Actuarial Reserving Cooking Show

Casualty Actuarial Society Meeting in San Diego – Live Streamed and Recorded

Monday, Nov 8 at 4:15 p.m. to 5:30 p.m. Pacific Time

- *The views and opinions expressed in today's show do not necessarily reflect the views and opinions of the Casualty Actuarial Society (CAS).*

- *The content is for general informational purposes only. The data, techniques, and evaluation approaches and discussions are meant to be generally illustrative of approaches used broadly across various industries.*

- *This show presents examples of basic approaches. It is not intended to encompass all commonly used reserving techniques.*

What Are We Cooking Today?

Actuarial Reserves

What kind of reserving chef are you?

- Head Chef (> 20 years experience)
- Sous Chef (5-20 years experience)
- Deputy Chef (< 5 years experience)
- Restaurant Guest (non-actuary)

OUR CHEFS

OUR JUDGES

Life Cycle of a Claim

ULTIMATE LOSSES

INCURRED

Paid Losses

+

Case Reserves

INCURRED BUT NOT REPORTED (IBNR)

The actuarial estimate of what might get paid in the future

*Actuaries predict what the **ultimate losses** will be!*

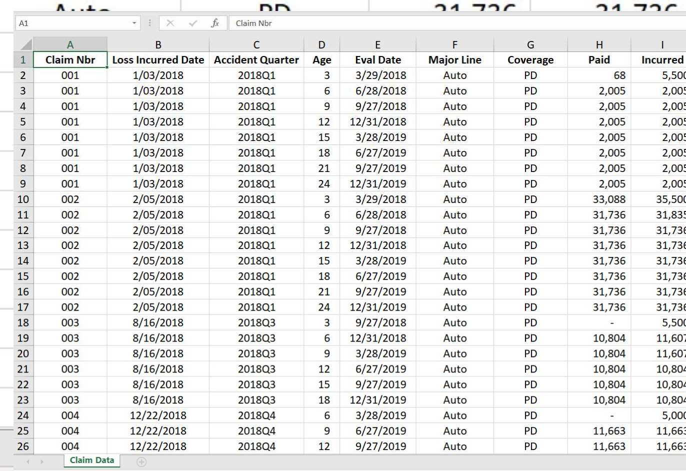
Round 1:
Commercial Auto Physical Damage

Pantry


CLAIM
DEPARTMENT
PRODUCT &
UNDERWRITING
DEPARTMENT
ECONOMIC
INDICATORS
MILES
DRIVEN
STATISTICS
INDUSTRY
AGGREGATED
DATA
PUBLIC
INFO

Paid Cumulative Triangle ($M, age in months)

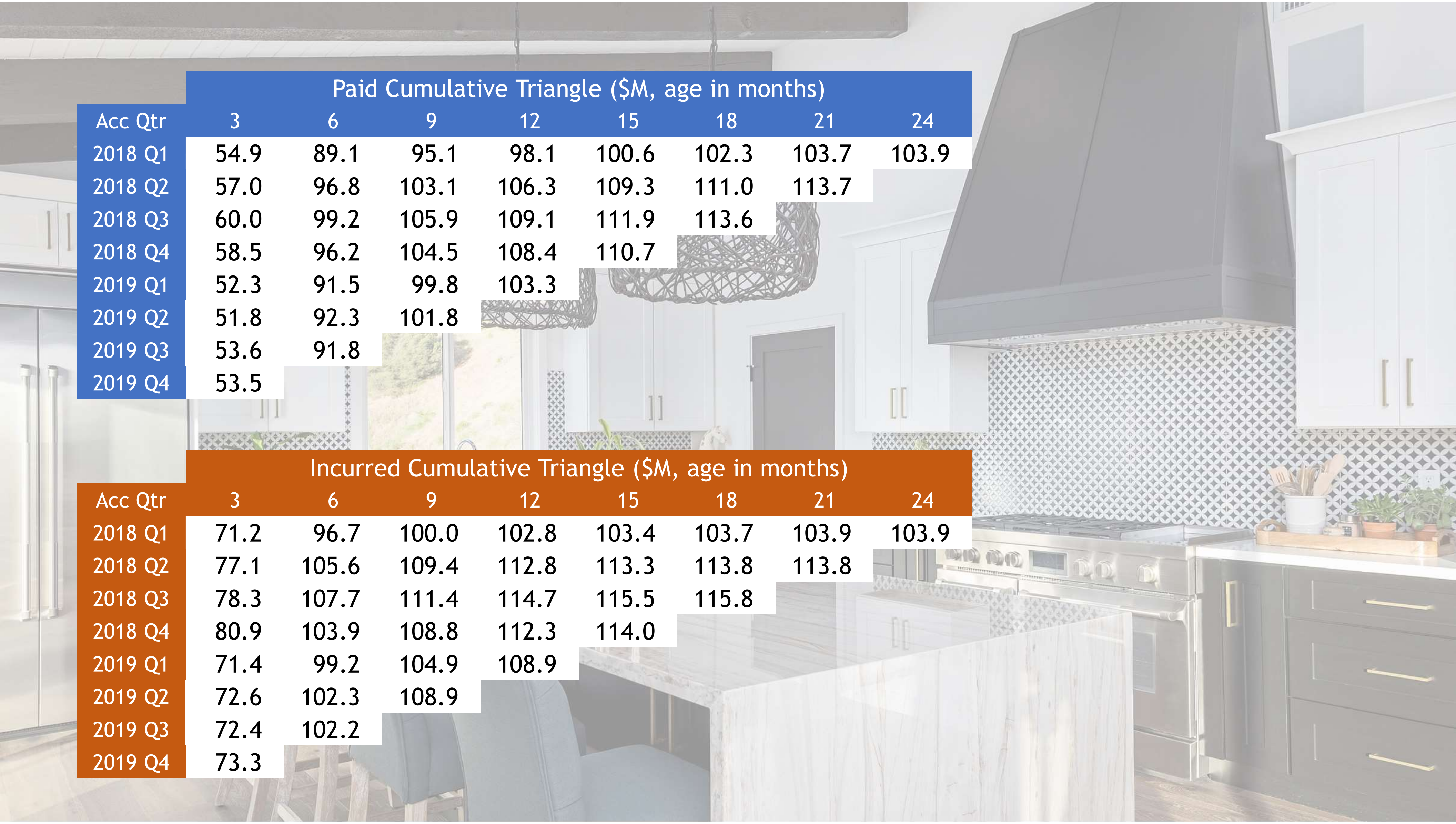
Acc Qtr	3	6	9	12	15	18	21	24
2018 Q1	54.9	89.1	95.1	98.1	100.6	102.3	103.7	103.9
2018 Q2	57.0	96.8	103.1	106.3	109.3	111.0	113.7	
2018 Q3	60.0	99.2	105.9	109.1	111.9	113.6		
2018 Q4	58.5	96.2	104.5	108.4	110.7			
2019 Q1	52.3	91.5	99.8	103.3				
2019 Q2	51.8	92.3	101.8					
2019 Q3	53.6	91.8						
2019 Q4	53.5							



A1 Claim Nbr

	A	B	C	D	E	F	G	H	I
1	Claim Nbr	Loss Incurred Date	Accident Quarter	Age	Eval Date	Major Line	Coverage	Paid	Incurred
2	001	1/03/2018	2018Q1	3	3/29/2018	Auto	PD	68	5,500
3	001	1/03/2018	2018Q1	6	6/28/2018	Auto	PD	2,005	2,005
4	001	1/03/2018	2018Q1	9	9/27/2018	Auto	PD	2,005	2,005
5	001	1/03/2018	2018Q1	12	12/31/2018	Auto	PD	2,005	2,005
6	001	1/03/2018	2018Q1	15	3/28/2019	Auto	PD	2,005	2,005
7	001	1/03/2018	2018Q1	18	6/27/2019	Auto	PD	2,005	2,005
8	001	1/03/2018	2018Q1	21	9/27/2019	Auto	PD	2,005	2,005
9	001	1/03/2018	2018Q1	24	12/31/2019	Auto	PD	2,005	2,005
10	002	2/05/2018	2018Q1	3	3/29/2018	Auto	PD	33,088	35,500
11	002	2/05/2018	2018Q1	6	6/28/2018	Auto	PD	31,736	31,835
12	002	2/05/2018	2018Q1	9	9/27/2018	Auto	PD	31,736	31,736
13	002	2/05/2018	2018Q1	12	12/31/2018	Auto	PD	31,736	31,736
14	002	2/05/2018	2018Q1	15	3/28/2019	Auto	PD	31,736	31,736
15	002	2/05/2018	2018Q1	18	6/27/2019	Auto	PD	31,736	31,736
16	002	2/05/2018	2018Q1	21	9/27/2019	Auto	PD	31,736	31,736
17	002	2/05/2018	2018Q1	24	12/31/2019	Auto	PD	31,736	31,736
18	003	8/16/2018	2018Q3	3	9/27/2018	Auto	PD	-	5,500
19	003	8/16/2018	2018Q3	6	12/31/2018	Auto	PD	10,804	11,607
20	003	8/16/2018	2018Q3	9	3/28/2019	Auto	PD	10,804	11,607
21	003	8/16/2018	2018Q3	12	6/27/2019	Auto	PD	10,804	10,804
22	003	8/16/2018	2018Q3	15	9/27/2019	Auto	PD	10,804	10,804
23	003	8/16/2018	2018Q3	18	12/31/2019	Auto	PD	10,804	10,804
24	004	12/22/2018	2018Q4	6	3/28/2019	Auto	PD	-	5,000
25	004	12/22/2018	2018Q4	9	6/27/2019	Auto	PD	11,663	11,663
26	004	12/22/2018	2018Q4	12	9/27/2019	Auto	PD	11,663	11,663

