After the Bailout: Future Prospects for the U.S. Auto Industry

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INTRODUCTION

In this paper, we first review the financial "comeback" of the Detroit Three General Motors (GM), Ford, and Chrysler) in the last three years in the North American market. We then describe the larger picture of the comeback of the entire U.S. motor vehicle and parts manufacturing industry. We then use a series of Center for Automotive Research (CAR) forecasts to estimate where the U.S. auto industry is heading in the next four to five years in terms of sales, production, and employment. Finally, we discuss the growth prospects of the U.S. industry in the long run including the industry's potential for adding to the growth of the overall U.S. economy.

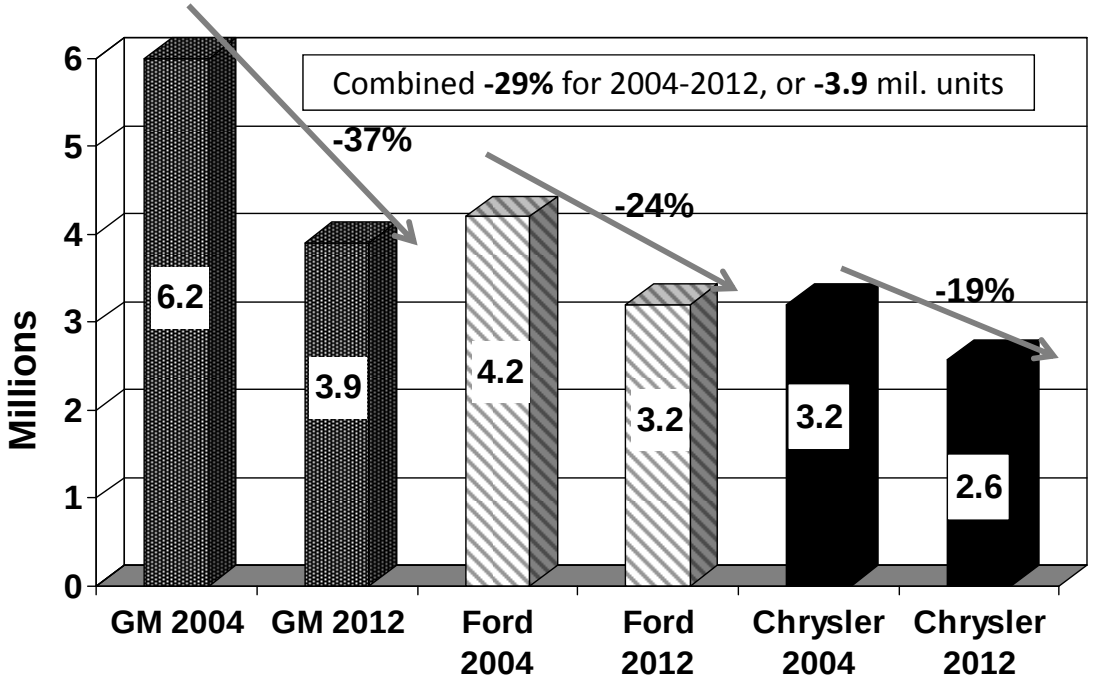
Section I: The Detroit Three Comeback

Any discussion of the benefits of the $80 billion in assistance provided by the U.S. and Canadian governments to GM and Chrysler in 2009 should review the current operational performance of these companies in the North American market. Further, this discussion should be placed in context of the overall "comeback" from the recent Great Recession of the entire U.S. auto industry and market and its prospects in the years ahead as a major industry in the U.S. economy. However, it should be remembered that the Detroit automakers were in difficult circumstances in their home market long before the advent of the recent recession.

The structured bankruptcies at GM and Chrysler in June and July of 2009 and the related labor contracts with the UAW resulted in the elimination of over $80 billion in fixed obligations for GM, Chrysler and also Ford Motor Company (which followed the other two companies closely in terms of labor union concessions). For example, in the case of GM, $54.4 billion in consolidated debt and $20 billion in long term obligations of the VEBA (Voluntary Employee Benefit Association/UAW retiree health trust) were reduced to a total of $17.4 billion in long term liabilities post-bankruptcy. A J.P. Morgan analyst recently estimated that GM reduced its annual North American fixed costs from $27 billion per year in 2009 to $19 billion a year at present.[1] The end result was the elimination by GM of thousands of dollars in fixed cost per vehicle in the North American market. Another important result of the restructuring was that the companies were able to accelerate their downsizing of their North American assembly and component capacity, a process that had already begun in the early part of the last decade. As shown in Figure 1, the three Detroit automakers reduced their North American vehicle production capacity by 3.9 million units or 29 percent during 2004 -2012.

[1] Automotive News, December 10, 2012, p. 64.

Figure 1: Detroit 3 Change in North American Vehicle Production Capacity

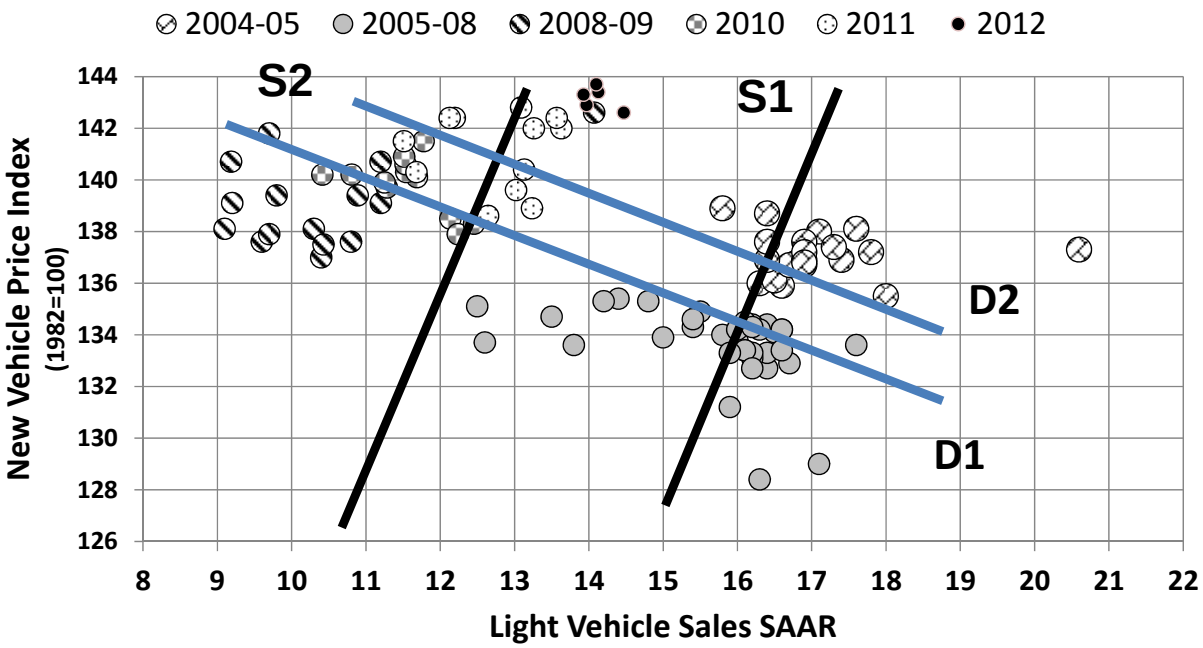


Source: Company restructuring plans, LMC Automotive Inc., and Center for Automotive Research

The reduction in capacity and related employment by the Detroit Three has clearly reduced their operating costs since 2009. Previously, the companies' manufacturing operations ran at low utilization levels. This was true despite the use of large incentive programs characteristic of the companies pricing during 2001-2008. The companies had employed large rebates and low financing for years in an attempt to generate sales that would employ not only their factories but also, due to the union contract, thousands of workers whose costs on layoff were no different than their costs when working. Contract requirements that included the infamous "Jobs Bank" and the plant closing moratorium motivated the companies to use rebate campaigns and carry much unneeded capacity for years. As a result of the incentive programs, new vehicle price inflation in the U.S. market was almost non-existent during 2001 – 2008. Figure 2 shows that this situation has improved remarkably since 2009.

Figure 2 lists monthly values for the new vehicle price index on the vertical axis and monthly light vehicle sales SAAR rates on the horizontal axis. Aside from the reduced capacity, a multi-year period of high values of the Japanese Yen has also improved the pricing environment as has steadily increasing consumer demand.

Figure 2: Light Vehicle Sales and New Vehicle Price Index, Jan. 2004 – Sept. 2012

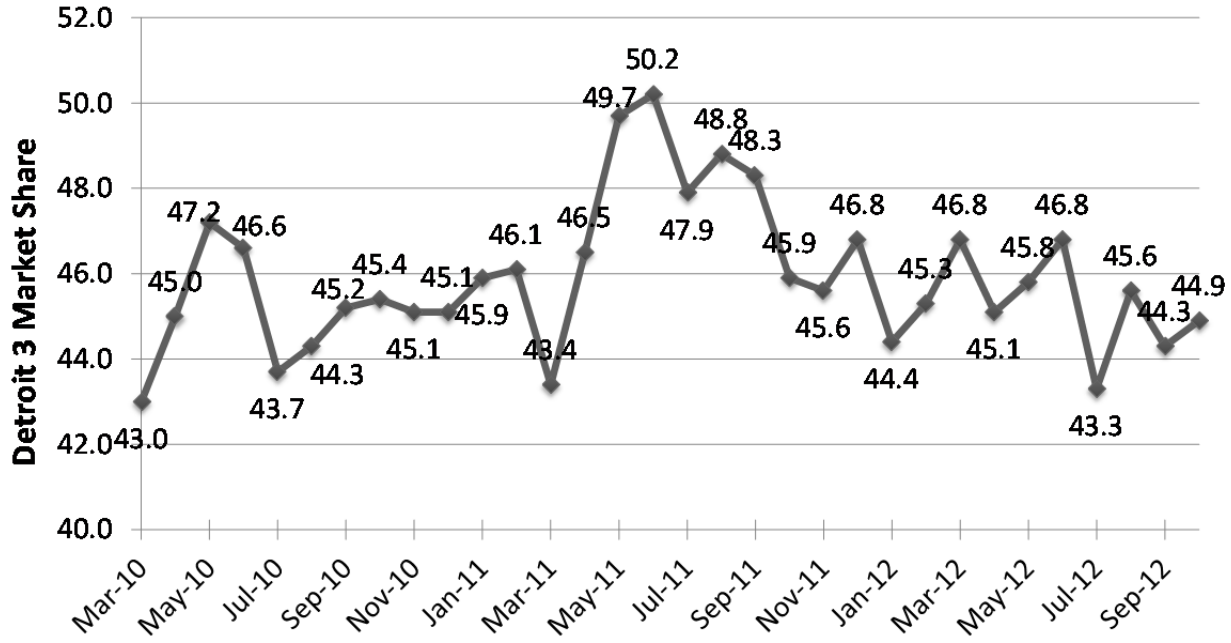


Source: Bureau of Labor Statistics, Bureau of Economic Analysis

A new business mantra for the Detroit Three in recent years is the concept of "price discipline." For many years, the Detroit automakers failed to produce profits on sales of passenger cars which losses were hardly offset by more favorable returns on the sale of large trucks. Losses in market share or high levels of inventories usually resulted in major incentive programs that sacrificed potential profits on sales to favorable customers who were actually willing to pay more. The essential problem for the companies was they were too large in terms of capacity and employment in the highly competitive North American market. Current strategies for the downsized Detroit Three emphasize "pricing to market" and the careful management of production and inventories.

