PRIIP-KID: Providing Retail Investors with Inappropriate Product Information?

Life: AFIR/ERM IACA

- Stefan Graf

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About the speaker

Institut für Finanz- und Aktuarwissenschaften (ifa)

- ifa is an independent actuarial consulting firm.
- Our consulting services in all lines of insurance business include:
  - typical actuarial tasks and actuarial modelling
  - insurance product development
  - risk management, Solvency II, asset liability management
  - data analytics
  - market entries (cross-border business, setup of new insurance companies, Fintechs)
  - professional education
  - academic research on actuarial topics of practical relevance
- located in Ulm, Germany
- currently about 30 consultants
- academic cooperation with the University of Ulm (offering the largest actuarial program in Germany)

Dr. Stefan Graf

- joined ifa in 2008
- qualified actuary (German Association of Actuaries DAV, 2013)
- member of the DAV working group "consumer protection"
- Master of Science (Mathematics and Management, University of Ulm, 2008)
- Ph.D. (University of Ulm, 2013)
- lecturer at the European Actuarial Academy EAA

Agenda

What is a PRIIP-KID?

VEV: Calculation recipe (and for regular premium payments?)

Methodology and inconsistencies of performance scenarios

Conclusion

References

What is a PRIIP-KID?

Introduction

Starting point: Regulation (EU) No 1286/2014 (European Commission, 2014)

- […] on **k**ey **i**nformation **d**ocuments for **p**ackaged **r**etail and **i**nsurance-based **i**nvestment **p**roducts
- Recital (1)
  - PRIIPs can be complex and difficult to understand.
  - Existing disclosures for such PRIIPs are uncoordinated and often do not help retail investors to compare different products, or understand their features.

  ➔ Consequently, retail investors have often made investments without understanding the associated risks and costs and have, on occasion, suffered unforeseen losses.
- Recital (2): The regulation's objectives are [among others] improving transparency by uniform rules on transparency for all providers of PRIIPs.

Actual requirements: Commission delegated regulation (EU) 2017/653 (European Commission, 2017)

- Regulatory technical standards (RTS) specify the content of the KID.
  - For insurance-based investment products, a KID has to be provided assuming single and regular premium payments.
- (actuarial) content: risk indicator, performance potential, disclosure of charges (not considered here)

What is a PRIIP-KID?

Summary risk indicator and performance scenarios

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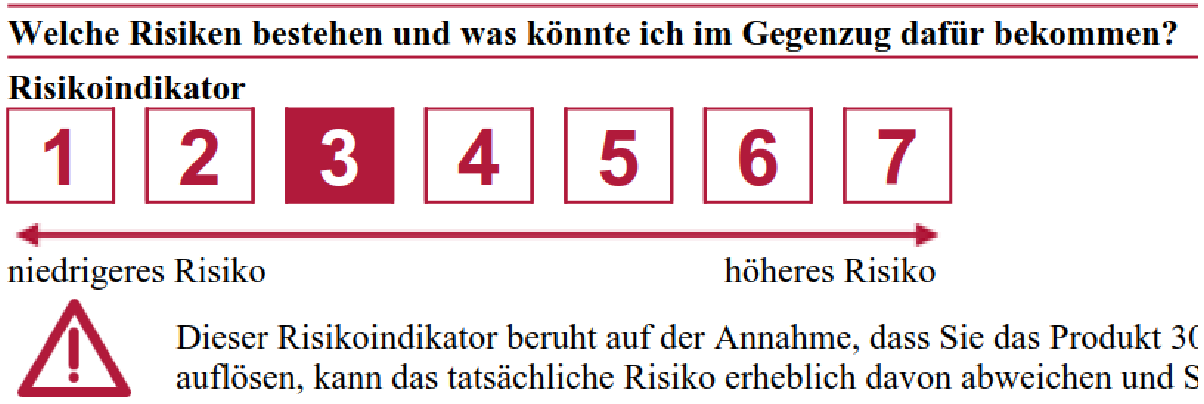
Summary risk indicator: Numeric indicator between 1 and 7

Combination of

- a market risk measure (MRM) indicating the product's "riskiness"
  - MRM is based on a so-called "Value-at-Risk-equivalent volatility" (VEV) derived from the product's 97.5th-Value-at-Risk
    - For different categories of PRIIPs, different calculation methodologies to obtain the respective Value-at-Risk apply.
- a credit risk measure indicating the product provider's creditworthiness (not addressed here)

An example from the German insurance market

- unit-linked product without guarantee
- assuming some underlying investment fund



*)

- yields a summary risk indicator of 3

*) source: ALTE LEIPZIGER Leben

What is a PRIIP-KID?

