$P_{0,01} = 1223 \cdot e^{-0{,}049 \cdot 10} - 344 + 344 \cdot N\left(\frac{\ln\left(\frac{344}{1223}\right) + \left(0{,}049 + 0{,}5 \cdot 0{,}255^2\right) \cdot 10}{0{,}255 \cdot \sqrt{10}}\right)$$
$$-1223 \cdot e^{-0{,}049 \cdot 10} \cdot N\left(\frac{\ln\left(\frac{344}{1223}\right) + \left(0{,}049 - 0{,}5 \cdot 0{,}255^2\right) \cdot 10}{0{,}255 \cdot \sqrt{10}}\right) = 441$$
$$P_{0,05} = 1223 \cdot e^{-0{,}049 \cdot 10} - 597 + 597 \cdot N\left(\frac{\ln\left(\frac{597}{1223}\right) + \left(0{,}049 + 0{,}5 \cdot 0{,}255^2\right) \cdot 10}{0{,}255 \cdot \sqrt{10}}\right)$$
$$-1223 \cdot e^{-0{,}049 \cdot 10} \cdot N\left(\frac{\ln\left(\frac{597}{1223}\right) + \left(0{,}049 - 0{,}5 \cdot 0{,}255^2\right) \cdot 10}{0{,}255 \cdot \sqrt{10}}\right) = 296$$
$$P_{0,10} = 1223 \cdot e^{-0{,}049 \cdot 10} - 800 + 800 \cdot N\left(\frac{\ln\left(\frac{800}{1223}\right) + \left(0{,}049 + 0{,}5 \cdot 0{,}255^2\right) \cdot 10}{0{,}255 \cdot \sqrt{10}}\right)$$
$$-1223 \cdot e^{-0{,}049 \cdot 10} \cdot N\left(\frac{\ln\left(\frac{800}{1223}\right) + \left(0{,}049 - 0{,}5 \cdot 0{,}255^2\right) \cdot 10}{0{,}255 \cdot \sqrt{10}}\right) = 219$$
$$x_{0,01} = 312 + 0{,}818 \cdot 441 = 672$$
$$x_{0,05} = 539 + 0{,}818 \cdot 296 = 781$$
$$x_{0,10} = 723 + 0{,}818 \cdot 219 = 392$$
$$GUISE = 0.3125 \cdot x_{0.01} + 0.4375 \cdot x_{0.05} + 0.2500 \cdot x_{0.10} = 778$$

The GUISE upon premature termination depends on the guaranteed value and on the risk-free interest rate. No table is included for this GUISE in the NRgfo, since the guaranteed value may be different for each product. The figure below shows how the GUISE for the product described in Example 4 develops. Although this GUISE follows the same pattern as the GUISE for linear products with single deposits, the payments are higher and the payment in the final year is at least the same as the guarantee.



The GUISE for non-linear products with single deposits, in which the non-linear component consists of a guarantee on the maturity date is calculated using the Risk Indicator Application provided by the AFM.

4.3 Linear products with periodic deposits

Examples of linear products with periodic deposits include annuities that do not commence directly (i.e. are deferred) and investment mortgages. Here, too, any investments in options in these products will result in a non-linear product with periodic deposits. Products with periodic deposits require monthly or annual payments. This means that the development of the yields from the capital is less than if the full amount is deposited at the start, since yields are realised on the amount of capital deposited. The amount that is not deposited until the end of the term in a periodic deposit product has less time to grow. As a result of this characteristic, the GUISE must be calculated in a different manner than the GUISE for products with single deposits.

Two calculation methods can be used: simulation and a mathematical approximation. The mathematical approximation gives a conservative estimate of the GUISE.

The approximation is based on a calculation including payment if the yield in each year is deemed to be the same as a pessimistic yield (i.e. the same as a quantile of the annual yield) rather than on a calculation of quantiles of the amount paid out.

The movements in the value during a particular year are calculated in the same fashion as the movements in the value of products with single deposits. However, the term is divided into steps in order to take account of the fact that the full amount is not deposited at the start, but in a series of instalments, creating an ‘effective term’.

