At a Plateau?

Adapting to an ever-changing light vehicle market ...
Contents

• Light Vehicle Outlook
• Structural Factors Alter an Industry
• Summary
Global growth is expected to rise in 2017 as US/EU economies strengthen and Brazil/Russia start recovery

**World Economic Growth Rates**

LOW INFLATION ECONOMY
Weak demand + abundant supply driving commodity prices lower, impacting trade.

World average
2016 = 2.2%

GDP growth rate %

<table>
<thead>
<tr>
<th>Year</th>
<th>World</th>
<th>United States</th>
<th>Japan</th>
<th>Eurozone</th>
<th>Brazil</th>
<th>Russia</th>
<th>India</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
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<td>2016</td>
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<td>2017</td>
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<tr>
<td>Avg 2018-2023</td>
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</tbody>
</table>

Source: IHS Markit
Exchange rates per US dollar

**Canadian dollar**

Source: IHS Markit © 2016 IHS Markit

**Euro**

Source: IHS Markit © 2016 IHS Markit

**Japanese yen**

Source: IHS Markit © 2016 IHS Markit

Quarterly averages

**Chinese renminbi**

Source: IHS Markit © 2016 IHS Markit
US crude oil prices and natural gas prices
Emerging Markets LV Sales Forecast
Recent declines only temporary – fundamentals remain positive

LV Sales Forecast (millions, 2005 – 2023)

- ASEAN: 3.0
- Central Europe: 1.3
- East Europe: 2.6
- Indian Subcontinent: 3.6
- Middle East/Africa: 4.7
- South America: 3.8

Source: IHS Automotive
Mature Markets LV Sales Forecast

Replacement demand is key driver – loyalty critical to OEMs

LV Sales Forecast (millions, 2005 – 2023)

Source: IHS Automotive
Global Light Vehicle Production Growth Ratchets Down a Gear

- 2007: 71 million
- 2008: 60 million
- 2009: 60 million
- 2010: 89 million
- 2011: 98 million
- 2012: 106 million

- 2015: 29 million
- 2016: 8 million

- Global: 1.9% CAGR
- China: 7.9, 3.6%
- S Asia: 4.5, 5.8%
- EU: 2.5, 1.4%
- MEA: 1.2, 6.1%
- NA: 1.1, 0.8%
- S Amer: 0.9, 3.3%
- Jap/Kor: -0.8, -0.8%

2015 – 2023 Growth Volume, CAGR%
Global LV Production Outlook
Over 70% of Total Growth From Asia

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<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>24.0</td>
<td>25.8</td>
<td>26.1</td>
<td>26.8</td>
<td>32.2</td>
<td>3.2%</td>
<td>42%</td>
<td>Tier 3 &amp; 4 city growth</td>
</tr>
<tr>
<td>Europe</td>
<td>20.9</td>
<td>21.5</td>
<td>21.8</td>
<td>22.2</td>
<td>23.5</td>
<td>1.3%</td>
<td>13%</td>
<td>Slow rebound of Russia and shift from West EU</td>
</tr>
<tr>
<td>NA</td>
<td>17.5</td>
<td>17.9</td>
<td>18.0</td>
<td>18.2</td>
<td>18.6</td>
<td>0.6%</td>
<td>5%</td>
<td>New capacity (Mex), D3 re-alignment</td>
</tr>
<tr>
<td>South Asia</td>
<td>8.0</td>
<td>8.2</td>
<td>8.7</td>
<td>9.3</td>
<td>12.6</td>
<td>6.3%</td>
<td>29%</td>
<td>India domestic &amp; export, ASEAN rise</td>
</tr>
<tr>
<td>Japan/Korea</td>
<td>13.3</td>
<td>13.0</td>
<td>13.2</td>
<td>13.0</td>
<td>12.6</td>
<td>-0.4%</td>
<td>-3%</td>
<td>Slow domestic mkts, production co-location</td>
</tr>
<tr>
<td>South America</td>
<td>3.1</td>
<td>2.7</td>
<td>2.7</td>
<td>2.8</td>
<td>3.9</td>
<td>5.2%</td>
<td>8%</td>
<td>Well below 2013 record of 4.5 mil</td>
</tr>
<tr>
<td>Middle East/Africa</td>
<td>2.0</td>
<td>2.3</td>
<td>2.4</td>
<td>2.6</td>
<td>3.2</td>
<td>4.7%</td>
<td>6%</td>
<td>Focus of more attention by OEMs</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>88.7</td>
<td>91.4</td>
<td>92.8</td>
<td>94.7</td>
<td>106.5</td>
<td>2.2%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Shift to global structures within B through D segments is apparent at ~70% of global volume

Growth in China, India and NA fed from global B & C segment structures = enhanced scale economies
Greater China Production

- Asian 4 and Other China OEMs growing faster than German 3, Detroit 3 and "Other Western" OEMs.