Summary risk indicator and performance scenarios

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Performance potential by means of so-called "performance scenarios"

- Assuming some stochastic approach, the product's potential benefit payments are disclosed for
  - a "stress scenario",
  - an unfavorable,
  - a moderate and
  - a favorable scenario.
- For different categories of PRIIPs, different calculation methodologies to obtain the performance scenarios apply.

An example from the German insurance market

- previous example continued
- yields the following performance scenarios

Anlage 10.000 EUR Versicherungsprämie 0,00 [illegible] **Szenarien**	**1 Jahr**	**15 Jahre**	**30 Jahre (Empfohlene Haltedauer)**
Erlebensfall-Szenarien			
stress scenario	**8.725 EUR** -12,75 %	**3.470 EUR** -6,81 %	**1.022 EUR** -7,32 %
unfavorable	**9.316 EUR** -6,84 %	**7.560 EUR** -1,85 %	**5.925 EUR** -1,73 %
moderate	**9.594 EUR** -4,06 %	**11.994 EUR** 1,22 %	**15.379 EUR** 1,45 %
favorable	**9.892 EUR** -1,08 %	**19.107 EUR** 4,41 %	**39.571 EUR** 4,69 %

*)

- *) source: ALTE LEIPZIGER Leben

The paper *"PRIIP-KID: Providing Retail Investors with Inappropriate Product Information?"* addresses calculation issues of the VEV (especially) for regular premium payments and methodological issues of the performance scenarios.

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VEV: Calculation recipe (and for regular premium payments?)

Calculation recipe: Possible reasoning and research issue

Calculation recipe

- Following European Commission (2017) for a maturity of T years , VEV is derived as

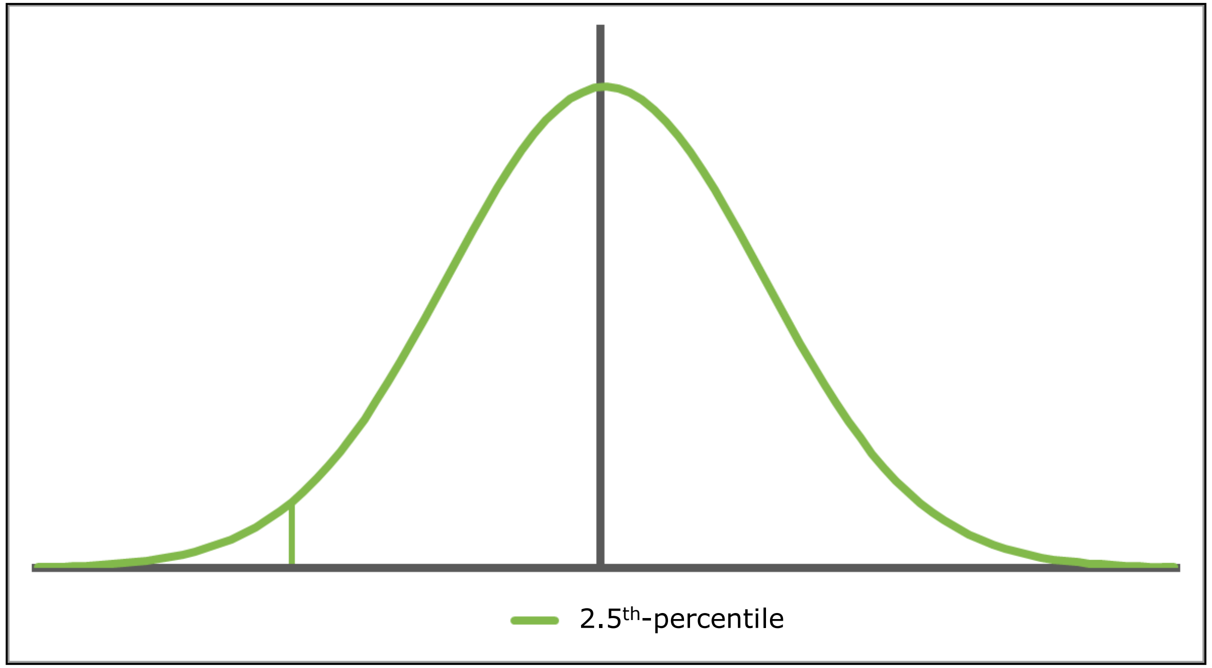
$$VEV = \frac{\sqrt{3.842 - 2 \cdot VaR_{ReturnSpace}} - 1.96}{\sqrt{T}}$$

  - $VaR_{ReturnSpace}$ is the log-return corresponding to the 2.5th-percentile of the product's probability distribution of maturity benefits.

