



Black History Month – Highlighting CAS Community Voices

Posted on February 25, 2022 by Lily Rozenstrauch

READ

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

CAS
@CASact

Congratulations to Sam LaDuca, FCAS, for being appointed to chief actuary at Concert Group Holdings! [ow.ly/yueV50lubwq](#)

26m

[Embed](#) [View on Twitter](#)

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Future of the Profession

Why you should read the CAS research paper

Markus Gesmann and Jake Morris are delighted to present “Hierarchical Compartmental Reserving Models”, which was published as part of the CAS research papers series in 2020.

The paper demonstrates how one can describe the dynamics of claims processes with differential equations and probability distributions. All of this is embedded within a Bayesian framework that naturally facilitates the combination of judgement and historical data.

Unlike a ‘black-box’ technique this is very much a transparent framework, in which all assumptions can be reviewed and challenged. And unlike some of the traditional reserving methods that are often applied to data first and with judgement applied thereafter (shoot first, aim later), the approach encourages users to incorporate as much expertise into the model upfront and use the data to update input assumptions based on credibility (aim first, shoot later). This is particularly helpful when entering a new product, line of business, or geography or when changes to products and business processes would make past data a less credible predictor.

The document gives a hands-on introduction to hierarchical compartmental reserving models which complements mathematical notation with intuitive explanations. Real-world case studies (for which code is provided) can be replicated by the reader using the probabilistic programming language Stan via the brms package in R.

Four key takeaways from the research are:

Thinking about the claims process as a ‘flow’ of monetary amounts from premium or exposure from one claims stage to another helps to describe the loss emergence process in a consistent way for different metrics of interest (Section 2).
Modelling incremental claims payments may be preferred to cumulative data when working with lognormal distributions. Payments are incremental by nature and as cohorts of claims get more mature their payments typically get smaller and smaller, along with their variance. (Section 3.3).
Hierarchical models provide an adaptive regularization framework in which the model learns how much weight subgroups of data should get, which can help to reduce overfitting. This is effectively a credibility weighting technique (Section 4.3).
A distinction should be made between expected and ultimate loss ratios. The expected loss ratio describes the mean of a distribution assuming the process can be re-run again and again and is not anchored to the latest cumulative paid position. The ultimate loss ratio is the final actual loss ratio for a specific year, i.e., the latest cumulative paid position, plus all future payments. (Section 4.6).
“Hierarchical Compartmental Reserving Models” brings together ideas which the authors have written about, presented, and developed over a number of years, and therefore serves as a comprehensive resource for all those hoping to learn about the application of compartmental models to insurance reserving.

Authors:

Gesmann, M., and Morris, J. “Hierarchical Compartmental Reserving Models.” Casualty Actuarial Society, CAS Research Papers, 19 Aug. 2020, <https://www.casact.org/sites/default/files/2021-02/compartmental-reserving-models-gesmannmorris0820.pdf>



CAS

@CASact



Congratulations to Sam LaDuca, FCAS, for being appointed to chief actuary at Concert Group Holdings! ow.ly/yueV50lubwq







26m

Embed

View on Twitter

THE CASUALTY ACTUARIAL SOCIETY

ROUNDTABLE

Conversations about CAS activities, voices from the actuarial profession, and more

Black History Month –
Highlighting CAS Community
Voices

Posted on February 25, 2022 by Lily Rozenstrauch

READ

Unboxing Hierarchical
Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical
Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical
Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical
Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical
Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical
Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical
Compartmental
Reserving Models

Posted on December 9, 2021 by User

Read

Future of the
profession

Unboxing Hierarchical
Compartmental
Reserving Models

Posted on December 9, 2021 by User

Read

Future of the
profession

Unboxing Hierarchical
Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical
Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical
Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Future of the Profession

Why you should read the CAS research paper

Markus Gesmann and Jake Morris are delighted to present “Hierarchical Compartmental Reserving Models”, which was published as part of the CAS research papers series in 2020.

