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RESERVING CHALLENGES FOR THE SHARING ECONOMY

CASUALTY LOSS RESERVING SEMINAR
AUSTIN, TX
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Oliver Wyman Actuarial Consulting, Inc.

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Agenda

- Sharing Economy Definition
- Challenges – Insurance Operations
- Challenges – Reserving
  - Segmentation
  - LDFs and Tail
  - ILFs
  - Traditional vs. Non-Traditional Methods
- Business Considerations
  - Ride sharing
  - Home sharing
  - Car sharing
  - Scooters and Bicycles

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Sharing Economy

| What is it? | The **sharing economy** is an economic model often defined as a peer-to-peer based activity of acquiring, providing or sharing access to goods and services that are facilitated by a community based on-line platform. |

| Examples | • Ride sharing (Lyft, Uber, Didi, …)
• Car sharing (Getaround, Turo, …)
• Home sharing (Airbnb, Booking.com, …)
• Peer-to-peer lending (Lending Club, Prosper, …)
• Coworking (Link, the Coop, …)
• Reselling or trading (eBay, Craigslist, …)
• Knowledge and talent sharing (TaskRabbit, LivePerson, …)
• Last-mile mobility (Bird, Lime, Scoot, Lyft, Uber, Wheelz, …) |

Sharing Economy
Good or Bad?

Advantages	Disadvantages	Benefits to society
• Cheaper goods and services • Extra income for providers • New and better opportunities • Stronger communities	• Privacy or safety concerns • No or few guarantees • Trust issues • Market distortions	• More flexibility in work and life • More ways to earn and save money • Less worry about valuable possessions and obligations • More adaptable businesses

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Insurance Operations Challenges

Immature book of business	Strong and inconsistent growth	Unknown long-term impact of large losses
Inexperienced TPA - Backlogs and catch-up - Evolving reserving philosophy	Evolving Regulations	Distribution shifts - New markets - New programs
	World-wide exposure	

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Reserving Challenges

Reserve Segmentation

- By geography (country / state)
- By program
- By coverage
- By period / phase / stage (0, 1, 2 and 3)

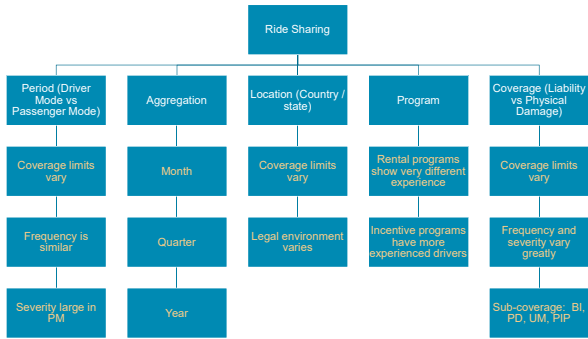### Loss Development Factors (LDFs)

Tail selection

Increased Limit Factors (ILFs)

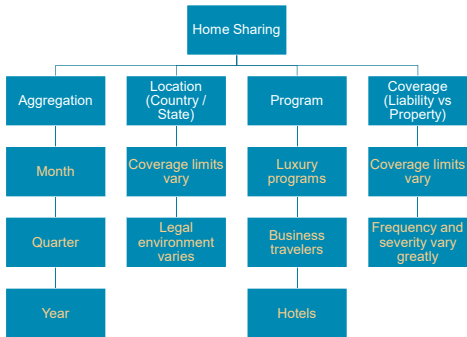### Traditional vs. Non-Traditional Methods

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Segment Selection

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Ride Sharing
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Period (Driver Mode vs Passenger Mode)	Aggregation	Location (Country / state)	Program	Coverage (Liability vs Physical Damage)
Coverage limits vary	Month	Coverage limits vary	Rental programs show very different experience	Coverage limits vary
Frequency is similar	Quarter	Legal environment varies	Incentive programs have more experienced drivers	Frequency and severity vary greatly
Severity large in PM	Year			Sub-coverage: BI, PD, UM, PIP

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Segment Selection

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Home Sharing
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Aggregation	Location (Country / State)	Program	Coverage (Liability vs Property)
Month	Coverage limits vary	Luxury programs	Coverage limits vary
Quarter	Legal environment varies	Business travelers	Frequency and severity vary greatly
Year		Hotels	

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Loss Development Factors

CHALLENGES
- Lack of appropriate industry benchmarks
- Inexperienced TPA with potentially inconsistent reserving practices
- Immature book with strong growth
- Should triangles be limited, if so to what limit
- Quarterly or yearly triangles
- How to estimate the tail and the length of the development patterns

POTENTIAL SOLUTIONS
- Use quarterly limited triangles if seasonality is moderate
- Fit LDFs to estimate tail
- Consider a Berquist-Sherman adjustment if reserving philosophy is inconsistent
- Explore stochastic reserving methods (Bootstrap, Clark, …)

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Loss Development Factors

QUARTERLY TRIANGLES

- Strong and potentially inconsistent growth makes the average accident date a moving target and variable through time. Quarterly triangles minimize this issue.
- Shorter period provides faster understanding of development pattern and provides multiple opportunities to adjust values
- If using annual industry benchmarks, need to adjust age of benchmarks in consideration of being applied to quarterly data

LIMITED TRIANGLES

- Limited triangles provide more stability but rely more heavily on ILFs
- Limit should consider large loss distribution
- Rule of thumb is that the limit caps 2% - 5% of claims

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Loss Development Factors

BERQUIST SHERMAN

Backlogs, catch-ups and TPA changes are part of life in the sharing economy.