Possible reasoning

- Assuming a single premium payment and a Black-Scholes model
  - equipped with drift $\mu = 0$ and volatility $\sigma = VEV$,
  - yields the same 2.5th-percentile as the pre-computed $VaR_{Returnspace}$
- Hence, the term Value-at-Risk-equivalent volatility.

Graphical illustration



➔ Research issue

- If above formulae is derived for a single premium payment, does it (or a potentially modified version) deliver appropriate results for regular premium payments?

VEV: Calculation recipe (and for regular premium payments?)

Regular premium payments: Qualitative requirement and numerical study

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VEV: (Potential) qualitative requirement for regular premium payments

- Determination of VEV such that assuming regular premium payments and a Black-Scholes model
  - equipped with drift $\mu = 0$ and volatility $\sigma = VEV$
  - yields the same 2.5th-percentile as the pre-computed 2.5th-percentile of the considered product

➔ Issues:
  - No closed form solution of the 2.5th-percentile for regular premium payments exists.
  - Therefore, (likely) no closed form solution for the corresponding VEV exists.

Approach: Based on Monte-Carlo-Simulation

- estimate the 2.5th-percentile for regular premium payments and different maturities $T = 1,2, \dots, 40$
  - assuming a Black-Scholes-model with drift $\mu = 0$ and volatility σ for different $\sigma = 0, 0.5\%, \dots, 30\%$
- try to re-engineer σ from the estimated percentile, i.e. try to compute the VEV
  - apply different methodologies for re-engineering σ from the estimated percentile.

VEV: Calculation recipe (and for regular premium payments?)

Regular premium payments: Approach 1

Approach 1: (Heuristic) Extension of the formula by European Commission (2017)

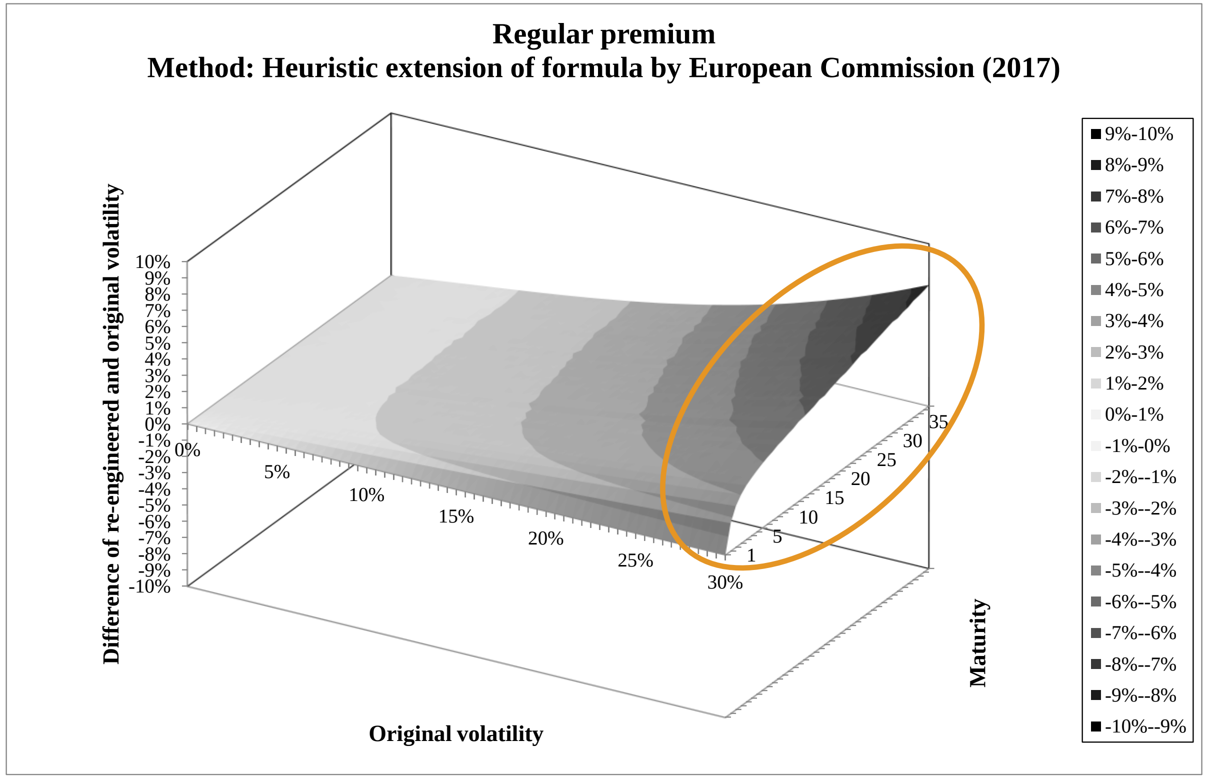
- Recall $VEV = \frac{\sqrt{3.842-2\cdot VaR_{ReturnSpace}}-1.96}{\sqrt{T}}$
  – Set $VaR_{ReturnSpace} = r \cdot T$ assuming an average annual return r
- r can also be calculated for regular premium payments.

