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Calculating AOE Reserves Using Limited Claim Transaction Data

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AOE versus Loss & DCCE

Comparison of AOE to Loss and DCCE Reserves

	AOE	Loss & DCCE
% of Industry Reserves	5%	95%
CAS Part 6 Learning Objectives	1	12
Data Collected by Rating Bureaus	No	Yes
Adequacy Measured by IRIS Tests	No	Yes
Advanced Statistical Methodologies	???	Many
CLRS Sessions Devoted to Topic	1	Most of the Others

Definition of AOE

ii. AO are those expenses other than DCC as defined in (i) above assigned to the expense group “Loss Adjustment Expense” AO include, but are not limited to the following items:
   (a) Fees and expenses of adjusters and settling agents;
   (b) Loss adjustment expenses for participation in voluntary and involuntary market pools if reported by calendar year;
   (c) Attorney fees incurred in the determination of coverage, including litigation between the reporting entity and the policyholder; and
   (d) Fees and salaries for appraisers, private investigators, hearing representatives, inspectors and fraud investigators, if working in the capacity of an adjuster.

Source: Statement of Statutory Accounting Principles No. 55

Unique Characteristics of AOE

- Lack of standardized data
  - No case reserves
  - Lack of triangle data by accident year
  - Often internal studies are the only source of real costs
  - Use of calendar year paid data
  - Transaction counts play a larger role
  - Unallocated needs to be “allocated”
    - Portion of CY expense payments allocated to AOE and/or LOB
    - AOE payments and reserves allocated back by AY and LOB
    - Allocation of overhead costs such as rent and utilities to claims handling function

Unique Characteristics of AOE (Cont'd)

- Lack of uniformity handling claims
  - Internal claims departments
  - Third party administrators
  - Insured settles their own claims below a threshold
- Lack of responsibility (for adequacy of reserves)
  - Difficult to test retrospectively
- Standard reserving methodologies don't usually apply
  - Paid to paid and count based methodologies mostly used
  - Methodology often developed based on knowledge insurer has about claims process and data available
- Run-Off calculation

“Recent” Literature

“Estimating ULAE Liabilities: Rediscovering and Expanding Kittel’s Approach” , Robert F. Conger & Alejandra Nolibos, 2003

Summarizes traditional approaches and introduces a generalized dollar based methodology. Currently the only ULAE/AOE paper on the CAS Syllabus.

“Using Claim Department Work Measurement Systems to Determine Claim Adjustment Expense Reserves”, Joanne S. Spalla, 2001

Uses an automated work measurement system to determine the cost of handling different types of claims and determine associated claim adjuster expense liabilities.

“Two Alternative Methods for Calculating the Unallocated Loss Adjustment Expense Reserves”, Donald Mango & Craig A. Allen, 1999

Presents two alternative methods to the paid to paid, and Wendy Johnson method to address their shortcomings.

“Recent” Literature

“Determination of Outstanding Liabilities for Unallocated Loss Adjustment Expenses” , Wendy A. Johnson, 1988

Introduces a methodology based on claim reporting and closure patterns. Utilizes average cost per historical “weighted” number of open claim counts.

“Unallocated Loss Adjustment Expense Reserves in an Inflationary Environment”, John Kittel , 1981

Adjusts the standard techniques for changing factors in the business environment such as staffing changes and inflation. Examines impact of various components on estimating ULAE reserves.

Our Example

Background

- Previous AOE payments allocated to AY were inappropriate
  - Percentage of expenses allocated to AOE was overstated and unchanged for many years
  - Insurer historically allocated AOE payments based on a percentage of all expense payments
- Insurer expressed a desire to allocate AOE by accident year to better reflect reality
- Limited available data
- Desire to incorporate client insights
- Single line of business

Data Available to Us

Data	History Available
Reported Claim Count Triangle	Last 16 AY
Calendar Year AOE Payments	Latest CY
Open Claim Counts by AY	Last 3 CY
Closed Claims by AY	Last 2 CY
Claim Payment Counts by AY(both interim and final)	Latest CY

Assumptions

- AOE is paid when:
  - Claims are first opened or reopened,
  - Payments are made, and
  - Claims are closed (with or without payment)
- The relativity of transaction costs between the reporting of a claim and payments/closings is constant
  - For our example, relativities of 5:1 and 3:1 are used based on discussion with insurer personnel
  - Assumes same cost to make a payment or close a claim
- Fixed overhead costs and claim maintenance costs when there is no payment activity are negligible.
- Claim costs will rise by a fixed percentage each year
  - For our example, 0% and 4% are used