Unlike with products with single deposits, the GUISE for products with periodic payments cannot be calculated in a single step. The following iterative process must be followed for each year for which the GUISE is to be calculated:

$$EL(year) = \frac{\sum_{t=1}^{year} I_t \cdot (year + 1 - t)}{\sum_{t=1}^{year} I_t}$$

$$x_i(0) = 0$$

$$x_i(1) = (x_i(0) + I - IK) \cdot e^{\mu + \log(1-dk) + \frac{z_{0,01} \cdot \sigma}{\sqrt{EL(year)}}}$$

$$\vdots$$

$$x_i(year-1) = (x_i(year-2) + I - IK) \cdot e^{\mu + \log(1-dk) + \frac{z_{0,01} \cdot \sigma}{\sqrt{EL(year)}}}$$

$$x_i(year) = (x_i(year-1) + I - IK) \cdot e^{\mu + \log(1-dk) + \frac{z_{0,01} \cdot \sigma}{\sqrt{EL(year)}}}$$

EL = effective term

I_{year} = deposit per year

Year = year for which the GUISE is calculated, from Year 1 until maturity.

Although the process is iterative, the GUISE for Year t cannot be calculated based on the GUISE for Year t-1. The reason for this is the effective term, which will be different for a term of t years than it is for a term of t-1 years.

Example:

Product C requires periodic deposits of €100 per month (€1200 per year). The entry charge is €20 and recurring costs are withheld at a rate of 1% per year. The product is invested entirely in shares, offering an average geometric yield on those investments of 8.3% with a volatility of 25.5%. The product has a term of 20 years.

$$EL(20) = \frac{20 \cdot 1200 + 19 \cdot 1200 + ... + 2 \cdot 1200 + 1 \cdot 1200}{20 \cdot 1200} = 10{,}5$$

$$x_{0,01}(0) = 0$$

$$x_{0,01}(1) = (1200 - 20) \cdot e^{0{,}083 + \ln(1-0{,}01) + \frac{z_{0,01} \cdot 0.255}{\sqrt{10{,}5}}} = 1057$$

$$\vdots$$

$$x_{0,01}(19) = (8740 + 1200 - 20) \cdot e^{0{,}083 + \ln(1-0{,}01) + \frac{z_{0,01} \cdot 0.255}{\sqrt{10{,}5}}} = 8885$$

$$x_{0,01}(20) = (8885 + 1200 - 20) \cdot e^{0{,}083 + \ln(1-0{,}01) + \frac{z_{0,01} \cdot 0.255}{\sqrt{10{,}5}}} = 9016$$

$$x_{0,05}(20) = 13744$$

$$x_{0,10}(20) = 17835$$

$$GUISE = 0.3125 \cdot x_{0.01} + 0.4375 \cdot x_{0.05} + 0.2500 \cdot x_{0.10} = 13289$$

In the case of premature termination after 10 years, the GUISE is:

$$EL(10) = \frac{10 \cdot 1200 + 9 \cdot 1200 + ... + 2 \cdot 1200 + 1 \cdot 1200}{10 \cdot 1200} = 5{,}5$$

$$x_{0{,}01}(0) = 0$$

$$x_{0{,}01}(1) = (1200 - 20) \cdot e^{0{,}083 + \ln(1-0{,}01) + \frac{z_{0{,}01} \cdot 0.255}{\sqrt{5{,}5}}} = 986$$

$$\vdots$$

$$x_{0{,}01}(9) = (4566 + 1200 - 20) \cdot e^{0{,}083 + \ln(1-0{,}01) + \frac{z_{0{,}01} \cdot 0.255}{\sqrt{5{,}5}}} = 4799$$

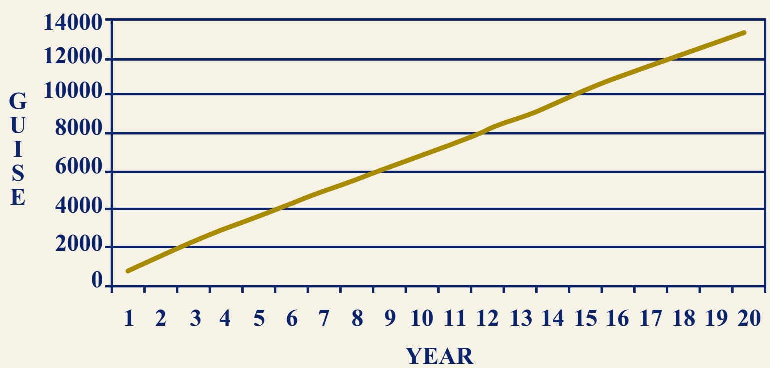
$$x_{0{,}01}(10) = (4799 + 1200 - 20) \cdot e^{0{,}083 + \ln(1-0{,}01) + \frac{z_{0{,}01} \cdot 0.255}{\sqrt{5{,}5}}} = 4994$$

$$x_{0{,}05}(20) = 6900$$

$$x_{0{,}10}(20) = 8340$$

$$GUISE = 0.3125 \cdot x_{0.01} + 0.4375 \cdot x_{0.05} + 0.2500 \cdot x_{0.10} = 6664$$