Claim Data



	Paid Cumulative Triangle ($M, age in months)							
Acc Qtr	3	6	9	12	15	18	21	24
2018 Q1	54.9	89.1	95.1	98.1	100.6	102.3	103.7	103.9
2018 Q2	57.0	96.8	103.1	106.3	109.3	111.0	113.7	
2018 Q3	60.0	99.2	105.9	109.1	111.9	113.6		
2018 Q4	58.5	96.2	104.5	108.4	110.7			
2019 Q1	52.3	91.5	99.8	103.3				
2019 Q2	51.8	92.3	101.8					
2019 Q3	53.6	91.8						
2019 Q4	53.5							

	Incurred Cumulative Triangle ($M, age in months)							
Acc Qtr	3	6	9	12	15	18	21	24
2018 Q1	71.2	96.7	100.0	102.8	103.4	103.7	103.9	103.9
2018 Q2	77.1	105.6	109.4	112.8	113.3	113.8	113.8	
2018 Q3	78.3	107.7	111.4	114.7	115.5	115.8		
2018 Q4	80.9	103.9	108.8	112.3	114.0			
2019 Q1	71.4	99.2	104.9	108.9				
2019 Q2	72.6	102.3	108.9					
2019 Q3	72.4	102.2						
2019 Q4	73.3							

	Paid Cumulative Triangle ($M, age in months)							
Acc Qtr	3	6	9	12	15	18	21	24
2018 Q1	54.9	89.1	95.1	98.1	100.6	102.3	103.7	103.9
2018 Q2	57.0	96.8	103.1	106.3	109.3	111.0	113.7	
2018 Q3	60.0	99.2	105.9	109.1	111.9	113.6		
2018 Q4	58.5	96.2	104.5	108.4	110.7			
2019 Q1	52.3	91.5	99.8	103.3				
2019 Q2	51.8	92.3	101.8					
2019 Q3	53.6	91.8						
2019 Q4	53.5							

Financials as of 12/31/2019	
Paid	Difference
101.9	**2.0**
113.7	-
113.6	-
110.7	-
103.3	-
101.8	-
91.8	-
53.5	-

	Incurred Cumulative Triangle ($M, age in months)							
Acc Qtr	3	6	9	12	15	18	21	24
2018 Q1	71.2	96.7	100.0	102.8	103.4	103.7	103.9	103.9
2018 Q2	77.1	105.6	109.4	112.8	113.3	113.8	113.8	
2018 Q3	78.3	107.7	111.4	114.7	115.5	115.8		
2018 Q4	80.9	103.9	108.8	112.3	114.0			
2019 Q1	71.4	99.2	104.9	108.9				
2019 Q2	72.6	102.3	108.9					
2019 Q3	72.4	102.2						
2019 Q4	73.3							

Financials as of 12/31/2019	
Incurred	Difference
101.9	**2.0**
113.8	-
115.8	-
114.0	-
108.9	-
108.9	-
102.2	-
73.3	-

Paid Cumulative Triangle ($M, age in months)								
Acc Qtr	3	6	9	12	15	18	21	24
2018 Q1	54.9	89.1	95.1	98.1	100.6	102.3	103.7	103.9
2018 Q2	57.0	96.8	103.1	106.3	109.3	111.0	113.7	
2018 Q3	60.0	99.2	105.9	109.1	111.9	113.6		
2018 Q4	58.5	96.2	104.5	108.4	110.7			
2019 Q1	52.3	91.5	99.8	103.3				
2019 Q2	51.8	92.3	101.8					
2019 Q3	53.6	91.8						
2019 Q4	53.5							

Incurred Cumulative Triangle ($M, age in months)								
Acc Qtr	3	6	9	12	15	18	21	24
2018 Q1	71.2	96.7	100.0	102.8	103.4	103.7	103.9	103.9
2018 Q2	77.1	105.6	109.4	112.8	113.3	113.8	113.8	
2018 Q3	78.3	107.7	111.4	114.7	115.5	115.8		
2018 Q4	80.9	103.9	108.8	112.3	114.0			
2019 Q1	71.4	99.2	104.9	108.9				
2019 Q2	72.6	102.3	108.9					
2019 Q3	72.4	102.2						
2019 Q4	73.3							

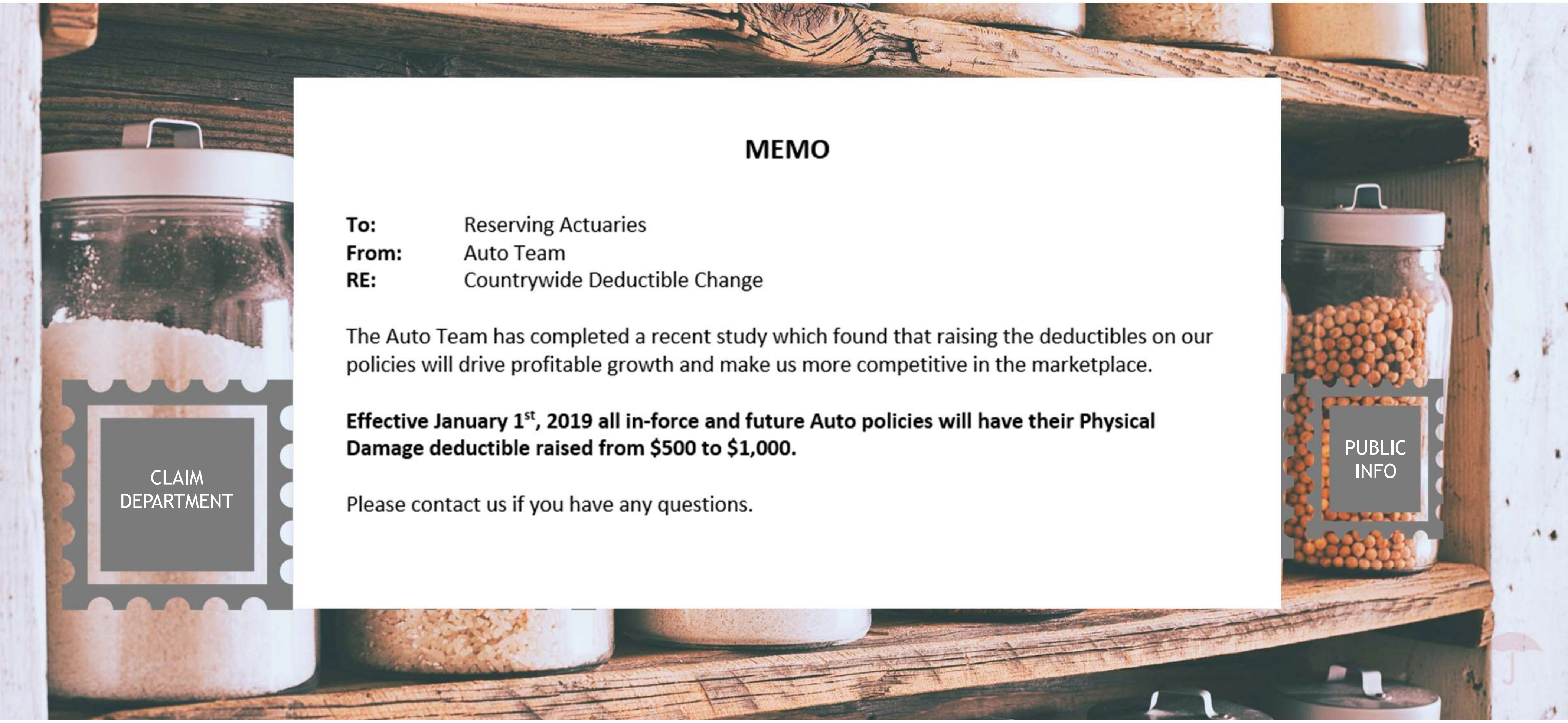
Acc Qtr	Paid Cumulative Triangle ($M, age in months)							
	3	6	9	12	15	18	21	24
2018 Q1	54.9	89.1	95.1	98.1	100.6	102.3	103.7	103.9
2018 Q2	57.0	96.8	103.1	106.3	109.3	111.0	113.7	
2018 Q3	60.0	99.2	105.9	109.1	111.9	113.6		
2018 Q4	58.5	96.2	104.5	108.4	110.7			
2019 Q1	52.3	91.5	99.8	103.3				
2019 Q2	51.8	92.3	101.8					
2019 Q3	53.6	91.8						
2019 Q4	53.5							