Outline of our Methodology

1. Estimate claim reporting pattern and related IBNR claim counts
2. Calculate average AOE cost incurred to (a) open a claim and (b) make a payment or close a claim
3. Trend the average transaction costs
4. Determine AOE reserves associated with future claim reportings
5. Calculate claim settlement pattern
6. Determine ratio of claim closings to total payments & closings
7. Calculate combined payment / closed claim pattern
8. Determine AOE reserves associated with future claim payments/closings

Methodology
Calculations - An Example

Estimate of IBNR Claim Counts

Step 1 - Estimate claim reporting pattern and related IBNR claim counts

AY	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
1993	406	361	134	44	20	10	0	5	0	0	10	5	0	0	0	0
1994	390	365	126	59	5	19	0	0	5	0	10	0	0	0	0	*0*
1995	408	210	120	36	24	6	0	0	0	6	0	6	0	0	*0*	*0*
1996	581	301	63	35	63	56	33	12	13	13	2	9	1	*0*	*0*	*0*
1997	737	494	69	60	8	0	0	8	0	0	0	0	*1*	*0*	*0*	*0*
1998	865	399	77	38	7	25	31	0	0	0	0	*1*	*1*	*0*	*0*	*0*
1999	847	435	40	48	8	40	0	0	0	0	*1*	*1*	*1*	*0*	*0*	*0*
2000	936	452	94	14	30	6	0	2	0	*2*	*2*	*2*	*2*	*0*	*0*	*0*
2001	1,005	480	33	42	6	2	1	3	*2*	*2*	*2*	*2*	*2*	*0*	*0*	*0*
2002	1,201	352	169	26	4	5	1	*4*	*2*	*2*	*2*	*2*	*2*	*0*	*0*	*0*
2003	1,498	271	97	96	19	18	*6*	*4*	*2*	*2*	*2*	*2*	*2*	*0*	*0*	*0*
2004	1,749	618	89	123	31	*21*	*8*	*5*	*3*	*3*	*3*	*3*	*3*	*0*	*0*	*0*
2005	1,847	630	201	210	*29*	*23*	*9*	*6*	*3*	*3*	*3*	*3*	*3*	*0*	*0*	*0*
2006	1,982	640	62	*121*	*28*	*23*	*9*	*6*	*3*	*3*	*3*	*3*	*3*	*0*	*0*	*0*
2007	1,702	524	*122*	*106*	*25*	*20*	*7*	*5*	*3*	*3*	*3*	*3*	*3*	*0*	*0*	*0*
2008	1,744	*610*	*129*	*112*	*26*	*21*	*8*	*5*	*3*	*3*	*3*	*3*	*3*	*0*	*0*	*0*

Using the historical reported claim count development triangle, and selected age to age factors, reported claim counts are developed to ultimate. Taking the differences in the cumulative claim counts, one can calculate the incremental claims to be reported in each future calendar year.

Average AOE Cost

Step 2 - Calculate average AOE cost incurred to open a claim and make a payment or close a claim

	5:1 Ratio
(1) CY AOE Payments	*$6,105,000*
(2) Number of Claims Reported during CY	*2,594*
(3) Number of Payments & Closings Made during CY	*3,339*
(4) Average AOE to Open a Claim = Row (1) / [Row (2) x 5 + Row (3)]	*$1,871.67*
(5) Average AOE per Claim Payment = Row (4) ÷ 5	*$374*

Although the average AOE incurred based on the transaction type is not readily available, the average costs by type can approximated based on an understanding of the claim handling function of an insurer.

Trending AOE Costs – IBNR Claims

Step 3 – Trend the average transaction costs (for IBNR claims)

Projected Unpaid AOE on IBNR Counts (B)																
AY	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
1993																
1994																1,947
1995															1,947	2,024
1996														1,947	2,024	2,105
1997													1,947	2,024	2,105	2,190
1998												1,947	2,024	2,105	2,190	2,277
1999											1,947	2,024	2,105	2,190	2,277	2,368
2000										1,947	2,024	2,105	2,190	2,277	2,368	2,463
2001									1,947	2,024	2,105	2,190	2,277	2,368	2,463	2,562
2002								1,947	2,024	2,105	2,190	2,277	2,368	2,463	2,562	2,664
2003							1,947	2,024	2,105	2,190	2,277	2,368	2,463	2,562	2,664	2,771
2004						1,947	2,024	2,105	2,190	2,277	2,368	2,463	2,562	2,664	2,771	2,881
2005					1,947	2,024	2,105	2,190	2,277	2,368	2,463	2,562	2,664	2,771	2,881	2,997
2006				1,947	2,024	2,105	2,190	2,277	2,368	2,463	2,562	2,664	2,771	2,881	2,997	3,116
2007			1,947	2,024	2,105	2,190	2,277	2,368	2,463	2,562	2,664	2,771	2,881	2,997	3,116	3,241
2008		1,947	2,024	2,105	2,190	2,277	2,368	2,463	2,562	2,664	2,771	2,881	2,997	3,116	3,241	3,371