Figure 3 shows the combined monthly U.S. market share of the Detroit Three from March 2010 through October 2012. Except for the summer spike in 2011 that reflected the effects of the Great Japan Earthquake on inventories and sales of the Japanese automakers, the Detroit automakers have maintained a steady share of about 45 percent of the U.S. market. Prices above unit cost and adequate margins, not market share, are the current targets for the Detroit Three.

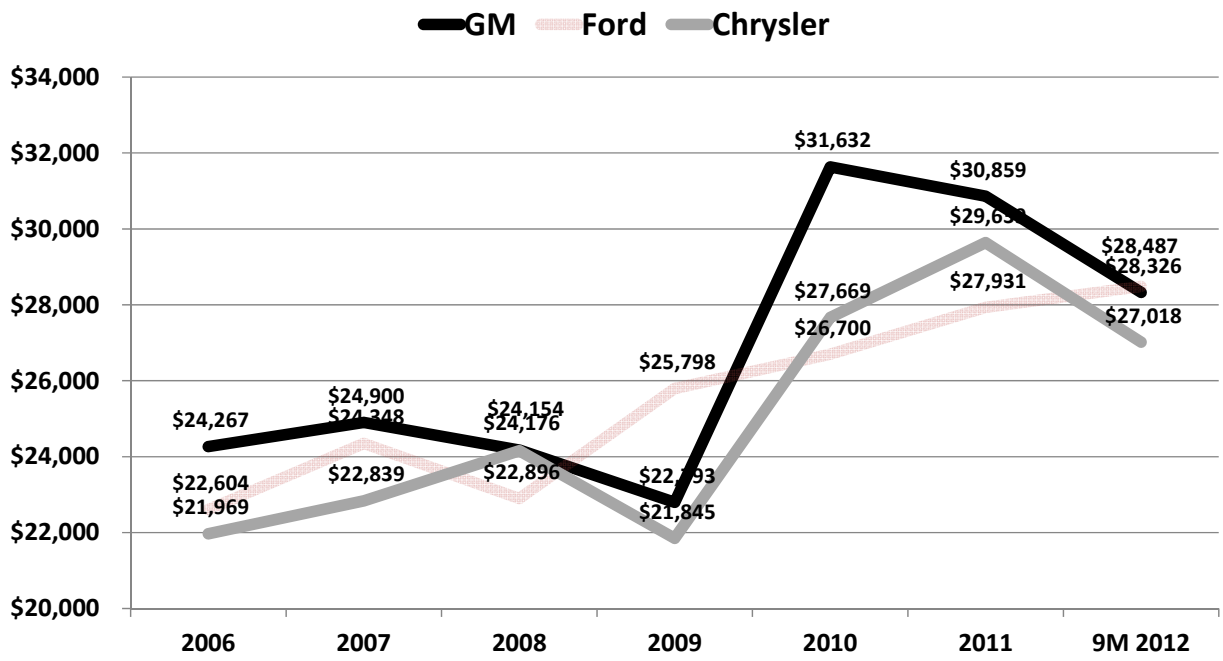
Figure 3: Detroit 3 Monthly U.S. Market share: March 2010 – October 2012



Does not include Volvo or Hummer sales after February 2010.
Source: Automotive News, Center for Automotive Research

The result of the reduction of capacity and the subsequent decrease in incentive programs has produced an impressive increase in revenue per unit for the Detroit companies. This is shown in Figure 4 for the period 2006 - 2012. Average revenue per unit for the companies was about $24,000 before 2008. Recent results for 2010 – 2012 have averaged about $28,000 or a $4,000 per vehicle increase. Table 1 shows a comparison between GM and Toyota of their average transaction prices by segment so far in 2012. In five of the ten segments, GM vehicles are selling for a higher price than Toyota models. In a similar table CAR produced in 2009, GM vehicles sold at a lower price than Toyota models in all ten segments.

Figure 4: Detroit 3 North American Automotive Revenue per Vehicle, 2006-9M2012



Source: Center for Automotive Research based on company's financial reports

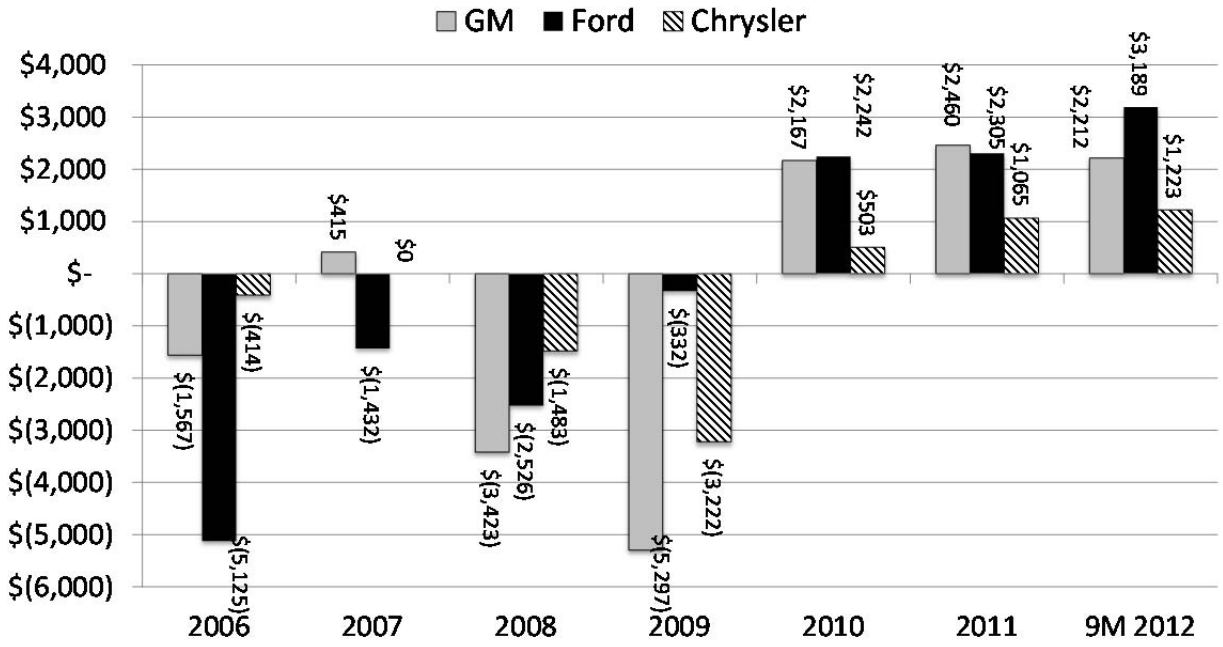
Table 1: 2012 Weighted Average Transaction Prices on Base Models

Segment	GM	Toyota	GM vs. Toyota
Lower Small	$ 14,599	$ 14,601	$ (2)
Upper Small	$ 17,740	$ 16,044	$1,696
Upper Middle	$ 23,115	$ 22,529	$ 586
Lower Luxury	$ 34,525	$ 32,407	$ 2,118
Middle CUV	$ 24,081	$ 23,960	$121
Middle Luxury CUV	$ 33,485	$ 36,554	$ (3,069)
Large SUV	$ 37,789	$ 39,638	$ (1,849)
Luxury Large SUV	$ 60,414	$ 78,389	$ (17,975)
Small Pickup	$ 17,931	$ 17,112	$ 819
Large Pickup	$ 21,514	$ 22,741	$ (1,227)

