Autonomous Vehicles

Impacts on the General Vehicle Industry

Evan Cooper and James Pearson
Agenda

• An Introduction to Self Driving Vehicles
• The History
• The current and future players
• Modelling and Assumptions
• How will this impact the industry if there is no industry shift?
• Expectations and Alternatives
Self Driving Cars
## Vehicle Automation

### Automation Levels of Autonomous Cars

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 0</strong></td>
<td>There are no autonomous features.</td>
</tr>
<tr>
<td><strong>Level 1</strong></td>
<td>These cars can handle one task at a time, like automatic braking.</td>
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<tr>
<td><strong>Level 2</strong></td>
<td>These cars would have at least two automated functions.</td>
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<tr>
<td><strong>Level 3</strong></td>
<td>These cars handle “dynamic driving tasks” but might still need intervention.</td>
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<tr>
<td><strong>Level 4</strong></td>
<td>These cars are officially driverless in certain environments.</td>
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<tr>
<td><strong>Level 5</strong></td>
<td>These cars can operate entirely on their own without any driver presence.</td>
</tr>
</tbody>
</table>

*Source: SAE International*
The Timeline of Automation

1980s
ABS

1990s
Traction and stability control

2009
Google self driving car project begins

2012
Google self driving car ride on city streets

2013
Lane keeping technology

2015
Google driverless car fully self driven ride

2019-2021
Large retailers expecting to release autonomous cars
LIDAR – Light Imaging, Detection and Radar
Tesla Vision

- Rearward Looking Side Cameras
  - Max distance 100m
- Wide Forward Camera
  - Max distance 60m
- Main Forward Camera
  - Max distance 150m
- Narrow Forward Camera
  - Max distance 250m
- Rear View Camera
  - Max distance 50m
- Ultrasonics
  - Max distance 8m
- Forward Looking Side Cameras
  - Max distance 80m
- Radar
  - Max distance 180m
Software, Neural Networks and Cars Communicating
The Trolley Problem
Autonomous Car Impact Model

- Premiums
- Claims
- Relative Risk by Age Bracket
- Comprehensive and Third Party Cover
- Uptake of Autonomous Vehicles
- Number of Autonomous and Non-Autonomous Vehicles
- Autonomous vehicle crash rates
Premium and Claims Assumptions
Overview of the motor vehicle industry

Crash Rates and Age

Source: 1995-2010 - Motor Vehicle crashes, injuries and deaths in relation to driver age – USA
An Overview of the Road Toll Trend and Drivers

Source: 2011 - Motor Vehicle crashes in New Zealand
Crashes causing Injury and Death by Age

Source: Ministry of Transport Licence and Fleet Statistics – Crash and Casualties report
Online Quotes for Car Insurance
Premium Assumptions – $702 per unit population

Claims Assumption – 69.5 cents per dollar

Car Uptake and Population Assumptions
Uptake

Source: Morning Consulting - 2016
Uptake

Source: Morning Consulting - 2016
Current Vehicles Over Time

Source: 2015 - Ministry of Transport – Annual Vehicle Fleet Statistics
Current Vehicles Over Time

Source: 2015 - Ministry of Transport – Annual Vehicle Fleet Statistics
Number of Autonomous Vehicles over time

- Net growth rate: 2% per annum
- Scrap rate: 4.8% per annum
- Uptake: exponential, 0% - 2016, 100% - 2030

Total Autonomous
Total Non Autonomous
Expectations and Alternatives
Earned Premium Sensitivity – Varying crash rates

- Modelled Premium
- Premium 70% C.R
- Premium 40% C.R
- Premium 20% C.R

[Graph showing earned premium sensitivity with varying crash rates from 2016 to 2046 in millions]
Alternative Models of the Automotive Industry

• Private Ownership vs Ride Sharing
  – Theft and Damage
  – Crash Liability

• Regulatory Changes

• Will it be an insurable market

• Cyber insurance
Conclusion and Discussion