Fed Reserve of Chicago/ December 2016
Europe Production

- Other European OEMs growing faster than German 3, Asian 4, Detroit 3 and ‘Other Global’ OEMs.
- Russia Production rises to 3.9 Million in 2022 from 2.7 Million Today.
Southeast Asia Production

Production by Country

- Malaysia
- Indonesia
- Philippines
- Thailand
- Vietnam
- Pakistan
- India
- Australia

Production by OEM

- Detroit 3: 8%
- Asian 4: 46%
- German 3: 5%
- Other 41%

- 2002: 41%
- 2012: 54%
- 2023: 30%
US: Light Vehicle Sales Forecast
Sales peak here; return to previous long-term trend level possible

Market peaks in mid-2017 – weaker buying conditions, slower job creation, rising oil prices start next cycle. Some return to ‘cars’ likely by 2022.

Source: IHS Markit Automotive, current light vehicles sales forecast
NAFTA Production
Customer Dynamics Changing ...

- Rise in Mazda, Fuji Heavy, Volvo and Tesla underscores ‘Other’ OEM rise – Supply base shifts.
- Detroit 3 output declines due to new competition, comparative lack of exports and longer-term impact of affordability.
NA Regional Shift  
Logistics and Supply Structure Under Pressure

**Midwest/Ontario**

<table>
<thead>
<tr>
<th>Year</th>
<th>Prod Vol Mil</th>
<th>A4</th>
<th>D3</th>
<th>G3</th>
<th>Oth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>5.6</td>
<td>2.4</td>
<td>2.4</td>
<td>2.4</td>
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<tr>
<td>2016</td>
<td>5.4</td>
<td>2.4</td>
<td>2.4</td>
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<tr>
<td>2017</td>
<td>4.8</td>
<td>2.4</td>
<td>2.3</td>
<td>2.2</td>
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<tr>
<td>2018</td>
<td>4.6</td>
<td>2.3</td>
<td>2.2</td>
<td>2.2</td>
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<tr>
<td>2019</td>
<td>4.6</td>
<td>2.2</td>
<td>2.2</td>
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<tr>
<td>2020</td>
<td>4.7</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
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<tr>
<td>2021</td>
<td>4.6</td>
<td>2.2</td>
<td>2.2</td>
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<tr>
<td>2022</td>
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<tr>
<td>2023</td>
<td>4.4</td>
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- Mix towards D/E-segment and Full Frame
- Detroit 3 still account for +60 of MW/ONT volume by 2023

**Southeast**

<table>
<thead>
<tr>
<th>Year</th>
<th>Prod Vol Mil</th>
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<th>D3</th>
<th>G3</th>
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<td>0.8</td>
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<td>0.8</td>
<td>1.0</td>
<td>2.8</td>
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<td>2018</td>
<td>0.8</td>
<td>1.0</td>
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<td>2019</td>
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<td>0.9</td>
<td>2.8</td>
<td>2.8</td>
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<td>2020</td>
<td>0.9</td>
<td>0.9</td>
<td>2.9</td>
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<td>2021</td>
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<td>2022</td>
<td>0.8</td>
<td>0.9</td>
<td>2.9</td>
<td>2.9</td>
<td>2.7</td>
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<td>2023</td>
<td>0.8</td>
<td>0.9</td>
<td>2.9</td>
<td>2.9</td>
<td>2.7</td>
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</tbody>
</table>

- Remarkable stability – newer facilities w/export focus
- Higher concentration on C & D-segment CUVs