The paper demonstrates how one can describe the dynamics of claims processes with differential equations and probability distributions. All of this is embedded within a Bayesian framework that naturally facilitates the combination of judgement and historical data.

Unlike a ‘black-box’ technique this is very much a transparent framework, in which all assumptions can be reviewed and challenged. And unlike some of the traditional reserving methods that are often applied to data first and with judgement applied thereafter (shoot first, aim later), the approach encourages users to incorporate as much expertise into the model upfront and use the data to update input assumptions based on credibility (aim first, shoot later). This is particularly helpful when entering a new product, line of business, or geography or when changes to products and business processes would make past data a less credible predictor.

The document gives a hands-on introduction to hierarchical compartmental reserving models which complements mathematical notation with intuitive explanations. Real-world case studies (for which code is provided) can be replicated by the reader using the probabilistic programming language Stan via the brms package in R.

Four key takeaways from the research are:

Thinking about the claims process as a ‘flow’ of monetary amounts from premium or exposure from one claims stage to another helps to describe the loss emergence process in a consistent way for different metrics of interest (Section 2).

Modelling incremental claims payments may be preferred to cumulative data when working with lognormal distributions. Payments are incremental by nature and as cohorts of claims get more mature their payments typically get smaller and smaller, along with their variance. (Section 3.3).

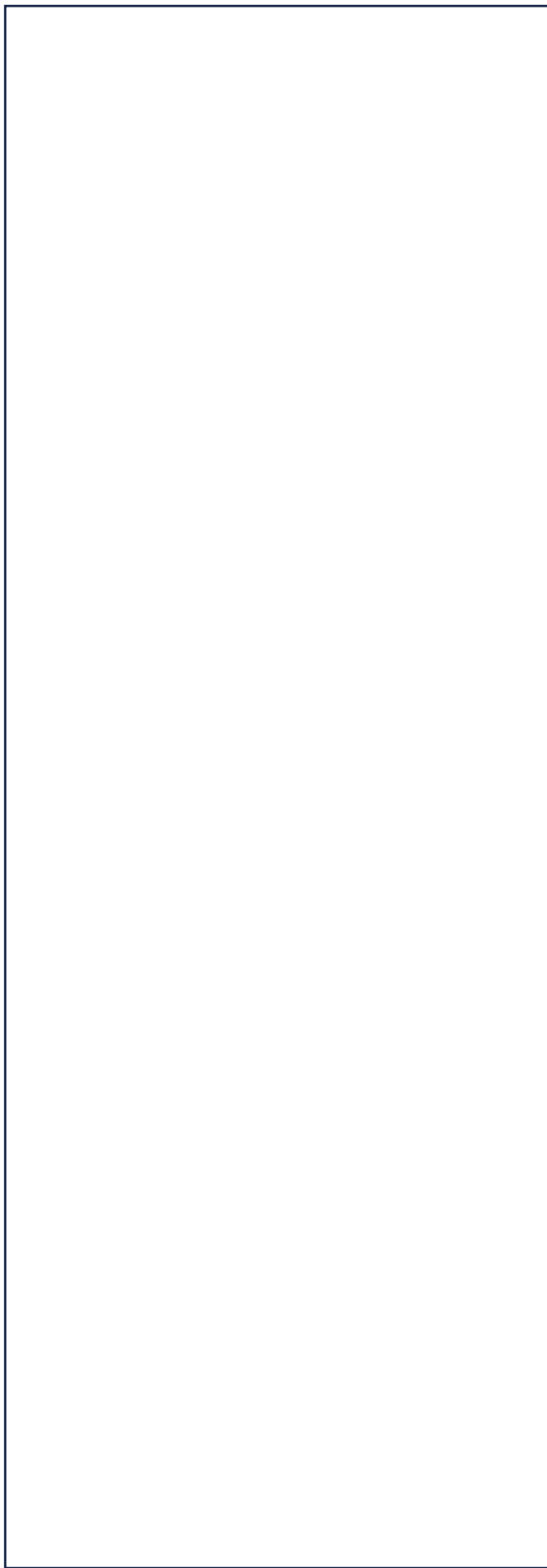
Hierarchical models provide an adaptive regularization framework in which the model learns how much weight subgroups of data should get, which can help to reduce overfitting. This is effectively a credibility weighting technique (Section 4.3).

