Automotive Outlook:

Long Term Impacts on U.S. Auto Sales

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Research Director

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Agenda

• Current sales
• Factors that affect sales
• The current industry
• A look forward
U.S. Light Vehicle Sales
Percent Change YTD Through August:
2014 vs. 2013

Total: 11,191,068
+ 539,111
100%
5.1%

Light Trucks: 5,712,294
+ 491,177
51.0%
9.4%

Passenger Cars: 5,478,774
+ 47,934
49.0%
0.9%

Source: Automotive News; CAR Research
Detroit Three at 43.6% in August 2014

U.S. Market Share:
August 2014 & YTD Total

- GM: 17.7% (YTD 17.2%)
- Ford: 15.2% (YTD 14.0%)
- Toyota: 14.5% (YTD 14.5%)
- Fiat-Chrysler: 12.4% (YTD 12.5%)
- Honda: 9.3% (YTD 10.5%)
- Nissan: 8.6% (YTD 8.5%)
- Hyundai-Kia: 8.1% (YTD 7.9%)

Source: Automotive News; CAR Research
Segment Breakdown
U.S. Light Vehicles Sales Percent Change
August YTD: 2014 vs. 2013

<table>
<thead>
<tr>
<th>Segment</th>
<th>2014 % Change</th>
<th>2013 % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4.9%</td>
<td>12.9%</td>
</tr>
<tr>
<td>SUV</td>
<td>11.0%</td>
<td>10.7%</td>
</tr>
<tr>
<td>CUV</td>
<td>2.6%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Van</td>
<td>2.2%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Pickup</td>
<td>1.2%</td>
<td>-9.2%</td>
</tr>
<tr>
<td>Luxury Car</td>
<td>-3.0%</td>
<td>-10.0%</td>
</tr>
<tr>
<td>Small Car</td>
<td>-5.0%</td>
<td>-5.0%</td>
</tr>
<tr>
<td>Middle Car</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Electrified</td>
<td>4.9%</td>
<td>11.0%</td>
</tr>
<tr>
<td>Large Car</td>
<td>-15.0%</td>
<td>-10.0%</td>
</tr>
</tbody>
</table>

Note: Electrified Segment consists of BEVs, HEVs and PHEVs; all other segments are sales exclusive of Hybrid models.
Source: Ward's Automotive Reports, HybridCars.com and CAR Research
Market Share: Segment Breakdown
U.S. Light Vehicles Sales
August YTD 2014

CUV: 26.5%
Small Car: 18.8%
Middle Car: 17.2%
Pickup: 13.0%
SUV: 6.9%
Luxury Car: 6.3%
Van: 5.5%
Electrified: 3.6%
Large Car: 2.0%

Note: Electrified Segment consists of BEVs, HEVs and PHEVs; all other segments are sales exclusive of Hybrid models
Source: Ward's Automotive Reports, HybridCars.com and CAR Research
Long Term Economic Indicators That Affect Sales

- Diminishing labor force participation
- Increasing household financial burdens
- Household budget outlays are shifting
- Motor vehicle price is rising
- Full-time employment drives up auto sales
- Household wealth effect
Labor Force Participation Rate Is Falling Even After the Last Two Recessions
Labor Force Participation Rate 1978 – 2014

- Women’s participation in labor force
- Economy Boomed. GDP grew 3.8% per year
- Lowest since 1978

Younger Generations Are Facing Tougher Challenges

Unemployment Rate by Age January 2000 – June 2014

And Households Are Carrying More Debt
Household Non-Mortgage Aggregate Debt 1Q 2003 – 1Q 2014

Source: FRBNY Consumer Credit Panel/Equifax
Household Budget Outlays Are Shifting To Non Auto Categories

