Reading: Friedland 13 (Berquist-Sherman Methods)
Model: 2016.Spring #20
Problem Type: Reserving Methods - PBS (Paid Berq-Sherm)

Find Use the paid Berquist-Sherman method to calculate the unpaid for AY 2025

Given

AY	Cumulative Paid Counts (CPC) 12	24	36	48	Ultimate Counts
2022	55	61	85	91	100
2023	45	75	85		110
2024	55	75			121
2025	55				132

** May be development past 48 months*

AY	Cumulative Paid Loss ($000s) (CPL) 12	24	36	48
2022	200	230	245	248
2023	240	275	290	
2024	280	330		
2025	320			

** May be development past 48 months*

	parameters for 2-point exponential fit: $y = ae^{bx}$									
	0 - 12		12 - 24		24 - 36		36 - 48		48 - 60	
AY	a	b	a	b	a	b	a	b	a	b
2022	use 12 - 24 values		56	0.02357	196	0.00264	206	0.00203	not needed	
2023	use 12 - 24 values		196	0.00455	185	0.00533				
2024	use 12 - 24 values		178	0.00825						
2025	use 12 - 24 values									

Step 1a calculate CDR as: CPC / UC *(UC = Ultimate Counts)*

	Claims DIsposal Rate **(CDR)**			
AY	12	24	36	48
2022	0.550	0.610	0.850	**0.910**
2023	0.409	0.682	**0.773**	
2024	0.455	**0.620**		
2025	**0.417**			
last CY	**0.417**	**0.620**	**0.773**	**0.910**

<-- select LATEST DIAGONAL (not all-period-average)

We assume the latest diagonal reflects current disposal rates. (This is the most recent CY.)
We will restate all AYs to be at the level of this most recent CY.

Step 1b restate CPC using CDRs from last CY

	Restated Cumulative Paid Counts **(CPC)**			
AY	12	24	36	48
2022	42	62	77	91
2023	46	68	85	
2024	50	75		
2025	55			

===>

This "range" table is just a visual aid

	Range Relative to Original Paid Counts			
AY	12	24	36	48
2022	0-12	24-36	24-36	48-60
2023	12-24	12-24	36-48	
2024	0-12	24-36		
2025	12-24			

Ex: 42 = 0.417 x 100
Ex: 68 = 0.62 x 110

The range table is helpful in visualizing which data points and/or which regression parameters to use in Step 2.

Step 2 restate CPL using linear interpolation

	Restated Cumulative Paid Loss **(CPL)**			
AY	12	24	36	48
2022	153	231	240	248
2023	241	267	290	
2024	255	330		
2025	320			

Exs:
153 = (42-0)/(55-0)x(200-0)+0
267 = (68-45)/(75-45)x(275-240)+240
240 = (77-61)/(85-61)x(245-230)+230

or... restate CPL using exponential regression interpolation

	Restated Cumulative Paid Loss **(CPL)**			
AY	12	24	36	48
2022	151	231	240	248
2023	242	267	290	
2024	269	330		
2025	320			

151 = 56 x EXP(0.02357 x 42)
267 = 196 x EXP(0.00455 x 68)
240 = 196 x EXP(0.00264 x 77)

Step 3a apply development method to restated CPL

LDFs

AY	12-24	24-36	36-48	**48-ult**
2022	1.510	1.039	1.033	
2023	1.108	1.086		
2024	1.294			*tail*
2025				*factor:*
selected	1.304	1.063	1.033	**1.016**

CDFs

	12-24	24-36	36-48	48-ult
age -> ult	1.455	1.116	1.050	**1.016**

Ults.

	'25@12	**'24@24**	**'23@36**	**'22@48**
diagonal	320	330	290	248
ultimate	465	368	304	252

or... apply development method to restated CPL

AY	12-24	24-36	36-48	**48-ult**
2022	1.530	1.039	1.033	
2023	1.103	1.086		
2024	1.227			*tail*
2025				*factor:*
selected	1.287	1.063	1.033	**1.016**

	12-24	24-36	36-48	48-ult
age -> ult	1.435	1.116	1.050	**1.016**

	'25@12	**'24@24**	**'23@36**	**'22@48**
diagonal	320	330	290	248
ultimate	459	368	304	252

Step 3b
unpaid for AY 2025 = 145 *<-- estimate based on LINEAR INTERPOLATION*
unpaid for AY 2025 = 139 *<-- estimate based on EXPONENTIAL REGRESSION INTERPOLATION*

Step 3c The estimate of ultimate using exponential regression differs from the estimate using liner interpolation by: -4.14%
(Step 3c was just for fun to see if there is any real difference between linear and exponential interpolation.)

