Light Vehicle Sales
Are We at a Turning Point?

Federal Reserve Bank of Chicago
June 3, 2016

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Overview

• U.S. Economy (C + I + G + Nx)

• U.S. Consumer – Ability and Willingness to Buy

• U.S. Auto Industry
  • Changing long-run demand for personal mobility
  • Contractionary determinates
  • Expansionary determinates

• Summary and Questions
## Main Economic Indicators

**Annual Comparison – 2009, 2015 and 2016 March YTD**

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP – Annual Growth Rate</td>
<td>-2.8%</td>
<td>2.4%</td>
<td>1.9%</td>
</tr>
<tr>
<td>PCE Core Inflation Yr. / Yr.</td>
<td>1.2%</td>
<td>1.3%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Unemployment Rate – Annual Avg.</td>
<td>9.3%</td>
<td>5.3%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Participation Rate</td>
<td>65.4%</td>
<td>62.6%</td>
<td>62.9%</td>
</tr>
<tr>
<td>Nonfarm Job Growth (Monthly Avg.)</td>
<td>-298,100</td>
<td>228,700</td>
<td>203,000</td>
</tr>
<tr>
<td>Initial Unemployment Claims</td>
<td>573,730</td>
<td>278,140</td>
<td>268,767</td>
</tr>
</tbody>
</table>

1. Year-over-year change - Q1 ’16 / Q1 ’15

Source: U.S. Bureau of Economic Analysis, Census Bureau and Bureau of Labor Statistics
U.S. Real GDP

Billions Chained $2009, % Change Q/Q at SAAR

Source: U.S. Bureau of Economic Analysis
U.S. Real GDP

Contribution to Percent Change, Q4, 2015 - Q/Q at SAAR

Note: Private domestic investment includes: nonresidential -0.81, residential +0.56, and -0.20 inventory change. Government Consumption and Investment includes: Federal -0.11 and State and Local 0.31. Net Exports includes: Exports -0.21 and Imports +0.03.

Source: U.S. Bureau of Economic Analysis
Real Personal Consumption Expenditures

Index, Q4 2007 = 100

Index

'07 '08 '09 '10 '11 '12 '13 '14 '15

Q1 '16 129.0
111.7
109.9

Source: Author’s calculations using data from the BEA
Real Personal Consumption Expenditures

Billions of Chained $2009, Percent Change - Q/Q at SAAR

Source: U.S. Bureau of Economic Analysis
U.S. Light Vehicle Sales

S.A.A.R – Millions of Units

Millions

'06 '07 '08 '09 '10 '11 '12 '13 '14 '15 '16

6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0

Cash for Clunkers
Aug '09 14.6

Feb '09

May '16 17.4
17.2 YTD

Source: Ward’s Automotive and BEA
Real Gross Domestic Investment

Billions Chained $2009, % Change Q/Q at SAAR

$ Billions

Q1 '16 $2,833.6
-2.7%

Source: U.S. Bureau of Economic Analysis

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Private Fixed Investment

Billions of Chained $2009, Percent Change - Q/Q at SAAR

Source: U.S. Bureau of Economic Analysis
New Orders and Industrial Production

Index – 2012 = 100

Note: New Orders Nondefense Capital Goods Excluding Aircraft.

Source: U.S. Bureau of Economic Analysis & U.S. Bureau of Census
U.S. Housing Starts

In Thousands of Units (SAAR) and Annual Average

Note: The United States averaged 1.5 million housing starts per year 1990 to 2004.

Source: U.S. Census Bureau
## Government Consumption & Investment

Billions of Chained $2009, Percent Change - Q/Q at SAAR

<table>
<thead>
<tr>
<th></th>
<th>Q1 '15</th>
<th>Q2 '15</th>
<th>Q3 '15</th>
<th>Q4 '15</th>
<th>Q1 '16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1.1</td>
<td>2.6</td>
<td>4.3</td>
<td>0.3</td>
<td>2.9</td>
</tr>
<tr>
<td>Federal</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Federal Nondefense</td>
<td>-0.8</td>
<td>-0.5</td>
<td>2.8</td>
<td>0.1</td>
<td>1.6</td>
</tr>
<tr>
<td>State &amp; Local</td>
<td>-1.2</td>
<td>-1.2</td>
<td>2.8</td>
<td>-1.2</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Source: U.S. Bureau of Economic Analysis
Stronger U.S. Dollar