$1,871.67 Average AOE cost per IBNR claim x 1.04 trend = $1,946.53

Trending AOE Costs – Payments/Closings

Step 3 – Trend the average AOE transaction costs (for interim payments and closing of claims)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1993	389															
1994	389	405														
1995	389	405	421													
1996	389	405	421	438												
1997	389	405	421	438	455											
1998	389	405	421	438	455	474										
1999	389	405	421	438	455	474	493									
2000	389	405	421	438	455	474	493	512								
2001	389	405	421	438	455	474	493	512	533							
2002	389	405	421	438	455	474	493	512	533	554						
2003	389	405	421	438	455	474	493	512	533	554	576					
2004	389	405	421	438	455	474	493	512	533	554	576	599				
2005	389	405	421	438	455	474	493	512	533	554	576	599	623			
2006	389	405	421	438	455	474	493	512	533	554	576	599	623	648		
2007	389	405	421	438	455	474	493	512	533	554	576	599	623	648	674	
2008	389	405	421	438	455	474	493	512	533	554	576	599	623	648	674	701

$1946.53 Average AOE cost per IBNR claim ÷ 5 = $389.31 Average AOE cost per payment/closing

AOE Reserves Associated w/ IBNR Claims

Step 4 - Determine AOE reserves associated with future reporting of claims – No Trend

From Slide 16

Accident Year	(1) Reported Claims at 12/31/08	(2) Ultimate Claim Count	(3) IBNR Claims (2)-(1)
1993	995	995	0
1994	979	979	0
1995	816	816	0
1996	1,182	1,182	0
1997	1,376	1,377	1
1998	1,442	1,444	2
1999	1,418	1,421	3
2000	1,534	1,542	8
2001	1,572	1,582	10
2002	1,758	1,772	14
2003	1,999	2,019	20
2004	2,610	2,659	49
2005	2,888	2,970	82
2006	2,684	2,886	202
2007	2,226	2,526	300
2008	1,744	2,670	926
Total	**27,223**	**28,840**	**1,617**

AOE Reserves associated with IBNR claims = 1,617 claims x $1,871.67 Avg. AOE = $3,026,484

IBNR claim counts from the claim count development triangle are used to estimate the AOE reserves associated with the first reporting of future claims, one of the two components of the total AOE reserves

AOE Reserves Associated w/ IBNR Claims

Step 4 - Determine AOE reserves associated with future reporting of claims –Trend

From Slides 16 & 18

AY	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	Ult
1993																	**0**
1994																0	**0**
1995															0	0	**0**
1996														0	0	0	**0**
1997													1,947	0	0	0	**1,947**
1998												1,947	2,024	0	0	0	**3,971**
1999											1,947	2,024	2,105	0	0	0	**6,076**
2000										3,893	4,049	4,211	4,379	0	0	0	**16,532**
2001									3,893	4,049	4,211	4,379	4,554	0	0	0	**21,086**
2002								7,786	4,049	4,211	4,379	4,554	4,737	0	0	0	**29,716**
2003							11,679	8,098	4,211	4,379	4,554	4,737	4,926	0	0	0	**42,583**
2004						40,877	16,195	10,527	6,569	6,832	7,105	7,389	7,685	0	0	0	**103,178**
2005					56,449	46,561	18,948	13,138	6,832	7,105	7,389	7,685	7,992	0	0	0	**172,098**
2006				235,530	56,683	48,424	19,706	13,663	7,105	7,389	7,685	7,992	8,312	0	0	0	**412,488**
2007			237,477	214,586	52,634	43,792	15,940	11,841	7,389	7,685	7,992	8,312	8,644	0	0	0	**616,291**
2008		1,187,385	261,147	235,801	56,929	47,821	18,946	12,315	7,685	7,992	8,312	8,644	8,990	0	0	0	**1,861,966**
																Total	**3,287,931**

