



PREVENTION. CARE. RECOVERY.

Te Kaporeihana Āwhina Hunga Whara

Projection of ACC Long Term Claim Numbers weekly compensation

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22 November 2010

Outline

- Purpose
- Background
- Modelling

Section 1: Purpose

- Project the future size of the long-term claims pool
- Gain an insight into the characteristics of long-term claims
- Allow testing under different scenarios
- Assist in claims liability estimates
- Provide impact of targeted intervention analysis
- This model: weekly compensation claims

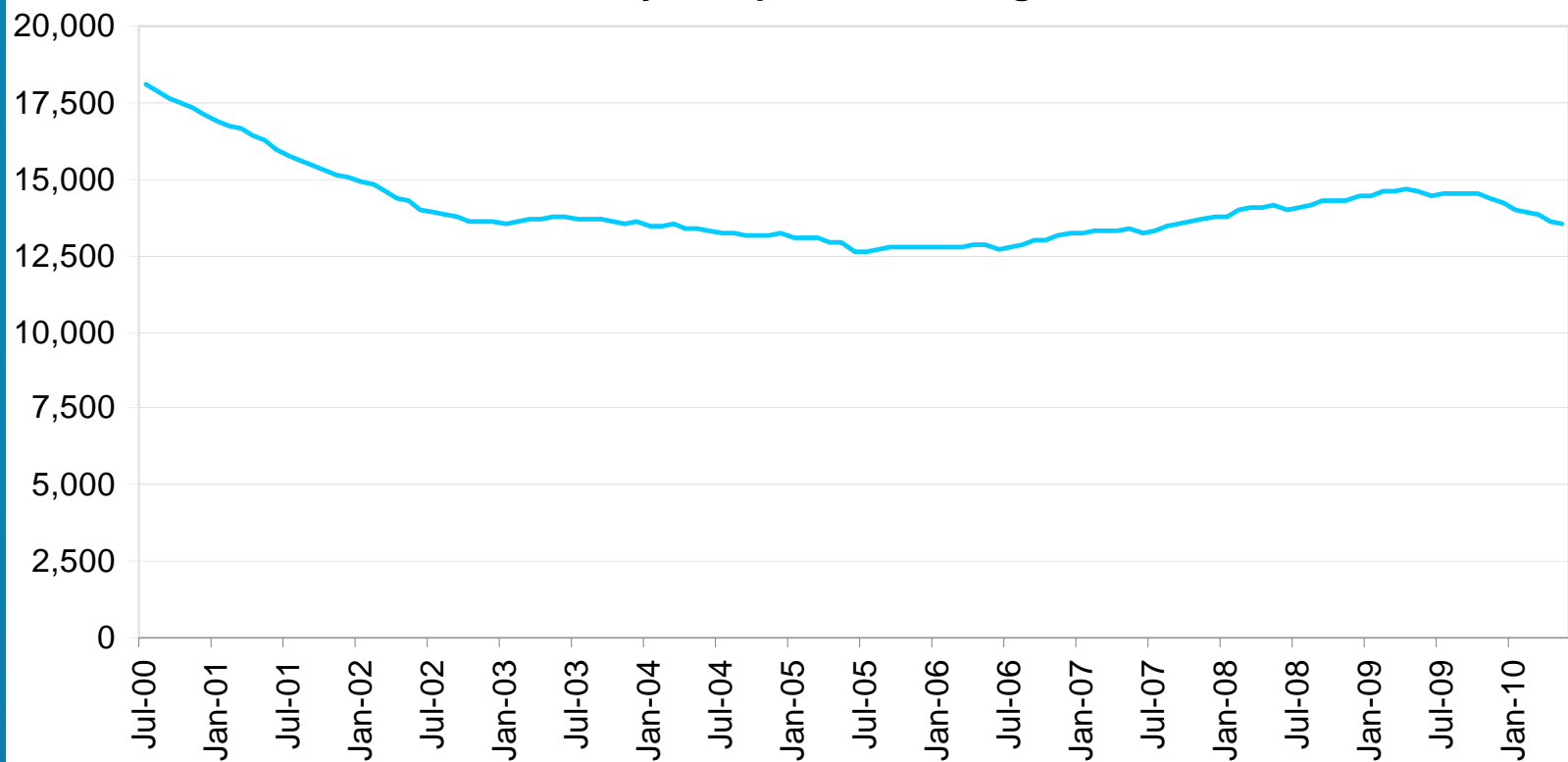
Section 2: Background

Weekly Compensation

- Definitions
 - weekly compensation (“WC”)
 - long term claims
- Outstanding claims liability provision for WC at June 2010 is \$6.7 billion - 90% due to claims active one year post accident

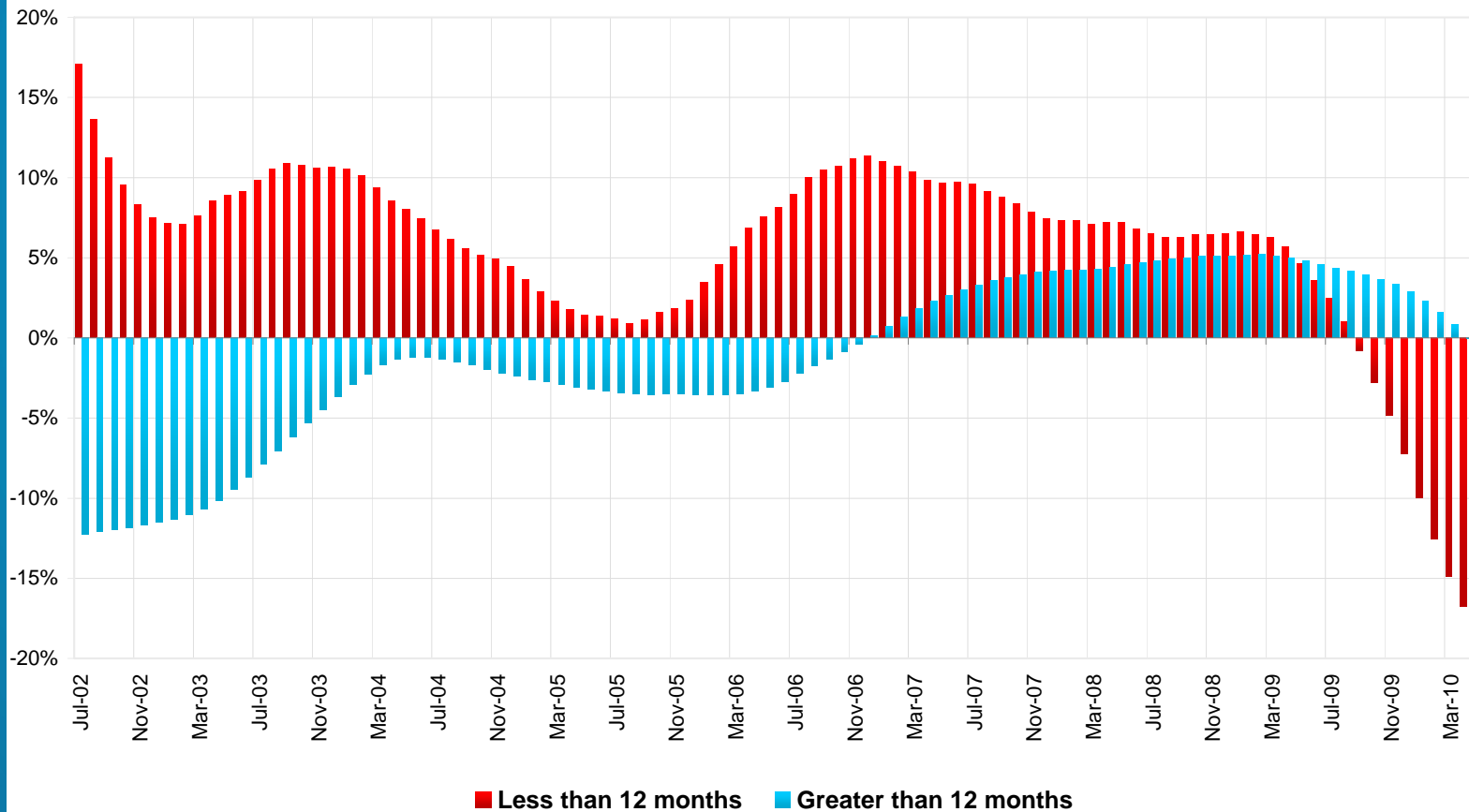
Section 2: Background

Number of Weekly Compensation Long-Term Claims



Section 2: Background

Annual Change in WC Active Claim Numbers (12 months Moving Average) by Claim Duration



Section 2: Background

External Environment

- Recession
- Political landscape
- Decline in new claims

Section 2: Background

Internal Environment

- Renewed case management focus
- Changes to operations model

Section 2: Background

Old Operations Model

- Front-end and volume driven
- Process compliance focused
- Case management focus on new claims to detriment of long-term claims management

Section 2: Background

New Operations Model

- Get back to basics
- Auto-streaming
- Experts review to identify “at risk” claims
- Expert early psycho-social screening

