



## Main Focus

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- Billing audit
- Retirement and life insurance
- Flexible loads on the energy market
- Data Science

# Financial Mathematics

## Methodological competence in financial mathematics, stochastics and data

The department has its methodological foundations in Financial Mathematics and Data Science. Data Science refers to an interdisciplinary scientific field with the goal of gaining scientifically robust insights from data. This often involves the use of methods from Machine Learning, which are the basis for many applications in the field of Artificial Intelligence (AI). Financial mathematics includes stochastic modeling, simulation and optimization as well as statistical methods and time series analysis.

We use our methodological competencies to make sustainable contributions to current societal challenges in cross-sector business areas: demographic change, energy transition and digitization. We are convinced that collaboration generates more value than the sum of the individual parts, which is why we cooperate with partners from the institute, academia and industry at many points.

In the business area of retirement provision, we have a holistic view of retirement provision in Germany and Europe in close cooperation with the Product Information Office for Retirement Provision (PIA). For example, we use our stochastic simulation technology for retirement provision products to assess the risks and rewards of tariffs from the customer's point of view.

Flexible loads will become increasingly important in the energy system of the future. These will act price-sensitively in electricity trading; thus, a currently still existing basic assumption of many models is no longer valid. We are developing new solutions for this, because the integration of flexibility requires new mathe-

tical algorithms, which we are developing together with energy industry expertise.

The digitization of processes is creating new opportunities to efficiently check billing processes. We have already developed audit methodology and software for several industries and are working closely with industry on new algorithms in ongoing projects. We are expanding our expertise in the direction of the healthcare industry and are working with public prosecutors and the police on methods for auditing nursing service billing.

Together with industry partners, we are active in quantum computing and are developing new approaches to solving problems.

### Department topics in this report:

- Quantum computing: joint project "Ener-Quant", p. 20
- Researchers in financial mathematics calculate smart solvency capital, p. 46
- Tracking down fraud with algorithms and AI, p. 48
- FlexEuro: Flexible and smart management wins in the energy market, p. 56

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