Acc Qtr	Paid Age-to-Age Factors						
	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24
2018 Q1	1.624 $= \frac{89.1}{54.9}$	1.067 $= \frac{95.1}{89.1}$	1.031	1.026	1.017	1.014	1.002
2018 Q2	1.696	1.065	1.031	1.029	1.015	1.025	
2018 Q3	1.653	1.067	1.030	1.025	1.016		
2018 Q4	1.645	1.086	1.038	1.020			
2019 Q1	1.747	1.092	1.034				
2019 Q2	1.782	1.103					
2019 Q3	1.712						

Paid Age-to-Age Factors							
Acc Qtr	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24
2018 Q1	1.624	1.067	1.031	1.026	1.017	1.014	1.002
2018 Q2	1.696	1.065	1.031	1.029	1.015	1.025	
2018 Q3	1.653	1.067	1.030	1.025	1.016		
2018 Q4	1.645	1.086	1.038	1.020			
2019 Q1	1.747	1.092	1.034				
2019 Q2	1.782	1.103					
2019 Q3	1.712						

Incurred Age-to-Age Factors							
Acc Qtr	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24
2018 Q1	1.357	1.034	1.029	1.006	1.003	1.002	1.000
2018 Q2	1.369	1.036	1.031	1.005	1.004	1.001	
2018 Q3	1.375	1.034	1.030	1.007	1.003		
2018 Q4	1.284	1.047	1.032	1.016			
2019 Q1	1.390	1.057	1.039				
2019 Q2	1.409	1.065					
2019 Q3	1.412						

Pantry



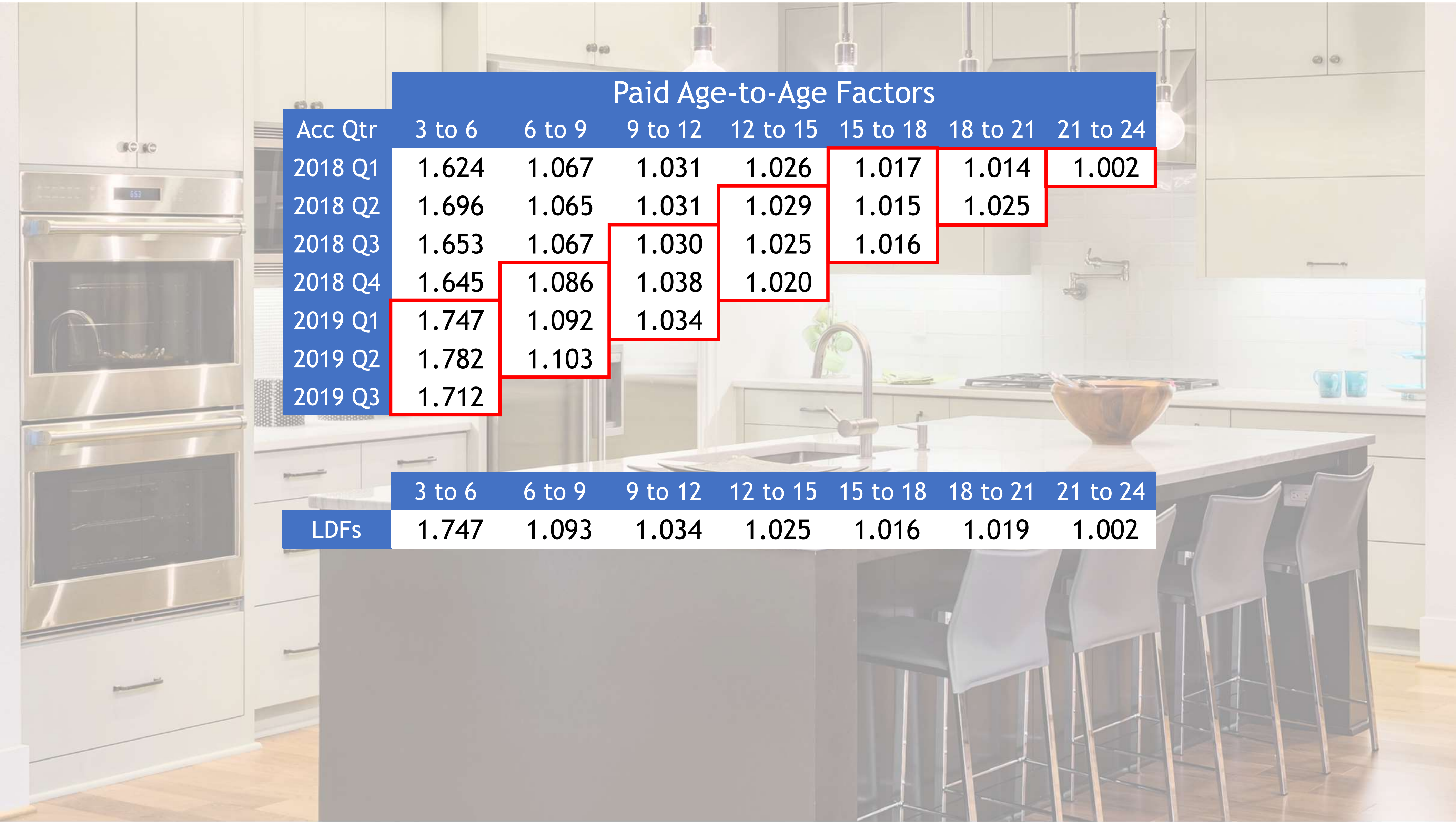
MEMO

To: Reserving Actuaries
From: Auto Team
RE: Countrywide Deductible Change

The Auto Team has completed a recent study which found that raising the deductibles on our policies will drive profitable growth and make us more competitive in the marketplace.

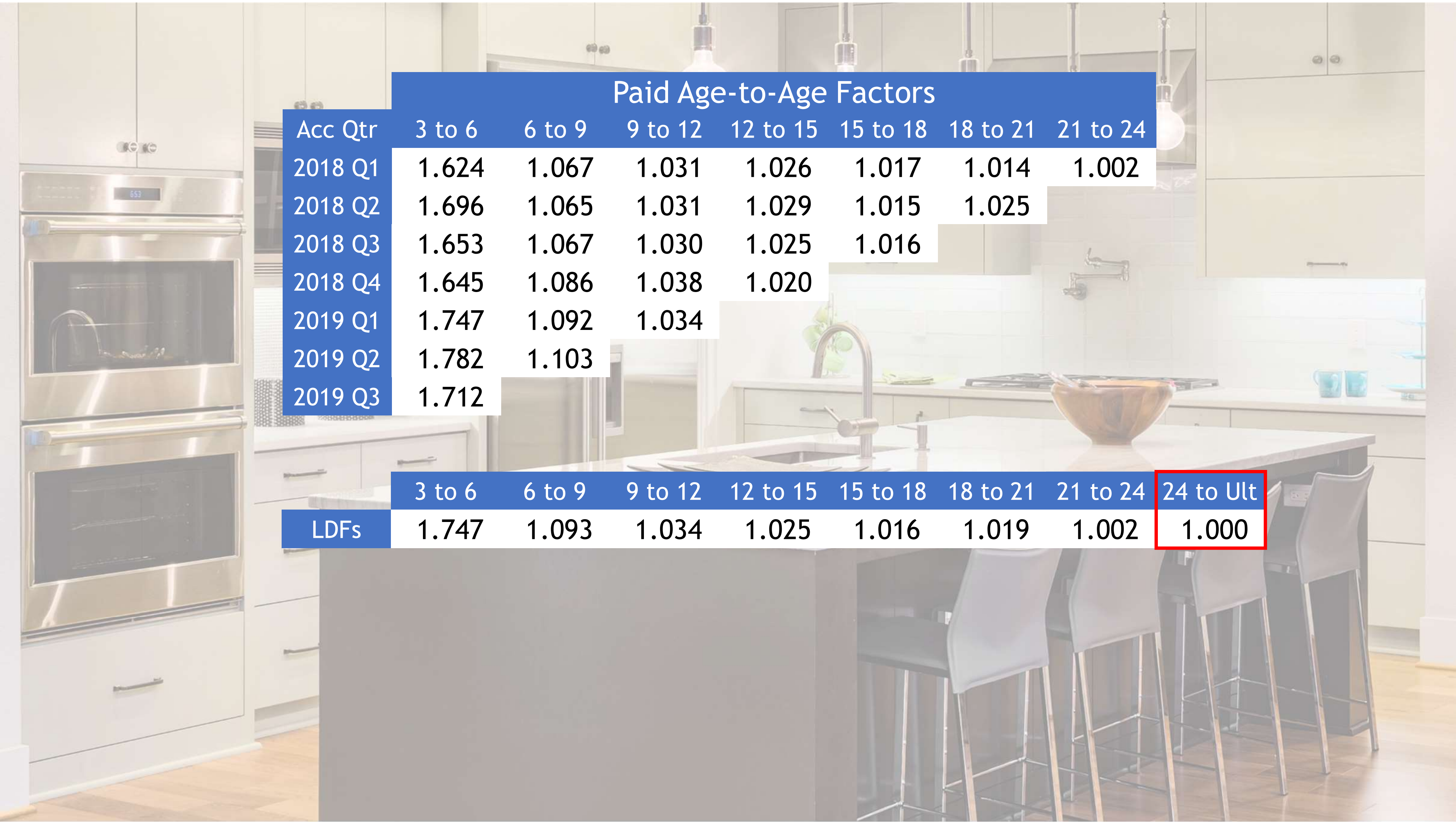
Effective January 1st, 2019 all in-force and future Auto policies will have their Physical Damage deductible raised from $500 to $1,000.