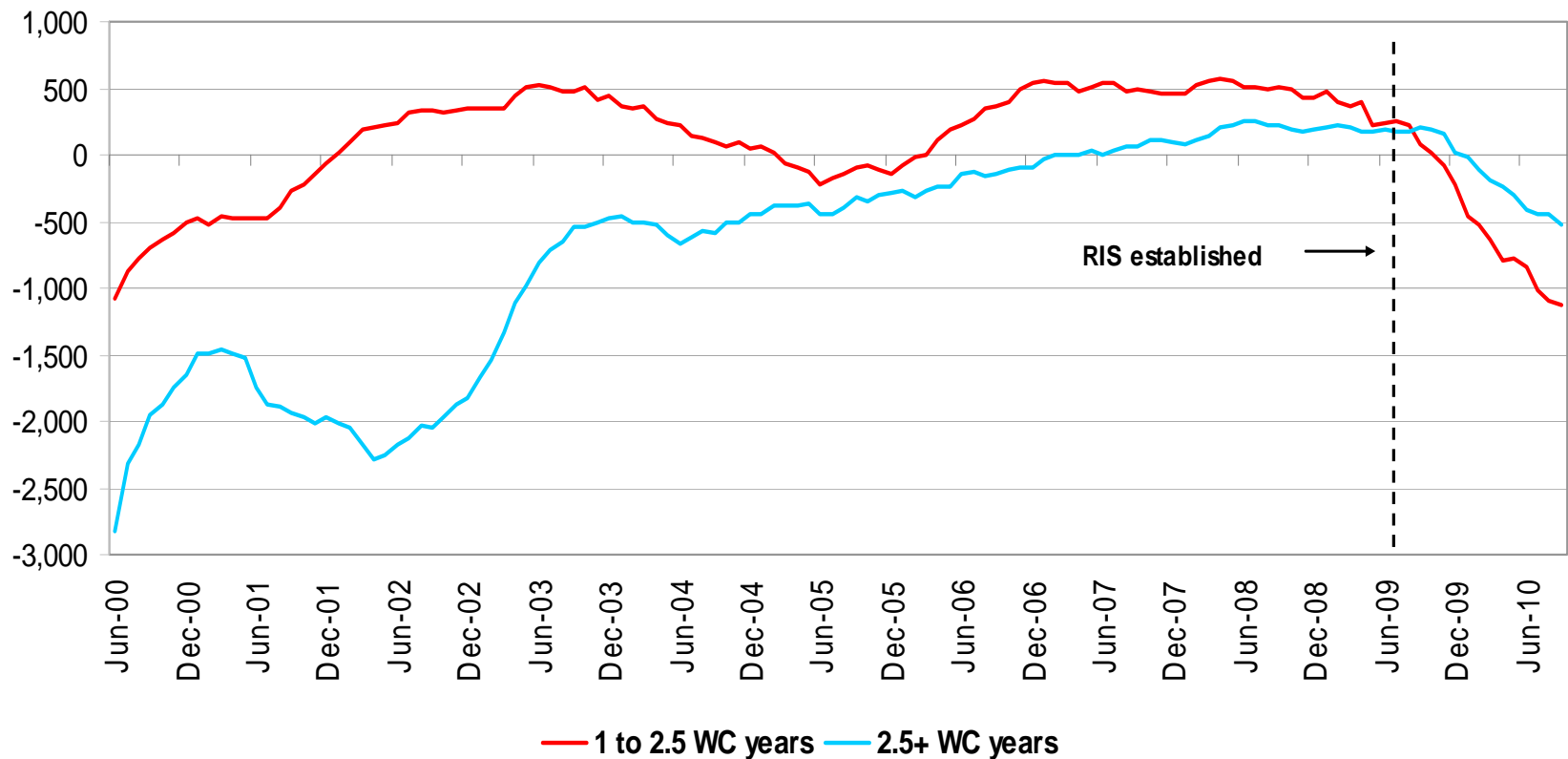
Section 2: Background

Recover Independence Service (“RIS”)

- New specialist rehabilitation team
- Set up in July 2009
- Focuses on claims that have received weekly compensation in excess of 2.5 years
- Increased number of case managers

Section 2: Background

Net Change in Long-Term Claim Numbers (Rolling 12 Months) by Duration



Section 2: Background

Questions:

- Favourable experience in the past 6 months
- How significant is the "RIS" factor
- How long is it likely to last
- Project future WC claim numbers

Section 3: Model

1. Segment the existing long-term WC claims pool to understand claim-mix
2. Construct a survival analysis model to determine which factors influence claim duration
3. Construct a simulation model to project future long-term claim numbers

Section 3: Model

Data

Segmentation

- Claims that had payments since 1 Jan 2000 and had more than 365 WC days

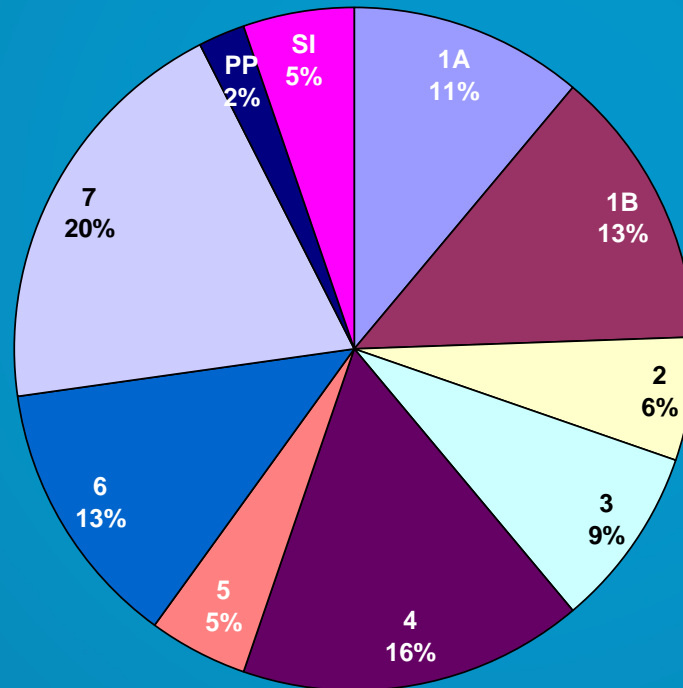
Survival Analysis

- Claims began on or after 1 Jan 2000 and had more than 365 WC days

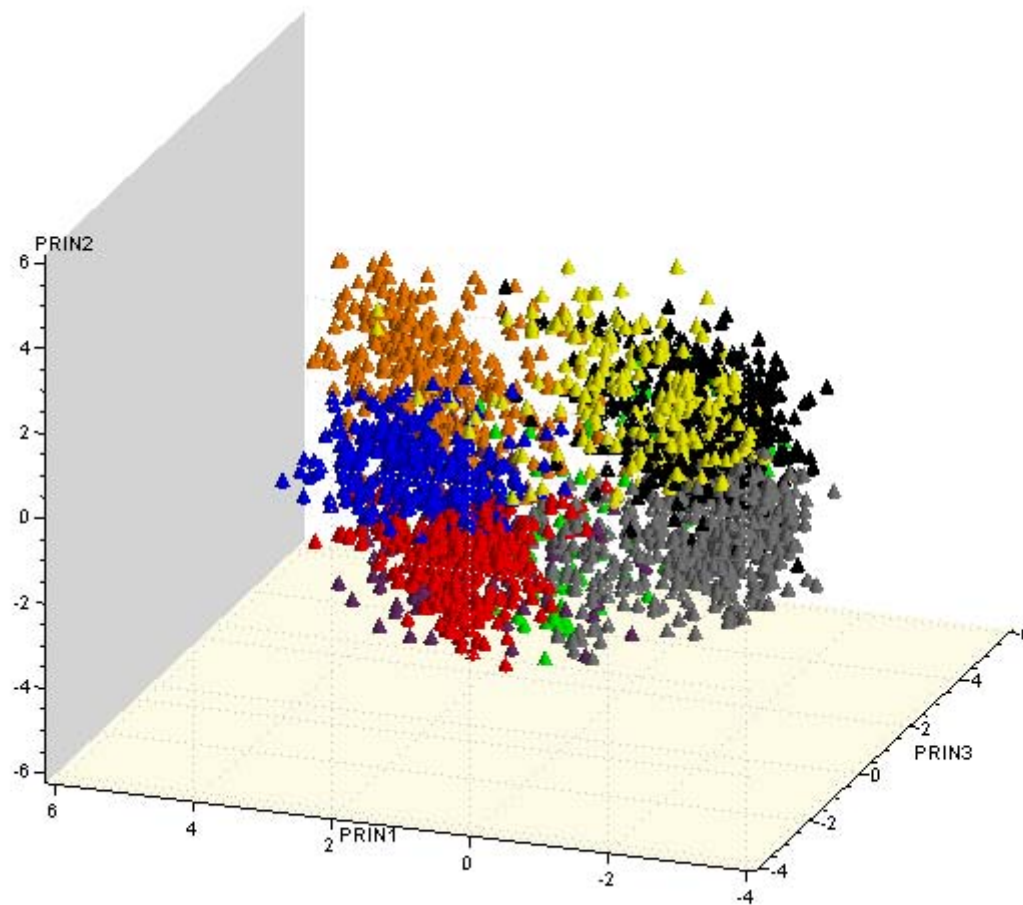
Section 3a: Segmentation

- Use **Principal Components Analysis** to
 - Identify the underlying factors that influenced claim characteristics
- 5 principal components
- Separate permanent pension and serious injury claims
- Use **Cluster Analysis** to
 - Divide the remaining claims into segments
 - Further divide segment 1 into 2 segments (denoted 1A and 1B)
- 8 distinct segments