Hence, this approach to derive the VEV for regular premium payments reads as

- For regular premium payments consider a product's (pre-calculated) 2.5th-percentile VaR.
  – Let r denote the corresponding internal rate of return.
- Applying this internal rate of return r, set the VEV as

$$VEV = \frac{\sqrt{3.842 - 2 \cdot r \cdot T} - 1.96}{\sqrt{T}}$$

- Results



This approach is currently widely used by the industry (e.g. Germany, Austria, European PRIIPs Template (EPT)).

VEV: Calculation recipe (and for regular premium payments?)

Regular premium payments: Approach 2

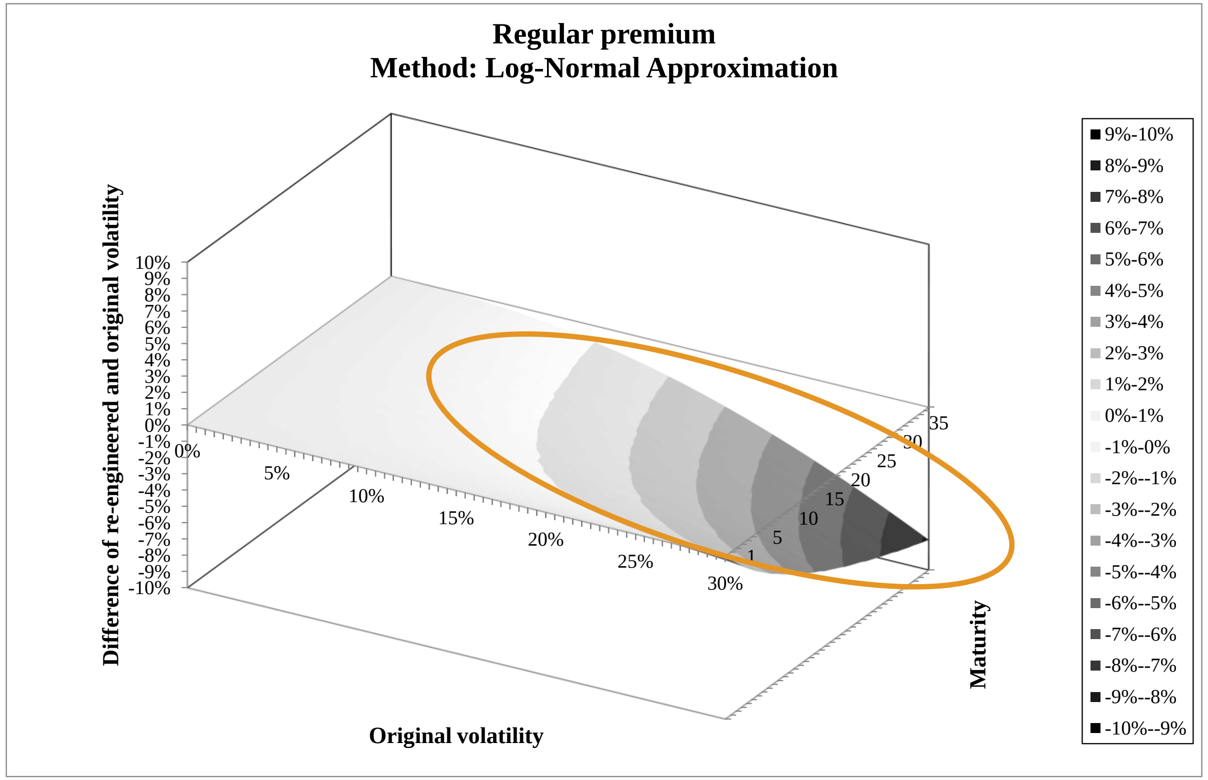
Approach 2: Approximation by a log-normal distribution