Select Currencies Jan 3, 2014 to May 27, 2016, Index – 2014 = 100

Index

Canadian Dollar to U.S. Dollar

Stronger U.S. Dollar

Weaker U.S. Dollar

Index

Euro to U.S. Dollar

Stronger U.S. Dollar

Weaker U.S. Dollar

Index

Japanese Yen to U.S. Dollar

Stronger U.S. Dollar

Weaker U.S. Dollar

Index

Chinese Yuan to U.S. Dollar

Stronger U.S. Dollar

Weaker U.S. Dollar

Source: Board of Governors – Federal Reserve System
Real Imports and Exports

Billions Chained $2009, Index – 2005 = 100

Source: U.S. Bureau of Economic Analysis
China PMI

Manufacturing & Nonmanufacturing - SA, +50 Signifies Expansion

Index

Source: China Federation of Logistics & Purchasing and Haver Analytics
Global Outlook

IMF Forecast for Growth (April ‘16 Database), % Chg. Yr./Yr.

Source: IMF - World Economic Outlook
## U.S. Real GDP Blue Chip Forecast

### Annual Percent Change – Chained $2009

<table>
<thead>
<tr>
<th>Month</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan '16</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Feb '16</td>
<td>2.1</td>
<td>2.4</td>
</tr>
<tr>
<td>Mar '16</td>
<td>2.1</td>
<td>2.4</td>
</tr>
<tr>
<td>Apr '16</td>
<td>2.0</td>
<td>2.3</td>
</tr>
<tr>
<td>May '16</td>
<td>1.8</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Source: April 2015 Blue Chip Economic Indicators
U.S. Consumer
Ability and Willingness to Buy
Real Disposable Personal Income & Savings Rate

Percent Change Year/Year and Percent of Personal Income

Source: U.S. Bureau of Economic Analysis
Personal Savings Rate

As Percent of Personal Income

Source: U.S. Bureau of Economic Analysis
Personal Consumption Expenditures

Gasoline and Other Energy Related Products - % of DPI

Source: Author’s calculations using U.S. Bureau of Economic Analysis data.
Total Consumer Credit

Revolving and Non-revolving Credit as % of DPI

Source: Federal Reserve Bank - Board of Governors
Personal Interest Payments

As a Percent of Disposable Personal Income

Source: U.S. Bureau of Economic Analysis

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Yield Curve

10 Year – 1 Year Treasuries

Source: Board of Governors – Federal Reserve System
Inflation

CPI All Items and Core, Percent Change Yr./Yr. - SA

Data: Consumer Price Index for All Urban Consumers, All Items and All Items Less Food and Energy

Source: U.S. Bureau of Labor Statistics
Personal Consumption Expenditures

Gasoline and Other Energy Related Products - % of DPI

Source: Author’s calculations using U.S. Bureau of Economic Analysis data.
Consumer Sentiment

University of Michigan

Index

January ’00
112.0

May ’16
94.7

Source: Thomson Reuters / University of Michigan
Initial Unemployment Claims

4 Week Moving Average

Thousands

Source: Author’s calculations using U.S. Bureau of Economic Analysis data.
Stock Market

S&P 500 and Dow Jones Indices, Index Jan, 2014 = 100

Source: St Louis Fed and S&P Dow Jones
Home Prices

S&P Case-Shiller 20 City Composite – Jan, 2010 = 100

Source: St Louis Fed and S&P Case-Shiller
Household Net Worth

Trillions of Dollars, Q1 ‘00 to Q4 ‘15

Source: Federal Reserve Z.1 Statistical Release , Table B100, Households and Nonprofit Organizations
Auto Industry
U.S. Total Vehicles – Actual and Trend