Source: Truecar, Wards' Auto and Center for Automotive Research

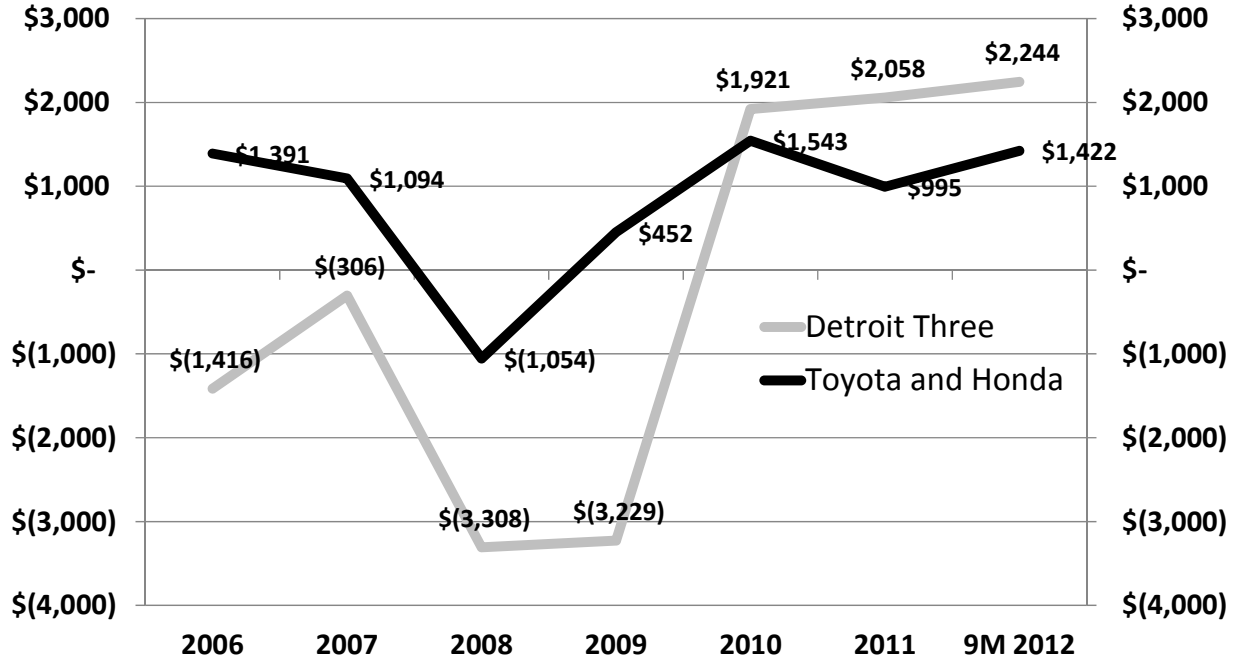
The combination of higher prices and lower fixed costs have produced a steady increase in North American operating profits starting in 2010 for all three Detroit automakers. This is a striking development compared to operating results before and during the recession. As can be seen in Figure 5, massive losses were reported in North America by both GM and Ford prior to the recession in 2006 and 2007. Starting in 2010, the three companies have reversed this position with all three companies operating at profitable levels and Ford, in particular, earning record margins of close to 11 percent in 2012. In fact as Figure 6 illustrates, the three Detroit companies on average have earned higher operating profits per vehicle In North America than the average for Toyota and Honda before and after the Great Japan Earthquake of 2011. This situation is undoubtedly unprecedented.

Figure 5: Detroit 3 North American Operating Profit per Vehicle, 2006 – 9M 2012



Automotive operating income per vehicle sold. Global average for Chrysler figure.
Source: Company reports

Figure 6: Per Vehicle Profits*, North America, Detroit 3 and Toyota and Honda, 2006-9M 2012

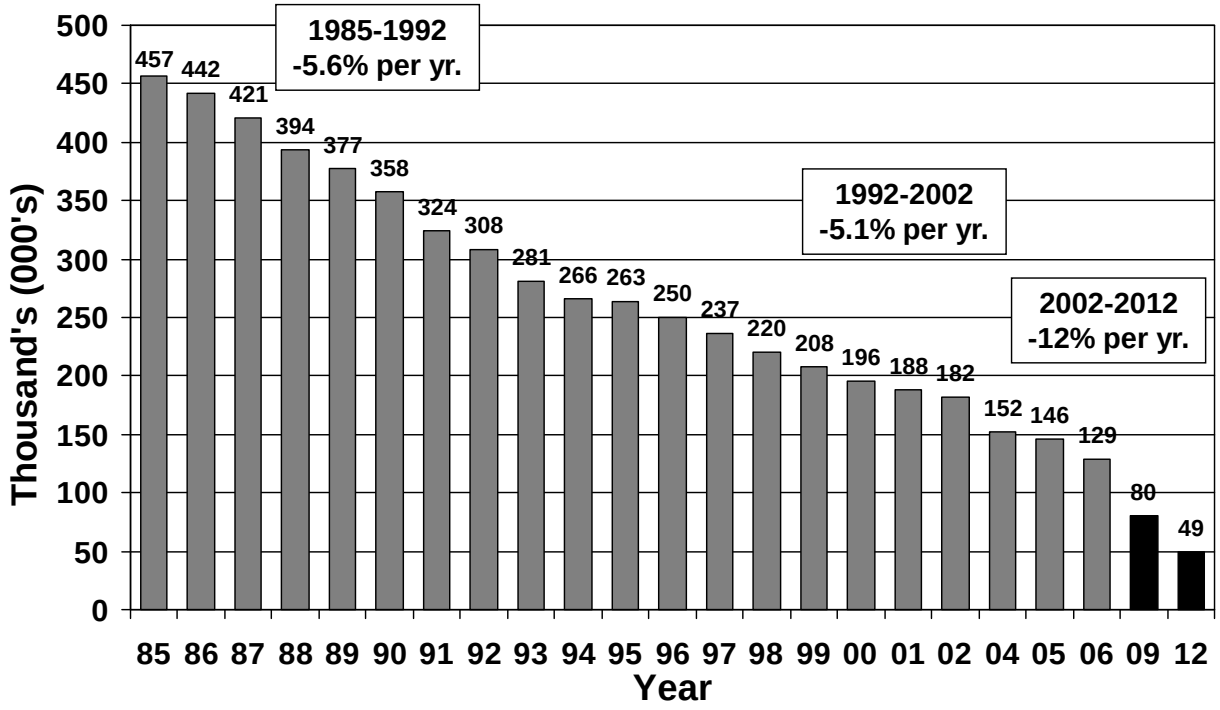


** EBIT or automotive operating income per vehicle sold. Honda excludes motorcycles and power equipment.*
Source: Company reports

The good news for the Detroit companies since the restructuring has not come without some costs, particularly in terms of employment. Figure 7 presents company data on annual GM/Delphi U.S. hourly employment for 1985 – 2012. As can be seen, despite the bankruptcy of Delphi in 2005, hourly employment at the two related firms still stood at 129,000 in 2006. This total was reduced to 80,000 in 2009 and is now 49,000 in 2012. The last employment figure has remained steady for the last two years with the attrition of each traditional contract worker now replaced by the hire of a new "2nd tier worker" at approximately half the hourly cost. Contract provisions allow this replacement of 2nd tier workers without limit until 2015. The 2007 labor agreement, the concession agreements of 2009, and the current 2011 contract have resulted in a considerable reduction in the cost of labor at the three companies.

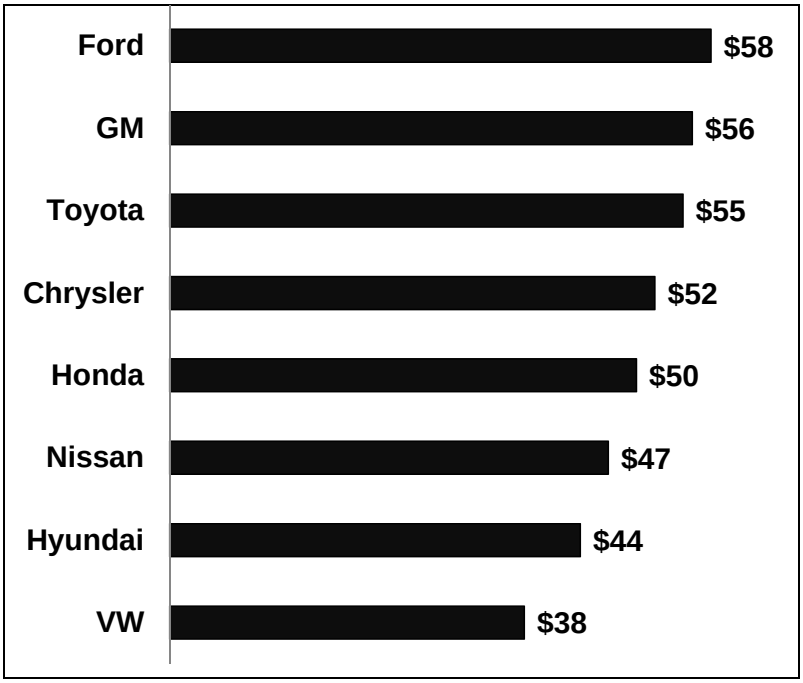
Figure 8 shows the results of a CAR analysis of Detroit Three labor costs in 2011. GM's cost in 2011 for hourly labor, for example, was $56 per hour, a considerable improvement over the $79 per hour cost in 2006. Chrysler's hourly cost of $52 per hour is even lower than CAR's estimate of $55 per hour for Toyota USA. The major improvements, of course, involved the transfer of such legacy costs as retiree health benefits to independent VEBAs managed by the UAW.

Figure 7: GM/Delphi U.S. Hourly Population, 1985-2012



Source: Company reports

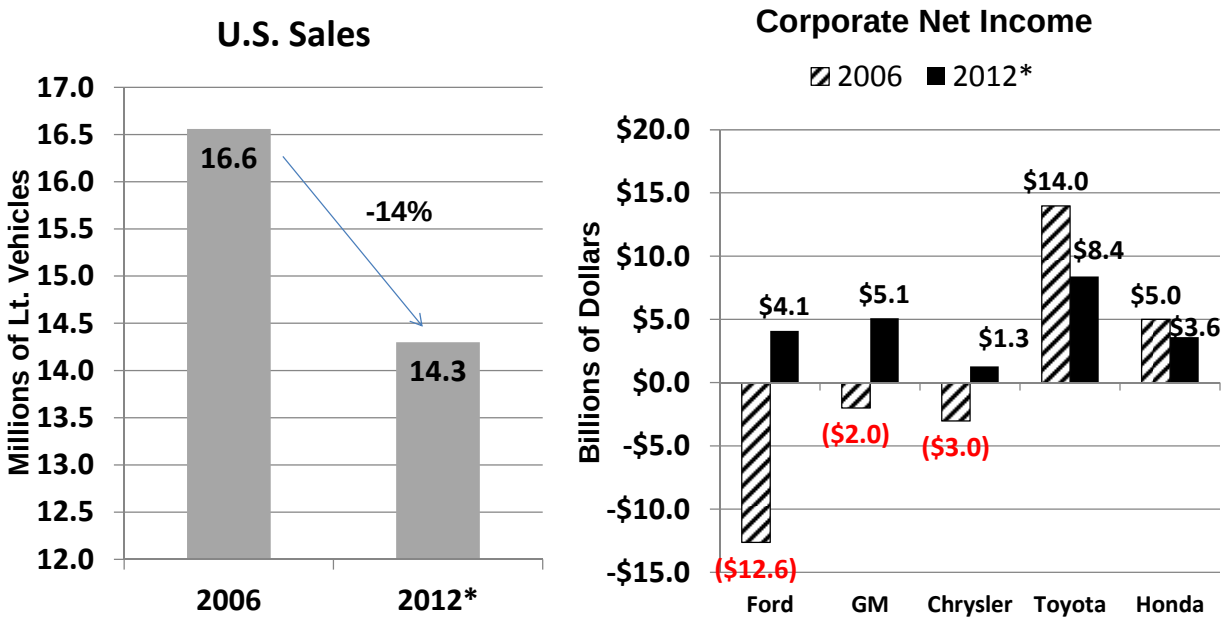
Figure 8: 2011 Labor Cost Competitiveness in the United States



Source: Company reports, Center for Automotive Research

The relative comeback of the Detroit Three in their North American operations can be summarized in Figure 9. In 2006, U.S. light vehicle sales reached a level of 16.6 million, yet the combined global net income of the Detroit Three was a loss of $17.6 billion compared to a gain of $19.0 billion for Toyota and Honda. So far in 2012, the U.S. market has trended at a sales level of 14.3 million units or 14 percent lower than sales in 2006. Yet the three companies have earned $10.5 billion in the first three quarters of 2012 compared to $12.0 billion for Toyota and Honda. The so-called break-even sales level in North America for the Detroit companies is clearly lower. Only significant losses in their European operations which outweigh their growing profits in the Chinese market prevent the Detroit companies from matching or exceeding their major Japanese competition in profitability.