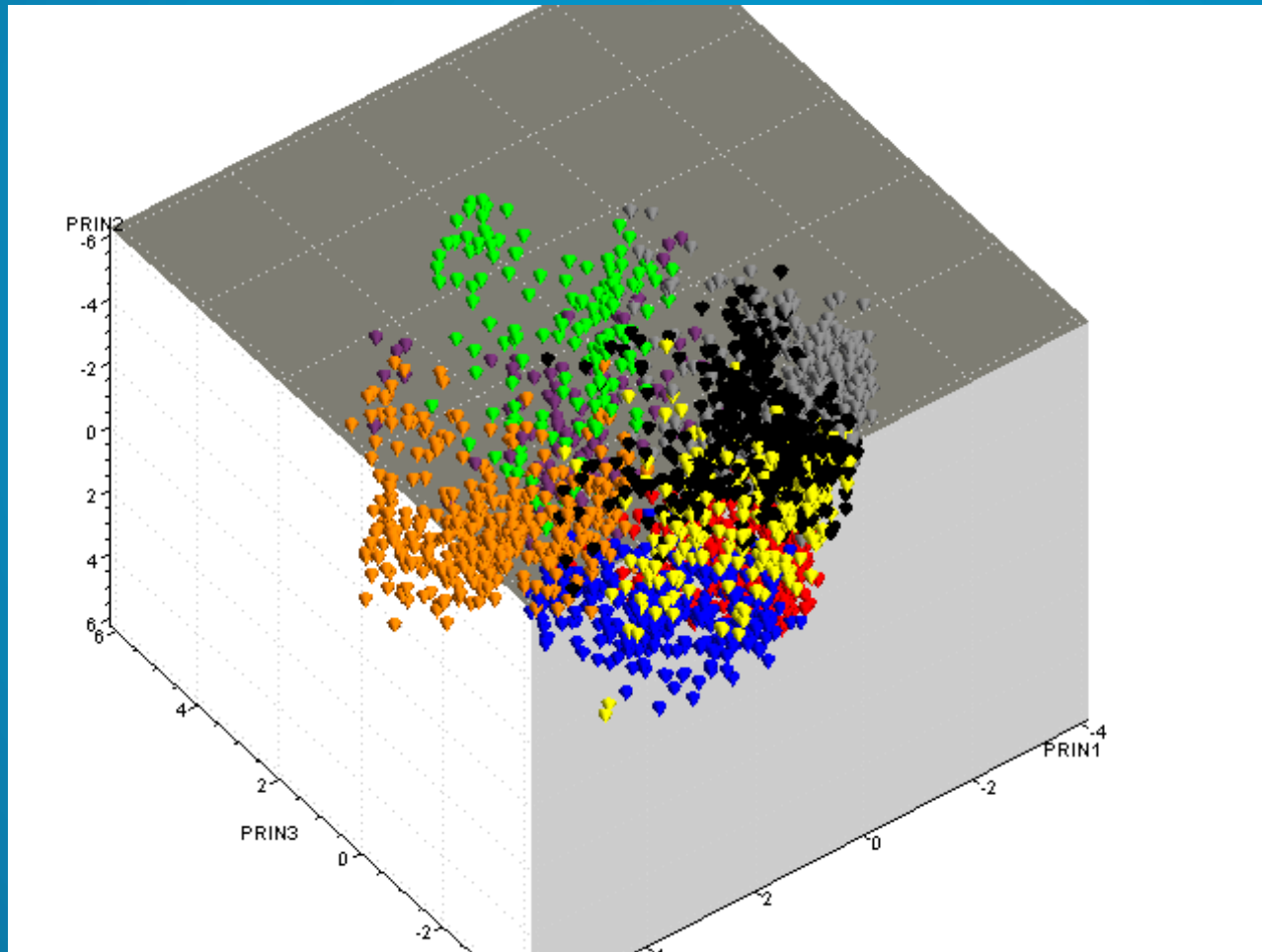
Section 3a: Segmentation



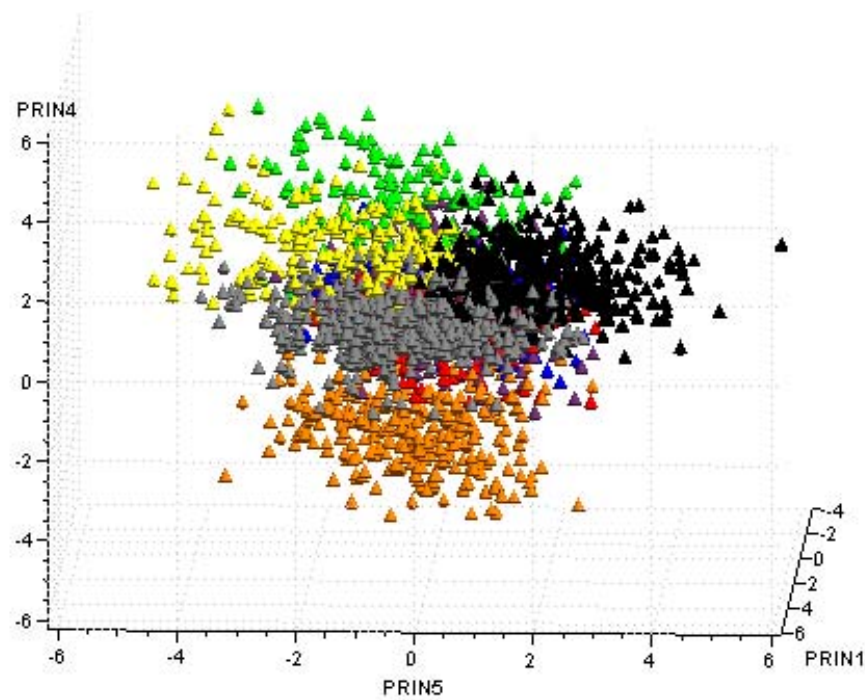
Section 3a: Segmentation



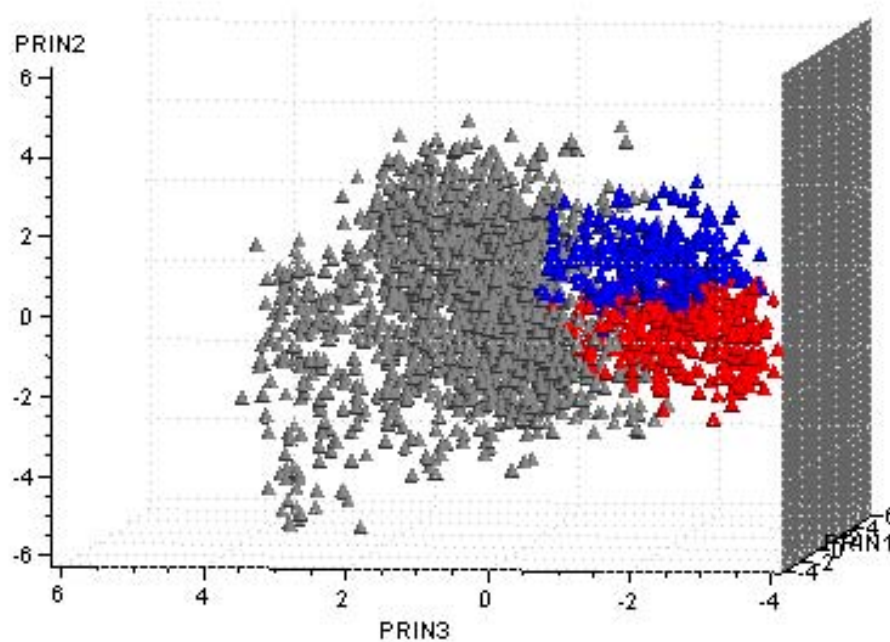
Section 3a: Segmentation



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Section 3a: Segmentation



Section 3a: Segmentation

Segment	Claim duration	Fund (predominant)	Gender	Age at accident
1A	short	Earners	more males	more younger and older people
1B	medium	Earners	more females	fewer young people
2	long	Treatment Injury	more females	more 50+, a lot more 60+
3	short	Work	more males	more older people (particularly 60+)
4	short	Work	more males	middle to late middle age
5	long	Non-Earners	more females	more young people
6	long	Motor Vehicle	fewer females	a lot more young people
7	very long	Residual Claims	mixed	less older people

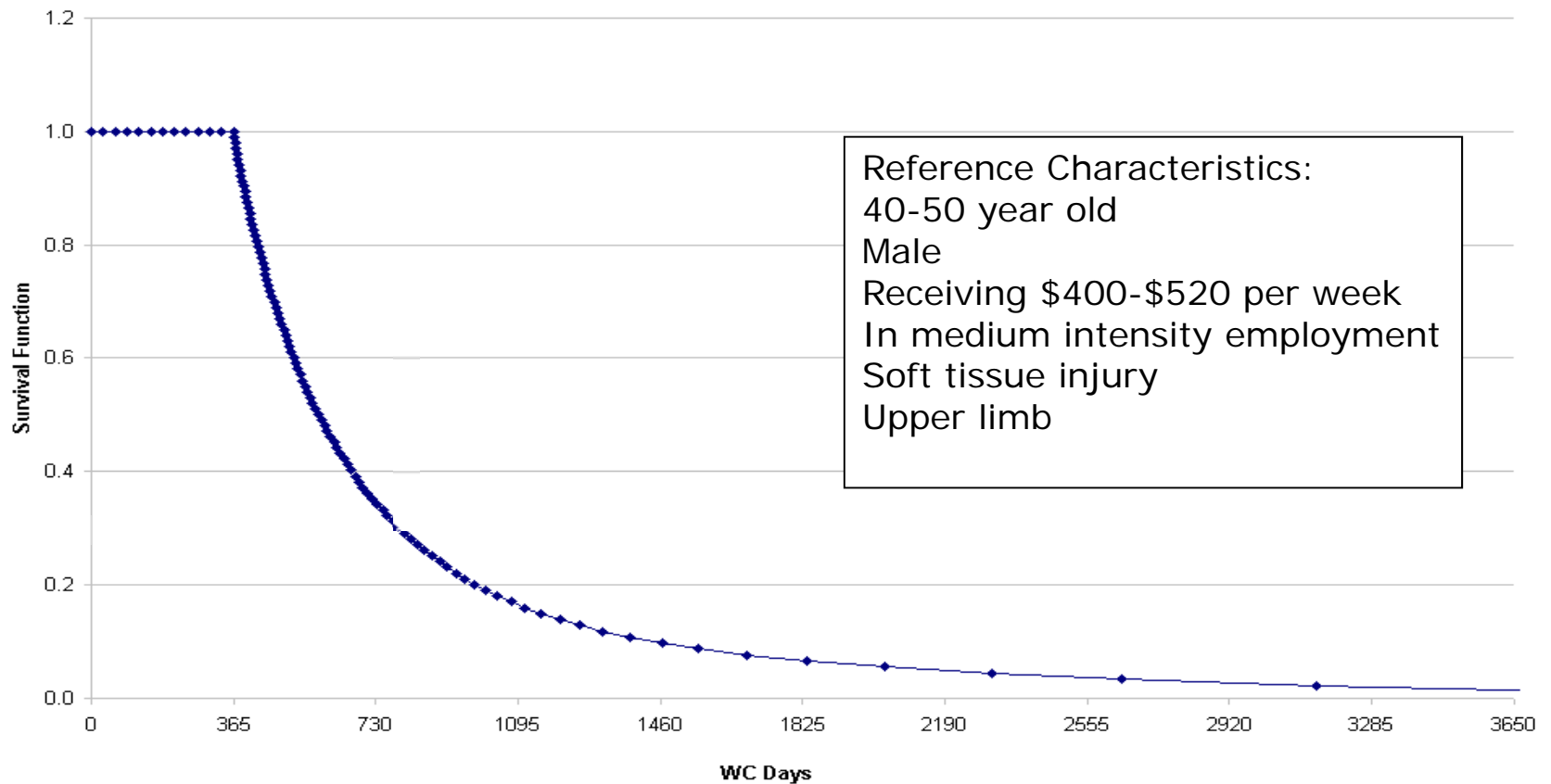
Section 3b: Survival Analysis

- Use **Survival Analysis** to project duration for claims with WC days longer than 365 days
- Use only claims data from January 2000 onwards
- Proportion hazards was used (after the assumptions were tested)
- Use claim related variables that are invariant to time, except for transfer to RIS.