Reading:	Friedland 13 (Berquist-Sherman Methods)	F-13 (020) Paid BerqSherm (Problem 2)
Model:	2016.Spring #20	
Problem Type:	Reserving Methods - PBS (Paid Berq-Sherm)	

Find Use the paid Berquist-Sherman method to calculate the ultimate for AY 2025

Given

	Cumulative Paid Counts **(CPC)**				Ultimate
AY	12	24	36	48	Counts
2022	590	660	680	700	970
2023	560	880	865		1,350
2024	650	835			1,475
2025	535				1,560

**** May be development past 48 months***

	Cumulative Paid Loss ($000s) **(CPL)**			
AY	12	24	36	48
2022	1,860	2,050	2,350	2,500
2023	2,260	3,330	3,310	
2024	2,400	2,970		
2025	3,140			

**** May be development past 48 months***

	parameters for 2-point exponential fit: $y = ae^{bx}$									
	0 - 12		12 - 24		24 - 36		36 - 48		48 - 60	
AY	a	b	a	b	a	b	a	b	a	b
2022	use 12 - 24 values		819	0.00139	23	0.00685	287	0.00310	not needed	
2023	use 12 - 24 values		1,147	0.00121	2,339	0.00040				
2024	use 12 - 24 values		1,135	0.00115						
2025	use 12 - 24 values									

Step 1a calculate CDR as: CPC / UC *(UC = Ultimate Counts)*

F-13 (020) Paid BerqSherm (Solution 2)

	Claims DIsposal Rate (CDR)			
AY	12	24	36	48
2022	0.608	0.680	0.701	0.722
2023	0.415	0.652	0.641	
2024	0.441	0.566		
2025	0.343			
last CY	0.343	0.566	0.641	0.722

<-- select LATEST DIAGONAL (not all-period-average)

We assume the latest diagonal reflects current disposal rates. (This is the most recent CY.) We will restate all AYs to be at the level of this most recent CY.

Step 1b restate CPC using CDRs from last CY

This "range" table is just a visual aid

	Restated Cumulative Paid Counts (CPC)			
AY	12	24	36	48
2022	333	549	622	700
2023	463	764	865	
2024	506	835		
2025	535			

===>

	Range Relative to Original Paid Counts			
AY	12	24	36	48
2022	0-12	0-12	12-24	48-60
2023	0-12	12-24	12-24	
2024	0-12	24-36		
2025	12-24			

Ex: 333 = 0.343 x 970
Ex: 764 = 0.566 x 1350

The range table is helpful in visualizing which data points and/or which regression parameters to use in Step 2.

Step 2 restate CPL using linear interpolation

or... restate CPL using exponential regression interpolation

	Restated Cumulative Paid Loss (CPL)			
AY	12	24	36	48
2022	1,050	385	1,915	2,500
2023	1,869	2,942	3,310	
2024	1,868	2,970		
2025	3,140			

	Restated Cumulative Paid Loss (CPL)			
AY	12	24	36	48
2022	1,301	988	1,974	2,500
2023	2,008	2,891	3,310	
2024	2,031	2,970		
2025	3,140			

Exs:

1,050 = (333-0)/(590-0)x(1860-0)+0
2,942 = (764-560)/(880-560)x(3330-2260)+2260
1,915 = (622-680)/(700-680)x(2500-2350)+2350

1,301 = 819 x EXP(0.00139 x 333)
2,891 = 1147 x EXP(0.00121 x 764)
1,974 = 287 x EXP(0.0031 x 622)

Step 3a apply development method to restated CPL

apply development method to restated CPL

LDFs

AY	12-24	24-36	36-48	48-ult
2022	0.367	4.974	1.305	
2023	1.574	1.125		
2024	1.590			*tail*
2025				*factor:*
selected	1.177	3.050	1.305	1.142

or...

AY	12-24	24-36	36-48	48-ult
2022	0.759	1.998	1.266	
2023	1.440	1.145		
2024	1.462			*tail*
2025				*factor:*
selected	1.220	1.572	1.266	1.125

CDFs

	12-24	24-36	36-48	48-ult
age -> ult	5.351	4.546	1.491	1.142

	12-24	24-36	36-48	48-ult
age -> ult	2.732	2.239	1.424	1.125

Ults.

	'25@12	'24@24	'23@36	'22@48
diagonal	3,140	2,970	3,310	2,500
ultimate	16,802	13,502	4,935	2,856

	'25@12	'24@24	'23@36	'22@48
diagonal	3,140	2,970	3,310	2,500
ultimate	8,578	6,648	4,715	2,813

Step 3b ultimate for AY 2025 = 16,802 *<-- estimate based on LINEAR INTERPOLATION*
ultimate for AY 2025 = 8,578 *<-- estimate based on EXPONENTIAL REGRESSION INTERPOLATION*

Step 3c The estimate of ultimate using exponential regression differs from the estimate using liner interpolation by: -48.95%

(Step 3c was just for fun to see if there is any real difference between linear and exponential interpolation.)