Figure 9: Profitable at Lower Sales Volumes, 2006 – 2012*



*Through September 2012.
Source: Automotive News, Company Annual Reports

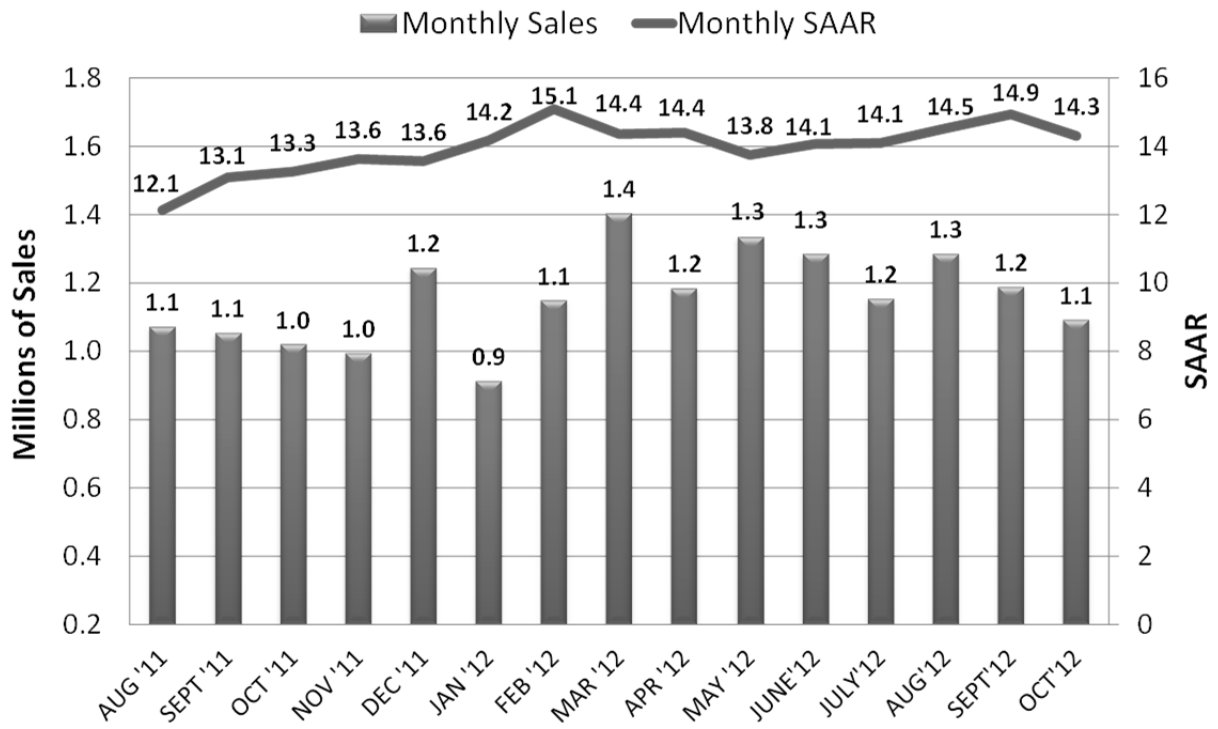
Section II: CAR Forecasts of Auto Sales, Production, and Employment

The U.S. automotive market is on the verge of posting its third consecutive annual double-digit percentage increase in vehicle sales. Many determinants of automotive sales are improving. The U.S. unemployment rate is finally below 8 percent and consumer confidence is at a four year high according to the indexes. Used vehicle prices are at a record level reducing competition from existing vehicles and increasing the size of trade in allowances. The age of vehicles on the road are also at a historical high reflecting the potential of enormous pent-up demand for new vehicles. Also, the spike in fuel prices has ended for now and the outlook on petroleum production has brightened. And the housing market appears to be bottoming out and some stability and even increases in home prices have been reported. Even recent natural disasters, such as Tropical Storm Sandy, may improve near term sales through replacement demand.

However, the general condition of the U.S. economy still faces many challenges which may negatively affect auto sales in the next several years. The economy or GDP is still growing slowly and over 12 million Americans are still unemployed. States and municipalities are still cutting employment month after month. Corporations have reduced their investment and hiring plans for next year in the general uncertainty regarding the "Fiscal Cliff" and the gathering recession in the Eurozone. Finally, the stock market appears to be especially volatile for many reasons and the housing recovery is far from a sure thing. To top it all off, there is a looming regulatory cliff in Washington for automakers that may greatly increase the price of vehicles and reduce the value of many attributes in motor vehicles.

This section will attempt to parse these influences into a series of CAR forecasts of automotive sales, production and employment for the next several years.

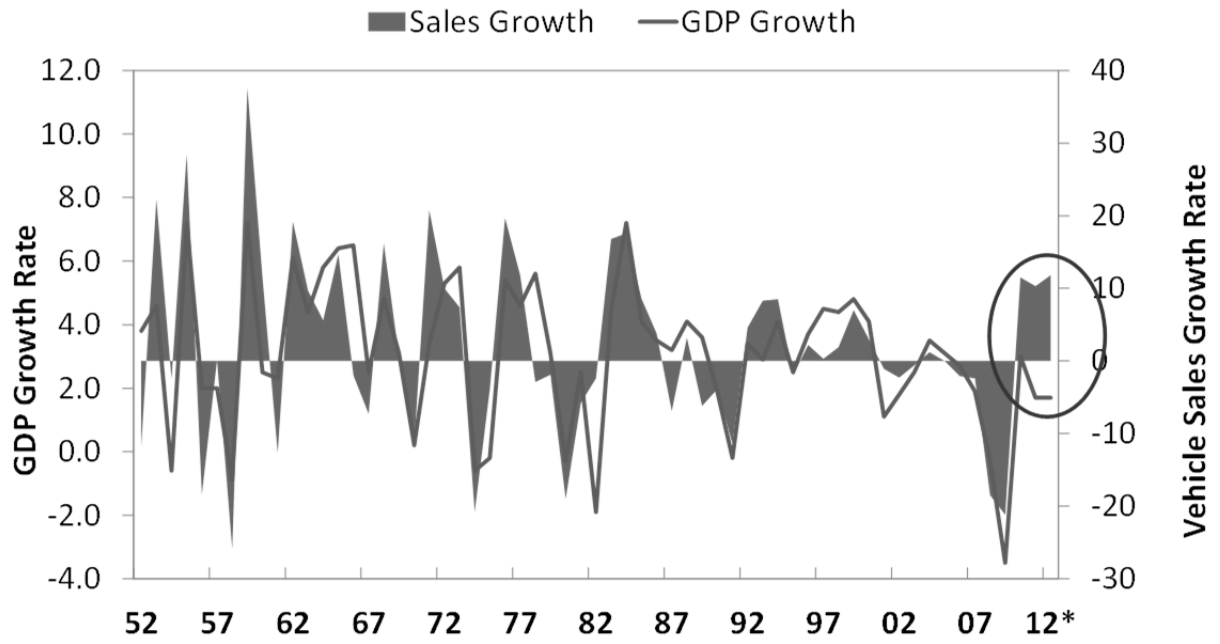
Figure 10: U.S. Light Vehicle Monthly Sales and SAAR October 2011 – October 2012



Source: Automotive News, Center for Automotive Research

Since the beginning of 2012 (with the exception of May), monthly light vehicle sales have grown at an annual rate above 14.0 million units, as shown in Figure 10. 2012 vehicle sales are expected to increase by 12 percent, which marks the third consecutive year of double-digit sales growth since 2009. Despite sluggish U.S. economic growth, the recovery in vehicle sales has been steady and promising.