Please contact us if you have any questions.



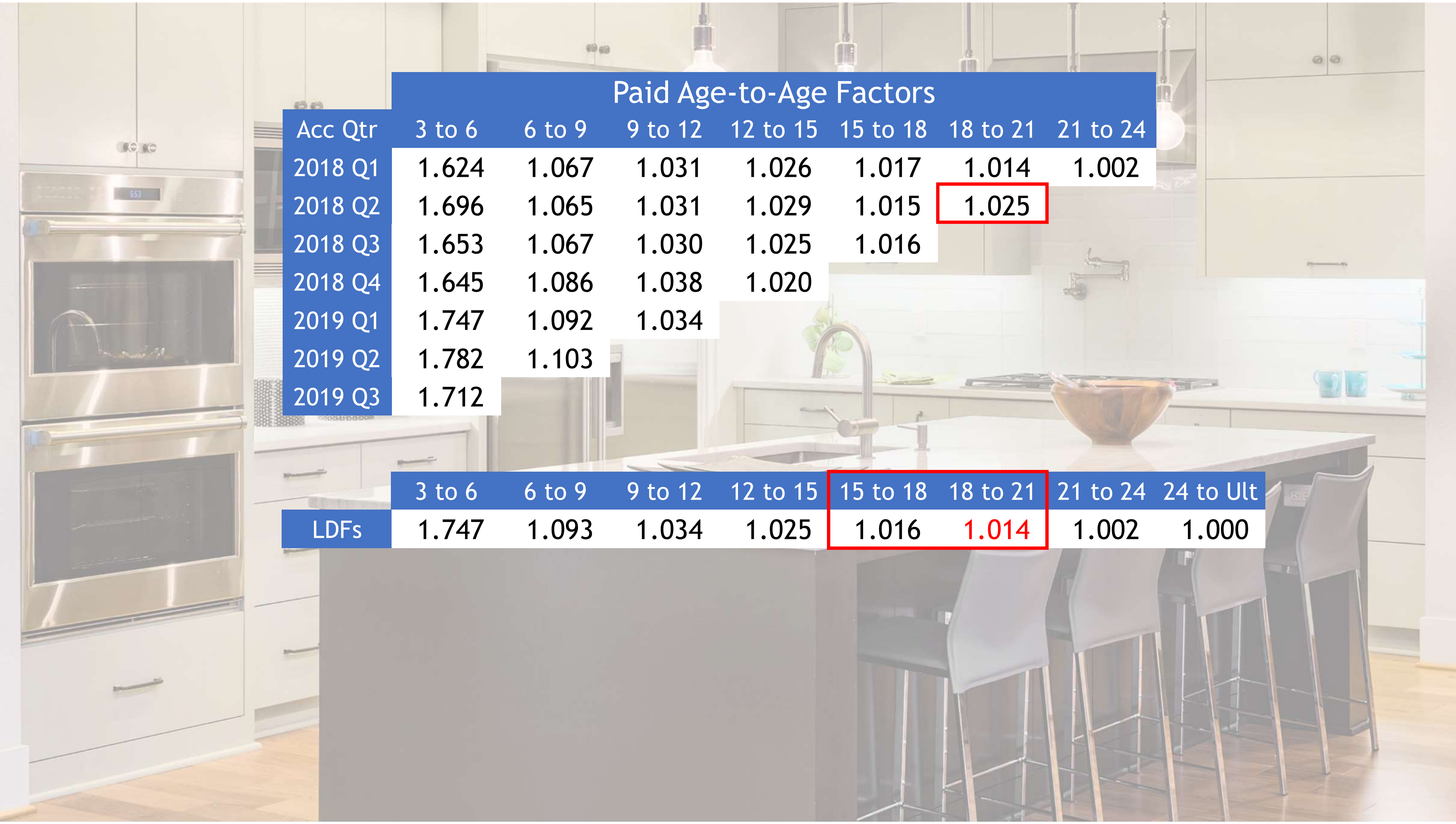
Acc Qtr	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24
	Paid Age-to-Age Factors						
2018 Q1	1.624	1.067	1.031	1.026	1.017	1.014	1.002
2018 Q2	1.696	1.065	1.031	1.029	1.015	1.025	
2018 Q3	1.653	1.067	1.030	1.025	1.016		
2018 Q4	1.645	1.086	1.038	1.020			
2019 Q1	1.747	1.092	1.034				
2019 Q2	1.782	1.103					
2019 Q3	1.712						

	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24
LDFs	1.747	1.093	1.034	1.025	1.016	1.019	1.002



Acc Qtr	Paid Age-to-Age Factors 3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24
2018 Q1	1.624	1.067	1.031	1.026	1.017	1.014	1.002
2018 Q2	1.696	1.065	1.031	1.029	1.015	1.025	
2018 Q3	1.653	1.067	1.030	1.025	1.016		
2018 Q4	1.645	1.086	1.038	1.020			
2019 Q1	1.747	1.092	1.034				
2019 Q2	1.782	1.103					
2019 Q3	1.712						

	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24	24 to Ult
LDFs	1.747	1.093	1.034	1.025	1.016	1.019	1.002	1.000



	Paid Age-to-Age Factors						
Acc Qtr	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24
2018 Q1	1.624	1.067	1.031	1.026	1.017	1.014	1.002
2018 Q2	1.696	1.065	1.031	1.029	1.015	$\boxed{1.025}$	
2018 Q3	1.653	1.067	1.030	1.025	1.016		
2018 Q4	1.645	1.086	1.038	1.020			
2019 Q1	1.747	1.092	1.034				
2019 Q2	1.782	1.103					
2019 Q3	1.712						

	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24	24 to Ult
LDFs	1.747	1.093	1.034	1.025	1.016	1.014	1.002	1.000

Paid Age-to-Age Factors

Acc Qtr	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24
2018 Q1	1.624	1.067	1.031	1.026	1.017	1.014	1.002
2018 Q2	1.696	1.065	1.031	1.029	1.015	1.025	
2018 Q3	1.653	1.067	1.030	1.025	1.016		
2018 Q4	1.645	1.086	1.038	1.020			
2019 Q1	1.747	1.092	1.034				
2019 Q2	1.782	1.103					
2019 Q3	1.712						

	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24	24 to Ult
LDFs	1.747 ×	1.093 ×	1.034 ×	1.025 ×	1.016 ×	1.014 ×	1.002 ×	1.000

	3 to Ult	6 to Ult	9 to Ult	12 to Ult	15 to Ult	18 to Ult	21 to Ult	24 to Ult
CDFs	2.089							

Acc Qtr	Paid Age-to-Age Factors						
	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24
2018 Q1	1.624	1.067	1.031	1.026	1.017	1.014	1.002
2018 Q2	1.696	1.065	1.031	1.029	1.015	1.025	
2018 Q3	1.653	1.067	1.030	1.025	1.016		
2018 Q4	1.645	1.086	1.038	1.020			
2019 Q1	1.747	1.092	1.034				
2019 Q2	1.782	1.103					
2019 Q3	1.712						

	3 to 6	6 to 9	9 to 12	12 to 15	15 to 18	18 to 21	21 to 24	24 to Ult
LDFs	1.747	1.093 ×	1.034 ×	1.025 ×	1.016 ×	1.014 ×	1.002 ×	1.000