610 IBNR claims x $1,946.54 average AOE = $1,187,385

Open and Reported Claim Counts

Step 5 - Calculate claim settlement pattern

Accident Year	Open Claim Counts			Reported Claim Counts		
	As of YE08	As of YE07	As of YE06	As of YE08	As of YE07	As of YE06
1993	3	4	4	995	995	995
1994	4	8	12	979	979	979
1995	7	13	14	816	816	816
1996	5	9	11	1,182	1,181	1,172
1997	17	22	28	1,376	1,376	1,376
1998	13	20	25	1,442	1,442	1,442
1999	19	28	38	1,418	1,418	1,418
2000	23	34	49	1,534	1,534	1,532
2001	47	64	99	1,572	1,569	1,568
2002	74	129	255	1,758	1,757	1,752
2003	197	285	440	1,999	1,981	1,962
2004	405	601	876	2,610	2,579	2,456
2005	875	1,134	1,459	2,888	2,678	2,477
2006	987	1,222	1,553	2,684	2,622	1,982
2007	1,455	1,612		2,226	1,702	
2008	1,350			1,744		
Total	**5,481**	**5,185**	**4,863**	**27,223**	**24,629**	**21,927**

Whereas we had reported claim count history to select a reported claim count pattern, we were limited to two years of CY closed claim count data using open and reported claim counts from the last three year-ends.