Figure 11: U.S. GDP Growth Rate and Vehicle Sales Growth Rate 1952 – 3Q2012

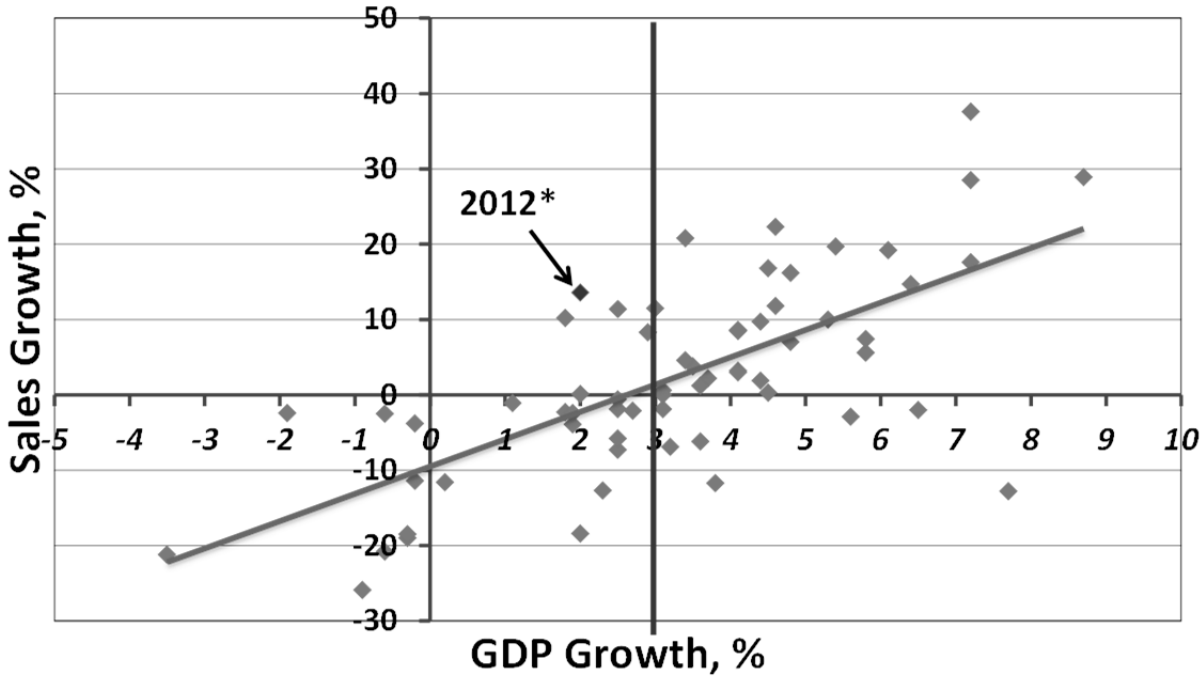


**Through 3Q 2012.*
Source: Bureau of Economic Analysis

Figure 11 shows the relationship between U.S. GDP and light vehicle sales growth rates from 1952 through 2012. These two variables were once statistically correlated to a degree that one could almost predict the GDP growth rate using only vehicle sales growth. However, the close relationship between GDP and vehicle sales seems to have been broken in 2010. Double-digit growth in U.S. vehicle sales in 2010, 2011, and 2012 YTD has been accompanied by GDP growth rates of 3 percent or lower. Based on historical trends, the predicted GDP growth rate for the past three years should have been 4 percent or higher based on recent growth in vehicle sales.

The connection between the auto industry and the U.S. economy also seems to be disconnected. There are three possible explanations: first, vehicle sales may be driven by pent-up vehicle demand, which would make sense given the economy alone is not a strong enough driver for the current rate of sales growth and the age of the fleet is at record highs; second, interest rates on new vehicle loans are very low—and credit is widely available, even for sub-prime borrowers; and finally, GDP growth rates may be suppressed by the persistently high unemployment rate, which is still above 8 percent—3 percent higher than 2007. Output of the economy would grow if the unemployment rate were lower.

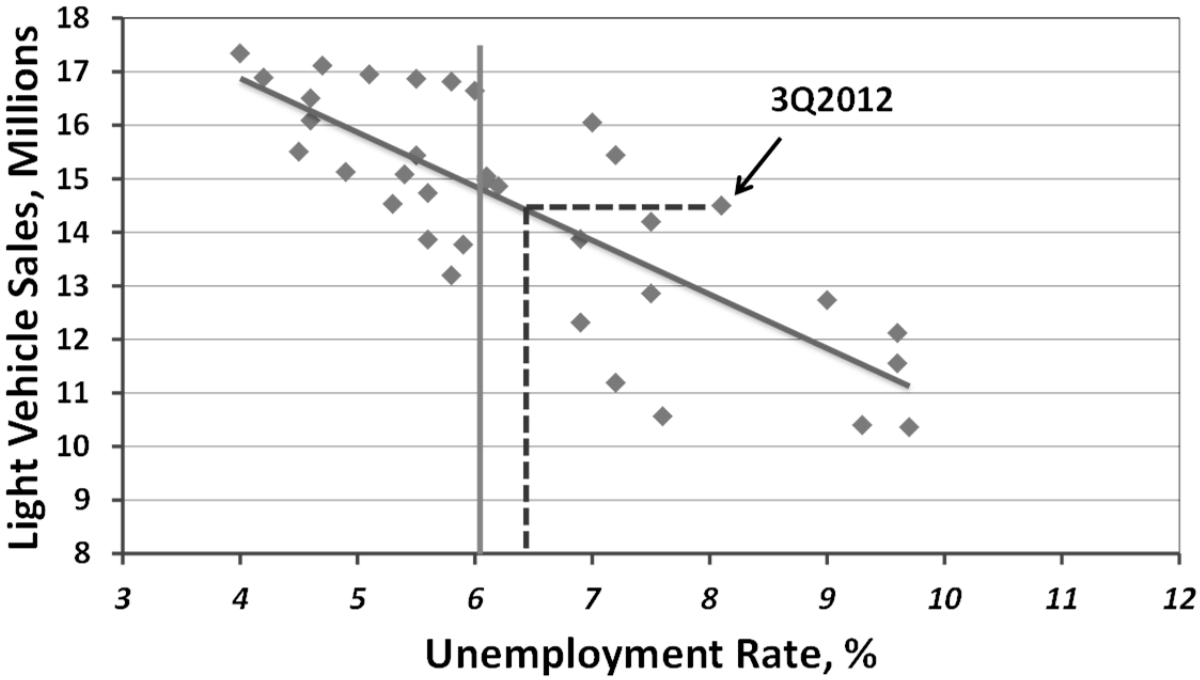
Figure 12: GDP Growth Rate and Sales Growth Rate, Annual 1950 – 2012*



**Through 3Q 2012.*
Source: Bureau of Economic Analysis

The historical trend of U.S. GDP growth rates and vehicle sales growth from 1950 through 2012 is shown in Figure 12. The data shows that GDP growth of 3 percent or higher is necessary to have a positive automotive sales growth. But since 2011, data observations have not been following the trend. In 2011, light vehicle sales grew by 10.3 percent, but GDP only grew by 1.8 percent; through the third quarter of 2012, vehicle sales grew by 13.6 percent, but GDP only grew by 2.0 percent. These short term observations show that vehicle sales were either above trend by at least 10 percentage points, or the GDP growth rates were below trend by 3 percentage points.

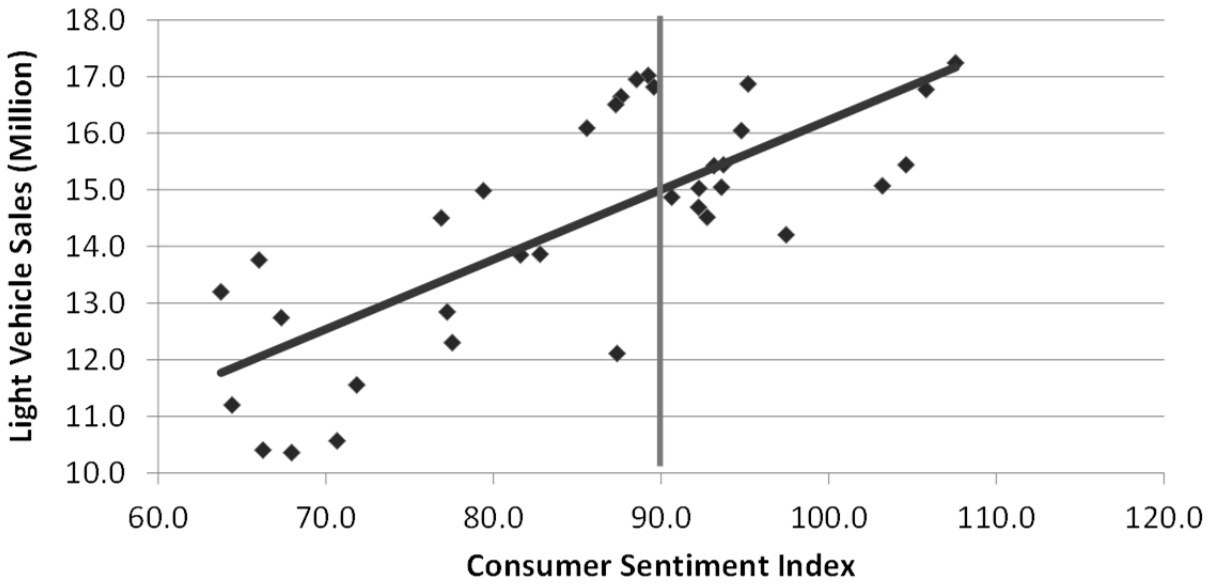
Figure 13: Light Vehicle Sales and Unemployment Rate, Annual 1978-2011, 3Q2012



Source: Bureau of Economic Analysis, Bureau of Labor Statistics

Figure 13 shows the simple correlation between unemployment rate and the level of U.S. light vehicle annual sales. The ordinary least squares (OLS) regression line shown implies that as the unemployment rate decreases by one percentage point, U.S. light vehicle sales are expected to increase by one million units. In order to have a 15 million unit sales year, the unemployment rate should be close to 6 percent. As of the third quarter 2012, the average unemployment rate was 8.1 percent, and the seasonally adjusted annual sales level was 14.2 million. According to this regression results, 14 million units of sales is not a sustainable level unless the unemployment rate decreases to lower than 7 percent.

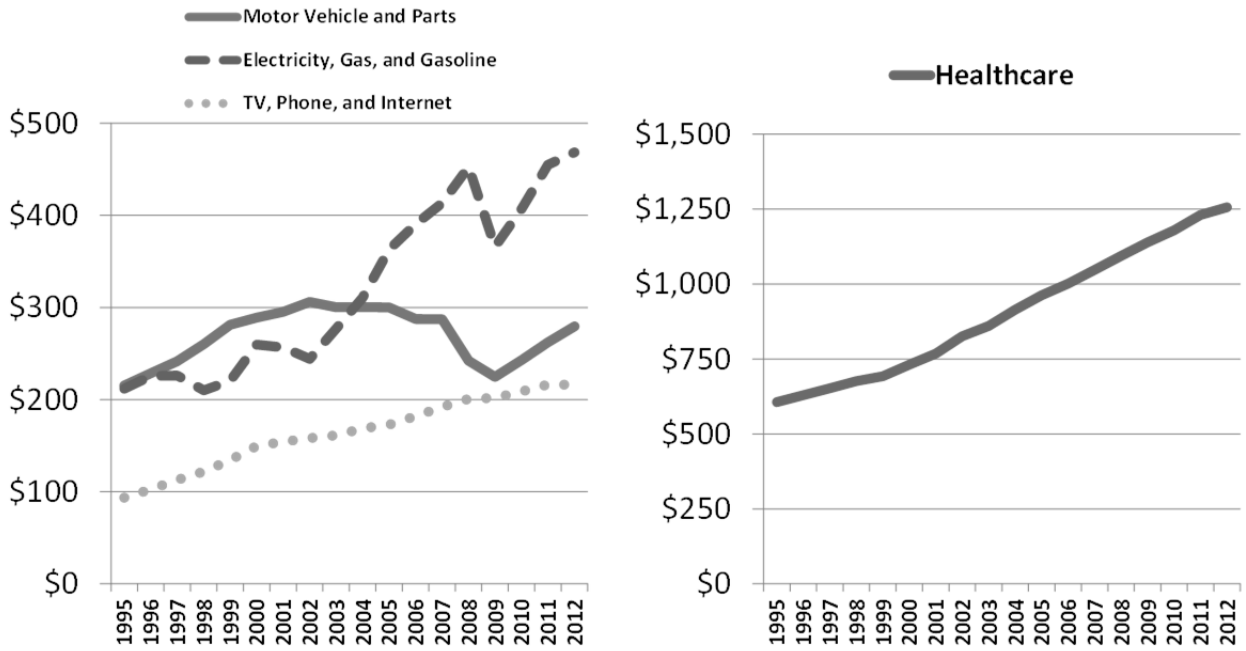
Figure 14: UM Consumer Sentiment Index Annual: 1978 - 2012*