Reviewing average case reserve on open cases should be done regularly.

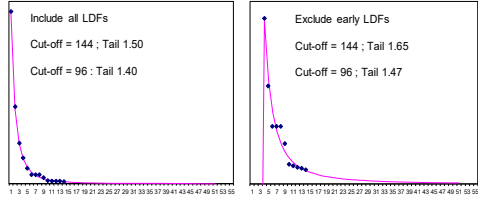Adjustments should be considered when large swings are observed.

Accident Period Ending	2	5	8	11	14	17
12/31/2016	1,900	3,400	5,500	8,400	12,400	15,900
3/31/2017	1,500	3,400	7,100	9,800	14,700	18,700
6/30/2017	2,000	6,400	10,100	13,400	17,400	18,300
9/30/2017	3,000	8,200	11,300	13,800	15,100	16,600
12/31/2017	3,900	6,600	10,100	13,200	17,900	20,800
3/31/2018	4,200	6,800	8,800	11,600	15,000	19,400
6/30/2018	2,900	6,100	9,200	11,800	15,800	
9/30/2018	3,400	6,300	8,800	11,800		
12/31/2018	2,500	5,100	9,100			
3/31/2019	4,200	14,000				
6/30/2019	10,200					

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Loss Development Factors
Tail Selection

FITTING DATA
When fitting LDFs to estimate a tail factor a number of factors need to be considered:
• Distribution: Inverse Power of Geometric tend to work well
• Fitting spectrum: include all link ratios or eliminate part of the pattern
• Cut-off age: how long is your pattern

Include all LDFs

Cut-off = 144 ; Tail 1.50

Cut-off = 96 ; Tail 1.40

Exclude early LDFs

Cut-off = 144 ; Tail 1.65

Cut-off = 96 ; Tail 1.47

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Increased Limit Factors

CHALLENGES
• Lack of appropriate industry benchmarks
• Inexperienced TPA with potentially inconsistent reserving practices
• Immature book with strong growth
• Unknown long term impact of large losses

POTENTIAL SOLUTIONS
• Use company data as a starting point and adjust for:
  o Exposure growth
  o Fit loss data
  o Review closed claim fit

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Increased Limit Factors

EXPOSURE GROWTH

When fitting historical losses, too much weight is given to recent period with larger volume. Using an inverse exposure weight may equalize the history.

Quarter	Exposure	Adjustment	Adjustment Sqrt
2016-1	1,000	7.43	2.73
2016-2	1,200	6.19	2.49
2016-3	1,440	5.16	2.27
2016-4	1,728	4.30	2.07
2017-1	2,074	3.58	1.89
2017-2	2,488	2.99	1.73
2017-3	2,986	2.49	1.58
2017-4	3,583	2.07	1.44
2018-1	4,300	1.73	1.31
2018-2	5,160	1.44	1.20
2018-3	6,192	1.20	1.10
2018-4	7,430	1.00	1.00
2019-1	8,916		
2019-2	10,699		

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Increased Limit Factors
Possible Adjustments

FITTING DATA

- Distribution: Logarithmic and Polynomial tend to work well
- Trending: Trend all claims or only closed claims
- All claims or a subset:
  - Closed claims only
  - Eliminate small claims
  - Eliminate new claims
- Fitting spectrum:
  - ILFs at consistent interval
  - Exclude small limits
 - Exclude limits where limited data is available

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Increased Limit Factors
Sample Results

	All Claims				Closed Claims				
	Exposure Adjusted		Not Exposure Adjusted		Exposure Adjusted		Not Exposure Adjusted		
Limit	Actual	Fitted	Actual	Fitted	Actual	Fitted	Actual	Fitted	ISO
50,000	0.68		0.71		0.74		0.77		
100,000	0.83		0.85		0.87		0.89		0.79
250,000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
300,000	1.09	1.03	1.07	1.03	1.04	1.02	1.03	1.02	1.05
350,000	1.12	1.06	1.10	1.05	1.06	1.04	1.05	1.03	1.09
500,000	1.18	1.13	1.15	1.11	1.11	1.08	1.08	1.07	1.20
750,000	1.26	1.20	1.21	1.18	1.16	1.13	1.12	1.10	1.33
1,000,000	1.30	1.26	1.25	1.22	1.18	1.16	1.15	1.13	1.43
1,500,000	1.31	1.33	1.26	1.29	1.20	1.21	1.16	1.17	1.57
2,000,000	1.31	1.39	1.26	1.33	1.20	1.24	1.16	1.20	1.67