Trend over Time - In Millions of Units

- Actual
- 1995 Trend
- 2000 Trend
- 2005 Trend
- 2010 Trend

Years: '80, '85, '90, '95, '00, '05, '10, '15, '20

Millions:
- 10,000
- 12,500
- 15,000
- 17,500
- 20,000

Data Points:
- 1995: 17,300
- 2000: 18,040
- 2010: 18,690
- 2020: 19,710
Origin of New Vehicle Sales

Determinates of Long-Run Vehicle Sales Trend

- More Vehicles per Household: 5%
- Household Formation: 20%
- Scrappage: 75%
Vehicle Miles Traveled

12 Month Total Miles Traveled in Billions

[Graph showing the trend of vehicle miles traveled over time from 1971 to 2015.]
Note: Average age for passenger cars and light trucks increased to 11.5 years in 2015. Vehicles in operation (VIO) increased to 258 million up 2.1% between 2014 and 2015.

Sales Weighted Vehicle Age

10 Year Sales Weighting

Note: Since 1960 the average cycle has been 8 years with an average expansion of 5 years.

Source: Author’s calculations using Ward’s Automotive and Blue Chip Forecast data.
New & Used Vehicle Prices

Index 2007 = 100

Data: New Vehicles and Used Cars and Trucks CPI.

Source: Author's calculations using Bureau of Labor Statistics data.
Light Vehicles Sales & Nonfarm Employee

In Millions of Units – S.A.A.R.

Note: Linear regression L.V. Sales to Nonfarm Employment and Trend Variable with $R^2$ of 52.3.

Source: Author’s calculations using data from Ward’s Automotive and BLS
Light Vehicles Sales per Nonfarm Employee

L.V. SAAR / Nonfarm Employment

Source: Author’s calculations using data from Ward’s Automotive and BLS
Labor Participation Rate

Percent of Noninstitutionalized Civilian Population

Civilian Labor Force

Percent Change Yr./Yr.

Light Vehicles Trend Using Nonfarm Employee

In Millions of Units – S.A.A.R.

Source: Author’s calculations using data from Ward’s Automotive and BLS
U.S. Nonfarm Payrolls

Monthly and Annual Average Job Change – In Thousands

U.S. Light Vehicle Industry

Millions of Units

Source: Ward’s Automotive
U.S. Light Vehicle Pent-Up Demand

Millions of Units

![Chart showing U.S. Light Vehicle Pent-Up Demand in millions of units from 1980 to 2016. The chart indicates a peak demand in 2015 with 254K units.](chart_image)
U.S. Light Vehicle Blue Chip Forecast

Millions of Units – Calendar Year

Source: April 2015 Blue Chip Economic Indicators
U.S. Light Vehicle Incentives

As Percent of Transaction Price - SA

Source: Author’s calculation using Ward’s Automotive and J.D Power data.
## Light Vehicle Transaction Price

### Annual Average & Percent Change Yr./Yr.

<table>
<thead>
<tr>
<th>Year</th>
<th>Dollars</th>
<th>% Chg. Yr/Yr (Right)</th>
</tr>
</thead>
<tbody>
<tr>
<td>'01</td>
<td>$22,000</td>
<td>-0.7</td>
</tr>
<tr>
<td>'02</td>
<td>$24,000</td>
<td>0.5</td>
</tr>
<tr>
<td>'03</td>
<td>$26,000</td>
<td>1.6</td>
</tr>
<tr>
<td>'04</td>
<td>$28,000</td>
<td>1.8</td>
</tr>
<tr>
<td>'05</td>
<td>$30,000</td>
<td>2.4</td>
</tr>
<tr>
<td>'06</td>
<td>$30,000</td>
<td>2.2</td>
</tr>
<tr>
<td>'07</td>
<td>$30,000</td>
<td>2.9</td>
</tr>
<tr>
<td>'08</td>
<td>$26,000</td>
<td>-3.6</td>
</tr>
<tr>
<td>'09</td>
<td>$30,000</td>
<td>1.6</td>
</tr>
<tr>
<td>'10</td>
<td>$30,000</td>
<td>4.4</td>
</tr>
<tr>
<td>'11</td>
<td>$30,000</td>
<td>2.1</td>
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<tr>
<td>'12</td>
<td>$30,000</td>
<td>0.9</td>
</tr>
<tr>
<td>'13</td>
<td>$30,000</td>
<td>2.7</td>
</tr>
<tr>
<td>'14</td>
<td>$30,000</td>
<td>2.4</td>
</tr>
<tr>
<td>'15</td>
<td>$30,000</td>
<td>2.3</td>
</tr>
<tr>
<td>'16</td>
<td>$30,000</td>
<td>2.4</td>
</tr>
</tbody>
</table>