**Through November 2012.*
Source: Bureau of Economic Analysis, Thomson Reuters/University of Michigan Surveys of Consumers

Consumer confidence is another indicator affecting light vehicle sales. As shown in Figure 14, during the 2008-2009 recession, the University of Michigan's (UM) Consumer Sentiment index dropped as low as 55.3. As of November 2012, the UM index has improved 27.4 points to 82.7, and U.S. light vehicle sales also increased 37 percent from 10.4 million in 2009 to over 14 million in 2012. The OLS regression line indicates that a one-point increase in the consumer sentiment index would produce an expected gain of 125,000 units in light vehicle sales. In other words, to sustain a 15 million sales level, the consumer sentiment index would have to be at least 90.

Figure 15: Monthly Expenditure Per Household By Type of Product/Service, 1995-2012*

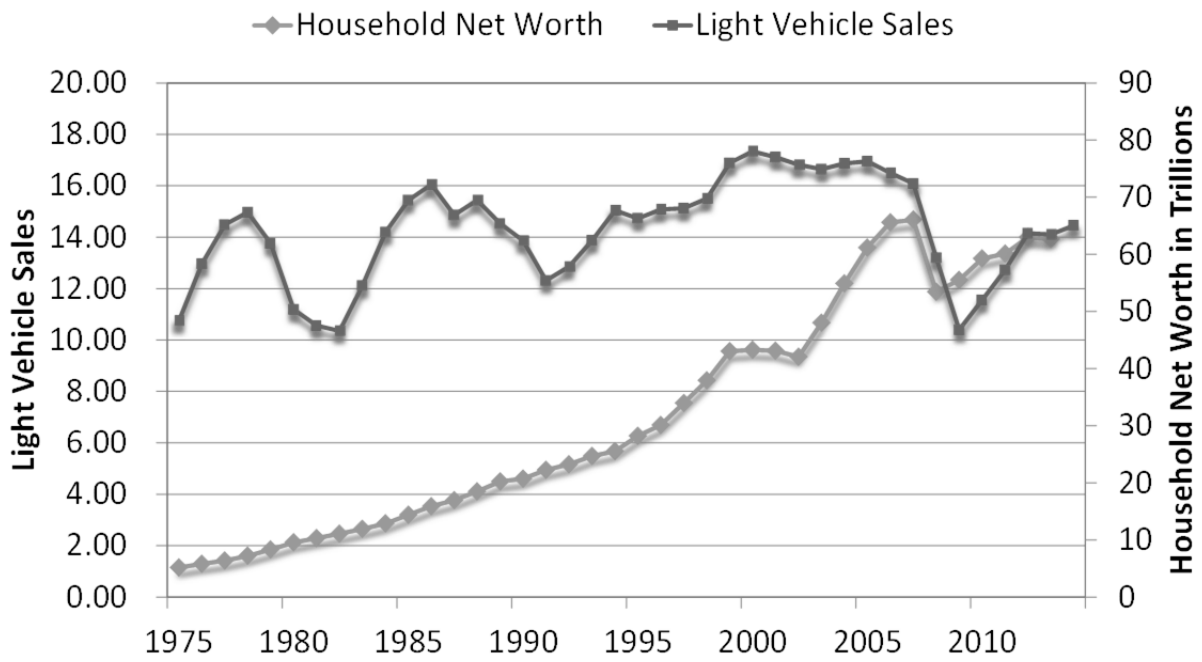


**Through 3Q 2012.*
Source: Center for Automotive Research based on Personal Consumption Expenditures by Type of Product, Bureau of Economic Analysis

Figure 15 shows monthly personal consumption expenditures per household by types of products and services for the years 1995 through 2012. The solid line on the left represents the category of motor vehicle and parts which include new and used vehicles, and accessories, but does not include motor vehicle maintenance and repair services. The broken line represents energy usage per household, which include house electricity, natural gas, fuel oil, and gasoline. The dotted line represents average household expenditures on cable and satellite television services, telecommunication services, and internet access. The solid line in the chart at right represents healthcare expenditures, which include outpatient and hospital services, and nursing home services, but not pharmaceutical and other medical products.

During the recession, both energy and motor vehicle expenditures dropped significantly. However, personal consumption expenditures on TV, phone, and internet services, and healthcare services did not decline at all. These categories are just two of the many examples of service expenditures that have become necessities, as purchases of goods (including energy) have become discretionary expenditures.

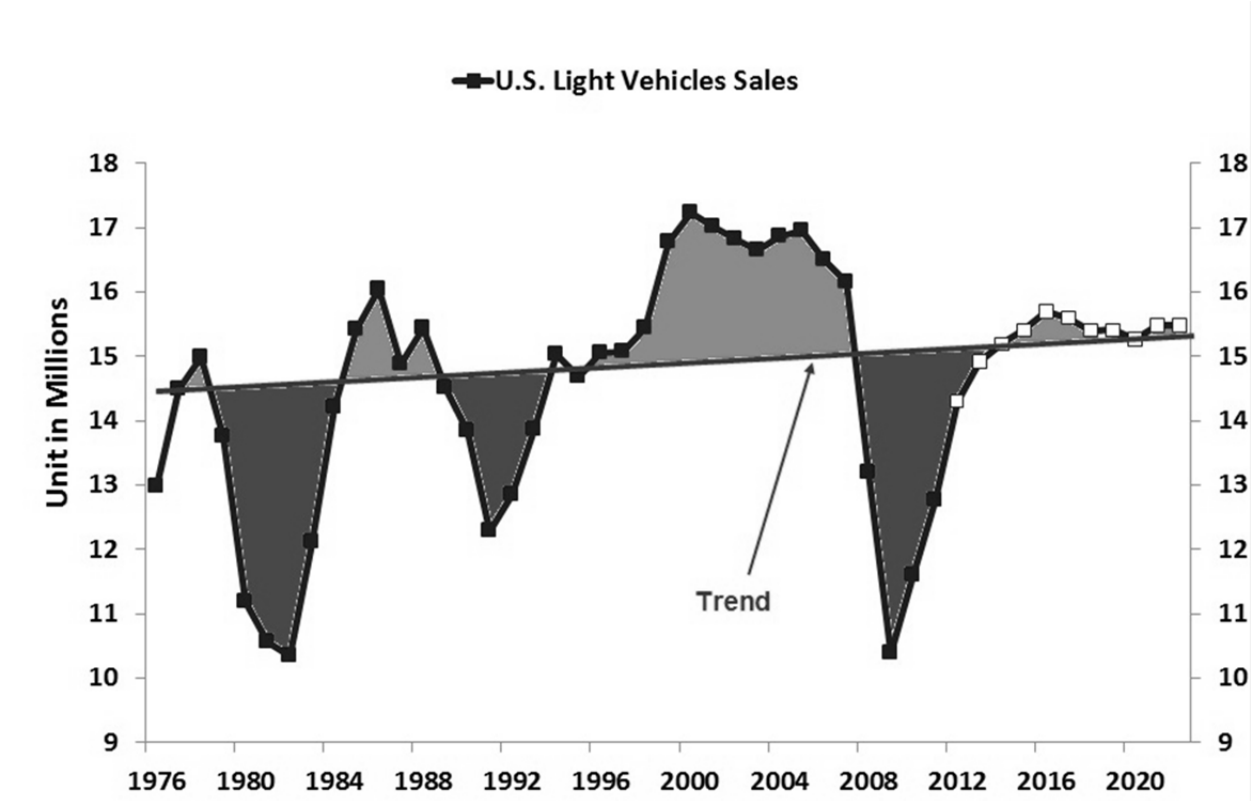
Figure 16: Household Net Worth and Annual Vehicle Sales, 1975 – 2012
Quarterly for Current Year, through 2Q 2012



Source: Federal Reserve Statistical Release, Z.1, Flow of Funds Accounts of the United States

Household net worth is an indicator to estimate the wealth effect on light vehicle sales (see Figure 16). Home value is a major element of household net worth. From 1975 to the late 1990s, household net worth grew steadily, accumulating by an average rate of 8 percent per year. Just before the 2008 recession, the accumulation rate was as high as 14 percent. This unusually high rate of accumulation for household wealth is believed to be the reason for the light vehicle sales "bubble" between 2001 and 2007. During this period of time, vehicle sales were consistently above 16 million units. Low vehicle prices and high home equity triggered consumers to buy additional vehicles, and once the housing bubble burst, light vehicle sales plummeted.