A distinction should be made between expected and ultimate loss ratios. The expected loss ratio describes the mean of a distribution assuming the process can be re-run again and again and is not anchored to the latest cumulative paid position. The ultimate loss ratio is the final actual loss ratio for a specific year, i.e., the latest cumulative paid position, plus all future payments. (Section 4.6).

“Hierarchical Compartmental Reserving Models” brings together ideas which the authors have written about, presented, and developed over a number of years, and therefore serves as a comprehensive resource for all those hoping to learn about the application of compartmental models to insurance reserving.

Authors:

Gesmann, M., and Morris, J. “Hierarchical Compartmental Reserving Models.” Casualty Actuarial Society, CAS Research Papers, 19 Aug.



Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession



THE CASUALTY ACTUARIAL SOCIETY

ROUNDTABLE

Conversations about CAS activities, voices from the actuarial profession, and more

Communications

Future of the Profession

From the President

Professional education

Search...



Unboxing
Hierarchical
Compartmental
Reserving
Models

Posted on December 9, 2021 by User

Unboxing
Hierarchical
Compartmental
Reserving
Models

Posted on December 9, 2021 by User

Black History Month :

Highlighting CAS

Community Voices

Posted on February 25, 2022 by Lily Rozenstrauch

READ

Unboxing
Hierarchical
Compartmental
Reserving Models

Posted on December 9, 2021 by User

Actuaries and epidemiologists share a lot in common. Both use advanced mathematical tools to study human behavior, investigate patterns, and manage risks. The medical profession has long utilized epidemiological models to understand the dynamics of epidemics and to project the trends, preparing for the allocation of medical resources and developing public health policies. Similar goals Read more

Unboxing
Hierarchical
Compartmental
Reserving Models

Posted on December 9, 2021 by User

Actuaries and epidemiologists share a lot in common. Both use advanced mathematical tools to study human behavior, investigate patterns, and manage risks. The medical profession has long utilized epidemiological models to understand the dynamics of epidemics and to project the trends, preparing for the allocation of medical resources and developing public health policies. Similar goals Read more

Unboxing Hierarchical Compartmental Reserving Models
Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models
Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models
Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models
Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models
Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models
Posted on December 9, 2021 by User



THE CASUALTY ACTUARIAL SOCIETY ROUNDTABLE

Conversations about CAS activities, voices from the actuarial profession, and more

Communications Future of the Profession From the President Professional education



Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User
Future of the Profession

Why you should read the CAS research paper

Markus Gesmann and Jake Morris are delighted to present “Hierarchical Compartmental Reserving Models”, which was published as part of the CAS research papers series in 2020.

The paper demonstrates how one can describe the dynamics of claims processes with differential equations and probability distributions. All of this is embedded within a Bayesian framework that naturally facilitates the combination of judgement and historical data.

Unlike a ‘black-box’ technique this is very much a transparent framework, in which all assumptions can be reviewed and challenged. And unlike some of the traditional reserving methods that are often applied to data first and with judgement applied thereafter (shoot first, aim later), the approach encourages users to incorporate as much expertise into the model upfront and use the data to update input assumptions based on credibility (aim first, shoot later). This is particularly helpful when entering a new product, line of business, or geography or when changes to products and business processes would make past data a less credible predictor.

The document gives a hands-on introduction to hierarchical compartmental reserving models which complements mathematical notation with intuitive explanations. Real-world case studies (for which code is provided) can be replicated by the reader using the probabilistic programming language Stan via the brms package in R.

