

University of Groningen

## Asset liability management for pension funds using multistage mixed-integer stochastic programming

Drijver, S.J.

**IMPORTANT NOTE:** You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

*Document Version*

Publisher's PDF, also known as Version of record

*Publication date:*

2005

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Drijver, S. J. (2005). *Asset liability management for pension funds using multistage mixed-integer stochastic programming*. [Thesis fully internal (DIV), University of Groningen]. s.n.

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

*Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.*

# Index

- active members, 26
- actual final pay system, 23
- Actuariële Principes voor Pensioenfondsen (APP), 69
- actuarial risks, 36
- amount of underfunding, 72
- arbitrage, 92
- asset allocation, 52
- asset liability management, 46
  
- branches, 46
  
- cash balance equation, 52
- chance constraints, 70
- continuïteitstoets, 70
- continuously compounded return, 101
- contribution policy, 32
- correlation, 108
  
- decision variables, 50
- deferred members, 26
- defined benefit system, 23
- defined contribution system, 23
- degree of change of indexation, 63
- degree of indexation, 50
- derivatives, 92
- duration of the liabilities, 75
- dynamic decision, 39
  
- equity risk premium, 106
- error-correction model, 93
- ex-ante risk premium, 100
  
- fair value, 35
- feasibility sets, 76
- Financieel Toetsingskader (FTK), 34
- fixed penalty costs, 45
- funding costs, 38
- funding ratio, 30
  
- Gordon growth model, 100
- greedy heuristic, 81
  
- hard constraints, 44
- horizon, 46
- hot starts, 79
  
- IAS19, 35
- illustrative case, 115
- indexing benefit payments, 24
- indexing policy, 31
- information constraints, 50
- integrated chance constraints, 75
- internal rate of return, 106
- International Accounting Standards, 35
- investment policy, 32
  
- linear programming, 39
- log return, 101
- long-term chance constraint, 71
  
- minimum required reliability, 71
- minimumtoets, 70
- moderate final pay system, 23
- multistage mixed-integer stochastic program, 45
- multistage stochastic programming, 44
  
- net capital position, 88
- nonanticipativity constraints, 50
  
- overfunding, 46
  
- penalty parameters, 44
- pension, 20
- pension policy, 31
- pension rules, 31
- pension spot curve, 106
- pensionable salaries, 57

planning horizon, 43  
political risks, 28  
premium holidays, 17  
probabilities, 91  
PVK, 33

recourse, 119  
reinsurance policy, 32  
remedial contribution, 45  
restitution, 46  
risk neutral probabilities, 104  
risk of underfunding, 46  
risks, 35

scenario generator, 20  
scenario tree, 44  
scenario tree structure, 46  
scenarios, 46  
sensitivity analyses, 115  
shortages, 54  
soft constraints, 44  
solvabiliteitstoets, 70  
solvency, 30  
sponsor, 31  
state, 46  
stochastic programming, 38  
stock spot curve, 106  
strategic decision process, 43  
supervisor, 31  
surplus, 30  
Surplus-at-Risk, 71

transaction costs, 52

underfunding, 30