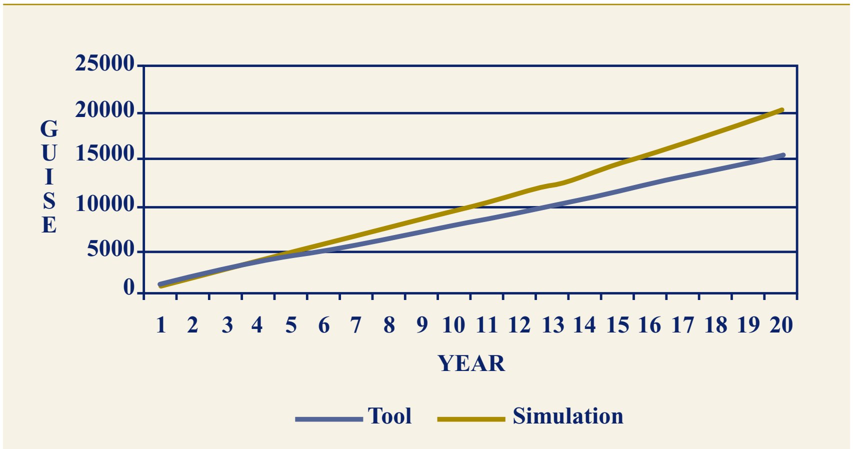
The GUISE will develop as follows over the course of the 20 years:



The development of the GUISE follows a different pattern than that of the GUISE for products with single deposits. This is caused by the fact that new amounts are deposited each year on top of the accrual of capital.

The GUISE for products with periodic deposits of €1200 per year (€100 per month) and no costs or charges is shown in Table 2a in Annex 4 to the NRgfo.[8] That table shows different values for the GUISE than those calculated using the formulas above. The reason for these differences is that the values in Table 2a were generated using simulation. The figure below shows the differences that the separate calculation methods produce in the GUISE, using a 20-year linear product with periodic deposits without costs or charges.

[8] *Table 5b in the NRfd.*



Upon commencement, the GUISE is more or less the same for both calculations, whereas there is a substantial difference at the end of the term. The GUISE calculated using simulation is more accurate than the GUISE generated using approximation.

4.4 Non-linear products with periodic deposits

Any products such as deferred annuities and investment mortgages that utilise options are classified as non-linear products with periodic deposits. The GUISE for these products cannot be calculated using an approximation. The periodicity of the deposits also means that that method is impossible for products that only offer guarantees upon maturity.

The solution is to use Monte Carlo simulation, which involves a large number of price developments being simulated. For each of those paths, the amount that would be paid to the investor is then determined. The GUISE is determined by sorting the payments and taking the average of the 10% of least favourable scenarios.

Using Monte Carlo simulation sometimes requires a great deal of theoretical information. It is important to note that the structure of the Financial Information (and the Risk Indicator) negate the necessity to generate simulations that are accurate to decimal fractions. This removes the need to apply any techniques that might improve the simulation.

Appendix 1: Method for estimating parameters

The system for Financial Information Leaflets distinguishes between six investment categories (deposits, bonds, property, mix, shares, emerging markets). The applicable regulations stipulate an average yield and volatility to be used for each of these six investment categories. The parameters (the expected yield and the volatility) stipulated in the regulations (as set out in Table 1) were redefined in 2005 . The method used for redefining each investment category is described below.

Deposits

There are no standard series with the returns on deposit investments. However, there are series for short-term interest rates (e.g. the three-month interest rate). Since history includes extended periods of high and low interest rates, the most recent information is not combined with older data as it is in Dimson et al. (2001). Specifically, the following algorithm is used:

1. Determine the Netherlands 3-month interbank offered rate in mathematical form based on the daily frequency.
2. Calculate the average return on deposits as the average annual interest rate for the past four years.
3. Calculate the standard deviation of the daily movements in the 3-month interbank offered rate.