Figure 17: CAR Baseline Sales Forecast

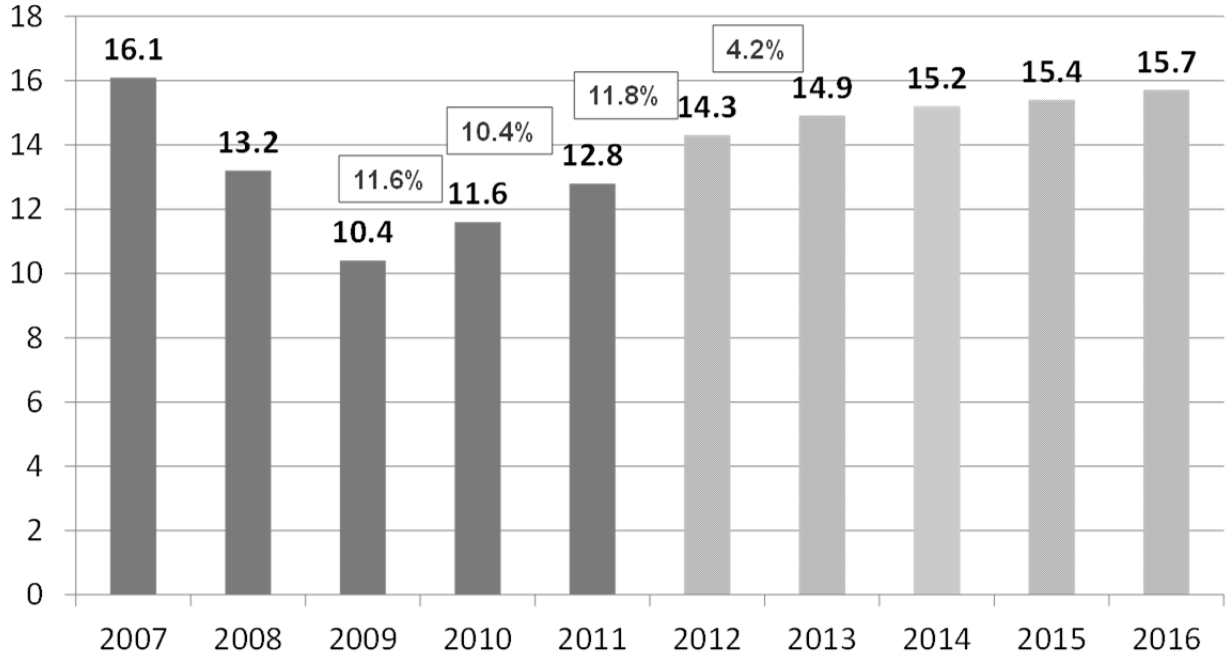


U.S. Sales Forecast (Millions)										
2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
14.3	14.9	15.2	15.4	15.7	15.6	15.4	15.4	15.3	15.5	15.5

Source: Center for Automotive Research

Despite an unemployment rate that is still close to 8 percent, and real GDP growth rate that is, at best, 2.5 percent, CAR's 2013 light vehicle sales forecast is 14.9 million units, 4.2 percent higher than 2012 (see Figure 17). U.S. household net worth has bottomed out, and is expected to grow for the third consecutive year in 2013. Low interest rates on new vehicle loans, along with record-high used car prices, also drives the new car market to grow at a faster rate than the overall economic recovery. However, long term market growth is hampered by slower-than-expected economic recovery and a higher-than-normal unemployment rate; therefore CAR estimates the market will only grow modestly in 2014 and 2015—15.2 million and 15.4 million, respectively. CAR does not forecast light vehicle sales returning to 16 million units any time soon.

Figure 18: CAR Baseline U.S. Light Vehicle Sales Forecast: 2007-2016

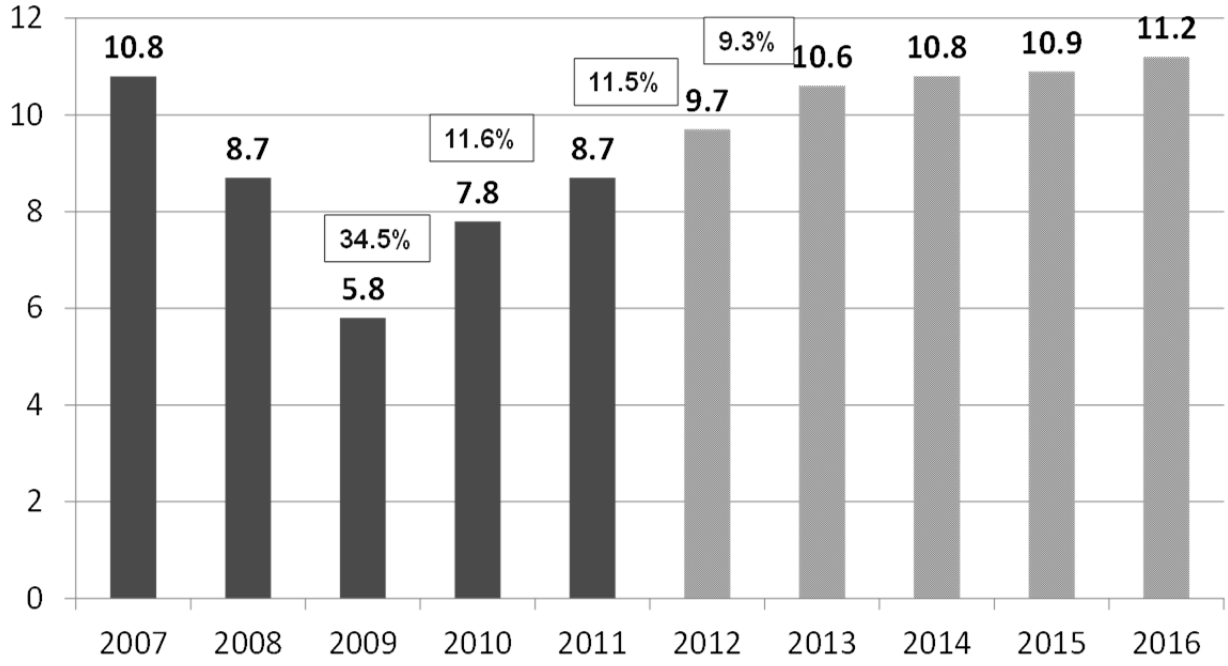


Source: Center for Automotive Research

Figure 18 represents U.S. light vehicle sales from 2007 to 2011, and CAR's baseline sales forecast from 2012 to 2016. CAR's baseline forecast uses macroeconomic indicators as variables of a dual-equation model. Other determinants are also included in the model, such as the relative price of motor vehicles (to overall Consumer Price Index (CPI)), vehicle saturation rate (numbers of registered vehicles per household), and light vehicle production. The details of CAR's sales model are explained in Appendix 1.

CAR's baseline forecast is that 2012 will be the last year to have double-digit sales growth before 2016. 2013 sales are forecast to grow only 4.2 percent, or 600,000 additional units compared to 2012 sales. The baseline forecast did not consider the impact of the federal government's "deficit reduction" policies on sales, and is a look at what light vehicle market demand could be if "deficit reduction" or the "fiscal cliff" did not exist. The impact of U.S. fiscal policies will be discussed later in this study.

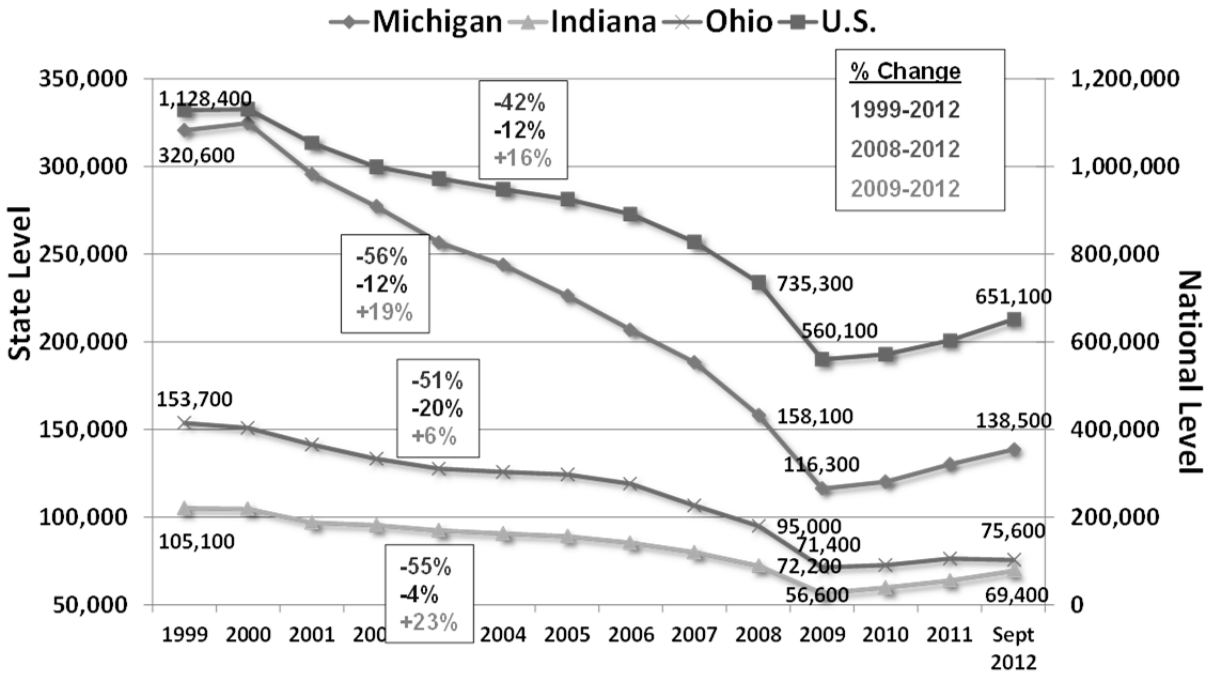
Figure 19: CAR Baseline U.S. Vehicle Production Forecast: 2007-2016



Source: Center for Automotive Research

In addition to light vehicle sales, CAR also forecast U.S. light vehicle production for 2012 through 2016 (Figure 19). CAR's production model is part of a dual-equation model that is simultaneously estimated with sales. CAR's estimate is that 2013 U.S. light vehicle production will grow by 9.3 percent to 10.6 million units, compared to 9.7 million units in 2012. Unlike vehicle sales which will probably not come back to pre-recession level any time soon, vehicle output is expected to fully recover by 2014. Output growth is stronger than sales growth partially because the weak U.S. dollar discourages vehicle imports, and therefore encourages transplants to increase U.S. production.