- When $S(t)$ follows a Black-Scholes model with volatility σ, the moments of $W_\sigma(T) = \sum_{t=0}^{T-1} P \cdot \frac{S(T)}{S(t)}$ can be derived analytically.
- A log-normal random variable Z_σ can be defined to match the first two moments of $W_\sigma(T)$ for given σ.
  - compute the 2.5th-percentile of Z_σ and check if it equals the pre-calculated 2.5th-percentile VaR.

Hence, this approach to derive the VEV for regular premium payments reads as

- For regular premium payments consider a product's (pre-calculated) 2.5th-percentile VaR.
  - Find the volatility VEV such that the 2.5th-percentile of Z_{VEV} and VaR coincide.

- Results



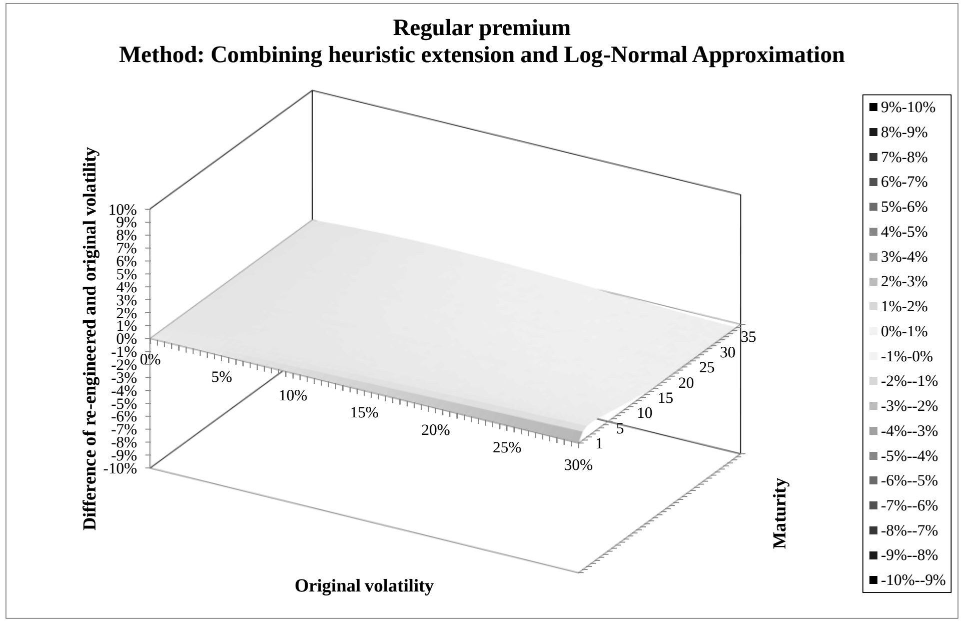
VEV: Calculation recipe (and for regular premium payments?)