Calculate the standard deviation of an investment in deposits as the standard deviation of rollover investments of four quarters at the 3-month rate using the formula:

$$\sigma = 29{,}6987 \cdot \sigma_{daily\ movement}$$

Bonds and shares

The average yields prescribed are a combination of the yields given by Dimson, Marsh & Staunton (2001) for the 1900-2000 period and more recent return information. Dimson et al. report the following results for the 1900-2000 period:

	Shares in the Netherlands
Average	9.0%
Average deposit interest	3.7%
Volatility	22.7%

[9] *The analysis for this process was carried out by CentER Applied Research*

This information is supplemented using returns over the 2000-2004 period using the following algorithm:

1. Calculate the geometric yield for the 2000-2004 period based on the daily frequency:
   - Bonds: yield on bond portfolios with terms of 5-7 years
   - Shares: broad share index of Dutch shares
2. Reduce each of the geometric yields by $1/252^{th}$ of the geometric Netherlands 3-month interbank offered rate as it applied for each day.
3. Calculate the risk premium over the 2000-2004 period as the average of the yields calculated in step 2 above the risk-free investment.
4. Multiply that premium by 252, the result being the annual premium.
5. Combine that average with the premium based on Dimson et al. by calculating the weighted average of the two, using weight factors 4 and 100.
6. Add the premium resulting from step 5 to the average yield on deposits as calculated below.

The volatilities are based on daily yields over the past four years, using the following algorithm:

1. Calculate geometric returns over the 2000-2004 period based on daily frequencies.
2. Calculate the volatility over the 2000-2004 period as the standard deviation of the yields calculated in step 1, multiplied by $\sqrt{252}=15.8745$

Property

The prescribed yields are based on geometric yields of an index in Datastream with reinvested rental income and available from 1973 to the present on a daily frequency. Volatilities are calculated over the years from 2000 to 20004, based on the method outlined above.

Mix funds

Average yields and volatilities are based on a portfolio of which 50% is invested in bonds and 50% in shares. In concrete terms, this means that the prescribed average yield is determined by taking the mathematical average of the average returns on bonds and shares. As professional literature shows that the correlation between returns on shares and returns on bonds is very minor, that correlation is disregarded for the purposes of determining the volatility of mix funds. The volatility of mix funds is calculated as follows:

$$\sigma_{mix} = \sqrt{\frac{1}{4}\sigma^2_{bonds} + \frac{1}{4}\sigma^2_{shares}}$$

Emerging markets

Few reliable long-term yield series are available emerging markets. In accordance with the financial theory that states that holding under-diversified portfolios results in a higher volatility, but not in a higher average yield, the average yield from emerging markets is equated to that of shares, as calculated above. Volatility is determined using a standard volatility mark-up of 5% in comparison to shares. This mark-up corresponds to the volatility of various emerging markets as reported in professional literature.[10]

Currency risk

Professional literature shows that, assuming that currency fluctuations do not correlate to yields from local investments, the total volatility follows as being. The volatility of currency fluctuations is based on the volatility of USD/EUR fluctuations, using the same period as for calculating the volatility of shares. The USD/EUR currency returns are also calculated in geometrically.

$$\sqrt{(volatility.of\,.product)^2 + (volatility.of\,.currency)^2}$$

[9] *See for example De Roon, Nijman, Werker (2001), 'Testing for MV-Spanning with Short Sales Constraints and Transaction Costs: The Case of Emerging Markets', Journal of Finance, 56, 723-744*