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Reserving Method Comparison
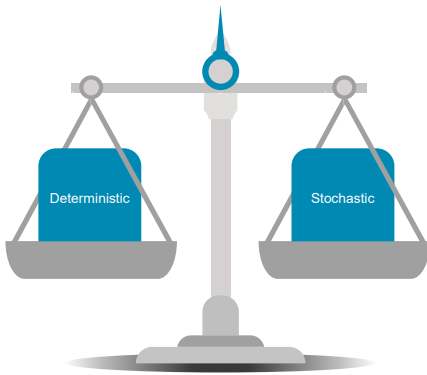
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Reserving Method Comparison

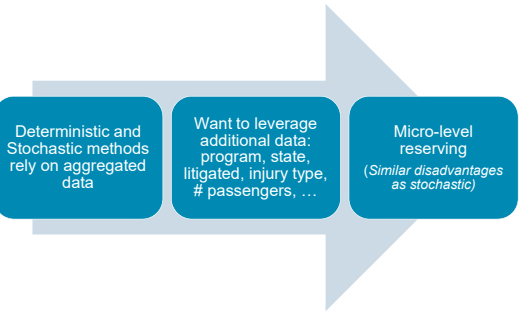| Deterministic Reserving	Stochastic Reserving

• Traditional methods
• One answer
• Advantages
  • Easy to communicate
  • Expert judgment
  • Control Adjustments
• Disadvantages
  • More subjective
  • Cannot fully capture uncertainty
	• Newer methods
	• Full reserve distribution
	• Advantages
	  • Provides more statistical info
	  • Captures more variability
	• Disadvantages
	  • Data intensive
	  • Subject to model error
	  • Tail estimation

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Reserving Method Comparison
Individual Claims Reserving

Deterministic and Stochastic methods rely on aggregated data → Want to leverage additional data: program, state, litigated, injury type, # passengers, … → Micro-level reserving (*Similar disadvantages as stochastic*)

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Ride Sharing
Considerations

What industry factors?	• Commercial auto – private passenger types • Taxis • Private passenger auto • ISO classifies TNC as PPA
Data Issues	• Period unavailable or mis-matched • Difficulty in limiting claims with multiple claimants
Driver mix can be very different	• Younger drivers • More males • Underwriting criteria
Predictive modeling	• Lower rated drivers are safer
Large physical damage deductible	• Many claims closed without payments • Recovery is nearly impossible on rental programs • Potential fraud

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Ride Sharing
Considerations

Awareness of insurance programs	• Optional vs. guarantee • Frequency impacted from structure
Primary vs. Secondary Insurance	• Claims may be paid by commercial insurers • Can explain large frequency • This is more common in Driver Mode
Rental programs	• Challenges with driver selection • Payee is the rental company requiring prompt repairs • TNC pays claims first and attempts recovery against driver (usually unsuccessful)
Business Model	• Livery vs. delivery • Market serviced: children, night clubs, others • Location: urban vs. rural, dark or well-lit
Fraud	

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Car Sharing
Considerations

What industry factors?	• Commercial auto – private passenger types • Private passenger auto
Driver mix can be very different	• Younger drivers • More males • Underwriting criteria • Drivers are often less experienced
Awareness of insurance programs	• Optional vs. guarantee • Frequency impacted from structure
Primary vs. Secondary Insurance	• Claims may be paid by commercial insurers • Can explain large frequency trend • Who is primary under a TNC scenario?
Fraud / Data Issues	

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Home Sharing
Considerations

What industry factors?	• Homeowners • Commercial property • General Liability • ISO does not separate
What is considered an insurance claim	• Discounted room • Coupon for future stay • Multiple data sources: TPA, CSR, Legal
Mix can be very different	• Shared bedroom or a castle? • Underwriting criteria
Data Issues	• Multiple data sources: TPA, CSR, Legal

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Home Sharing
Considerations

Possible accident date	• Booking date • Check-in date • Check-out date • Long-term stays can span months
Awareness of insurance programs	• Optional vs. guaranty • Frequency impacted from structure
Primary vs. Secondary Insurance	• Many claims have the potential of being paid by commercial insurers unaware of commercial use • Can explain large frequency trend as commercial insurers become more aware
Fraud	

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Scooters & Bicycles
Law Varies by State

Scooters and e-bikes are not legal in NYC.

The Texas Senate passed a bill that would require that scooter users be at least 16 years old.

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Scooters & Bicycles
Considerations

Current programs cover product liability	• Rider's agreement has no rider liability; most riders do not read the agreement • Many rider liability claims are reported; some are denied but most do not have enough proof to deny
Current programs do not cover rider liability	• Programs are being developed with low limits • Frequency of claims is expected to rise
Data collection is minimal	• No data on mileage • Little data on idle time • Little data on location
Current loss control measure	• Restricted speed • Night turn-off • No sidewalk use (grossly ignored)
Future loss control measure	• Helmet use • Additional time restrictions • Location restrictions

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QUALIFICATIONS, ASSUMPTIONS AND LIMITING CONDITIONS