**May '16 $30,993**

Source: Author’s calculation using J.D Power data.
Source: J.D Power data.
Average Financing at Finance Companies

New Car Loan Parameters – Index 2008 = 100, NSA

Source: Author’s calculations using Federal Reserve Board of Governors data
Auto Loan Rates – Commercial Banks

New Autos 48 and 60 Month Loans – Quarterly, NSA

Source: Federal Reserve Board of Governors
## Payment Risk

### Percent Change in Payment to Percent Change in Loan Rate by Duration

<table>
<thead>
<tr>
<th>Percent Change in Loan Rate</th>
<th>36 Months</th>
<th>48 Months</th>
<th>60 Months</th>
<th>72 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>1.5%</td>
<td>2.0%</td>
<td>2.4%</td>
<td>2.9%</td>
</tr>
<tr>
<td>2%</td>
<td>3.1%</td>
<td>4.0%</td>
<td>4.9%</td>
<td>5.8%</td>
</tr>
<tr>
<td>3%</td>
<td>4.6%</td>
<td>6.0%</td>
<td>7.4%</td>
<td>8.7%</td>
</tr>
<tr>
<td>4%</td>
<td>6.2%</td>
<td>8.1%</td>
<td>10.0%</td>
<td>11.7%</td>
</tr>
<tr>
<td>5%</td>
<td>7.8%</td>
<td>10.2%</td>
<td>12.5%</td>
<td>14.7%</td>
</tr>
</tbody>
</table>
Car & Light Truck Mix
Percent of Light Vehicles

Source: Author’s calculations using Ward’s Automotive data.
New Home Construction and Pickup Trucks

Index 2005 = 100

Data: New Privately-Owned Housing Units Under Construction and Ward’s Large Pickup truck sales.

Source: Author’s calculations using U.S. Bureau of the Census data.
Oil Price – North Sea Brent

Average Annual Price In Current Dollars

Source: International Energy Agency – Reference Case Forecast
Gasoline – All Grades

Average Annual Price In Current Dollars

Source: International Energy Agency – Reference Case Forecast
Buying Conditions for Vehicles

University of Michigan

Source: Thomson Reuters / University of Michigan
Reasons for Buying Conditions for Vehicles

University of Michigan

Good / Bad Reason: Why do you say so?

- Low Prices: 28
- Prices Will Increase: 6
- Low Interest Rates: 29
- Rising Interest Rates: 3
- Time's good: 12
- Fuel Efficiency: 3
- Prices High: 13
- High Interest Rates: 2
- Can't Afford: 4
- Uncertain Future: 3
- Gas Prices: 2
- Poor Selection: 4

Note: May add to more than a 100 due to multiple mentions.

Source: University of Michigan Survey of Consumers
Summary

• Despite the slow start in 2016, the U.S. Economic growth is to continue to expand at a moderate pace in 2016 and 2017.

• The U.S. consumer continues to experience improved financial conditions supported by low energy prices, improving real personal income and rebounding household net worth.

• Low interest rates and low prices are two of the factors making it a good time to buy a new vehicle.

• Demographic changes, increasing length of ownership, and slowing labor force growth are changing the determinates of long-run vehicle sales trend.
Summary

• Low interest rates and longer financing terms are helping to keep new vehicle payment affordable while offsetting rising vehicle prices.

• Low energy prices are helping SUV and Pickup truck sales pushing light truck share to new record highs.

• Light vehicle sales may have peaked in 2015 but are expected to stay in the 17.0 million range through 2017.

• Rising interest rate could be a risk to vehicle sales going forward by causing monthly payments to increase at a faster pace than overall inflation.

• But consumers continue to feel it is a good time to buy a vehicle.
Thank You!