Appendix 2: GUISE and pessimistic return tables

Table 1a	GUISE per asset category with one-off deposit of €100											
	No exchange rate risk						*Exchange rate risk*					
Category:	Deposit	Bonds	Real Estat	Mixfund	Stocks	Emerging	Deposit	Bonds	Real Estat	Mixfund	Stocks	Emerging
Expected return	3.7%	4.2%	6.7%	6.2%	8.3%	8.3%	3.7%	4.2%	6.7%	6.2%	8.3%	8.3%
Stdev. Return	0.6%	4.4%	11.8%	12.9%	25.5%	30.5%	10.4%	11.3%	15.7%	16.6%	27.5%	32.2%
Term (years)												
1	1027	965	869	848	696	639	864	855	812	795	672	620
2	1061	975	853	822	631	559	832	822	775	751	601	537
3	1097	992	855	815	597	516	815	805	761	729	563	491
4	1135	1013	865	817	578	488	806	797	757	719	540	461
5	1175	1038	882	824	567	471	801	793	759	715	526	442
6	1217	1064	903	837	563	459	800	794	767	717	519	428
7	1260	1094	928	852	562	452	802	797	778	721	515	420
8	1305	1125	956	871	566	448	805	802	792	729	515	414
9	1352	1157	988	892	572	447	810	809	809	739	518	411
10	1400	1192	1022	916	580	448	817	818	829	751	523	411
11	1450	1229	1059	942	591	451	825	828	851	766	530	412
12	1503	1267	1100	971	604	456	833	839	875	782	539	414
13	1557	1307	1143	1001	618	462	843	852	901	800	550	418
14	1613	1349	1189	1034	635	469	854	865	930	819	562	424
15	1672	1393	1239	1069	653	478	866	880	960	841	576	431
16	1733	1438	1291	1107	674	488	879	895	993	863	592	438
17	1796	1486	1347	1146	696	500	892	912	1028	888	609	447
18	1861	1536	1407	1188	720	513	906	930	1066	914	628	457
19	1929	1587	1470	1233	745	527	922	948	1106	942	648	469
20	1999	1641	1537	1280	773	542	937	968	1148	972	670	481
21	2072	1697	1607	1330	803	558	954	988	1192	1003	694	494
22	2148	1756	1682	1382	835	576	971	1010	1240	1036	719	508
23	2226	1816	1762	1437	869	595	989	1032	1290	1071	746	524
24	2307	1879	1846	1496	906	616	1008	1055	1343	1108	775	541
25	2392	1945	1935	1557	945	637	1028	1080	1399	1146	806	558
26	2479	2013	2028	1622	986	661	1048	1105	1458	1187	839	577
27	2570	2084	2128	1690	1030	685	1069	1132	1520	1230	875	598
28	2664	2158	2233	1762	1077	712	1091	1159	1586	1275	912	619
29	2762	2234	2344	1837	1127	740	1114	1187	1656	1323	952	642
30	2863	2314	2461	1916	1180	770	1138	1217	1729	1373	994	667

