Automotive Outlook

2017 FTA Revenue Estimation & Tax Research Conference

September 25, 2017

Kim Hill, President
Agenda

• Forecast of sales – next three years
• The U.S. auto industry/market is changing
• What will happen in next few years, and why
• Special topics on revenue
  – Forecast revenue implications for fuel efficiency/EV/autonomous
  – Revenue estimation in time of uncertainty
State of Automotive

Manufacturing—how vehicles are made and sold
Consumers—How the industry is changing: who’s driving vehicles and how they are being driven
Policy—Maintaining roads: where are all the revenues?
A Strong Economy

Household wealth:
  – Housing prices fully recovered
  – Stock market above pre-recession peak

Economy speeding up:
  – GDP growth— was 3% in the last quarter for the first time in a while – 3.5% in 3rdQ?

Unemployment is very low... 4.4% in August,

Tax reform?? Who knows?
  – State tax deductions could be eliminated?
Auto Sales Leading Strong Economy

Auto sales have been growing faster than the economy
Affordable borrowing rates, high number of leases
Older market—average buyer is 51 years of age—purchase majority of light trucks
Average price of new vehicle—$33,000
Fleet sales down a lot
Recovery in sales is old and running out but revenue still increasing (more truck sales)
Uber–Hertz: what are the sales implications?
Low Gas Prices Affecting the Mix

Real Gas Price  Cars Share of Sales  Light Trucks Share of Sales

$2.61/gal.  65%  35%

HWA Analytics LLC  Ann Arbor, Michigan
What Is a Truck?
U.S. Light Vehicle Sales

Percent Change YTD Through August: 2016 vs. 2017

-12.0%
3.6%
-2.7%
-14%
-12%
-10%
-8%
-6%
-4%
-2%
0%
2%
4%

Passenger Cars
Light Trucks
Total
Percent Change in Sales of Light Vehicles Per OEM: YTD Through August: 2017 vs. 2016

- **GM**: 0.1%
- **Toyota**: -1.3%
- **Ford**: -2.7%
- **Hyundai-Kia**: -2.7%
- **Honda**: -0.5%
- **FCA**: -4.0%
- **Nissan**: -7.5%
- **TOTAL LV Sales**: -10.7%

Bars show the percentage change in sales from 2016 to 2017 for each OEM.
The automotive companies are all playing to their strengths—and holding market share.
Sales Are Back and Revenues Have Never Been Higher

Bubble economy helped sales 99-06; recession took wind out 08-10; post recession growth and efficiencies 2011-present

Both spending and vehicle sales exceed 2006 level
Don’t Really Want to Rain on the Parade . . .
Average Decline is (29%)

- Market Growth:
  2 Good Years, 1 Bad Year, 220% Total Growth, 3.5% annual, 2 Veh./Household

- Market Saturation:
  The Roller Coaster, 28% Total Growth, .75% annual growth
U.S. Sales on a Declining Plateau? We hope...

AVERAGE: 29% drop from peak = 12.4 mil.
## 2017 U.S. Sales Forecasts (millions)

<table>
<thead>
<tr>
<th>Source</th>
<th>Forecast</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWA Analytics, LLC</td>
<td>17.1</td>
<td>9/17</td>
</tr>
<tr>
<td>Kelley Blue Book</td>
<td>17.0</td>
<td>8/16</td>
</tr>
<tr>
<td>NADA</td>
<td>17.1</td>
<td>7/17</td>
</tr>
<tr>
<td>TrueCar</td>
<td>17.1</td>
<td>7/17</td>
</tr>
<tr>
<td>WardsAuto</td>
<td>16.9</td>
<td>8/17</td>
</tr>
<tr>
<td>IHS Global Insight</td>
<td>17.1</td>
<td>8/17</td>
</tr>
<tr>
<td>LMC Automotive</td>
<td>17.1</td>
<td>8/17</td>
</tr>
</tbody>
</table>
Automation threatens jobs in plants and at supplier companies

Motor Vehicle and Parts Manufacturing Employment 2001 to 2021 Forecast

- United States: 1,050,000 US Empl
- Michigan: 833,000 US Empl
- Ohio: 573,000 US Empl

Source: Emsi 2017
Other Factors

Implications of NAFTA renegotiations

- What auto plants are building sedans in U.S.? Fewer and fewer . . .