Monthly Expenditure Per Household By Selected Products and Services, 1999-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Cars &amp; Parts</th>
<th>Gasoline &amp; Fuel</th>
<th>MV Service</th>
<th>Consumer Electronics</th>
<th>Telephone &amp; Internet</th>
<th>Health Care</th>
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</thead>
<tbody>
<tr>
<td>1999</td>
<td>705</td>
<td>130</td>
<td>945</td>
<td>130</td>
<td>398</td>
<td>596</td>
</tr>
<tr>
<td>2001</td>
<td>945</td>
<td>130</td>
<td>1,211</td>
<td>130</td>
<td>398</td>
<td>596</td>
</tr>
<tr>
<td>2003</td>
<td>1,000</td>
<td>130</td>
<td>1,500</td>
<td>130</td>
<td>398</td>
<td>596</td>
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<tr>
<td>2005</td>
<td>1,000</td>
<td>130</td>
<td>2,000</td>
<td>130</td>
<td>398</td>
<td>596</td>
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<tr>
<td>2007</td>
<td>1,000</td>
<td>130</td>
<td>2,500</td>
<td>130</td>
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<tr>
<td>2009</td>
<td>1,000</td>
<td>130</td>
<td>3,000</td>
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<td>398</td>
<td>596</td>
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<td>2011</td>
<td>1,000</td>
<td>130</td>
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<td>398</td>
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<td>130</td>
<td>3,000</td>
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<td>398</td>
<td>596</td>
</tr>
</tbody>
</table>

Source: CAR research based on Personal Consumption Expenditures by Type of Product, Bureau of Economic Analysis
Increase in Full-Time Employment Drives Up Sales
October 1996 – June 2014

Source: BEA; BLS
Growth in Household Wealth Drives Up Auto Sales
January 2000 – April 2014

Source: BEA; Yahoo Finance; National Composite Home Price Index for the United States
Beware of the Next Downturn!
U.S. Monthly LV Sales and Automotive Business Cycle

Source: BEA
U.S. Light Vehicle Monthly Sales and SAAR
August 2012 – August 2014

Source: Automotive News; CAR Research
Are Sales Back?
1995-2014

Source: BEA, Table 7.2.6B. Real Motor Vehicle Output, Chained Dollars

Source: BLS, U.S. DOL, Statistics Canada
Big 7 Monthly U.S. Market Share
1999 – 2014 YTD (August)

Source: Automotive News; CAR Research
U.S. Vehicle Production Forecast: 2007-2018

Source: CAR Research, Aug 2014
North American Production Forecast: 2007-2018

Source: CAR Research, Aug 2014
Footprint of the North American Automotive Industry

Almost 500 automaker facilities, and over 7500 supplier facilities in the United States

Source: CAR / BLS 2012
U.S. Motor Vehicle Related Value Chain Exceeds $1 Trillion

Suppliers $307 Bil.
Auto Makers $119 Bil.
Dealers $37 Bil.
Finance & Insurance $80 Bil.

Fuels and Lubricants $343 Bil.
Leasing, Rental, and Parking $62 Bil.
Repair Service & Aftermarket $213 Bil.
Resale $117 Bil.
Salvage $4 Bil.

Source: NADA, BEA, U.S. Census, R.L. Polk, CAR Research, 2007 estimates
Automotive-related Taxes and Fees

**Sales Tax Revenues**
- New Vehicles (New)
- Used Vehicles (Fleet)
- Parts/Services (Fleet)

**Use Tax Revenues**
- Fuel (Fleet)
- Title/Registration (Fleet)
- Driver’s License (Fleet)

**Business Taxes**
- Manufacturers (New)
- Dealerships (New/Fleet)

**Personal Income Taxes**
- Automakers (New)
- Suppliers (New)
- Dealerships (New/Fleet)
What is Auto Manufacturing?
Automotive Employment and Establishments

TOTAL Michigan Automotive Industry: 250,000 Employees
4,500 Establishments

2013 Per Vehicle Profits North America

<table>
<thead>
<tr>
<th>Company</th>
<th>EBIT per Vehicle Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM</td>
<td>$2,307</td>
</tr>
<tr>
<td>Ford</td>
<td>$2,844</td>
</tr>
<tr>
<td>Chrysler</td>
<td>$1,323</td>
</tr>
<tr>
<td>Honda</td>
<td>$1,254</td>
</tr>
<tr>
<td>Toyota</td>
<td>$1,225</td>
</tr>
</tbody>
</table>

EBIT or automotive operating income per vehicle sold. Global average for Chrysler figure. Honda also excludes motorcycle, finance, and power products.
Total North America
2014: $7.9 billion
2013: $8.8 billion

United States
2014: $4.5 billion
2013: $6.4 billion

Mexico
2014: $3.4 billion
2013: $1.5 billion

Canada
2014: $0 billion
2013: $0.9 billion

Source: CAR Research, Book of Deals
The New Big Three - Technology Shock!