Determination of Claim Settlement Pattern

Step 5 - Calculate claim settlement pattern

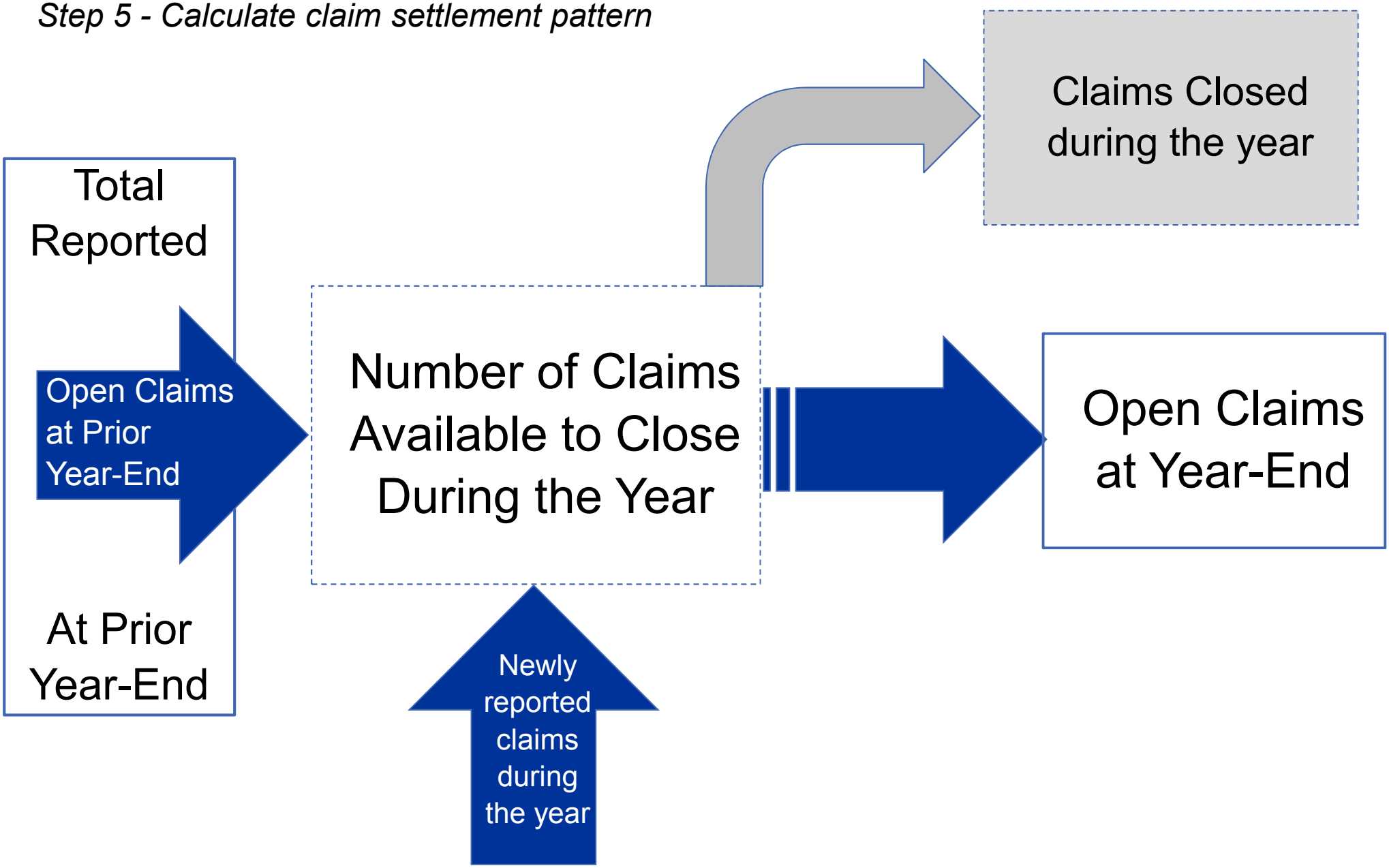
From Slide 22

Maturity (months)	(1) Percentage of Reported Claims That are Open as of YE08	(2) as of YE07	(3) as of YE06	(4) % of Claims Open Selection
192	0.3%			**0.5%**
180	0.4%	0.4%		**0.7%**
168	0.9%	0.8%	0.4%	**1.0%**
156	0.4%	1.6%	1.2%	**1.5%**
144	1.2%	0.8%	1.7%	**2.0%**
132	0.9%	1.6%	0.9%	**2.2%**
120	1.3%	1.4%	2.0%	**2.5%**
108	1.5%	2.0%	1.7%	**3.0%**
96	3.0%	2.2%	2.7%	**3.5%**
84	4.2%	4.1%	3.2%	**4.2%**
72	9.9%	7.3%	6.3%	**8.5%**
60	15.5%	14.4%	14.6%	**15.0%**
48	30.3%	23.3%	22.4%	**25.0%**
36	36.8%	42.3%	35.7%	**35.0%**
24	65.4%	46.6%	58.9%	**55.0%**
12	77.4%	94.7%	78.4%	**85.0%**

Using the open and reported claim counts from the previous slide, we select the percentage of reported claims that we would expect to remain open at different evaluation periods at 12 month intervals.

Claim Settlement Process

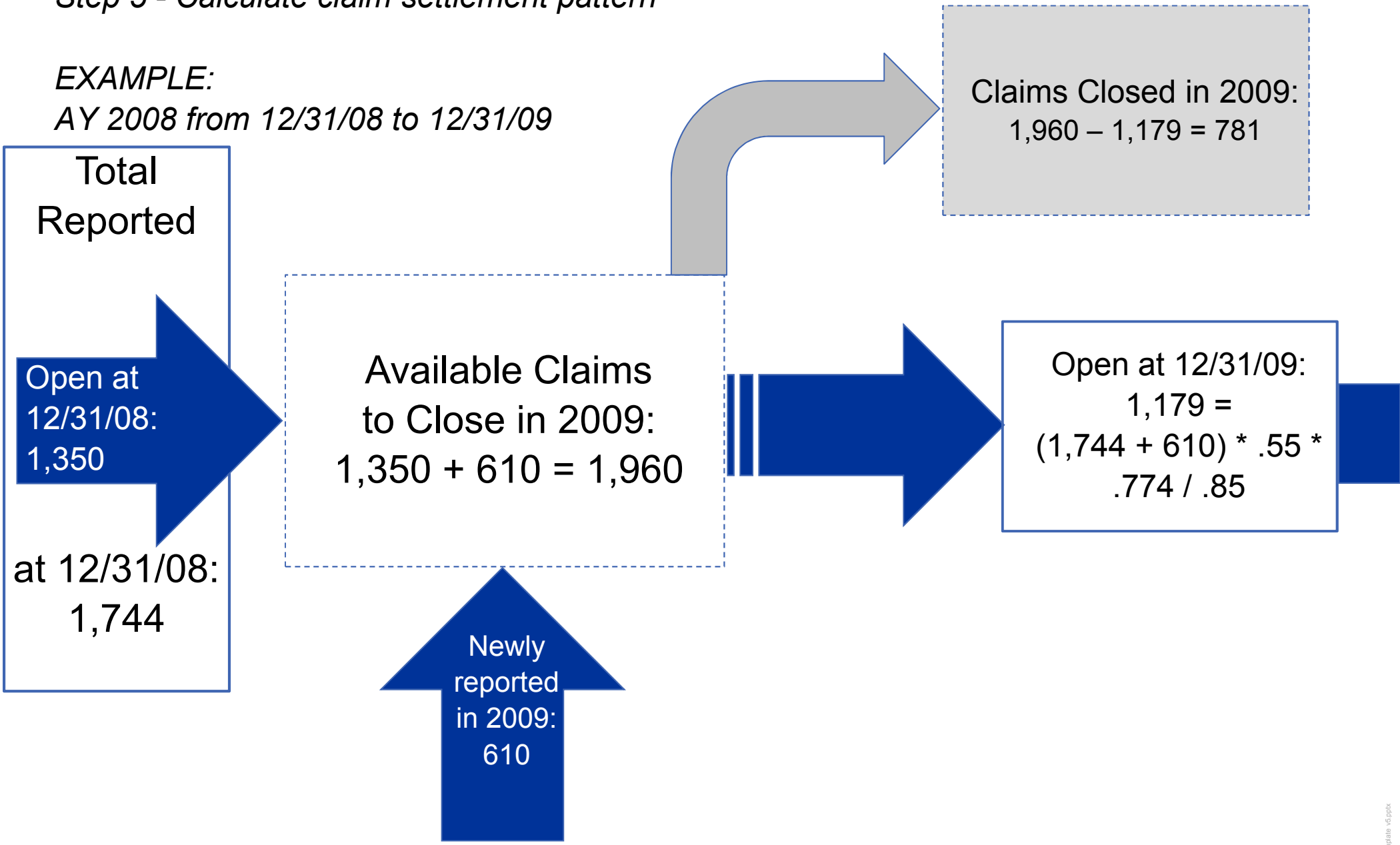
Step 5 - Calculate claim settlement pattern