Table 1b	revenue per year for GUISE-scenario per asset category with one-off deposit											
	No exchange rate risk						*Exchange rate risk*					
Category:	Deposit	Bonds	Real Estat	Mixfund	Stocks	Emerging	Deposit	Bonds	Real Estat	Mixfund	Stocks	Emerging
Expected return	3.7%	4.2%	6.7%	6.2%	8.3%	8.3%	3.7%	4.2%	6.7%	6.2%	8.3%	8.3%
Stdev. Return	0.6%	4.4%	11.8%	12.9%	25.5%	30.5%	10.4%	11.3%	15.7%	16.6%	27.5%	32.2%
Term (years)												
1	2.68%	-3.50%	-13.10%	-15.18%	-30.40%	-36.14%	-13.57%	-14.50%	-18.81%	-20.47%	-32.76%	-37.98%
2	2.99%	-1.27%	-7.62%	-9.32%	-20.58%	-25.22%	-8.80%	-9.35%	-11.94%	-13.34%	-22.47%	-26.74%
3	3.14%	-0.27%	-5.09%	-6.60%	-15.80%	-19.81%	-6.59%	-6.97%	-8.72%	-9.98%	-17.43%	-21.13%
4	3.22%	0.33%	-3.55%	-4.94%	-12.82%	-16.40%	-5.26%	-5.52%	-6.74%	-7.91%	-14.27%	-17.58%
5	3.28%	0.74%	-2.48%	-3.79%	-10.72%	-13.99%	-4.33%	-4.52%	-5.36%	-6.48%	-12.05%	-15.07%
6	3.32%	1.05%	-1.69%	-2.93%	-9.14%	-12.17%	-3.65%	-3.78%	-4.33%	-5.40%	-10.37%	-13.17%
7	3.35%	1.29%	-1.06%	-2.26%	-7.89%	-10.73%	-3.11%	-3.19%	-3.53%	-4.56%	-9.04%	-11.67%
8	3.38%	1.48%	-0.56%	-1.71%	-6.88%	-9.55%	-2.67%	-2.72%	-2.87%	-3.87%	-7.96%	-10.43%
9	3.40%	1.64%	-0.14%	-1.26%	-6.03%	-8.56%	-2.31%	-2.33%	-2.32%	-3.30%	-7.05%	-9.40%
10	3.42%	1.77%	0.22%	-0.87%	-5.30%	-7.72%	-2.00%	-1.99%	-1.86%	-2.82%	-6.28%	-8.52%
11	3.44%	1.89%	0.53%	-0.54%	-4.67%	-6.99%	-1.74%	-1.70%	-1.46%	-2.40%	-5.61%	-7.75%
12	3.45%	1.99%	0.80%	-0.25%	-4.12%	-6.34%	-1.51%	-1.45%	-1.11%	-2.03%	-5.02%	-7.08%
13	3.46%	2.08%	1.03%	0.01%	-3.63%	-5.77%	-1.30%	-1.23%	-0.80%	-1.70%	-4.50%	-6.48%
14	3.48%	2.16%	1.25%	0.24%	-3.19%	-5.26%	-1.12%	-1.03%	-0.52%	-1.41%	-4.03%	-5.95%
15	3.49%	2.23%	1.44%	0.45%	-2.80%	-4.80%	-0.95%	-0.85%	-0.27%	-1.15%	-3.61%	-5.46%
16	3.49%	2.30%	1.61%	0.64%	-2.44%	-4.38%	-0.80%	-0.69%	-0.04%	-0.91%	-3.22%	-5.02%
17	3.50%	2.36%	1.77%	0.81%	-2.11%	-4.00%	-0.67%	-0.54%	0.16%	-0.70%	-2.87%	-4.62%
18	3.51%	2.41%	1.91%	0.96%	-1.81%	-3.64%	-0.54%	-0.40%	0.35%	-0.50%	-2.55%	-4.25%
19	3.52%	2.46%	2.05%	1.11%	-1.53%	-3.32%	-0.43%	-0.28%	0.53%	-0.31%	-2.26%	-3.91%
20	3.52%	2.51%	2.17%	1.24%	-1.28%	-3.02%	-0.32%	-0.16%	0.69%	-0.14%	-1.98%	-3.60%
21	3.53%	2.55%	2.29%	1.37%	-1.04%	-2.74%	-0.22%	-0.06%	0.84%	0.01%	-1.73%	-3.30%
22	3.54%	2.59%	2.39%	1.48%	-0.82%	-2.48%	-0.13%	0.04%	0.98%	0.16%	-1.49%	-3.03%
23	3.54%	2.63%	2.49%	1.59%	-0.61%	-2.23%	-0.05%	0.14%	1.11%	0.30%	-1.26%	-2.77%
24	3.55%	2.66%	2.59%	1.69%	-0.41%	-2.00%	0.03%	0.23%	1.24%	0.43%	-1.05%	-2.53%
25	3.55%	2.70%	2.67%	1.79%	-0.23%	-1.79%	0.11%	0.31%	1.35%	0.55%	-0.86%	-2.30%
26	3.55%	2.73%	2.76%	1.88%	-0.05%	-1.58%	0.18%	0.39%	1.46%	0.66%	-0.67%	-2.09%
27	3.56%	2.76%	2.84%	1.96%	0.11%	-1.39%	0.25%	0.46%	1.56%	0.77%	-0.50%	-1.89%
28	3.56%	2.78%	2.91%	2.04%	0.27%	-1.21%	0.31%	0.53%	1.66%	0.87%	-0.33%	-1.70%
29	3.57%	2.81%	2.98%	2.12%	0.41%	-1.03%	0.37%	0.59%	1.75%	0.97%	-0.17%	-1.51%
30	3.57%	2.84%	3.05%	2.19%	0.55%	-0.87%	0.43%	0.66%	1.84%	1.06%	-0.02%	-1.34%