	3 to Ult	6 to Ult	9 to Ult	12 to Ult	15 to Ult	18 to Ult	21 to Ult	24 to Ult
CDFs	2.089	1.196	1.094	1.058	1.032	1.016	1.002	1.000

Acc Qtr	(1) Current Paid Loss ($M)	(2) Paid CDFs	(3) = (1) × (2) Ultimate Paid LDF ($M)	Paid Cumulative Triangle ($M, age in months)							
				3	6	9	12	15	18	21	24
2018 Q1	103.9	1.000	103.9	54.9	89.1	95.1	98.1	100.6	102.3	103.7	103.9
2018 Q2	113.7	1.002	113.9	57.0	96.8	103.1	106.3	109.3	111.0	113.7	
2018 Q3	113.6	1.016	115.4	60.0	99.2	105.9	109.1	111.9	113.6		
2018 Q4	110.7	1.032	114.2	58.5	96.2	104.5	108.4	110.7			
2019 Q1	103.3	1.058	109.2	52.3	91.5	99.8	103.3				
2019 Q2	101.8	1.094	111.3	51.8	92.3	101.8					
2019 Q3	91.8	1.196	109.7	53.6	91.8						
2019 Q4	53.5	**2.089**	111.7	53.5							

	3 to Ult	6 to Ult	9 to Ult	12 to Ult	15 to Ult	18 to Ult	21 to Ult	24 to Ult
CDFs	2.089	1.196	1.094	1.058	1.032	1.016	1.002	1.000

Acc Qtr	(1) Paid Ultimate ($M)	(2) Paid Weight	(3) Incurred Ultimate ($M)	(4) Incurred Weight	(5) = (1)×(2) + (3)×(4) Selected Ultimate ($M)
2018 Q1	103.9	100%	103.9	0%	103.9
2018 Q2	113.9	100%	113.8	0%	113.9
2018 Q3	115.4	100%	116.0	0%	115.4
2018 Q4	114.2	100%	114.5	0%	114.2
2019 Q1	109.2	0%	110.4	100%	110.4
2019 Q2	111.3	0%	114.1	100%	114.1
2019 Q3	109.7	0%	113.1	100%	113.1
2019 Q4	111.7	0%	113.8	100%	113.8

Selected Ultimate	$899 M
Total Incurred Losses to Date	- $841 M
Implied Actuarial IBNR	$ 58 M

Final Dish

Selected Ultimate	**$ 899 M**
Implied Actuarial IBNR	**$ 58 M**

	(1)	(2)	(3)	(4) = [1 - (3)$^{-1}$]	(5) = (2) + (1) × (4)
Acc Qtr	Expected Ultimate Loss ($M)	Current Incurred ($M)	Incurred CDFs	Percent Unreported	BF Ultimate ($M)
2018 Q1	120.8	103.9	1.000	0.0%	103.9
2018 Q2	128.8	113.8	1.000	0.0%	113.8
2018 Q3	129.0	115.8	1.001	0.1%	116.0
2018 Q4	126.4	114.0	1.004	0.4%	114.5
2019 Q1	123.2	108.9	1.014	1.4%	110.6
2019 Q2	122.1	108.9	1.048	4.5%	114.5
2019 Q3	130.3	102.2	1.107	9.6%	114.7
2019 Q4	126.6	73.3	1.553	35.6%	118.4

	(1)	(2)	(3)	(4)	(5) = (1)×(2) + (3)×(4)
Acc Qtr	Incurred Ultimate ($M)	Incurred Weight	BF Ultimate ($M)	BF Weight	Selected Ultimate ($M)
2018 Q1	103.9	100%	103.9	0%	103.9
2018 Q2	113.8	100%	113.8	0%	113.8
2018 Q3	116.0	100%	116.0	0%	116.0
2018 Q4	114.5	100%	114.5	0%	114.5
2019 Q1	110.4	100%	110.6	0%	110.4
2019 Q2	114.1	100%	114.5	0%	114.1
2019 Q3	113.1	0%	114.7	100%	114.7
2019 Q4	113.8	0%	118.4	100%	118.4

Selected Ultimate	$906 M
Total Incurred Losses to Date	- $841 M
Implied Actuarial IBNR	$ 65 M

Final Dish

Selected Ultimate	$ 906 M
Implied Actuarial IBNR	$ 65 M

Nick

Claim Count Cumulative Triangle (age in months)								
Acc Qtr	3	6	9	12	15	18	21	24
2018 Q1	12,715	16,469	16,545	16,598	16,681	16,704	16,750	16,750
2018 Q2	12,977	17,235	17,367	17,449	17,501	17,520	17,545	
2018 Q3	13,090	16,982	17,042	17,077	17,104	17,110		
2018 Q4	13,244	16,761	16,798	16,886	16,866			
2019 Q1	11,859	15,746	15,769	15,773				
2019 Q2	11,921	16,072	16,091					
2019 Q3	12,095	15,871						
2019 Q4	12,179							

Incurred Cumulative Triangle ($M, age in months)								
Acc Qtr	3	6	9	12	15	18	21	24
2018 Q1	71.2	96.7	100.0	102.8	103.4	103.7	103.9	103.9
2018 Q2	77.1	105.6	109.4	112.8	113.3	113.8	113.8	
2018 Q3	78.3	107.7	111.4	114.7	115.5	115.8		
2018 Q4	80.9	103.9	108.8	112.3	114.0			
2019 Q1	71.4	99.2	104.9	108.9				
2019 Q2	72.6	102.3	108.9					
2019 Q3	72.4	102.2						
2019 Q4	73.3							

$$\text{Severity} = \frac{\text{Incurred Loss}}{\text{Claim Count}}$$

$$\frac{\$71.2M}{12,715} = \$5,602$$

Incurred Severity Triangle ($, age in months)								
Acc Qtr	3	6	9	12	15	18	21	24
2018 Q1	5,602	5,871	6,043	6,195	6,198	6,210	6,203	6,203
2018 Q2	5,944	6,126	6,299	6,462	6,475	6,493	6,488	
2018 Q3	5,984	6,341	6,537	6,716	6,754	6,770		
2018 Q4	6,107	6,198	6,475	6,648	6,759			
2019 Q1	6,018	6,298	6,649	6,905				
2019 Q2	6,090	6,364	6,770					
2019 Q3	5,982	6,437						
2019 Q4	6,015							

Acc Qtr	3
2018 Q1	12,715
2018 Q2	12,977
2018 Q3	13,090
2018 Q4	13,244
2019 Q1	11,859
2019 Q2	11,921
2019 Q3	12,095
2019 Q4	12,179

	(1)	(2)	(3) = (1) × (2)	(4)	(5)	(6) = (4) × (5)	(7) = (3) × (6)
Acc Qtr	Current Claim Count	Count CDFs	Ultimate Claim Count	Current Severity ($)	Severity CDFs	Ultimate Severity ($)	Selected Ultimate ($M)
2018 Q1	16,750	1.000	16,750	6,203	1.000	6,203	103.9
2018 Q2	17,545	1.000	17,545	6,488	1.000	6,488	113.8
2018 Q3	17,110	1.002	17,145	6,770	0.999	6,764	116.0
2018 Q4	16,866	1.003	16,916	6,759	1.001	6,768	114.5
2019 Q1	15,773	1.005	15,853	6,905	1.008	6,958	110.3
2019 Q2	16,091	1.008	16,223	6,770	1.037	7,017	113.8
2019 Q3	15,871	1.012	16,057	6,437	1.080	6,954	111.7
2019 Q4	12,179	1.326	16,149	6,015	1.130	6,796	109.7

n months)