What about new pickups coming—Hyundai, Mercedes (Toyota and Nissan tried this)?

Toyota/Mazda plant—where?

Detroit—Pickups—Ford, GM, FCA have almost 90% of market
How the Industry is Changing: Who Is Driving Vehicles and How They Are Being Driven

Automated trucks—Amazon, Uber, UPS
• Drivers needed?

Ride sharing threatening who owns and buys cars (consumers)
– Ride-share, on-demand
  • Maven; Zipcar
– Ride-hail
  • Uber; Lyft; Car2Go

These changes will affect volume of sales, number of vehicles on the road, and number of jobs.
The Industry Is Changing

What do Boston, Austin, Pittsburgh, San Jose, Waterloo (Ontario), Indianapolis, Columbus have in common (with Detroit)?

Mobility services
Self-driving vehicles
Electric
“Revolutionizing transportation for our customers while improving safety on roads is the goal of our autonomous vehicle technology”

Mary Barra, CEO, GM

In an age of constant innovation, mobility has outpaced our definition of the word. Our ability to move ourselves – and objects – has pushed beyond what was previously imagined.

Ford Motor Company: Microtrends Talk
A Driverless Future?

SAE AUTONOMY LEVELS

**LEVEL 0**
Human driver is in complete control. Maybe the car shifts its own gears, if you, you know, hate fun.

**LEVEL 1**
Driver must be ready to take over at any time. Features like adaptive cruise control, parking assist with automatic steering, lane keeping assist, in any combination.

**LEVEL 2**
Automated system is doing most of the driving, including steering, braking, and accelerating, but humans must be alert and ready to take over at any time.

**LEVEL 3**
In specific situations and environments, like highway driving, the car is in complete control. Human driver can read or text or whatever if they want.

**LEVEL 4**
The car can drive itself independently in most environments, with some exceptions for weather or unusual environments. Humans may still need to take over at times.

**LEVEL 5**
All robot, all the time. Humans just along for the ride, and, ideally, to tell the car where to go. No restrictions where the car can drive.
The Road to Level 5 and Full Battery Electric

**Substantial change/new component**
- Thermal
- Electrical/power supply
- Steering
- Braking
- Aerodynamics/NVH
- Driveline
- Electronics
- Battery
- Vision/lighting
- ADAS/Active safety
- Wheels/tires

**Modest change**
- Fuel
- Propulsion
- Exhaust
- Suspension
- Interior
- Seating
- Exterior
- Passive safety
This Is Now...

What is Auto Manufacturing?
Automotive Employment and Establishments in Michigan

- Computers and semi-conductors
- Professional and Technical Services
- Vehicle IT Platforms
- Advanced driver assistance systems
- Dedicated short range communications
- Autonomous vehicle operating systems
- Collision avoidance
- Connected vehicle services
- Connected vehicle ecosystem
- Navigation
- Systems integration
- Information technologies
- Passive safety
- Sensors
- Proximity sensors
- Microprocessors
- Embedded processors
- Testing services
- Software systems

- Artificial intelligence
- Deep learning
- Autonomous cars
- Haptic touch control
- Haptic feedback systems
- Gesture and motion detection systems
- Human-machine interface
- Speech recognition technologies
- Machine learning
- After-market autopilot systems
- Radar
- Lidar—light-based radar
- GPS
- EV charging systems
- Antenna systems
- Onboard communication systems
- Computer vision systems
- Vehicle cameras
- Simulation systems
Suppliers

Adapt
Was GM, Toyota, etc., now Google, Apple or ??

Align
Tech and Auto do not know each other’s industry – they think they do

Strategize and Collaborate
Tech companies looking at component suppliers as a way into the auto industry
Policy: What About the Revenues?

Who pays taxes for roads (maintenance)?

In 2016, state DOT’s spent $97 billion on highways while revenues were only $72 billion.

- You can’t import highways...you either do it, or you don’t.

But...where does the money come from???
## Vehicle Taxes and Fees—How does mobility change this?