Section 3b: Survival Analysis

- lag between injury and lodgement of claim
- multiple injury indicator
- injury diagnosis
- injury site
- scene of injury
- serious injury indicator
- at work injury indicator
- occupation
- pre-injury work strenuousness
- hours at weekend indicator
- WC rate per week
- gender
- age at start of WC payment

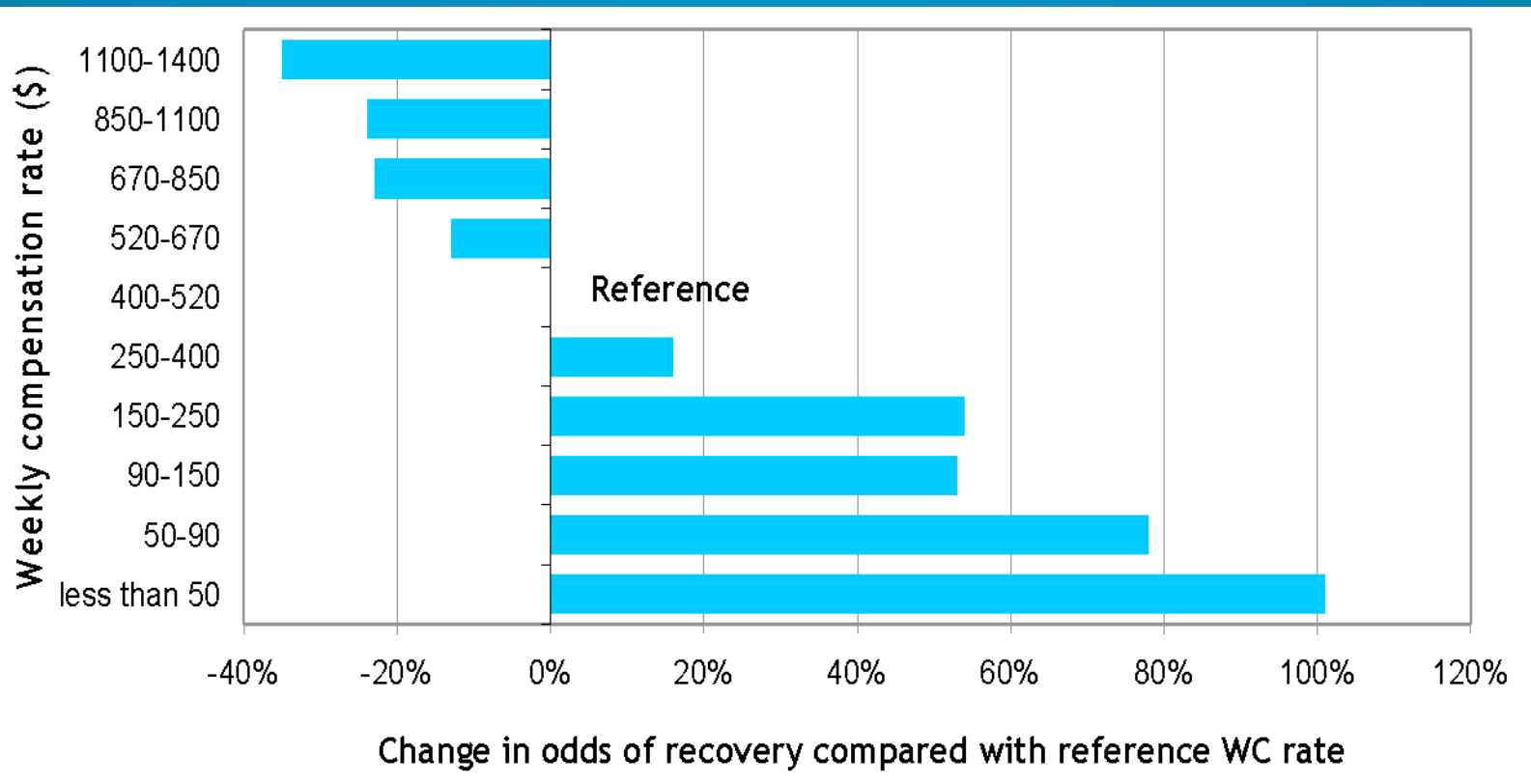
Section 3b: Survival Analysis



Section 3b: Survival Analysis

Variable	Parameter Estimate	Significance (P value)	Hazard Ratio
RIS	0.43	<.0001	1.54
Female	-0.15	<.0001	0.86
log_WCrate_less_4	0.63	<.0001	1.88
log_WCrate_4_to_4p5	0.59	<.0001	1.80
log_WCrate_4p5_to_5	0.47	<.0001	1.60
log_WCrate_5_to_5p5	0.42	<.0001	1.53
log_WCrate_5p5_to_6	0.18	<.0001	1.19
log_WCrate_6p25_to_6p5	-0.13	<.0001	0.88
log_WCrate_6p5_to_6p75	-0.24	<.0001	0.79
log_WCrate_6p75_to_7	-0.25	<.0001	0.78
log_WCrate_7_to_7p25	-0.22	0.00	0.81
log_WCrate_7p25_plus	-0.36	<.0001	0.70
zlog_WCrate_6_to_6p25	Reference	Reference	Reference

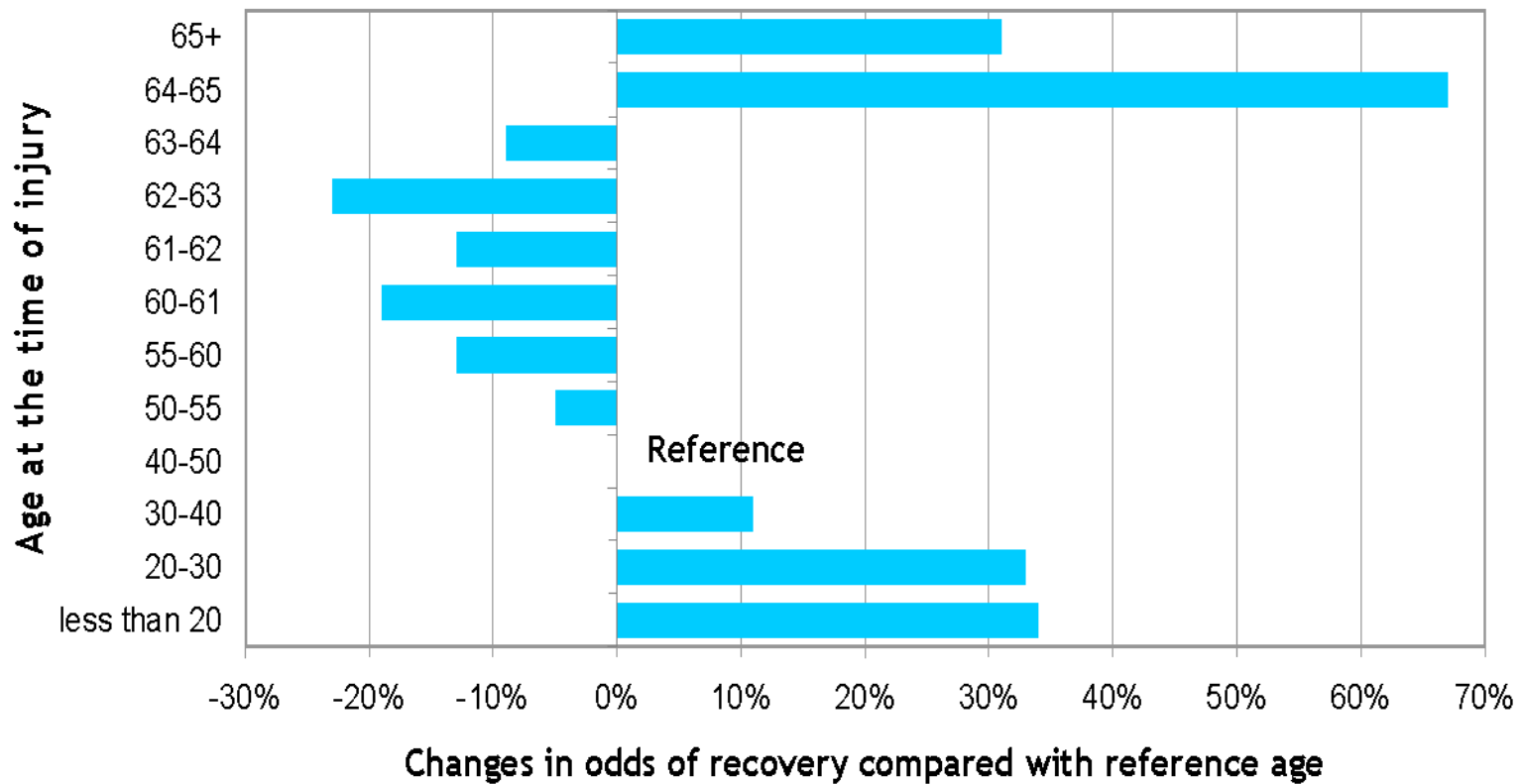
Section 3b: Survival Analysis



Section 3b: Survival Analysis

Variable	Parameter Estimate	Significance (P value)	Hazard Ratio
age_WC_start_less_20	0.33	<.0001	1.39
age_WC_start_20_to_30	0.29	<.0001	1.34
age_WC_start_30_to_40	0.12	<.0001	1.13
age_WC_start_50_to_55	-0.03	0.31	0.97
age_WC_start_55_to_60	-0.14	0.00	0.87
age_WC_start_60_to_61	-0.23	0.00	0.80
age_WC_start_61_to_62	-0.10	0.26	0.91
age_WC_start_62_to_63	-0.18	0.09	0.84
age_WC_start_63_to_64	-0.10	0.39	0.91
age_WC_start_64_to_65	0.50	<.0001	1.65
age_WC_start_65_to_66	0.36	0.02	1.43
age_WC_start_66_to_67	0.06	0.77	1.06
age_WC_start_67_plus	0.30	0.01	1.35
age_WC_start_40_to_50	Reference	Reference	Reference

Section 3b: Survival Analysis



Section 3b: Survival Analysis

Variable	Parameter Estimate	Significance (P value)	Hazard Ratio
DG_Amputation	-0.45	0.00	0.64
DG_Burn_Corrosion	-0.04	0.84	0.96
DG_Foreign_Body	0.10	0.75	1.11
DG_Gradual_Process	-0.04	0.31	0.96
DG_Hard_Tissue	-0.04	0.10	0.96
DG_Head_Trauma	-0.07	0.33	0.93
DG_Internal_Injury	-0.40	0.10	0.67
DG_Mental_Injury	0.16	0.22	1.17
DG_Other	-0.10	0.18	0.91
zDG_Soft_Tissue	Reference	Reference	Reference

Section 3b: Survival Analysis

Segment	RIS hazard ratio	Claim duration	Fund (predominant)	Gender	Age at accident
1A	1.49	short	Earners	more males	more younger and older people
1B	1.56	medium	Earners	more females	fewer young people
2	2.04	long	Treatment Injury	more females	more 50+, a lot more 60+
3	1.46	short	Work	more males	more older people (particularly 60+)
4	1.36	short	Work	more males	middle to late middle age
5	1.54	long	Non-Earners	more females	more young people
6	1.97	long	Motor Vehicle	fewer females	a lot more young people
7	1.48	very long	Residual Claims	mixed	less older people

Section 3b: Survival Analysis

Factor	Change in odds of recovery
Serious Injury	-84%
Multiple Injury	-16%
Female	-16%
Injury at work	-6%
Long lag between injury and claim	-6%
Hours at weekend	5%