Table 2a GUISE per asset category with monthly deposit of €100

	No exchange rate risk						Exchange rate risk					
Category:	Deposit	Bonds	Real Estate	Mixfund	Stocks	Emerging	Deposit	Bonds	Real Estate	Mixfund	Stocks	Emerging
Expected return	3.7%	4.2%	6.7%	6.2%	8.3%	8.3%	3.7%	4.2%	6.7%	6.2%	8.3%	8.3%
Stdev. Return	0.6%	4.4%	11.8%	12.9%	25.5%	30.5%	10.4%	11.3%	15.7%	16.6%	27.5%	32.2%
Term (years)												
1	1216	1171	1097	1082	961	915	1096	1088	1053	1041	942	899
2	2473	2349	2166	2122	1822	1706	2143	2127	2050	2014	1774	1669
3	3772	3550	3241	3157	2648	2449	3173	3148	3034	2966	2566	2386
4	5116	4778	4334	4199	3458	3167	4195	4163	4019	3912	3337	3076
5	6508	6038	5453	5258	4265	3872	5216	5179	5014	4860	4102	3751
6	7950	7332	6604	6338	5078	4574	6241	6201	6027	5817	4868	4420
7	9443	8663	7792	7444	5902	5279	7272	7232	7061	6788	5640	5088
8	10989	10034	9022	8580	6741	5990	8312	8274	8122	7778	6425	5762
9	12592	11447	10297	9750	7600	6712	9363	9330	9211	8787	7226	6444
10	14251	12903	11622	10956	8482	7446	10427	10403	10334	9820	8044	7135
11	15971	14407	12999	12201	9389	8196	11505	11492	11493	10880	8883	7841
12	17754	15958	14433	13489	10326	8965	12598	12601	12690	11967	9748	8562
13	19600	17561	15929	14822	11294	9755	13709	13731	13930	13087	10639	9302
14	21514	19216	17489	16204	12298	10569	14837	14882	15214	14239	11561	10062
15	23498	20927	19119	17638	13341	11409	15985	16058	16547	15428	12515	10844
16	25553	22696	20821	19125	14423	12275	17152	17257	17930	16654	13503	11651
17	27684	24523	22601	20671	15549	13172	18342	18483	19367	17920	14528	12483
18	29892	26414	24462	22276	16722	14098	19553	19735	20862	19229	15595	13342
19	32180	28369	26411	23945	17942	15059	20786	21015	22414	20581	16701	14232
20	34553	30393	28455	25685	19217	16057	22046	22327	24035	21981	17854	15154
21	37012	32487	30593	27494	20550	17095	23332	23671	25723	23435	19056	16111
22	39561	34654	32835	29378	21943	18174	24643	25046	27482	24939	20311	17106
23	42203	36897	35187	31343	23400	19297	25981	26455	29317	26500	21621	18137
24	44943	39220	37655	33392	24925	20466	27350	27900	31233	28120	22987	19212
25	47782	41625	40246	35527	26523	21684	28747	29381	33232	29799	24418	20329
26	50726	44115	42964	37756	28197	22954	30174	30899	35320	31543	25911	21491
27	53777	46693	45818	40079	29950	24278	31632	32456	37499	33354	27476	22701
28	56941	49364	48815	42506	31791	25661	33123	34054	39780	35234	29111	23963
29	60220	52131	51964	45036	33722	27104	34648	35695	42160	37191	30825	25279
30	63621	54998	55275	47683	35751	28615	36208	37378	44653	39225	32622	26652

Table 2b Revenue per month for GUISE-scenario per asset category with periodic deposits