<table>
<thead>
<tr>
<th>Tax Category</th>
<th>State ($M)</th>
<th>Federal ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Tax Revenues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Millions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Vehicles</td>
<td>21,997</td>
<td></td>
</tr>
<tr>
<td>Used Vehicles</td>
<td>12,084</td>
<td></td>
</tr>
<tr>
<td>Parts/Services</td>
<td>4,831</td>
<td></td>
</tr>
<tr>
<td>Use Tax Revenues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Millions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel</td>
<td>40,135</td>
<td>36,000</td>
</tr>
<tr>
<td>Title/Registration</td>
<td>23,304</td>
<td></td>
</tr>
<tr>
<td>Driver License</td>
<td>2,513</td>
<td></td>
</tr>
<tr>
<td>Business Taxes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Millions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturers</td>
<td>762</td>
<td></td>
</tr>
<tr>
<td>Dealerships</td>
<td>995</td>
<td></td>
</tr>
<tr>
<td>State and Local Employee Personal Income Taxes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Millions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automaker</td>
<td>1,352</td>
<td>21,883</td>
</tr>
<tr>
<td>Supplier</td>
<td>1,192</td>
<td>20,485</td>
</tr>
<tr>
<td>Dealer</td>
<td>1,108</td>
<td>18,332</td>
</tr>
<tr>
<td>All Taxes Paid to Government</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Millions)</td>
<td>$ 110,273</td>
<td>$ 96,700</td>
</tr>
<tr>
<td>Total</td>
<td>$ 846,214</td>
<td></td>
</tr>
<tr>
<td>% AUTO</td>
<td>13%</td>
<td></td>
</tr>
</tbody>
</table>

The production, sale, maintenance, and use of an automobile all contribute to state coffers.
These Will Affect State Revenue Stream

Mobility
Self-driving vehicles
Electrification

How much will your state’s revenues change?

$\text{millions less in fuel efficiency alone...}
Average End User Gasoline Prices per Gallon (USD)

<table>
<thead>
<tr>
<th>Country</th>
<th>Gas/No Tax</th>
<th>Average Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>$0.42</td>
<td>$1.79</td>
</tr>
<tr>
<td>Canada</td>
<td>$1.17</td>
<td>$3.06</td>
</tr>
<tr>
<td>Japan</td>
<td>$2.12</td>
<td>$4.32</td>
</tr>
<tr>
<td>Spain</td>
<td>$2.24</td>
<td>$5.11</td>
</tr>
<tr>
<td>France</td>
<td>$2.02</td>
<td>$5.68</td>
</tr>
<tr>
<td>Germany</td>
<td>$2.03</td>
<td>$5.77</td>
</tr>
<tr>
<td>UK</td>
<td>$1.81</td>
<td>$6.21</td>
</tr>
<tr>
<td>Italy</td>
<td>$2.13</td>
<td>$6.41</td>
</tr>
</tbody>
</table>

HWA Analytics LLC
Ann Arbor, Michigan
Mobility Impacts

What will happen to VMT rate? Will people commute further? Will autonomous vehicles increase commuting distances?

Road maintenance could continue to increase

Funding for new infrastructure—hard (roads, bridges) and soft (electronic, sensors, etc.)

Are current roads and highways ready to handle self-driving/connected cars, or are major improvements/modifications necessary?

What is the phase-in rate at current estimates, and once the technology is proven?

What about parking in urban areas? What becomes of parking lots?

What will happen to displaced workers from the trucking, manufacturing, chauffeur industries?

Will self-driving and ride-hailing cars replace mass transit?

– Evidence this is already happening—NYC, WDC, Boston

A lot of cost savings in autonomy, and safety—no accidents, tow trucks, bump shops, speeding tickets
Outlook is Holding

Sales down for the year
- Yet should stay above 16.5 million units in the next three years
- Extended finance terms and high lease rates underscore industry’s willingness to assist buyers in getting a new vehicle
- Incentives climbing higher – especially on cars
- Fleet sales down, used vehicles more competitive (lower prices)

Truck-type products are selling well—high margins
- Passenger car sales at recession levels

Car-type products being moved out of country
- Low margins, difficult to build profitably in U.S.

5% of sales will be self-driving in 2025, 30% in 2030
HWA can help sort this out

Forecast realistic transportation changes by state through 2025, 2030
  – Construct scenarios for electrification, mobility services, autonomous driving
Using scenarios, forecast change in transportation cost/revenue through 2025, 2030 by state:
  – Fuel use taxes, operator taxes, registration fees, etc.
Evaluate effect of various revenue policies given changes in transportation activity and modes
Also need direct input from industry
Thank you

kimhill@hwa-analytics.com
734-355-1740