**Mexico**

<table>
<thead>
<tr>
<th>Year</th>
<th>Prod Vol Mil</th>
<th>A4</th>
<th>D3</th>
<th>G3</th>
<th>Oth</th>
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<td>1.1</td>
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<td>1.6</td>
<td>1.5</td>
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<td>2017</td>
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<td>1.4</td>
<td>1.6</td>
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<td>1.5</td>
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<tr>
<td>2018</td>
<td>0.7</td>
<td>1.5</td>
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<td>2020</td>
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<td>1.6</td>
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<td>2021</td>
<td>0.9</td>
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<td>1.5</td>
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<tr>
<td>2023</td>
<td>1.0</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.5</td>
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</tbody>
</table>

- Mid-Mexico now accounts for ~70% of Mex volume
- Rise of B & C-segment products with increasing luxury focus for export
Shifting Geography Matters

- Logistics cost and risk reduction is focal to OEM cost reduction initiatives
  - Key at GM, Nissan and VW
- Massive shift from 2015 (Jackson, TN) to 2020 (Oneida, AR) at 31 miles/yr
- Alters locational strategies, competitiveness etc.
- US South and Mexico customers growing faster than other markets

‘Center of the Industry’ shifts impacts all facets of supply
Divergent Trajectories – NA LV Production
Detroit Three Reaches an Apex in 2016
Detroit Three Volumes Peak .....

Quarterly NA Light Vehicle Production

<table>
<thead>
<tr>
<th>Millions</th>
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<tbody>
<tr>
<td>GM</td>
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<tr>
<td>Ford</td>
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<tr>
<td>FCA</td>
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North America Engine Output
Sub 3.0L totals to 73% of the Market
North America Engine Technology Trends

- Electric
- Fuel Cell
- Hybrid-Full
- Hybrid-Mild
- Stop/Start
- Diesel
- Gas-E85
- Gas DI
- Gas Boosted

Years: 2014 to 2022

Millions
Contents

- Light Vehicle Outlook
- **Structural Factors Alter an Industry**
  - Autonomous Vehicles, Lightweighting, Powertrain Shifts and Regulations
- Summary
Global Vehicle Program Launches by Region

Increased launch activity raises risk.

Increased industry pace places pressure on talent, resources and infrastructure.

North America Europe Japan/Korea China Other

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Fed Reserve of Chicago/ December 2016
Over ¼ of NA engine production volume will be <2.0L and based upon global platforms.

Shift towards 48V will further solidify growth of smaller 4 & 3 cylinder engines as (turbo and super) charging efficiency rises.

Upwards of 66% of volume will be <2.9L and global in nature.

V6s are increasingly being squeezed from the top by ‘vocation V8s’ and bottom by turbo I4s.

Regional engines account for only 15 of NA production volume.

V8s are only ~10% of the market by 2022.
Global Engine Program Launches by Region
New Powertrains pulled forward to 2018/19

OEMs focus greater attention on electrification, revision of existing engines and packaging.

Fed Reserve of Chicago/ December 2016
U.S. Midterm Evaluation – Highlighting the Compliance Gap

- OEMs are girding for widening compliance gaps – Direct BIW lightweighting will play a critical role to reducing primary and secondary mass to close these gaps.

Compliance gaps are increasing in NA, Europe and China.
U.S. Light Vehicles in Operation

VIO Will Increase +10% by 2021

Data as of January 1 each year.

Source: IHS Automotive

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Average Age Rise Impacts VIO Units

Average Vehicle Rises

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Age (yrs)</th>
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<tbody>
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<tr>
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<tr>
<td>2016</td>
<td>11.6</td>
</tr>
<tr>
<td>2019</td>
<td>11.8</td>
</tr>
</tbody>
</table>

Source: IHS Automotive

Fed Reserve of Chicago/December 2016
Self-Driving Car Evolution

L5: Self-driving Only

L4: Full Self-driving

L3: Limited Self-driving

Auto Pilot: Parking
Auto Pilot: Highway

L2: Partial Autonomy

Park Assist
Adaptive Cruise Control
Lane Keep Assist

L1

Autonomous Braking
Adaptive Cruise Control

2010  2015  2020  2025  2030
Global CO₂ Targets Are Swift and Aggressive

- Reduced CO₂ emission equates to improved fuel efficiency
- Global convergence toward 2025
Material Forecast Analysis
NA LV Material Consumption (Net Usage)
Electrification Takes Hold
Shift From S/S to Mild/Full Hybrids Starts Next Decade

Electrification is Required
• Larger D & E segment offerings require several solutions
• Fewer options into the next decade
• 48V is an enabler though a learning/cost curve ensues
• Low oil environment complicates
• CARB electrification mandate complicates
Three Disruptive Realities

How Do Industry Participants Adapt ....