Claim Settlement Process – An Example

Step 5 - Calculate claim settlement pattern

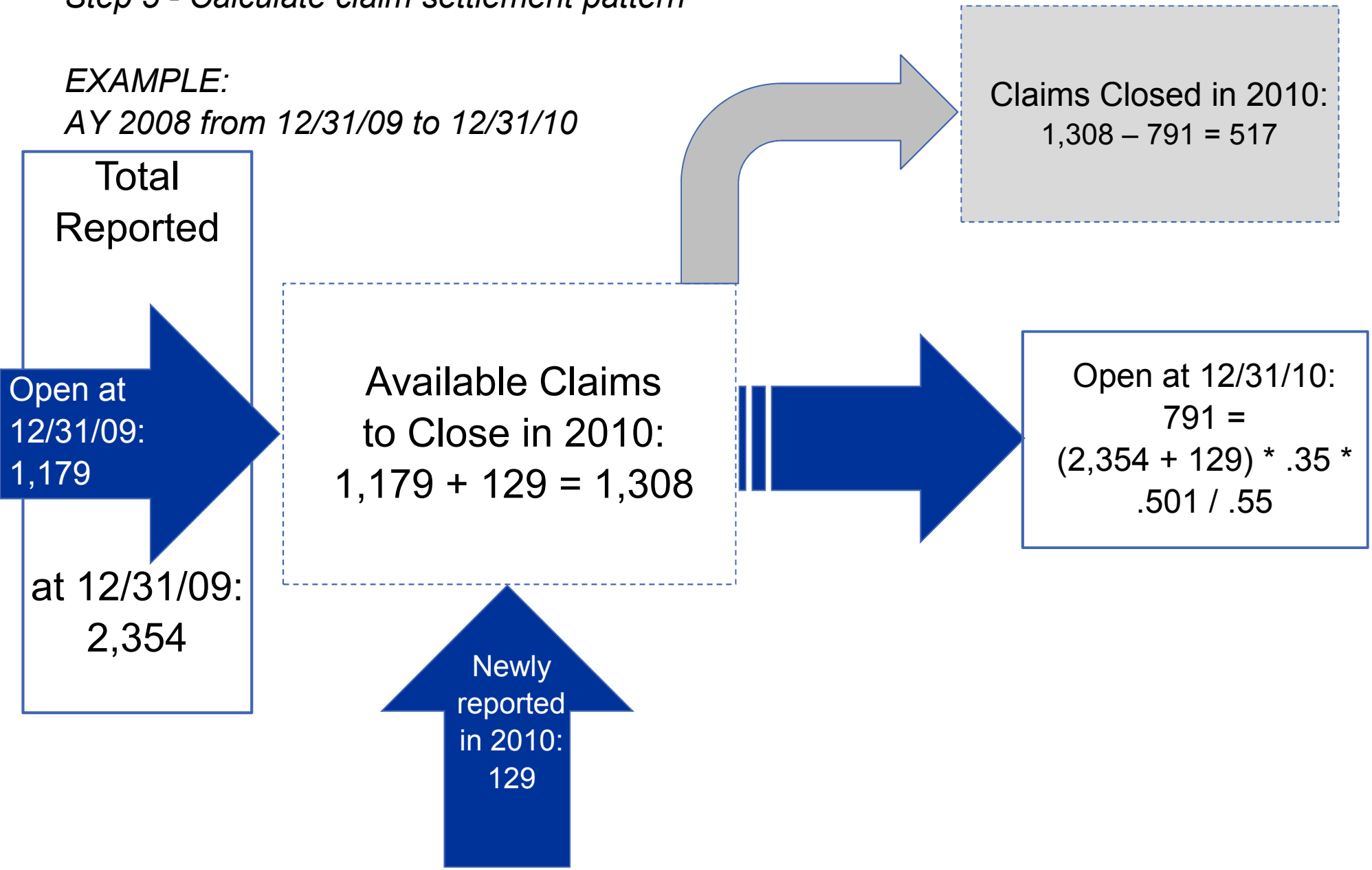
EXAMPLE:
AY 2008 from 12/31/08 to 12/31/09