Materials

Connectivity

Powertrain

New Jobs?
New Rules?
New Players?
Market Share of U.S. Electrified Light Vehicle Sales and Selected OEM Share of U.S. Electrified Sales

August YTD 2014 vs. 2013

- Electrified Total: 3.9% (2013 YTD) vs. 3.6% (2014 YTD)
- Toyota: 14.7% (2013 YTD) vs. 15.9% (2014 YTD)
- Ford: 5.6% (2013 YTD) vs. 6.2% (2014 YTD)
- Hyundai-Kia: 6.0% (2013 YTD) vs. 6.2% (2014 YTD)
- Nissan: 3.5% (2013 YTD) vs. 3.1% (2014 YTD)
- GM: 8.4% (2013 YTD) vs. 5.3% (2014 YTD)
- Honda: 1.1% (2013 YTD) vs. 4.8% (2014 YTD)
- Volkswagen: 0.76% (2013 YTD) vs. 0.76% (2014 YTD)

Note: Electrified Light Vehicles consist of BEV, HEV and PHEV
Source: Ward’s Automotive Reports; HybridCars.com; CAR Research
Key Material Trends in Next 10 Years - All technology pathways anticipate light-weighting

- Increased use of ultra high strength steel for structural components around the “safety cage” to prevent intrusion

- Aluminum use for chassis and exterior panels is increasing—Ford F-150

- Fiber reinforced plastics (glass and carbon) for structural components are still several years away from high volume production

- Joining complexity: more laser welding, fasteners and adhesives
An average vehicle contains around 60 microprocessors to run electric content—four times as many as a decade ago. More than 300 million lines of software code run a typical vehicle’s sophisticated computer network.
Intelligent Mobility

- DSRC for Safety and Mobility
- Freight and Transit Operations, Management, and Logistics
- Tolling Applications
- Border Security
- Weight Enforcement
- Probe Vehicle Data Retrieval
- GPS Navigation with Live Re-routing Using Public ITS Data
- Emergency Vehicle Signal Priority

Intelligent Transportation Systems

- Remote Traffic Monitoring
- Roadside Weather Stations
- Adaptive Signal Control
- Incident Detection and Response
- Dynamic Message Signs

- Automated Vehicle System- Enabling Infrastructure (Standardized signage, lane markings, positioning systems, etc.)

Connected Vehicle Systems

- Automated Vehicles with GPS Positioning or Other Remote Signal Input
- Intelligent Highway Systems
- Personal Rapid Transit Systems
- Inter-agency Automated Platooning over DSRC/Wi-Fi (SARTRE)
- Automated Incident Reporting (Auto 911)

- GPS Navigation
- Cellular Connectivity for Voice and SMS (Text)
- Cellular Connectivity to Internet (Embedded Modem)
- Smartphone and PID Interface (Bluetooth, Wi-Fi, etc.)

Automated Vehicle Systems

- Parking and Back-Up Assistance Systems
- Adaptable Cruise Control
- Traffic Jam Assist
- Sensor-based Collision Avoidance and Mitigation
- Automated Vehicles with No GPS Positioning or Other Remote Signal Input

- Single-Agency Automated Platooning over DSRC/Wi-Fi
- DSRC-based Collision Avoidance and Mitigation
- Remote Software Updating and Data Collection
U.S. Auto Parts Manufacturing

% of Capacity Utilization

Source: U.S. Federal Reserve Board of Governors, 2013
Generally, All Is Good, But Keep An Eye On These

- Labor force participation rates
- Household financial burdens
- Shifting household budget outlays
- Full-time employment
- Household wealth effect
- External shocks

- Student debt
- GDP growth
- Gas prices
- Interest rates
Thank You

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