Section 3b: Survival Analysis

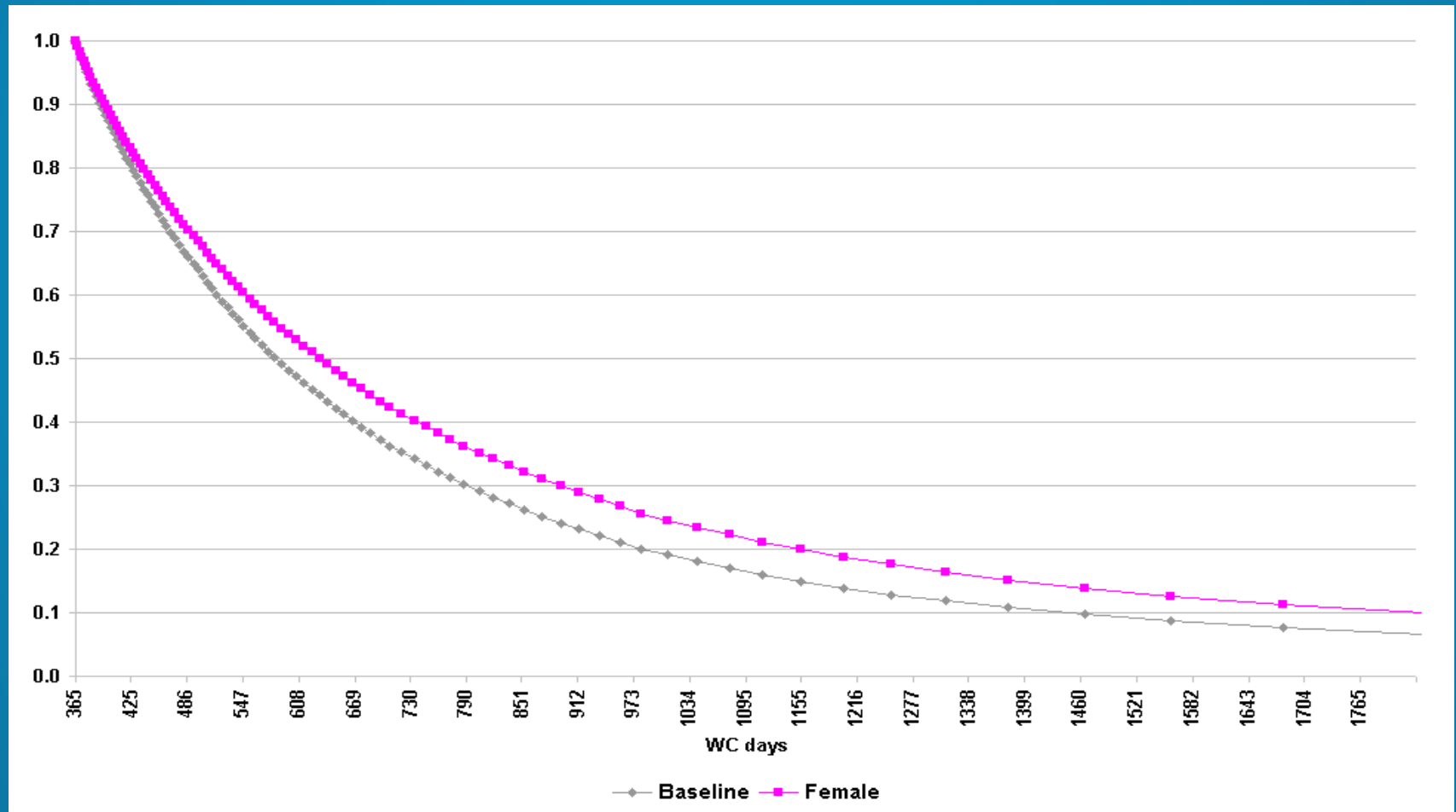
Factor	Influence on odds of recovery	Area of influence
Injury site	best	upper limb, lower limb
	worst	head/face, back/spine
Diagnosis	best	foreign body, mental injury
	worst	internal, head trauma
	in the middle	gradual proc, hard tissue, soft issue
Work type	best	very heavy, heavy
	worst	sedentary, light
Fund	best	Earners, Self-Employed Work
	worst	Residual Claims, Treatment Injury, Motor Vehicle

Section 3b: Survival Analysis

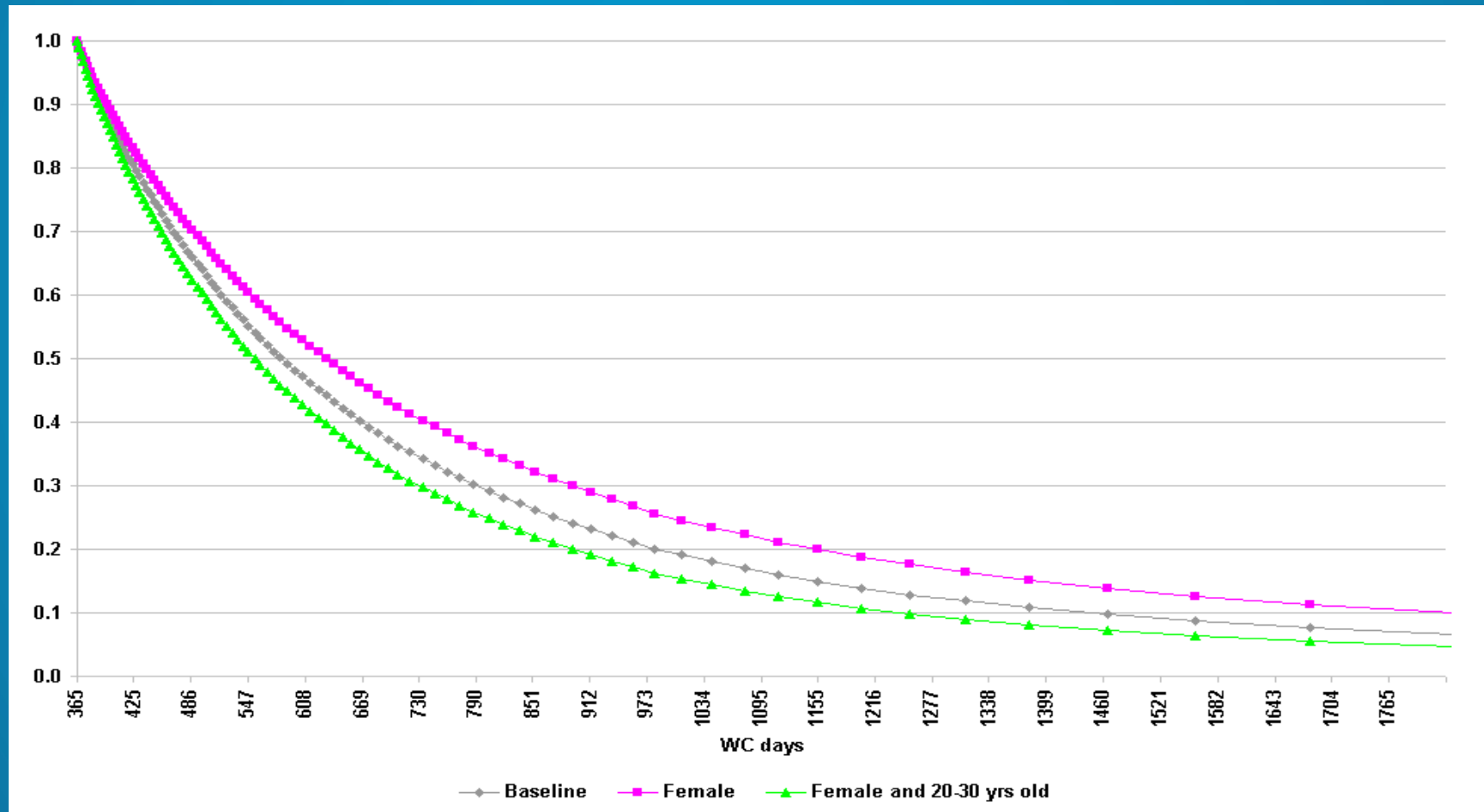
To get the predicted survival curve for each claim we:

- Take the baseline survival curve
- Adjust for the claim characteristics
- Adjust for how long they have survived so far
- Adjust for the introduction of the service delivery model
- Adjust for the claim being transferred to the RIS team