21	24
6,203	6,203
6,488	

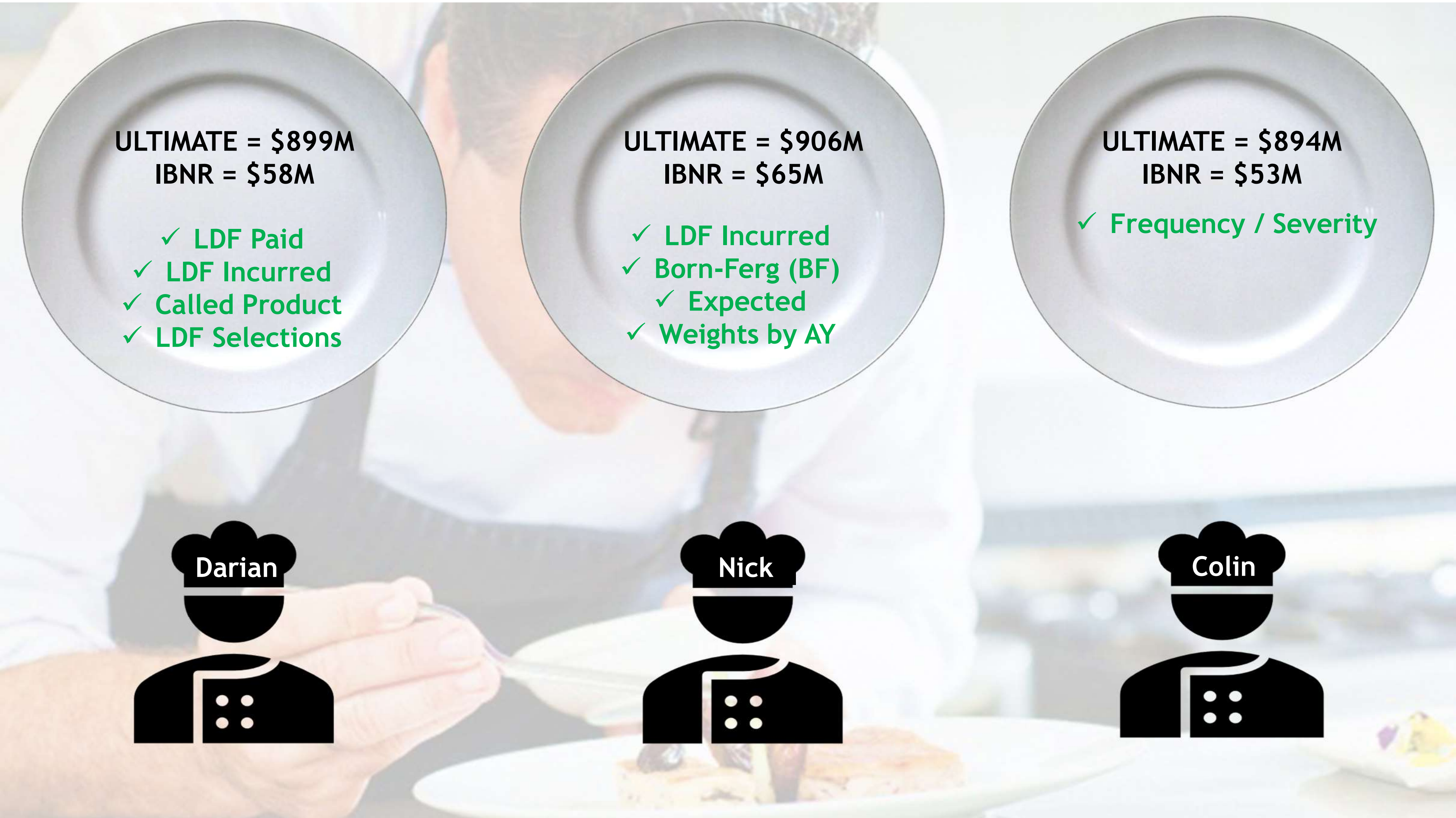
Selected Ultimate	$894 M
Total Incurred Losses to Date	- $841 M
Implied Actuarial IBNR	$ 53 M

Final Dish

Selected Ultimate	$ 894 M
Implied Actuarial IBNR	$ 53 M

Colin

Who should be eliminated?


ULTIMATE = $899M
IBNR = $58M
✓ LDF Paid
✓ LDF Incurred
✓ Called Product
✓ LDF Selections
ULTIMATE = $906M
IBNR = $65M
✓ LDF Incurred
✓ Born-Ferg (BF)
✓ Expected
✓ Weights by AY
ULTIMATE = $894M
IBNR = $53M
✓ Frequency / Severity
Darian
Nick
Colin

ROUND 1 ELIMINATION

Commercial Break

Round 2
Commercial Auto Bodily Injury

Acc Year	12	24	36	48	60	72	84	96
	Paid Cumulative Triangle ($ Millions) by age in months							
2012	49.6	219.5	378.3	504.5	580.0	618.9	635.2	645.7
2013	45.6	183.0	339.1	464.5	553.7	597.5	619.8	
2014	29.2	144.6	287.9	408.4	492.6	537.1		
2015	40.5	172.0	348.2	480.2	572.0			
2016	35.7	185.1	355.9	540.7				
2017	40.1	204.5	410.1					
2018	44.4	231.2						
2019	49.5							

	Paid Age-to-Age Factors						
Acc Year	12 to 24	24–36	36–48	48–60	60–72	72–84	84–96
2012	4.424	1.723	1.334	1.150	1.067	1.026	1.016
2013	4.009	1.853	1.370	1.192	1.079	1.037	
2014	4.960	1.991	1.419	1.206	1.090		
2015	4.243	2.025	1.379	1.191			
2016	5.187	1.922	1.519				
2017	5.106	2.006					
2018	5.205						

MEMO

To: Reserving Actuaries
From: Econometrics Team
RE: Attorney Representation Rates

The Econometrics Team conducted a study of attorney representation rates for use in your Bodily Injury reserve analysis. Here are the selected ultimate attorney representation rates by accident year:

Accident Year	Ultimate Attorney Rep Rates
2012	57.0%
2013	57.1%
2014	59.8%
2015	62.5%
2016	62.5%
2017	63.3%
2018	65.6%
2019	67.1%

** Disclaimer: Data is fictitious and for illustration purposes only*

Acc Year	Paid Age-to-Age Factors						
	12 to 24	24–36	36–48	48–60	60–72	72–84	84–96
2012	4.424	1.723	1.334	1.150	1.067	1.026	1.016
2013	4.009	1.853	1.370	1.192	1.079	1.037	
2014	4.960	1.991	1.419	1.206	1.090		
2015	4.243	2.025	1.379	1.191			
2016	5.187	1.922	1.519				
2017	5.106	2.006					
2018	5.205						

	12 to 24	24–36	36–48	48–60	60–72	72–84	84–96	96 to Ult
LDF	5.205	2.006	1.519	1.191	1.090	1.037	1.016	1.020

Acc Year	Paid Age-to-Age Factors						
	12 to 24	24–36	36–48	48–60	60–72	72–84	84–96
2012	4.424	1.723	1.334	1.150	1.067	1.026	1.016
2013	4.009	1.853	1.370	1.192	1.079	1.037	
2014	4.960	1.991	1.419	1.206	1.090		
2015	4.243	2.025	1.379	1.191			
2016	5.187	1.922	1.519				
2017	5.106	2.006					
2018	5.205						

	12 to 24	24–36	36–48	48–60	60–72	72–84	84–96	96 to Ult
LDF	5.205	2.006	1.519	1.191	1.090	1.037	1.016	1.020

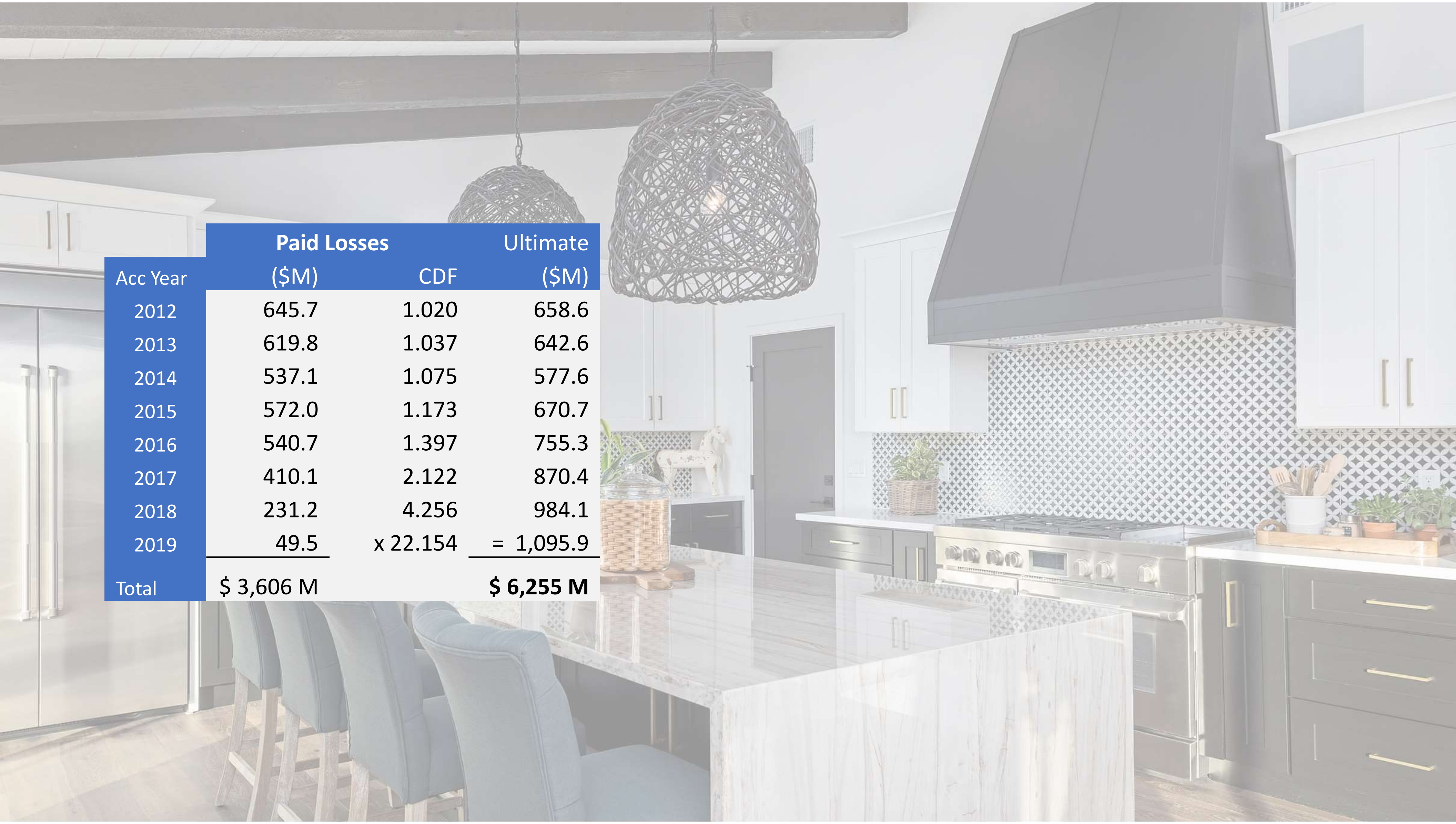
	From 12 mos to Ult	24–Ult	36–Ult	48–Ult	60–Ult	72–Ult	84–Ult	96–Ult
CDF	22.154	4.256	2.122	1.397	1.173	1.075	1.037	1.020