**Electrification**
- S/S >> Plug-in Mild Hybrid >> Full Hybrid >> BEV
- Enablers – Legislation, 48V, mass reduction
- Implementation depends on segment, geography, scale, infrastructure and customer purchase capability
- How does the ICE and accessories adapt through this process? What about transmissions and driveline?

**Automated Driving**
- Speed of implementation depends more on legislation versus technical capability
- Several disruptors enter with little patience for automotive timelines, processes and structure
- Will the lack of driver intervention alter content and structure of the powertrain?
- Areas of the vehicle materially altered by automated driving: Interior, Powertrain, Electrical & Chassis

**Shared Mobility & Connected Car**
- New generations live in a more global, urban and environmentally-friendly world
- Ride sharing and reduced/limited driver input changes ownership, maintenance and use structures
- Impact on municipalities, healthcare, dealer/service infrastructure, need for a license
- How does shared mobility alter the vehicle cycle, supply base, insurance, aftermarket, standardization and safety?

<table>
<thead>
<tr>
<th>2015-2020</th>
<th>2020-2025</th>
<th>2025+</th>
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</thead>
<tbody>
<tr>
<td>PHEVs</td>
<td>Increased Electrification</td>
<td>BEVs &amp; Infrastructure</td>
</tr>
<tr>
<td>Level 2 &gt;&gt; 3 Driving</td>
<td>Level 3 &gt;&gt; 4</td>
<td>Level 3 &amp; 4 &gt;&gt;&gt; 5</td>
</tr>
<tr>
<td>Uber/Lyft</td>
<td>Expanding Mobility Solutions</td>
<td>Vehicle Park Reflects Shifts</td>
</tr>
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A Looming Cost Cliff Alters The Market
OEMs, Suppliers, Regulators and Customers Are All Impacted

~2025
- L3/4 Autonomy, Global influences, System Profit Pools Shift
- Full Hybrid, BEV and Alternative Drive Formats Rise
- Integration of ‘Non-Standard Materials’ & Joining Methods

~2020
- L3 Autonomy, More ADAS Content, Warranty Visibility
- Mild Hybrid Rise Starts in Larger Segments, 48V
- Mass Reduction Shifts Beyond The ‘Edge Segments’

Today
- ADAS & Connectivity Content Rises, Warranty Costs
- Down Displacement, Multi-speed Trans & S/S
- BIW & Chassis System Lightweighting Begins

Success in a Rising Cost Environment
- Understand your costs, markets & risk profile
- Diversify customers, segments and cadence
- Hedge technologies
- Smart vertical integration
- Proactive engagement
- Today’s differentiators are not tomorrow’s
Contents

• Light Vehicle Outlook
• Structural Factors Alter an Industry
• Summary
Shifts in Supplier/OEM Relationships

• Plateauing volumes alter the landscape
  > OEMs feeling the pressure of increased incentives
  > Existing suppliers begin to cannibalize business

• Looming cost cliff drives urgency into system cost reductions
  > Share of ‘value’ devoted to hard parts decline – the pie slices thinner
  > Increased evidence of incremental cost transparency driven by OEMs
  > Likelihood of regulatory relaxation are in play – Select OEMs and California

• Supplier strategies to combat vary by system
  > Vertical integration to offer enhanced capability to maintain margins
  > Marketable technology, cost efficiency and customer/regulatory solutions
Summary
Foresight Reigns ....

• Volumes plateauing in several markets and segments
  > Japan/Korea, North America and Europe grow below global trend

• Cadence is faster – challenging for Tier 2 & 3 regional suppliers
  > Increased complexity coupled with shorter cycles

• Meeting the legislative mandates difficult on the edges
  > Electrification/ Lightweighting/ Reducing parasitic losses/ Aerodynamics/ Optimization

• The New Differentiators
  > Innovation, cost reduction and strategic patents protect margins
  > Ability to anticipate and benefit from major shifts – electrification, automated driving, lightweighting, packaging efficiency and the hard/soft part shift
Thank You

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