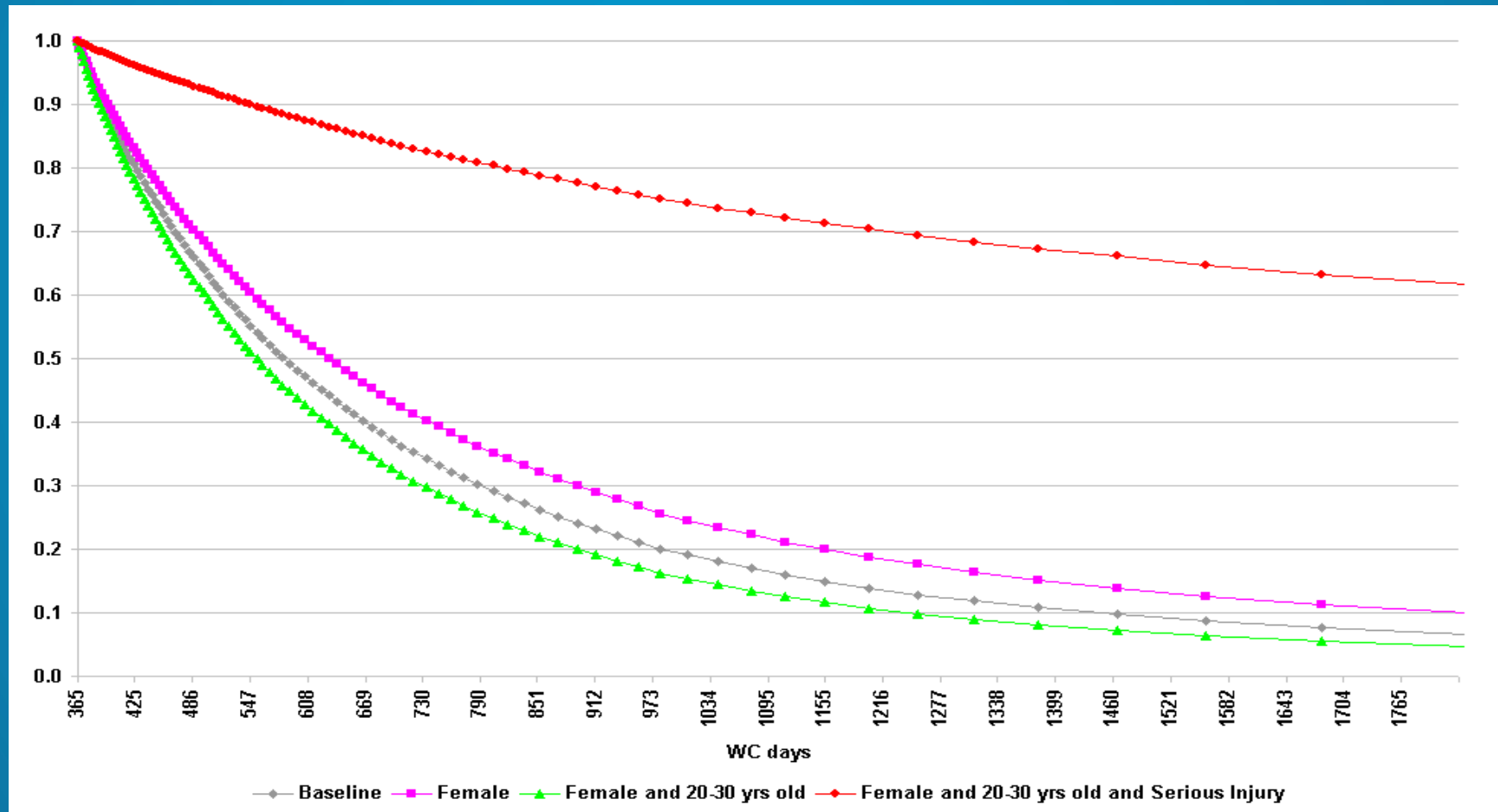
Section 3b: Survival Analysis



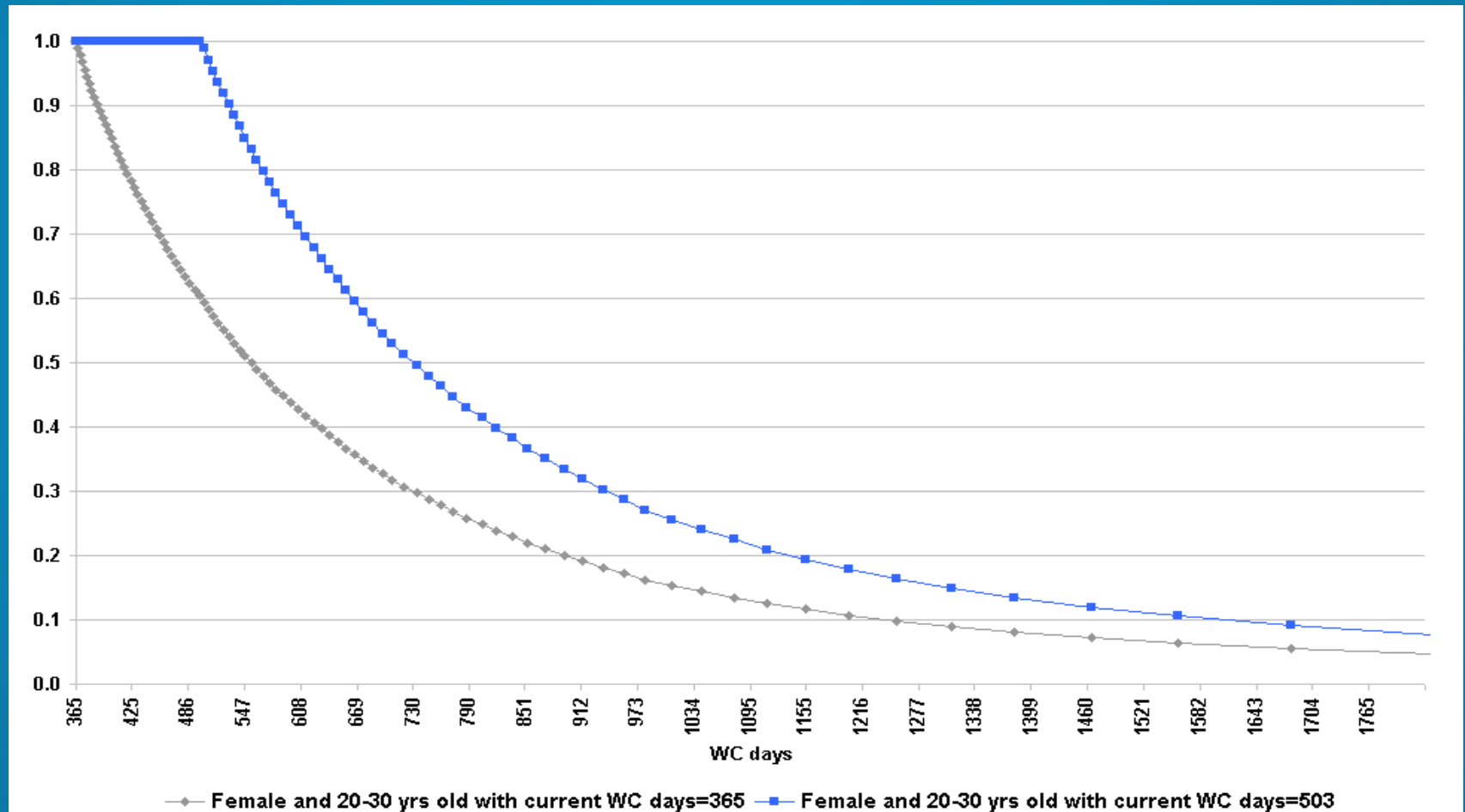
Section 3b: Survival Analysis



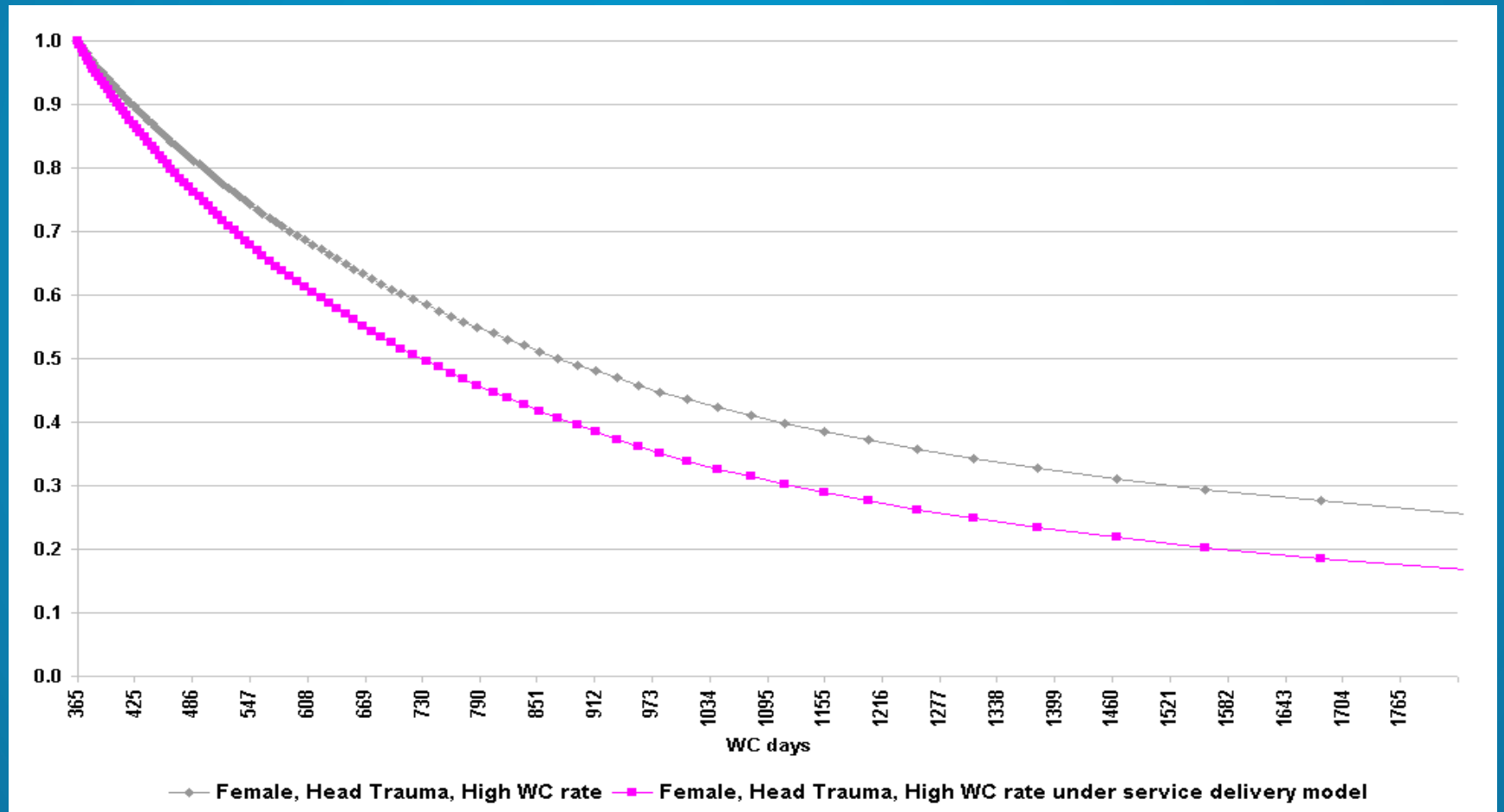
Section 3b: Survival Analysis



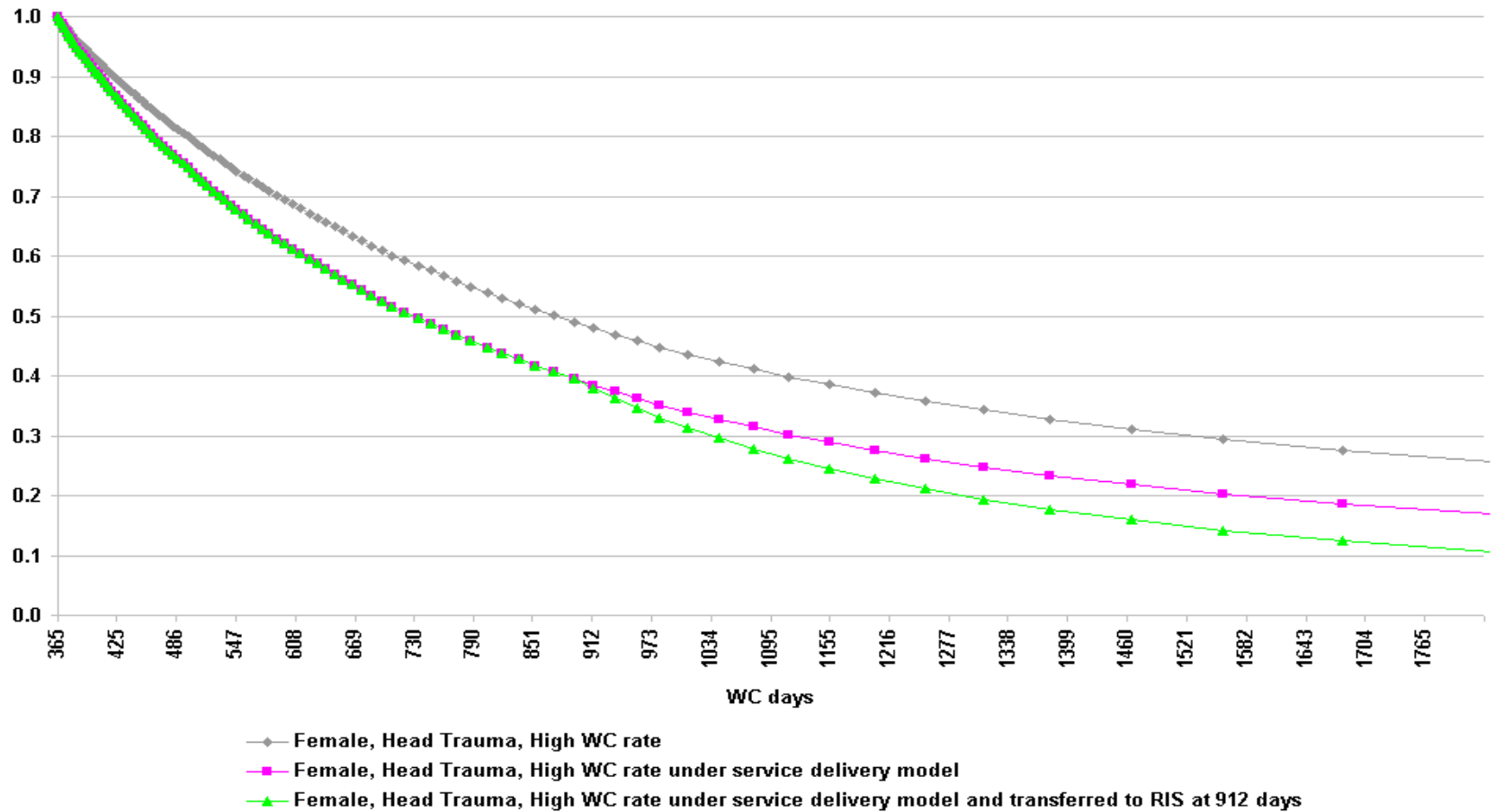
Section 3b: Survival Analysis



Section 3b: Survival Analysis



Section 3b: Survival Analysis



Section 3c: Simulation

In the simulation each claim has a simulated opening and closing date.

The advantages of using a simulation include:

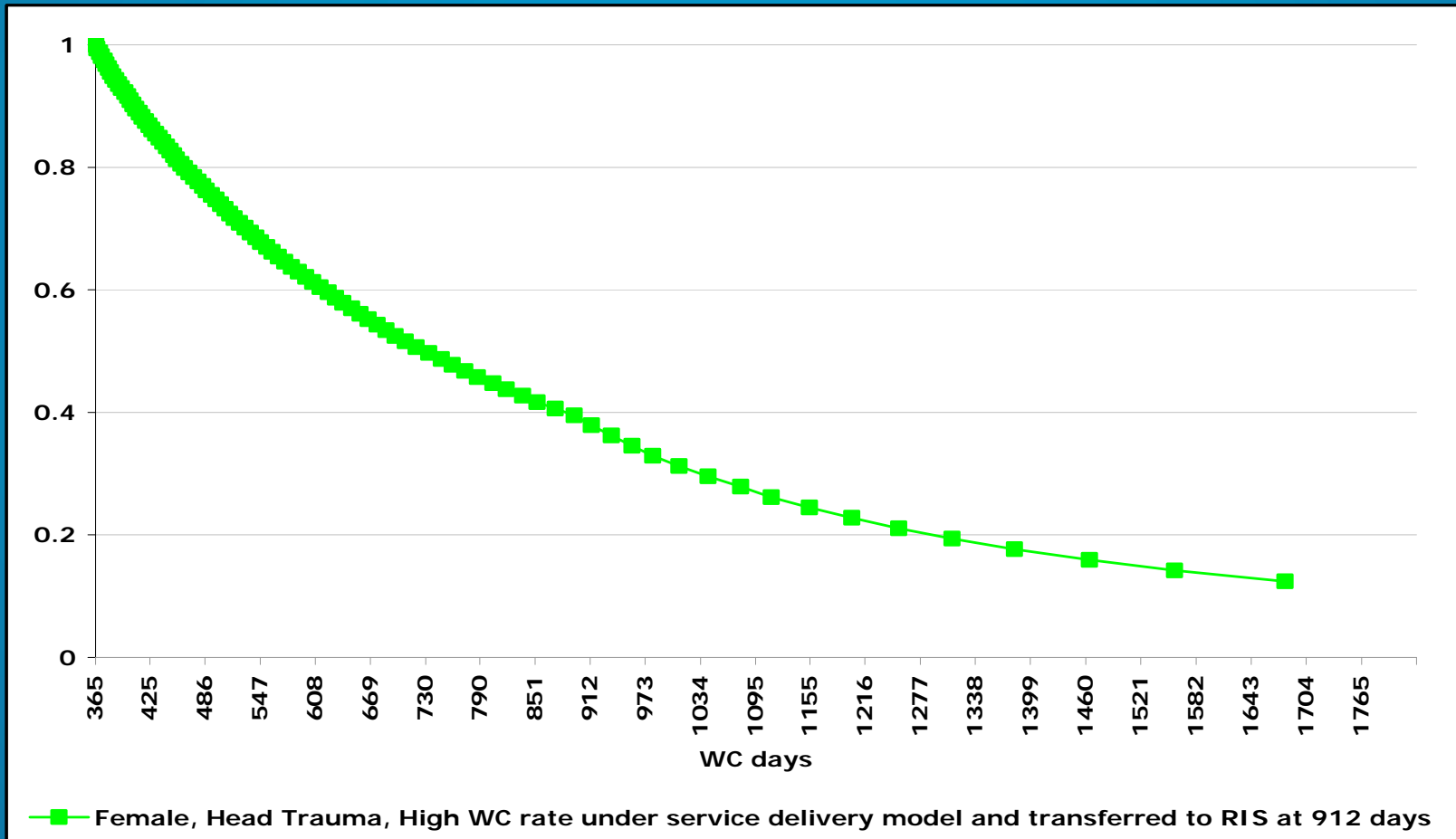
- Easier for non-statistical audience to understand the output