Four key takeaways from the research are:

Thinking about the claims process as a ‘flow’ of monetary amounts from premium or exposure from one claims stage to another helps to describe the loss emergence process in a consistent way for different metrics of interest (Section 2).
Modelling incremental claims payments may be preferred to cumulative data when working with lognormal distributions. Payments are incremental by nature and as cohorts of claims get more mature their payments typically get smaller and smaller, along with their variance. (Section 3.3).
Hierarchical models provide an adaptive regularization framework in which the model learns how much weight subgroups of data should get, which can help to reduce overfitting. This is effectively a credibility weighting technique (Section 4.3).
A distinction should be made between expected and ultimate loss ratios. The expected loss ratio describes the mean of a distribution assuming the process can be re-run again and again and is not anchored to the latest cumulative paid position. The ultimate loss ratio is the final actual loss ratio for a specific year, i.e., the latest cumulative paid position, plus all future payments. (Section 4.6).
“Hierarchical Compartmental Reserving Models” brings together ideas which the authors have written about, presented, and developed over a number of years, and therefore serves as a comprehensive resource for all those hoping to learn about the application of compartmental models to insurance reserving.

Authors:

Gesmann, M., and Morris, J. “Hierarchical Compartmental Reserving Models.” Casualty Actuarial Society, CAS Research Papers, 19 Aug. 2020, <https://www.casact.org/sites/default/files/2021-02/compartmental-reserving-models-gesmannmorris0820.pdf>

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical
Compartmental Reserving
Models

Research

Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical Compartmental Reserving Models

Research

Diversity

Posted on December 9, 2021
by User



THE CASUALTY ACTUARIAL SOCIETY ROUNDTABLE

Conversations about CAS activities, voices from the actuarial profession, and more



Communications

Communications

Communications

Search...



Unboxing Hierarchical Compartmental Reserving Models

Research Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical Compartmental Reserving Models

Research Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical Compartmental Reserving Models

Research Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical Compartmental Reserving Models

Research Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical Compartmental Reserving Models

Research Diversity

Posted on December 9, 2021
by User

Unboxing Hierarchical Compartmental Reserving Models

Research Diversity

Posted on December 9, 2021
by User



CAS
@CASact



Congratulations to Sam LaDuca, FCAS, for being appointed to chief actuary at Concert Group Holdings! ow.ly/yueV50lubwq





26m

[Embed](#)[View on Twitter](#)

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Future of the Profession

Why you should read the CAS research paper

Markus Gesmann and Jake Morris are delighted to present “Hierarchical Compartmental Reserving Models”, which was published as part of the CAS research papers series in 2020.

The paper demonstrates how one can describe the dynamics of claims processes with differential equations and probability distributions. All of this is embedded within a Bayesian framework that naturally facilitates the combination of judgement and historical data.

Unlike a ‘black-box’ technique this is very much a transparent framework, in which all assumptions can be reviewed and challenged. And unlike some of the traditional reserving methods that are often applied to data first and with judgement applied thereafter (shoot first, aim later), the approach encourages users to incorporate as much expertise into the model upfront and use the data to update input assumptions based on credibility (aim first, shoot later). This is particularly helpful when entering a new product, line of business, or geography or when changes to products and business processes would make past data a less credible predictor.

The document gives a hands-on introduction to hierarchical compartmental reserving models which complements mathematical notation with intuitive explanations. Real-world case studies (for which code is provided) can be replicated by the reader using the probabilistic programming language Stan via the brms package in R.