Claim Settlement Process – An Example

Step 5 - Calculate claim settlement pattern

EXAMPLE:
AY 2008 from 12/31/09 to 12/31/10



Projected Future Closed Claim Counts

Step 5 - Calculate claim settlement pattern

From Slides 22 & 23

AY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1993	3															
1994	1	3														
1995	2	1	4													
1996	2	1	1	2												
1997	5	4	3	2	4											
1998	2	4	3	2	1	3										
1999	3	3	5	4	2	2	4									
2000	6	4	4	6	4	2	2	4								
2001	9	9	6	5	9	7	4	3	7							
2002	16	11	11	7	6	11	9	5	4	9						
2003	105	20	14	14	9	7	14	12	7	5	12					
2004	195	125	24	17	17	11	8	17	14	8	6	14				
2005	374	250	162	31	21	21	14	10	21	18	11	7	18			
2006	371	318	214	138	27	18	18	12	9	18	15	9	6	15		
2007	600	354	312	209	134	26	18	18	12	9	18	15	9	6	15	
2008	781	517	313	259	175	111	22	15	15	10	8	15	12	7	5	12

The exhibits on this slide and the next slide are computed simultaneously in conjunction with the calculations described in the previous slide.

Projected Open Claim Counts

Step 5 - Calculate claim settlement pattern

From Slides 22 & 23

Number of Claims at Open Year-End

AY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1994	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1995	5	4	-	-	-	-	-	-	-	-	-	-	-	-	-
1996	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
1997	13	9	6	4	-	-	-	-	-	-	-	-	-	-	-
1998	12	9	6	4	3	-	-	-	-	-	-	-	-	-	-
1999	17	15	11	8	5	4	-	-	-	-	-	-	-	-	-
2000	19	17	15	12	8	5	4	-	-	-	-	-	-	-	-
2001	40	34	30	27	20	14	9	7	-	-	-	-	-	-	-
2002	62	53	44	39	35	27	18	12	9	-	-	-	-	-	-
2003	98	82	70	58	51	47	35	23	16	12	-	-	-	-	-
2004	231	115	96	82	69	60	55	41	28	19	14	-	-	-	-
2005	530	303	150	125	108	90	79	72	54	36	25	18	-	-	-
2006	737	446	255	126	106	91	76	67	61	45	30	21	15	-	-
2007	977	729	442	252	125	104	90	75	66	60	45	30	21	15	-
2008	1,179	791	591	358	205	101	85	73	61	53	49	36	24	17	12

Estimate of Total Future Payments

Step 6 - Determine ratio of claim closings to total payments & closings

AY	Maturity (months)	(1) Claims Closed in 2008	(2) 2008 Claim Payment & Closing Counts	(3) Percentage of Closings to Total Payments & Closings (1)/(2)	(4) Selected % of Closings to Total Payments & Closings
1993	180-192	1	1	100%	**100%**
1994	168-180	4	4	100%	**100%**
1995	156-168	6	6	100%	**100%**
1996	144-156	5	6	83%	**100%**
1997	132-144	5	7	71%	**98%**
1998	120-132	7	7	100%	**95%**
1999	108-120	9	10	90%	**93%**
2000	96-108	11	13	85%	**92%**
2001	84-96	20	27	74%	**90%**
2002	72-84	56	66	85%	**90%**
2003	60-72	106	122	87%	**87%**
2004	48-60	227	259	88%	**85%**
2005	36-48	469	586	80%	**75%**
2006	24-36	297	540	55%	**60%**
2007	12-24	681	1,012	67%	**50%**
2008	0-12	394	673	59%	**40%**
Total		**2,298**	**3,339**		

Since we are assuming the same AOE cost is incurred when a claim payment is made and when a claim is closed (with or without payment), we need to apply a factor to the projected future closings to determine all closings and interim payments incurring an AOE cost.