Regular premium payments: Approach 3

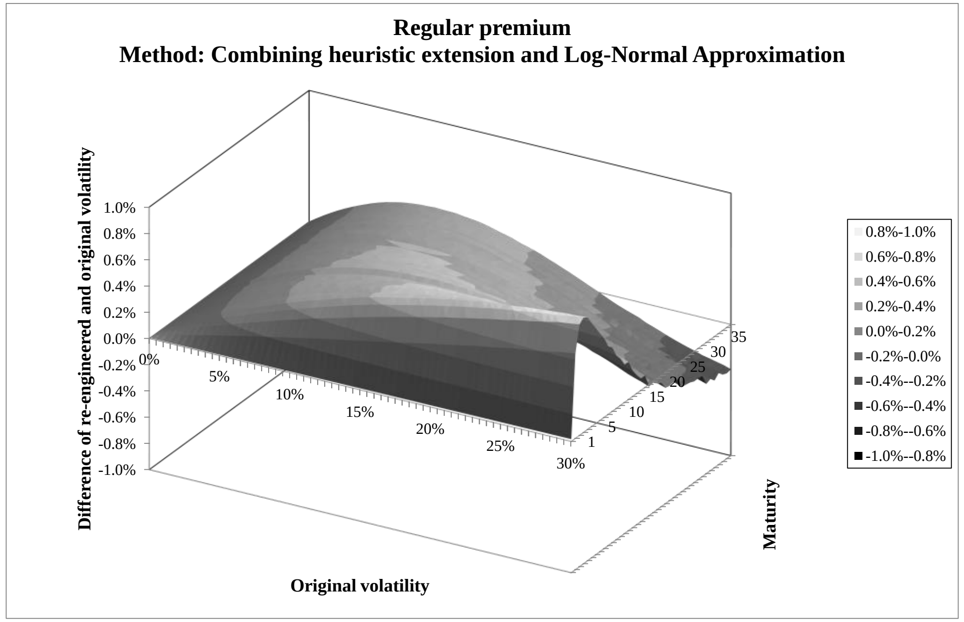
Approach 1 (approach 2) overestimates (underestimates) true volatilities.

➔ Approach 3: Combine approach 1 and approach 2 by averaging their results.

Results



Results (different scaling)



Approach 3 delivers (from a practicioner‘s point of view) very accurate estimates for the true VEV.

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Methodology and inconsistencies of performance scenarios

Performance scenarios for PRIIPs of category 2

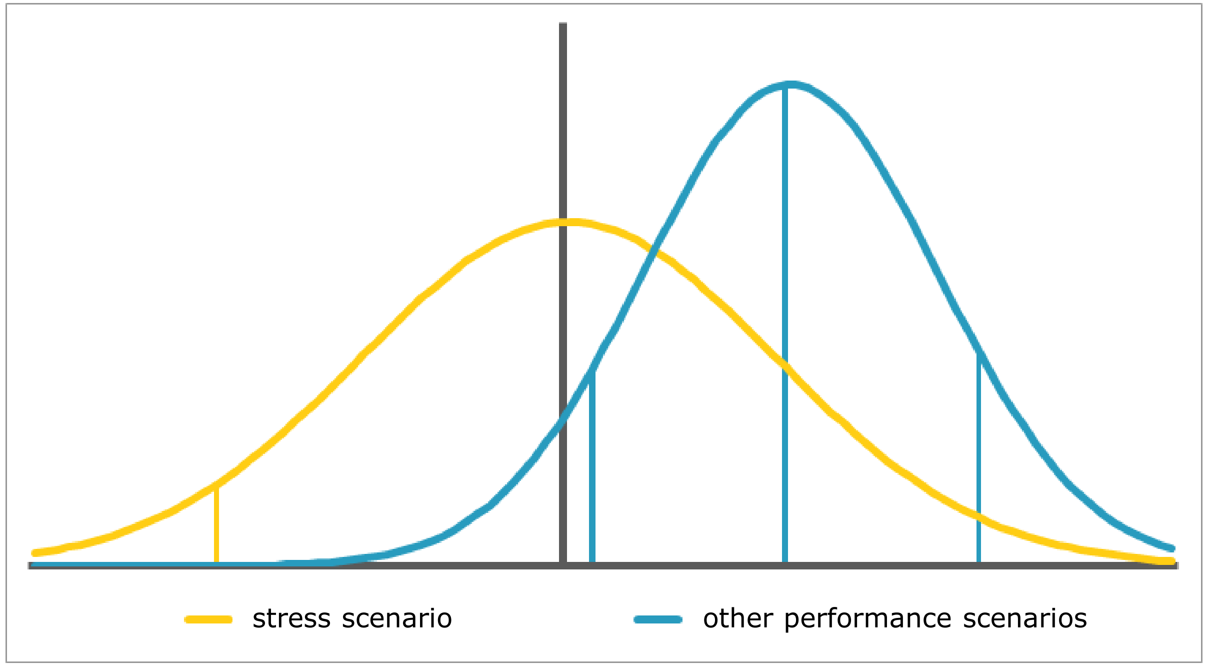
Performance scenarios

- align different PRIIPs into four different product categories
  - apply different methodologies for different categories
  - to derive the performance in the "stress", unfavorable, moderate and favorable scenario

The methodology for products of category 2 is based on a so-called Cornish-Fisher expansion (cf. Cornish and Fisher, 1938).