Acc Year	Paid Losses ($M)	CDF
2012	645.7	1.020
2013	619.8	1.037
2014	537.1	1.075
2015	572.0	1.173
2016	540.7	1.397
2017	410.1	2.122
2018	231.2	4.256
2019	49.5	x 22.154
Total	$ 3,606 M	

Paid Cumulative Triangle ($ Millions) by age in months

Acc Year	12	24	36	48	60	72	84	96
2012	49.6	219.5	378.3	504.5	580.0	618.9	635.2	645.7
2013	45.6	183.0	339.1	464.5	553.7	597.5	619.8	
2014	29.2	144.6	287.9	408.4	492.6	537.1		
2015	40.5	172.0	348.2	480.2	572.0			
2016	35.7	185.1	355.9	540.7				
2017	40.1	204.5	410.1					
2018	44.4	231.2						
2019	49.5							

	From 12 mos to Ult	24–Ult	36–Ult	48–Ult	60–Ult	72–Ult	84–Ult	96–Ult
CDF	22.154	4.256	2.122	1.397	1.173	1.075	1.037	1.020



Acc Year	Paid Losses ($M)	CDF	Ultimate ($M)
2012	645.7	1.020	658.6
2013	619.8	1.037	642.6
2014	537.1	1.075	577.6
2015	572.0	1.173	670.7
2016	540.7	1.397	755.3
2017	410.1	2.122	870.4
2018	231.2	4.256	984.1
2019	49.5	x 22.154	= 1,095.9
Total	$ 3,606 M		**$ 6,255 M**

Acc Year	Paid Losses ($M)	CDF	Ultimate ($M)
2012	645.7	1.020	658.6
2013	619.8	1.037	642.6
2014	537.1	1.075	577.6
2015	572.0	1.173	670.7
2016	540.7	1.397	755.3
2017	410.1	2.122	870.4
2018	231.2	4.256	984.1
2019	49.5	x 22.154	= 1,095.9
Total	$ 3,606 M		**$ 6,255 M**

Acc Year	Incurred Losses ($M)	CDF	Ultimate ($M)
2012	658.0	1.010	664.6
2013	632.4	1.014	641.0
2014	559.4	1.027	574.8
2015	624.0	1.061	661.9
2016	662.4	1.131	749.2
2017	626.7	1.361	852.7
2018	542.9	1.867	1,013.8
2019	333.5	x 3.643	= 1,214.9
Total	$ 4,639 M		**$ 6,373 M**

Acc Year	Paid Losses ($M)	CDF	Ultimate ($M)
2012	645.7	1.020	658.6
2013	619.8	1.037	642.6
2014	537.1	1.075	577.6
2015	572.0	1.173	670.7
2016	540.7	1.397	755.3
2017	410.1	2.122	870.4
2018	231.2	4.256	984.1
2019	49.5	x 22.154	= 1,095.9
Total	$ 3,606 M		**$ 6,255 M**

Acc Year	Incurred Losses ($M)	CDF	Ultimate ($M)
2012	658.0	1.010	664.6
2013	632.4	1.014	641.0
2014	559.4	1.027	574.8
2015	624.0	1.061	661.9
2016	662.4	1.131	749.2
2017	626.7	1.361	852.7
2018	542.9	1.867	1,013.8
2019	333.5	x 3.643	= 1,214.9
Total	$ 4,639 M		**$ 6,373 M**

Selected Ultimate	**$ 6,314 M**
Total Incurred Losses to Date	- $ 4,639 M
Implied Actuarial IBNR	= $ 1,675 M

Final Dish

Selected Ultimate	**$ 6,314 M**
Implied Actuarial IBNR	**$ 1,675 M**

Nick

MEMO

To: Reserving Actuaries
From: Econometrics Team
RE: Attorney Representation Rates

The Econometrics Team conducted a study of attorney representation rates for use in your Bodily Injury reserve analysis. Here are the selected ultimate attorney representation rates by accident year:

Accident Year	**Ultimate Attorney Rep Rates**
2012	57.0%
2013	57.1%
2014	59.8%
2015	62.5%
2016	62.5%
2017	63.3%
2018	65.6%
2019	67.1%

** Disclaimer: Data is fictitious and for illustration purposes only*

With Attorney

Incurred Severity for Claims *With* Attorney

Acc Year	12	24	36	48	60	72	84	96
2012	$40,217	$62,496	$73,835	$80,902	$84,612	$86,145	$87,105	$87,422
2013	$41,807	$61,290	$77,034	$84,921	$90,404	$91,929	$93,133	
2014	$39,190	$60,072	$77,495	$88,624	$94,132	$96,937		
2015	$43,387	$67,821	$86,580	$97,790	$103,841			
2016	$44,064	$69,143	$89,496	$106,662				
2017	$46,894	$74,415	$96,550					
2018	$45,729	$78,068						
2019	$53,568							

Non-Attorney

Incurred Severity for Claims *Non*-Attorney

Acc Year	12	24	36	48	60	72	84	96
2012	$12,367	$10,746	$9,568	$9,536	$9,555	$9,463	$9,498	$9,525
2013	$11,323	$8,614	$7,243	$7,333	$7,583	$7,644	$7,682	
2014	$9,618	$7,547	$5,247	$5,282	$5,458	$5,499		
2015	$10,139	$9,036	$7,904	$8,070	$7,952			
2016	$12,513	$11,653	$9,705	$9,810				
2017	$10,736	$8,935	$9,444					
2018	$12,848	$11,072						
2019	$14,717							

With Attorney

Incurred Severity for Claims *With* Attorney

Acc Year	12	24	36	48	60	72	84	96	Attorney Ultimate Severity
2012	$40,217	$62,496	$73,835	$80,902	$84,612	$86,145	$87,105	$87,422	$87,422
2013	$41,807	$61,290	$77,034	$84,921	$90,404	$91,929	$93,133		$93,471
2014	$39,190	$60,072	$77,495	$88,624	$94,132	$96,937			$98,469
2015	$43,387	$67,821	$86,580	$97,790	$103,841				$107,944
2016	$44,064	$69,143	$89,496	$106,662					$117,751
2017	$46,894	$74,415	$96,550						$123,712
2018	$45,729	$78,068							$129,629
2019	$53,568								$146,500

Non-Attorney

Incurred Severity for Claims *Non*-Attorney

Acc Year	12	24	36	48	60	72	84	96	Non-Attorney Ultimate Severity
2012	$12,367	$10,746	$9,568	$9,536	$9,555	$9,463	$9,498	$9,525	$9,525
2013	$11,323	$8,614	$7,243	$7,333	$7,583	$7,644	$7,682		$7,704
2014	$9,618	$7,547	$5,247	$5,282	$5,458	$5,499			$5,538
2015	$10,139	$9,036	$7,904	$8,070	$7,952				$8,071
2016	$12,513	$11,653	$9,705	$9,810					$10,050
2017	$10,736	$8,935	$9,444						$9,829
2018	$12,848	$11,072							$10,888
2019	$14,717								$12,259