Projected Payments & Closings

Step 7 - Calculate combined payment / closed claim pattern

From Slides 27 & 29

AY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1993	3																**3**
1994	1	3															**4**
1995	2	1	4														**7**
1996	2	1	1	2													**5**
1997	5	4	3	2	4												**18**
1998	2	4	3	2	1	3											**15**
1999	3	3	5	4	2	2	4										**22**
2000	6	5	4	6	4	2	2	4									**32**
2001	9	9	6	5	9	7	4	3	7								**59**
2002	18	12	12	8	6	11	9	5	4	9							**92**
2003	117	22	15	15	9	7	14	12	7	5	12						**234**
2004	224	139	27	18	18	12	9	17	14	8	6	14					**503**
2005	440	288	180	34	23	22	14	10	21	18	11	7	18				**1,086**
2006	495	374	246	153	30	20	19	13	9	18	15	9	6	15			**1,423**
2007	1,001	471	367	241	149	28	19	19	13	9	18	15	9	6	15		**2,381**
2008	1,562	861	417	304	201	124	24	16	16	11	8	15	12	7	5	12	**3,595**
Total	**3,890**	**2,197**	**1,288**	**792**	**456**	**237**	**118**	**99**	**90**	**78**	**69**	**60**	**45**	**28**	**20**	**12**	**9,479**

1,562 = 781 closed claims in 2009 ÷ 50% (% of payments to closed claims)

861 = 517 ÷ 60%

No Trend: AOE Reserves associated with interim payments and claim closing transactions = 9,479 x $374.33 = $3,548,248

Trending AOE Costs

Step 8 – Determine AOE reserves associated with future claim payments/closings

From Slides 19 & 30

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1993	1,168																1,168
1994	445	1,157															1,602
1995	818	567	1,474														2,858
1996	649	405	281	730													2,064
1997	2,040	1,722	1,075	745	1,937												7,519
1998	863	1,599	1,246	777	539	1,401											6,426
1999	1,339	1,037	2,020	1,668	1,041	721	1,876										9,702
2000	2,431	1,825	1,511	2,555	1,755	1,095	759	1,974									13,905
2001	3,666	3,779	2,660	2,083	3,973	3,200	1,997	1,385	3,600								26,343
2002	7,004	4,739	4,885	3,349	2,558	5,134	4,374	2,729	1,892	4,920							41,586
2003	45,578	9,047	6,214	6,404	4,291	3,202	6,728	5,996	3,742	2,594	6,745						100,540
2004	87,103	56,092	11,195	7,893	8,136	5,562	4,236	8,551	7,328	4,573	3,170	8,243					212,082
2005	171,170	116,538	75,677	14,968	10,295	10,610	7,096	5,286	11,148	9,972	6,223	4,314	11,217				454,516
2006	192,690	151,615	103,779	66,969	13,587	9,261	9,544	6,471	4,887	10,028	8,737	5,452	3,780	9,828			596,628
2007	389,530	190,860	154,651	105,441	67,989	13,494	9,538	9,833	6,671	5,043	10,337	8,996	5,613	3,892	10,119		992,007
2008	608,047	348,623	175,517	133,318	91,361	58,498	11,896	8,357	8,613	5,955	4,585	9,052	7,578	4,729	3,278	8,524	1,487,929
																Total	3,956,876

1,562 interim payments and claim closings x $389.31 Average AOE = $608,047

Results & Discussion

Results

		AOE Relativity	
		5X	3X
No Trend	Reporting of IBNR Claims	3,026,484	2,663,012
	Future Payments and Closings on Open & IBNR Claims	3,548,248	5,203,522
	Total	**6,574,732**	**7,866,534**
Trend	Reporting of IBNR Claims	3,287,931	2,893,060
	Future Payments and Closings on Open & IBNR Claims	3,956,876	5,802,778
	Total	**7,244,807**	**8,695,838**

- As the AOE relativity decreases (5X to 3X), AOE reserves will increase.
- Annual trend of 4% produces AOE reserves approximately 10% greater than when there is no trend.

Discussion

- Future possible modifications
  - Consider AOE cost (fixed) for maintenance
  - Reopening of claims
  - Reflect partial AY
- Benefit – can allocate AOE CY expenses by AY
- Results can vary based on differing assumptions of trend, AOE relativities, reporting patterns, closing patterns, payment occurrences.

Q & A

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