Four key takeaways from the research are:

Thinking about the claims process as a ‘flow’ of monetary amounts from premium or exposure from one claims stage to another helps to describe the loss emergence process in a consistent way for different metrics of interest (Section 2). Modelling incremental claims payments may be preferred to cumulative data when working with lognormal distributions. Payments are incremental by nature and as cohorts of claims get more mature their payments typically get smaller and smaller, along with their variance. (Section 3.3). Hierarchical models provide an adaptive regularization framework in which the model learns how much weight subgroups of data should get, which can help to reduce overfitting. This is effectively a credibility weighting technique (Section 4.3). A distinction should be made between expected and ultimate loss ratios. The expected loss ratio describes the mean of a distribution assuming the process can be re-run again and again and is not anchored to the latest cumulative paid position. The ultimate loss ratio is the final actual loss ratio for a specific year, i.e., the latest cumulative paid position, plus all future payments. (Section 4.6). “Hierarchical Compartmental Reserving Models” brings together ideas which the authors have written about, presented, and developed over a number of years, and therefore serves as a comprehensive resource for all those hoping to learn about the application of compartmental models to insurance reserving.

Authors:

Gesmann, M., and Morris, J. “Hierarchical Compartmental Reserving Models.” Casualty Actuarial Society, CAS Research Papers, 19 Aug. 2020, <https://www.casact.org/sites/default/files/2021-02/compartmental-reserving-models-gesmannmorris0820.pdf>



CAS
@CASact



Congratulations to Sam LaDuca, FCAS, for being appointed to chief actuary at Concert Group Holdings! ow.ly/yueV50lubwq





26m

Embed

View on Twitter

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

[Read](#)

Future of the profession

Search...



THE CASUALTY ACTUARIAL SOCIETY

ROUNDTABLE

Conversations about CAS activities, voices from the actuarial profession, and more

Communications

Future of the Profession

Professional Education

Future of the Profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the
profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Future of the Profession

Why you should read the CAS research paper

Markus Gesmann and Jake Morris are delighted to present “Hierarchical Compartmental Reserving Models”, which was published as part of the CAS research papers series in 2020.

The paper demonstrates how one can describe the dynamics of claims processes with differential equations and probability distributions. All of this is embedded within a Bayesian framework that naturally facilitates the combination of judgement and historical data.

Unlike a ‘black-box’ technique this is very much a transparent framework, in which all assumptions can be reviewed and challenged. And unlike some of the traditional reserving methods that are often applied to data first and with judgement applied thereafter (shoot first, aim later), the approach encourages users to incorporate as much expertise into the model upfront and use the data to update input assumptions based on credibility (aim first, shoot later). This is particularly helpful when entering a new product, line of business, or geography or when changes to products and business processes would make past data a less credible predictor.

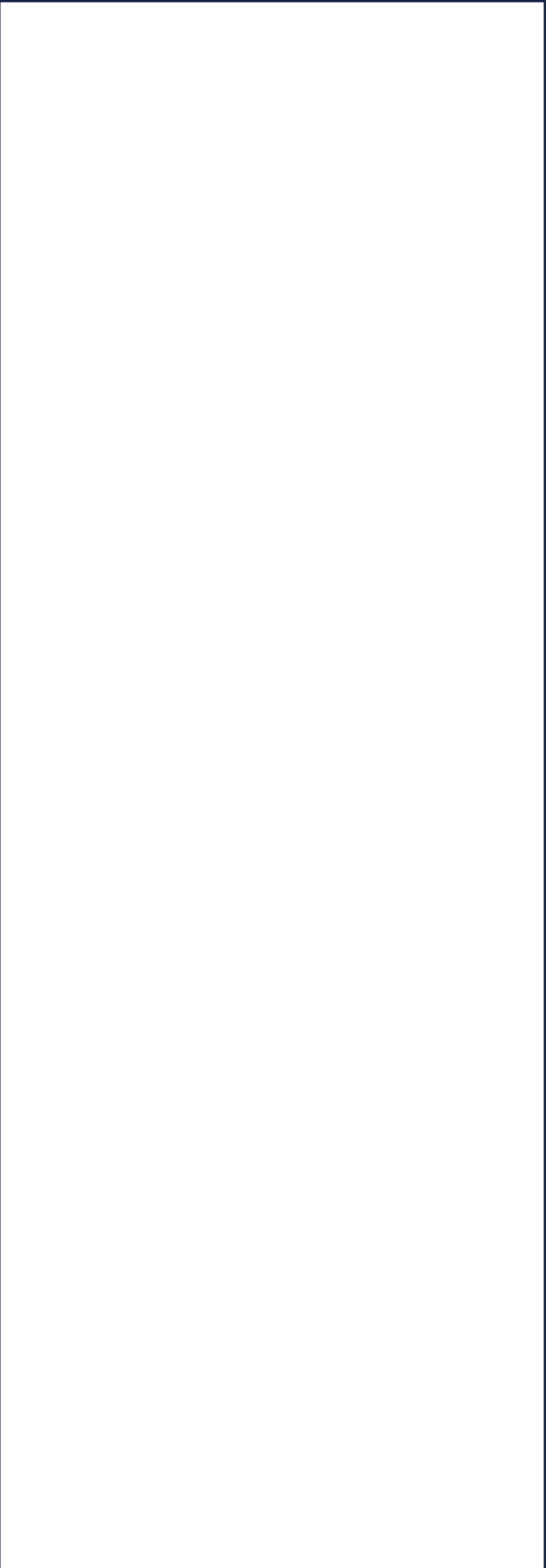
The document gives a hands-on introduction to hierarchical compartmental reserving models which complements mathematical notation with intuitive explanations. Real-world case studies (for which code is provided) can be replicated by the reader using the probabilistic programming language Stan via the brms package in R.