- The methodology builds on observed returns of the last 5 years and projects these (applying the Cornish-Fisher expansion) into the future.

Graphical illustration



Issues

- We show that the technical implementation in European Commission (2017) contains errors that yield to a general underestimation of returns compared to a correct application of the Cornish-Fisher methodology (not discussed here).
- The stress scenario's methodology further differs from the remaining performance scenarios (unfavorable, moderate und favorable) which may yield unintended results (cf. following slides).

Methodology and inconsistencies of performance scenarios

Performance scenarios for PRIIPs of category 2: Stress scenario

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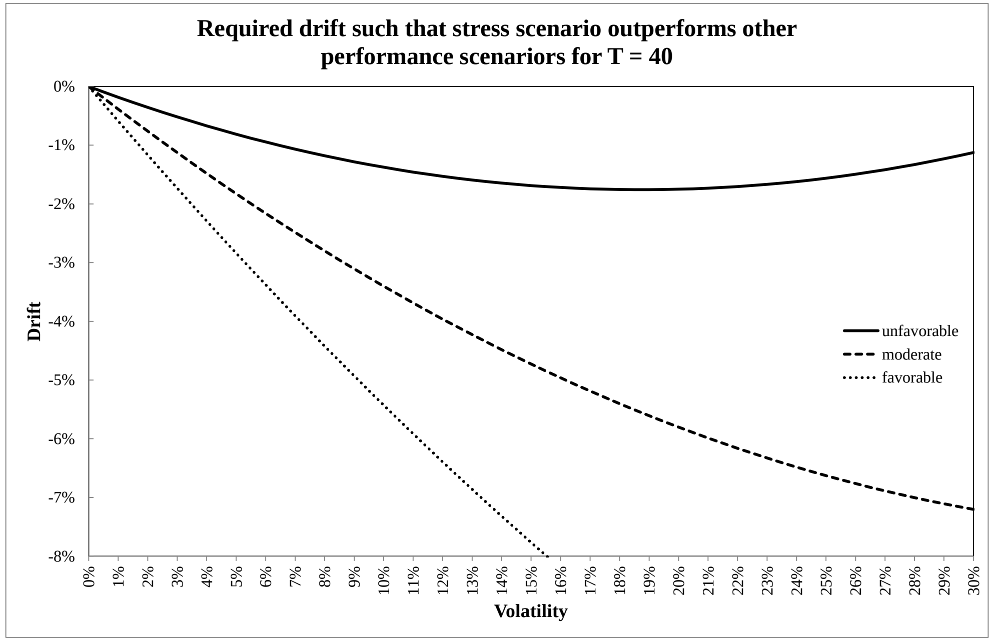
The stress scenario *“shall set out significant unfavorable impacts of the product not covered in the unfavorable scenario”* (cf. European commission, 2017).

(Corrected) Specification of the stress scenario

$$e^{\sigma_{stress}\cdot\sqrt{T}\cdot\left(z_\alpha+\frac{(z_\alpha^2-1)}{6}\cdot\frac{\mu_1}{\sqrt{T}}+\frac{(z_\alpha^3-3z_\alpha)}{24}\cdot\frac{\mu_2}{T}-\frac{(2z_\alpha^3-5z_\alpha)}{36}\cdot\frac{\mu_1^2}{T}\right)}$$

(Corrected) Specification of the unfavorable scenario

$$e^{M_1\cdot T+\sigma\cdot\sqrt{T}\cdot\left(-1.28+0.107\cdot\frac{\mu_1}{\sqrt{T}}+0.0724\cdot\frac{\mu_2}{T}-0{,}0611\cdot\frac{\mu_1^2}{T}\right)}$$



Black-Scholes model

There are examples where the stress scenario delivers higher returns than the remaining performance scenarios.

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The PRIIP-regulation's objectives

- Recital (2): The regulation's objectives are [among others] improving transparency by uniform rules on transparency for all providers of PRIIPs.

However, our analysis shows that

- Deriving a product's risk indicator is unclear for regular premium payments.
  - Currently applied approaches to compute the VEV may overestimate "true" volatilities.
  - ➔ We proposed different approaches to overcome these issues.
- Performance scenarios contain technical errors.
- Compared to the remaining performance scenarios the stress scenario may be misleading.

Do the PRIIP-KIDs really increase transparency then?

Our results may be taken into account in the already planned revision of the PRIIP-regulation during 2018.

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