- Output has the same format as real data so we can run any existing report on the simulated data
- Easier to track changes in the case mix
- Easier to trial different scenarios such as number and case mix of new claims

Section 3c: Simulation

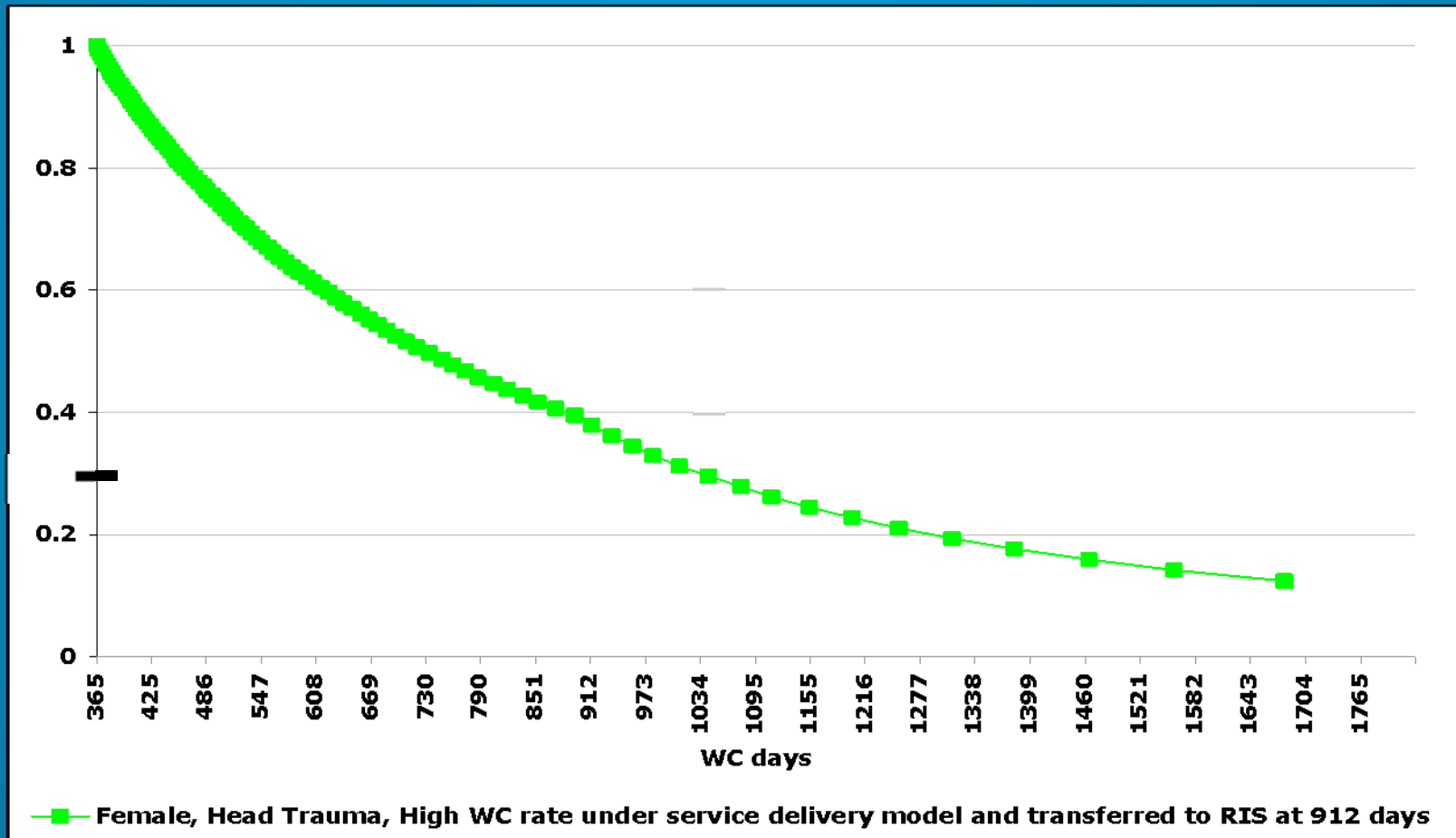
Modelling Steps

- Determine the baseline survival function for each claim
- Adjust for individual claim characteristics, the influence of RIS and the service delivery model
- Generate a random number ($U[0,1]$) and use it to determine the closing duration of the claim
- Simulate new claims by taking the last year of claims and putting them in again each year