Four key takeaways from the research are:

Thinking about the claims process as a ‘flow’ of monetary amounts from premium or exposure from one claims stage to another helps to describe the loss emergence process in a consistent way for different metrics of interest (Section 2).
Modelling incremental claims payments may be preferred to cumulative data when working with lognormal distributions. Payments are incremental by nature and as cohorts of claims get more mature their payments typically get smaller and smaller, along with their variance. (Section 3.3).
Hierarchical models provide an adaptive regularization framework in which the model learns how much weight subgroups of data should get, which can help to reduce overfitting. This is effectively a credibility weighting technique (Section 4.3).
A distinction should be made between expected and ultimate loss ratios. The expected loss ratio describes the mean of a distribution assuming the process can be re-run again and again and is not anchored to the latest cumulative paid position. The ultimate loss ratio is the final actual loss ratio for a specific year, i.e., the latest cumulative paid position, plus all future payments. (Section 4.6).
“Hierarchical Compartmental Reserving Models” brings together ideas which the authors have written about, presented, and developed over a number of years, and therefore serves as a comprehensive resource for all those hoping to learn about the application of compartmental models to insurance reserving.

Authors:

Gesmann, M., and Morris, J. “Hierarchical Compartmental Reserving Models.” Casualty Actuarial Society, CAS Research Papers, 19 Aug.



Research

Volunteerism

Risk Management

Diversity

Exams and Admissions

University Engagement

Actuarial Review

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Actuaries and epidemiologists share a lot in common. Both use advanced mathematical tools to study human behavior, investigate patterns, and manage risks. The medical profession has long utilized epidemiological models to understand the dynamics of epidemics and to project the trends, preparing for the allocation of medical resources and developing public health policies. Similar goals [Read more](#)





THE CASUALTY ACTUARIAL SOCIETY ROUNDTABLE

Conversations about CAS activities, voices from the actuarial profession, and more

Communications

Future of the Profession

From the President

Professional education



Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the
profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the
profession

Research

Volunteerism

Risk Management

Diversity

Exams and Admissions

University Engagement

Actuarial Review

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Read

Future of the profession

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Black History Month – Highlighting CAS Community Voices

Posted on February 25, 2022 by Lily Rozenstrauch

[READ](#)

Black History Month – Highlighting CAS Community Voices

Posted on February 25, 2022 by Lily Rozenstrauch

[READ](#)