Acc Year	Claim Counts - BI 12	24	36	48	60	72	84	96	Ultimate Claim Count
2012	11,100	12,210	12,621	12,683	12,721	12,746	12,762	12,762	12,762
2013	10,112	11,115	11,449	11,569	11,604	11,642	11,656		11,656
2014	8,326	9,296	9,608	9,724	9,754	9,792			9,804
2015	8,023	9,026	9,455	9,552	9,607				9,653
2016	8,034	9,216	9,650	9,774					9,865
2017	8,204	9,568	10,068						10,279
2018	8,922	10,467							11,217
2019	8,913								11,173

Acc Year	Ultimate Claim Count (from above)	Attorney Rep Rate (from memo)	Ultimate Attorney Claim Count	Ultimate Non-Attorney Claim Count
2012	12,762	57.0%	= 12,762 x 57%	= 12,762 x (100% - 57%)
2013	11,656	57.1%		
2014	9,804	59.8%		
2015	9,653	62.5%		
2016	9,865	62.5%		
2017	10,279	63.3%		
2018	11,217	65.6%		
2019	11,173	67.1%		

Claim Counts - BI

Acc Year	12	24	36	48	60	72	84	96	Ultimate Claims
2012	11,100	12,210	12,621	12,683	12,721	12,746	12,762	12,762	12,762
2013	10,112	11,115	11,449	11,569	11,604	11,642	11,656		11,656
2014	8,326	9,296	9,608	9,724	9,754	9,792			9,804
2015	8,023	9,026	9,455	9,552	9,607				9,653
2016	8,034	9,216	9,650	9,774					9,865
2017	8,204	9,568	10,068						10,279
2018	8,922	10,467							11,217
2019	8,913								11,173

Acc Year	Ultimate Claims (from above)	Attorney Rep Rate (from memo)	Ultimate Attorney Claim Count	Ultimate Non-Attorney Claim Count
2012	12,762	57.0%	7,274	5,488
2013	11,656	57.1%	6,656	5,000
2014	9,804	59.8%	5,861	3,943
2015	9,653	62.5%	6,035	3,619
2016	9,865	62.5%	6,164	3,700
2017	10,279	63.3%	6,503	3,776
2018	11,217	65.6%	7,353	3,864
2019	11,173	67.1%	7,496	3,677

Acc Year	Attorney: **Attorney** Ultimate Severity	Attorney: Ultimate Attorney Claim Count	Non-Attorney: **Non-Attorney** Ultimate Severity	Non-Attorney: Ultimate Non-Attorney Claim Count
2012	$87,422	7,274	$9,525	5,488
2013	$93,471	6,656	$7,704	5,000
2014	$98,469	5,861	$5,538	3,943
2015	$107,944	6,035	$8,071	3,619
2016	$117,751	6,164	$10,050	3,700
2017	$123,712	6,503	$9,829	3,776
2018	$129,629	7,353	$10,888	3,864
2019	$146,500	7,496	$12,259	3,677

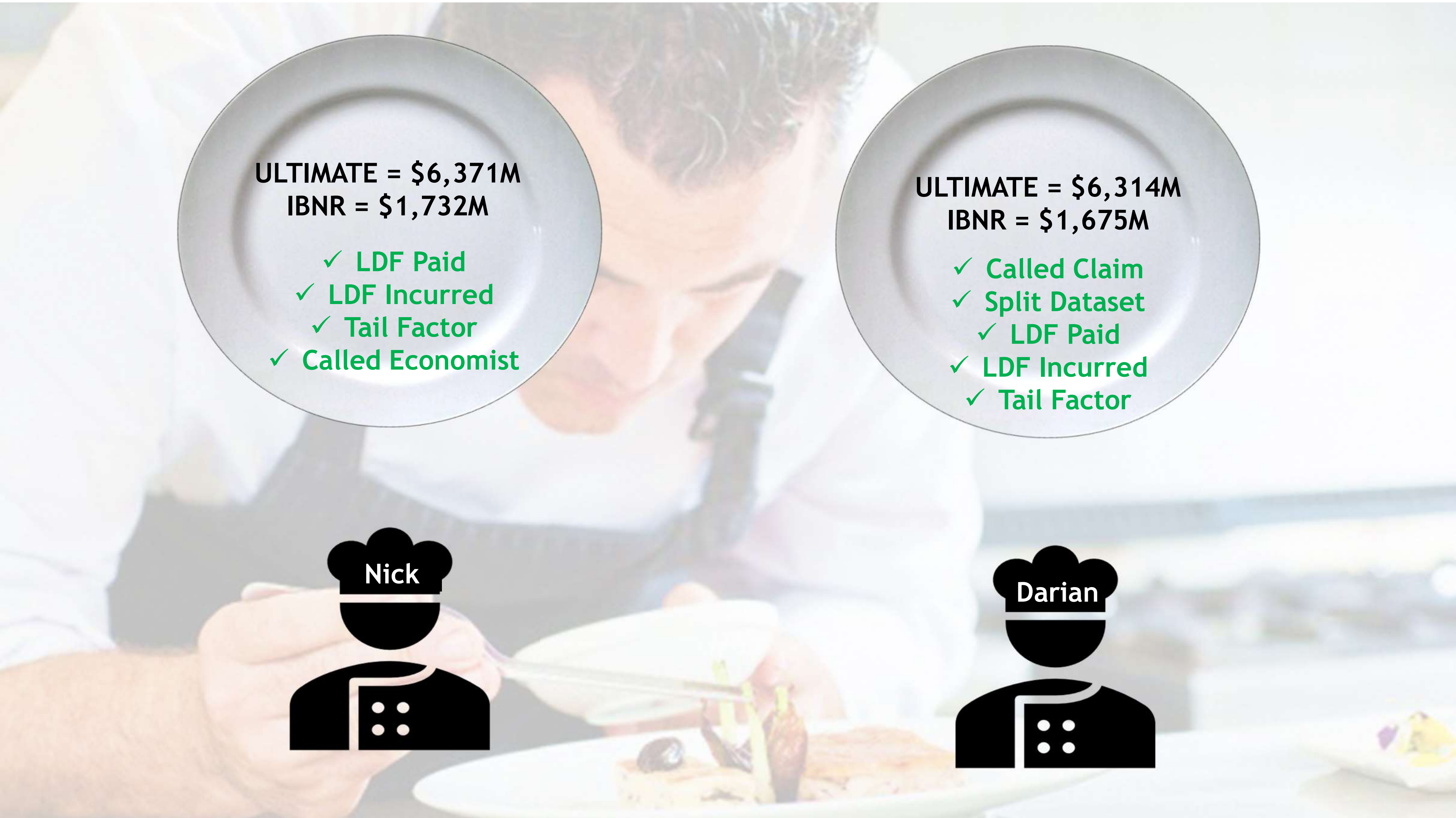
	Attorney			Non-Attorney		
Acc Year	**Attorney** Ultimate Severity	Ultimate Attorney Claim Count	Ultimate Losses (M) with Attorney	**Non-Attorney** Ultimate Severity	Ultimate Non-Attorney Claim Count	Ultimate Losses (M) non-Attorney
2012	$87,422	7,274	$636	$9,525	5,488	$52
2013	$93,471	6,656	$622	$7,704	5,000	$39
2014	$98,469	5,861	$577	$5,538	3,943	$22
2015	$107,944	6,035	$651	$8,071	3,619	$29
2016	$117,751	6,164	$726	$10,050	3,700	$37
2017	$123,712	6,503	$804	$9,829	3,776	$37
2018	$129,629	7,353	$953	$10,888	3,864	$42
2019	$146,500	x 7,496	= $1,098	$12,259	x 3,677	= $45
Total			$6,068			$303

Combined	
Ultimate Losses ($M)	$6,371
Indicated IBNR ($M)	$1,732

Final Dish

Selected Ultimate	$ 6,371 M
Implied Actuarial IBNR	$ 1,732 M

Who should be eliminated?


ULTIMATE = $6,371M
IBNR = $1,732M
✓ LDF Paid
✓ LDF Incurred
✓ Tail Factor
✓ Called Economist
ULTIMATE = $6,314M
IBNR = $1,675M
✓ Called Claim
✓ Split Dataset
✓ LDF Paid
✓ LDF Incurred
✓ Tail Factor
Nick
Darian

WHO IS OUR WINNER?

WHO IS OUR WINNER?

Q & A

CREDITS

HOST
Marci Freida, Business Insurance Claim

CHEFS
Darian Garner, Business Insurance Loss Analytics & Reserving
Colin Heydorn, Business Insurance Loss Analytics & Reserving
Nick LaPenta, Corporate Actuarial

JUDGES
Deb Mergens, Bond & Specialty Insurance Reserving
Rachel Warner, Corporate Reinsurance

PRODUCT PARTNER, CLAIM PARTNER, CHIEF ECONOMIST, COMMERCIAL PRODUCER
Wesley Griffiths, Corporate Actuarial

DIRECTED BY

Thank You!

TRAVELERS