	No exchange rate risk						Exchange rate risk					
Category:	Deposit	Bonds	Real Estate	Mixfund	Stocks	Emerging	Deposit	Bonds	Real Estate	Mixfund	Stocks	Emerging
Expected return	3.7%	4.2%	6.7%	6.2%	8.3%	8.3%	3.7%	4.2%	6.7%	6.2%	8.3%	8.3%
Stdev. Return	0.6%	4.4%	11.8%	12.9%	25.5%	30.5%	10.4%	11.3%	15.7%	16.6%	27.5%	32.2%
Term (years)												
1	0.24%	-0.45%	-1.65%	-1.90%	-4.14%	-5.09%	-1.66%	-1.80%	-2.41%	-2.63%	-4.53%	-5.43%
2	0.26%	-0.19%	-0.91%	-1.09%	-2.50%	-3.13%	-1.00%	-1.07%	-1.40%	-1.56%	-2.75%	-3.34%
3	0.26%	-0.08%	-0.61%	-0.77%	-1.84%	-2.35%	-0.74%	-0.78%	-1.00%	-1.14%	-2.04%	-2.52%
4	0.27%	-0.02%	-0.44%	-0.58%	-1.47%	-1.90%	-0.59%	-0.62%	-0.78%	-0.90%	-1.65%	-2.05%
5	0.27%	0.02%	-0.33%	-0.46%	-1.23%	-1.60%	-0.49%	-0.51%	-0.63%	-0.74%	-1.38%	-1.73%
6	0.27%	0.05%	-0.25%	-0.37%	-1.04%	-1.39%	-0.41%	-0.43%	-0.52%	-0.62%	-1.18%	-1.50%
7	0.28%	0.07%	-0.18%	-0.30%	-0.90%	-1.22%	-0.36%	-0.37%	-0.43%	-0.53%	-1.03%	-1.32%
8	0.28%	0.09%	-0.13%	-0.24%	-0.79%	-1.08%	-0.31%	-0.32%	-0.36%	-0.46%	-0.91%	-1.18%
9	0.28%	0.11%	-0.09%	-0.19%	-0.70%	-0.97%	-0.27%	-0.28%	-0.31%	-0.40%	-0.81%	-1.06%
10	0.28%	0.12%	-0.05%	-0.16%	-0.62%	-0.88%	-0.24%	-0.25%	-0.26%	-0.35%	-0.72%	-0.96%
11	0.28%	0.13%	-0.02%	-0.12%	-0.55%	-0.79%	-0.21%	-0.22%	-0.22%	-0.30%	-0.65%	-0.88%
12	0.28%	0.14%	0.00%	-0.09%	-0.49%	-0.72%	-0.19%	-0.19%	-0.18%	-0.27%	-0.59%	-0.80%
13	0.28%	0.15%	0.03%	-0.07%	-0.44%	-0.66%	-0.17%	-0.17%	-0.15%	-0.23%	-0.53%	-0.73%
14	0.29%	0.16%	0.05%	-0.04%	-0.39%	-0.60%	-0.15%	-0.15%	-0.12%	-0.20%	-0.48%	-0.68%
15	0.29%	0.16%	0.07%	-0.02%	-0.35%	-0.55%	-0.14%	-0.13%	-0.10%	-0.18%	-0.43%	-0.62%
16	0.29%	0.17%	0.08%	0.00%	-0.32%	-0.51%	-0.12%	-0.11%	-0.07%	-0.15%	-0.39%	-0.57%
17	0.29%	0.18%	0.10%	0.01%	-0.28%	-0.47%	-0.11%	-0.10%	-0.05%	-0.13%	-0.36%	-0.53%
18	0.29%	0.18%	0.11%	0.03%	-0.25%	-0.43%	-0.09%	-0.09%	-0.03%	-0.11%	-0.32%	-0.49%
19	0.29%	0.19%	0.13%	0.04%	-0.22%	-0.39%	-0.08%	-0.07%	-0.02%	-0.09%	-0.29%	-0.45%
20	0.29%	0.19%	0.14%	0.06%	-0.19%	-0.36%	-0.07%	-0.06%	0.00%	-0.07%	-0.26%	-0.42%
21	0.29%	0.19%	0.15%	0.07%	-0.17%	-0.33%	-0.06%	-0.05%	0.02%	-0.06%	-0.23%	-0.39%
22	0.29%	0.20%	0.16%	0.08%	-0.15%	-0.30%	-0.05%	-0.04%	0.03%	-0.04%	-0.21%	-0.36%
23	0.29%	0.20%	0.17%	0.09%	-0.12%	-0.28%	-0.04%	-0.03%	0.04%	-0.03%	-0.19%	-0.33%
24	0.29%	0.21%	0.18%	0.10%	-0.10%	-0.25%	-0.04%	-0.02%	0.06%	-0.02%	-0.16%	-0.30%
25	0.29%	0.21%	0.19%	0.11%	-0.08%	-0.23%	-0.03%	-0.01%	0.07%	0.00%	-0.14%	-0.28%
26	0.29%	0.21%	0.20%	0.12%	-0.07%	-0.21%	-0.02%	-0.01%	0.08%	0.01%	-0.12%	-0.26%
27	0.29%	0.21%	0.20%	0.13%	-0.05%	-0.19%	-0.01%	0.00%	0.09%	0.02%	-0.11%	-0.23%
28	0.29%	0.22%	0.21%	0.14%	-0.03%	-0.17%	-0.01%	0.01%	0.10%	0.03%	-0.09%	-0.21%
29	0.29%	0.22%	0.22%	0.14%	-0.02%	-0.15%	0.00%	0.01%	0.11%	0.04%	-0.07%	-0.20%
30	0.29%	0.22%	0.22%	0.15%	0.00%	-0.13%	0.00%	0.02%	0.12%	0.05%	-0.06%	-0.18%

Autoriteit
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