**Unboxing Hierarchical
Compartmental Reserving Models**

Posted on December 9, 2021 by User

**Unboxing Hierarchical
Compartmental Reserving Models**

Posted on December 9, 2021 by User

**Unboxing Hierarchical
Compartmental Reserving Models**

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Actuaries and epidemiologists share a lot in common. Both use advanced mathematical tools to study human behavior, investigate patterns, and manage risks. The medical profession has long utilized epidemiological models to understand the dynamics of epidemics and to project the trends, preparing for the allocation of medical resources and developing public health policies. Similar goals Read more



Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Actuaries and epidemiologists share a lot in common. Both use advanced mathematical tools to study human behavior, investigate patterns, and manage risks. The medical profession has long utilized epidemiological models to understand the dynamics of epidemics and to project the trends, preparing for the allocation of medical resources and developing public health policies. Similar goals Read more



Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Posted on December 9, 2021 by User

Future of the Profession

Why you should read the CAS research paper

Markus Gesmann and Jake Morris are delighted to present “Hierarchical Compartmental Reserving Models”, which was published as part of the CAS research papers series in 2020.

The paper demonstrates how one can describe the dynamics of claims processes with differential equations and probability distributions. All of this is embedded within a Bayesian framework that naturally facilitates the combination of judgement and historical data.

Unlike a ‘black-box’ technique this is very much a transparent framework, in which all assumptions can be reviewed and challenged. And unlike some of the traditional reserving methods that are often applied to data first and with judgement applied thereafter (shoot first, aim later), the approach encourages users to incorporate as much expertise into the model upfront and use the data to update input assumptions based on credibility (aim first, shoot later). This is particularly helpful when entering a new product, line of business, or geography or when changes to products and business processes would make past data a less credible predictor.

The document gives a hands-on introduction to hierarchical compartmental reserving models which complements mathematical notation with intuitive explanations. Real-world case studies (for which code is provided) can be replicated by the reader using the probabilistic programming language Stan via the brms package in R.

Four key takeaways from the research are:

Thinking about the claims process as a ‘flow’ of monetary amounts from premium or exposure from one claims stage to another helps to describe the loss emergence process in a consistent way for different metrics of interest (Section 2).
Modelling incremental claims payments may be preferred to cumulative data when working with lognormal distributions. Payments are incremental by nature and as cohorts of claims get more mature their payments typically get smaller and smaller, along with their variance. (Section 3.3).
Hierarchical models provide an adaptive regularization framework in which the model learns how much weight subgroups of data should get, which can help to reduce overfitting. This is effectively a credibility weighting technique (Section 4.3).
A distinction should be made between expected and ultimate loss ratios. The expected loss ratio describes the mean of a distribution assuming the process can be re-run again and again and is not anchored to the latest cumulative paid position. The ultimate loss ratio is the final actual loss ratio for a specific year, i.e., the latest cumulative paid position, plus all future payments. (Section 4.6).
“Hierarchical Compartmental Reserving Models” brings together ideas which the authors have written about, presented, and developed over a number of years, and therefore serves as a comprehensive resource for all those hoping to learn about the application of compartmental models to insurance reserving.

Authors:

Gesmann, M., and Morris, J. “Hierarchical Compartmental Reserving Models.” Casualty Actuarial Society, CAS Research Papers, 19 Aug. 2020, <https://www.casact.org/sites/default/files/2021-02/compartmental-reserving-models-gesmannmorris0820.pdf>

Unboxing Hierarchical Compartmental Reserving Models

Research

Diversity

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Research

Diversity

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Research

Diversity

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Research

Diversity

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Research

Diversity

Posted on December 9, 2021 by User

Unboxing Hierarchical Compartmental Reserving Models

Research

Diversity

Posted on December 9, 2021 by User

**Unboxing
Hierarchical
Compartmental
Reserving
Models**

Posted on December 9, 2021 by User

**Unboxing
Hierarchical
Compartmental
Reserving
Models**

Posted on December 9, 2021 by User

Black History Month : Highlighting CAS Community Voices

Posted on February 25, 2022 by Lily Rozenstrauch

READ