Section 3c: Simulation

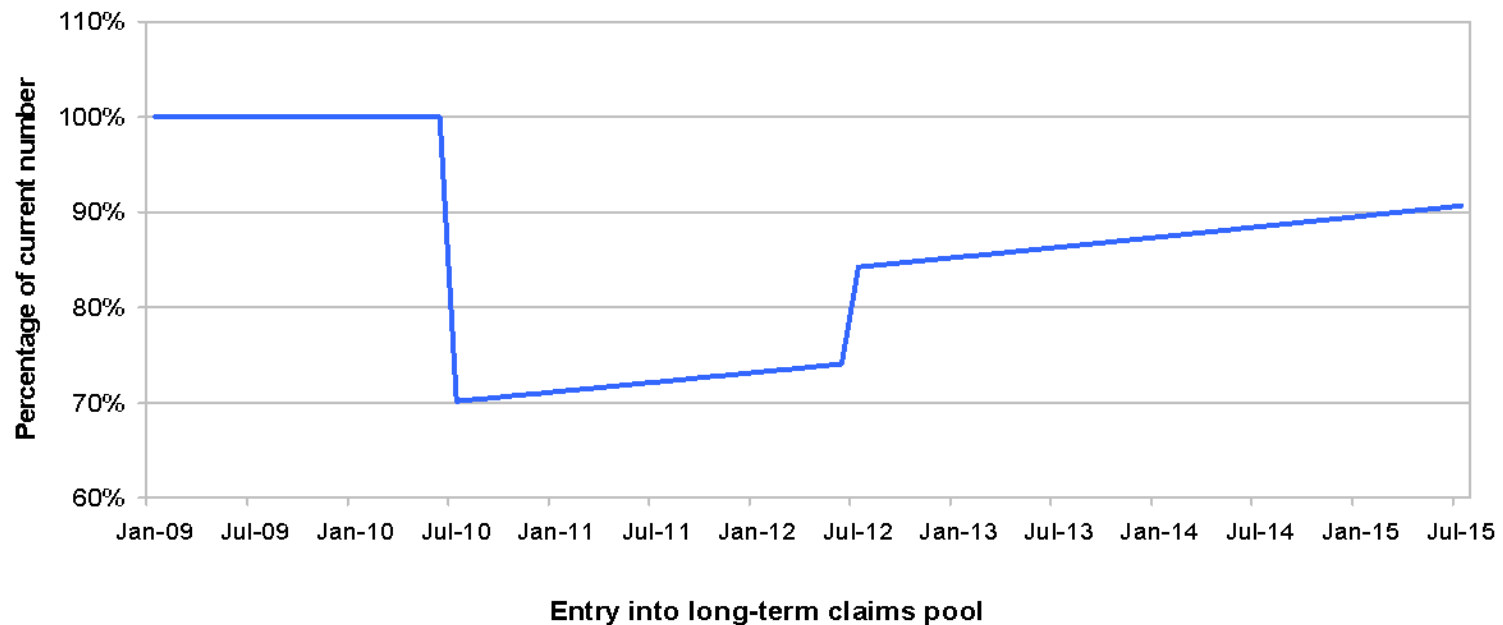


Section 3c: Simulation



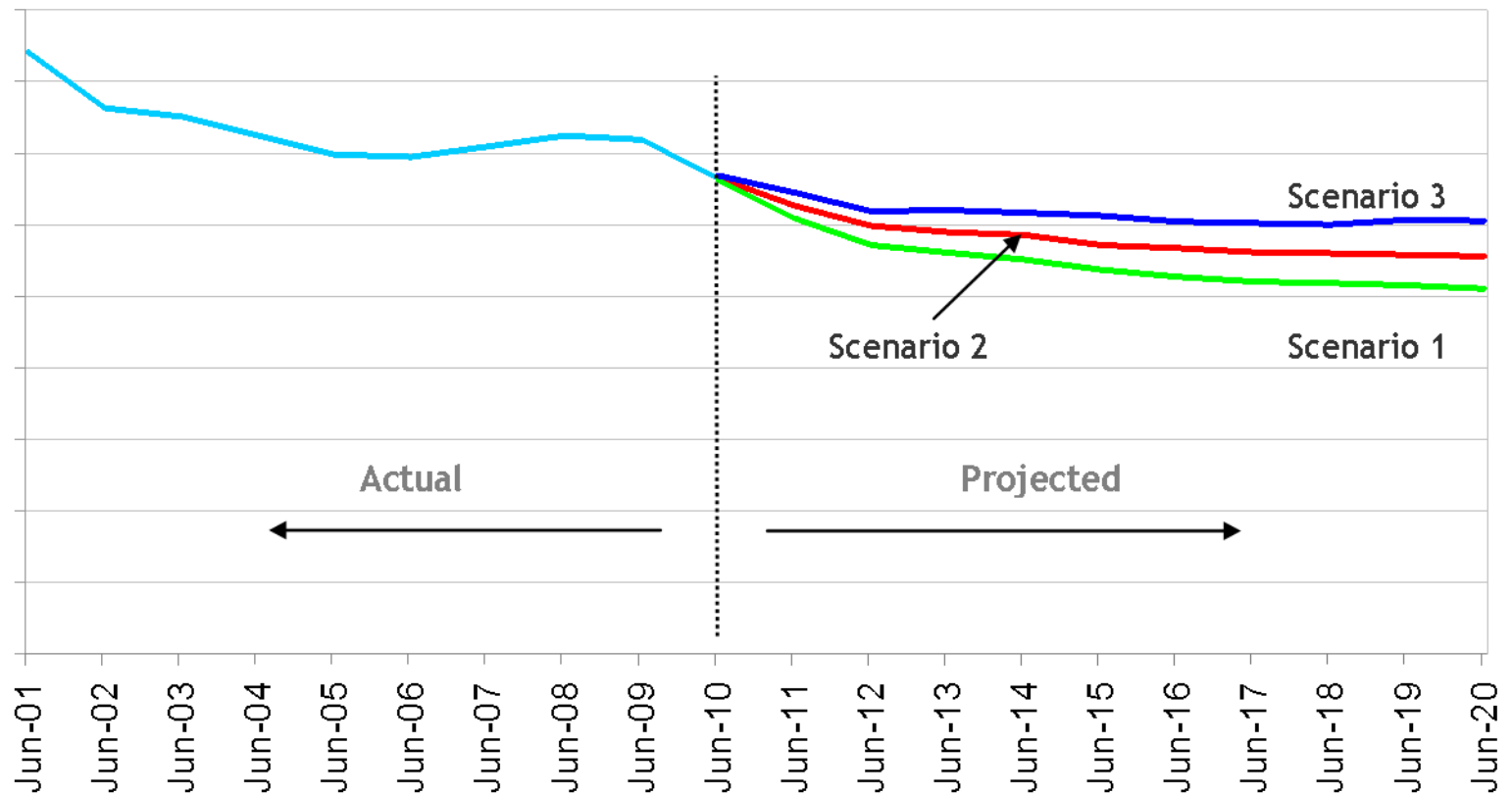
Section 3c: Simulation

Scenario	Short-term reduction in entries	Duration of short-term improvement	Long-term reduction in entries	RIS improvement	non-RIS improvement
1	35%	2 years	25%	65%	40%
2	30%	2 years	20%	50%	30%
3	25%	2 years	15%	40%	25%



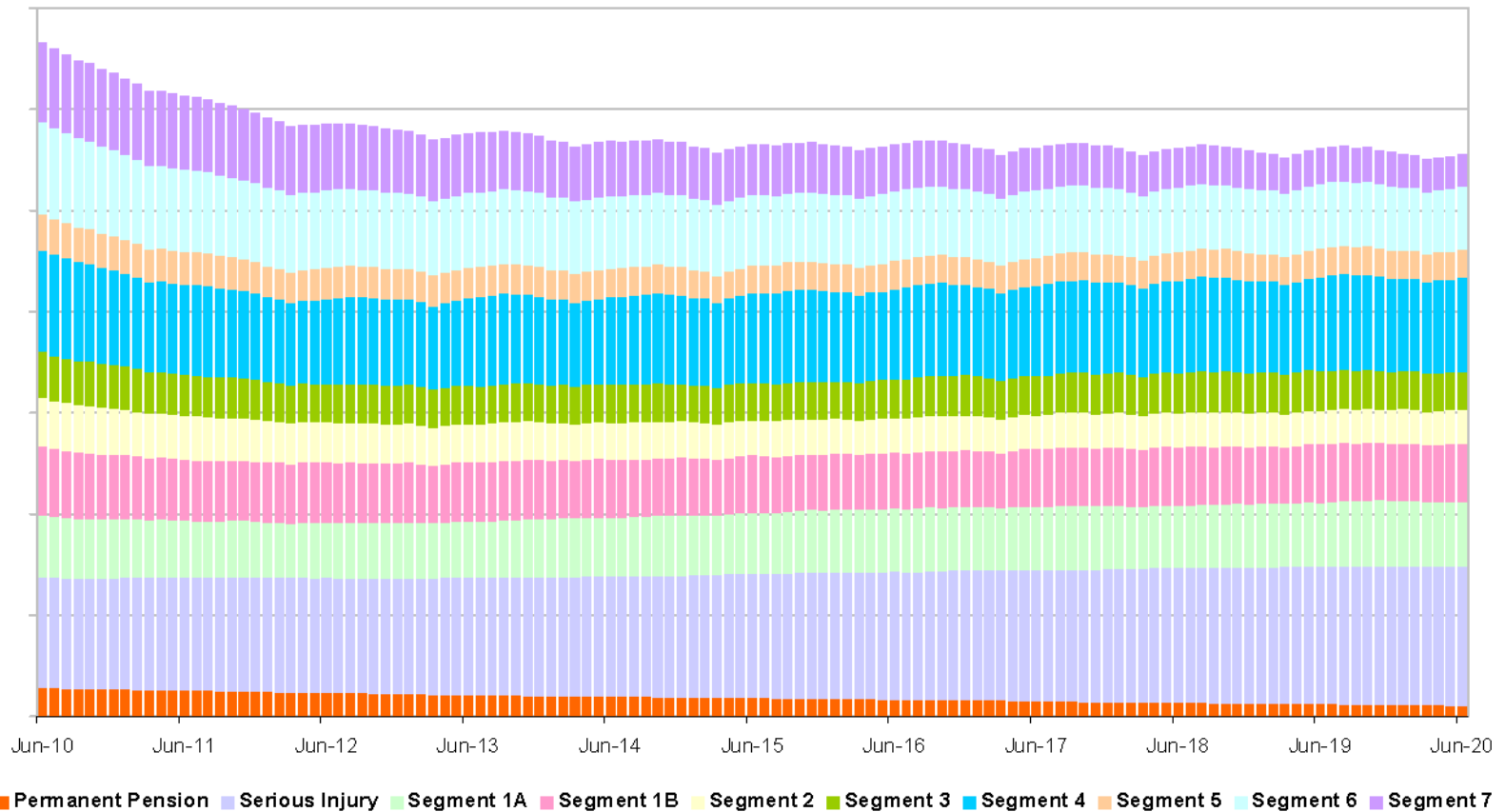
Section 3c: Simulation

Total Number of Long-Term Claims



Section 3c: Simulation

Scenario 2 - Total Long-Term Claims by Segment





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Questions...