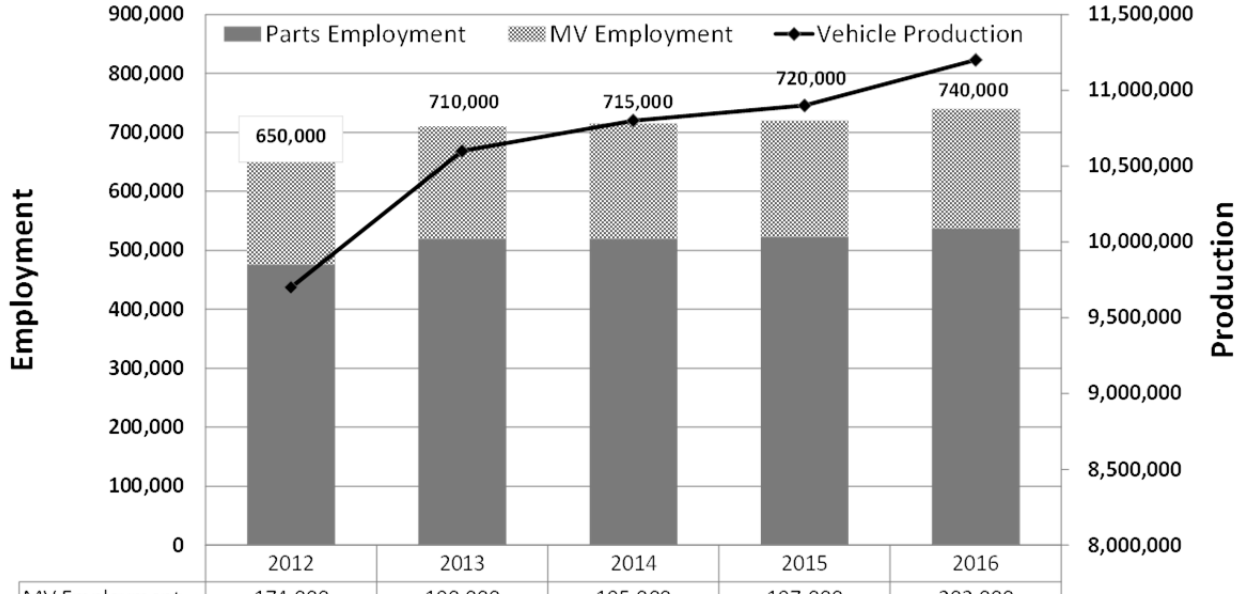
Figure 20: Motor Vehicle & Parts Manufacturing Employment 1999 – 2012 September



Source: Bureau of Labor Statistics

U.S. automotive employment is not yet back to its 2008 level after three years of recovery, as shown in Figure 20. In September 2012, U.S. automotive employment was still 84,100 fewer than it was in 2008. In fact, from 1999 to September2012, U.S. automotive employment dropped by 42 percent. Three Midwest states—Michigan, Ohio, and Indiana—where much of the automotive industry is concentrated, had even steeper drops in automotive employment. Since the recession, employment numbers have been recovering, but they are not expected to return to 1999 levels (when the auto industry employed more than 1 million people in the United States) in the foreseeable future.

Figure 21: U.S. Vehicle Production & CAR Motor Vehicle & Parts Employment Forecasts, 2012-2016

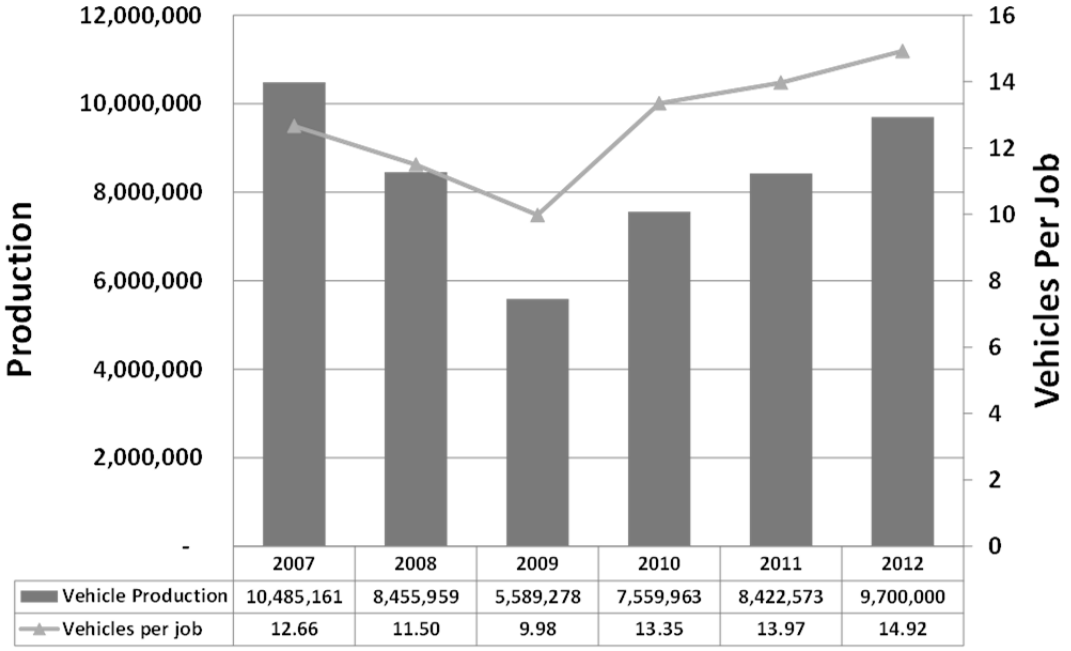


	2012	2013	2014	2015	2016
MV Employment	174,000	190,000	195,000	197,000	203,000
Parts Employment	476,000	520,000	520,000	523,000	537,000
Vehicle Production	9,700,000	10,600,000	10,800,000	10,900,000	11,200,000

Source: Center for Automotive Research

Figure 21 shows CAR's forecast of U.S. automotive employment from 2012 through 2016. Overall, the industry is expected to add 90,000 employees by 2016, of which about one-third will be in motor vehicle manufacturing and two-thirds will be in the automotive supplier sector. Currently the ratio of automotive supplier employment to automaker employment is about three to one. Therefore, the projected two-to-one ratio for future automotive employment growth indicates that future vehicle production and OEM employment will support fewer domestic parts workers. It could also mean that production from the foreign automakers will comprise a larger share of production growth than that of domestic automakers, assuming foreign automakers as a whole source a smaller proportion of their inputs from U.S. auto suppliers than domestic automakers do.

Figure 22: U.S. Vehicle Production & Vehicles per Job 2007-2012

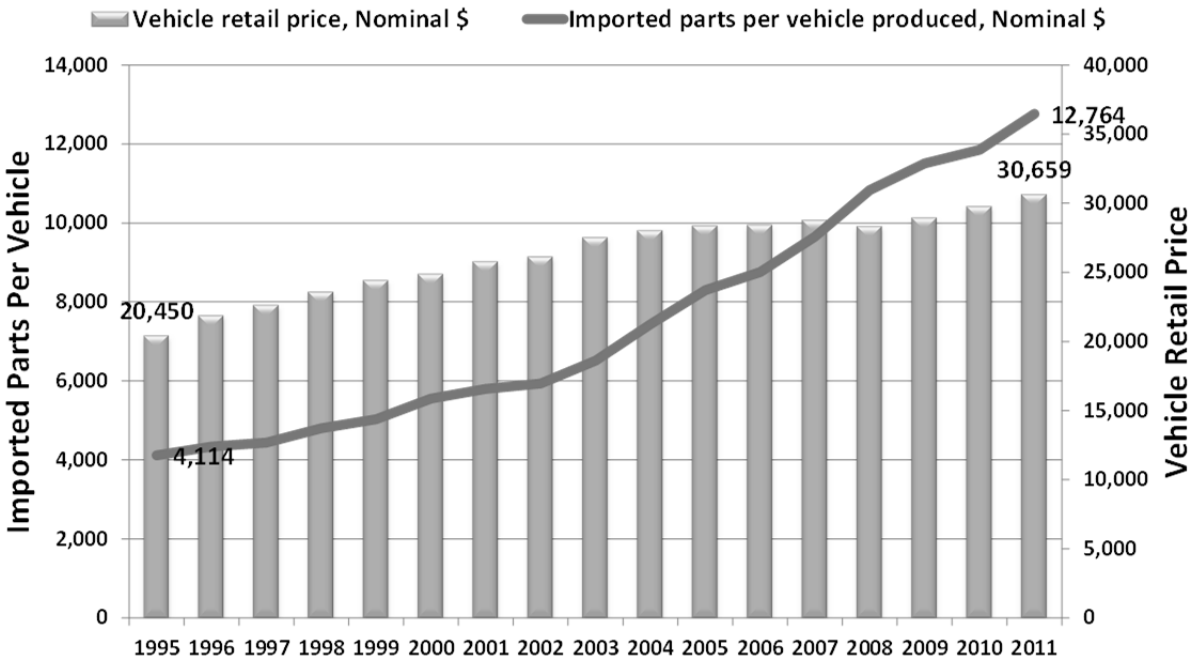


	2007	2008	2009	2010	2011	2012
Vehicle Production	10,485,161	8,455,959	5,589,278	7,559,963	8,422,573	9,700,000
Vehicles per job	12.66	11.50	9.98	13.35	13.97	14.92

Source: LMC Automotive, Bureau of Labor Statistics

Figure 22 shows U.S. vehicle production and the number of vehicles per job, a productivity measure which is calculated by dividing vehicle production by automotive employment (including motor vehicle manufacturing and automotive parts manufacturing workers). Before the recession, there were 12.7 vehicles for every automotive job. During the recession, the figure plummeted to below 10. One year after the recession, the figure bounced back to 13.3, and continued to grow in 2011 and 2012. Currently, automotive labor productivity is at the highest level ever recorded since 1960, which means fewer workers are needed to produce the same number of vehicles. There are many changes and improvements in the manufacturers' production systems, work scheduling, and in overtime trends that increase labor productivity, but productivity could also be driven by increasing imports of automotive parts.

Figure 23: Value of Imported parts per vehicle and Vehicle Retail Price, 1995-2011



Source: Transportation and Machinery Office, International Trade Administration; National Automobile Dealers Association

According to National Automobile Dealers Association (NADA), the average retailer price for vehicles increased from $20,450 in 1995 to $30,659 in 2011 (represented by the bars in Figure 23). During the same period of time, the total amount of imported automotive parts ballooned from $46 billion to $108 billion, and imported parts per vehicle tripled from $4,114 to $12,764. Some may argue that a portion of imported parts are for aftermarket or used vehicles, which both grew significantly during the same period of time. However, personal consumption expenditure on motor vehicle parts and accessories (all of them are considered aftermarket parts) only grew by 35 percent. Price inflation, which is about 45 percent during this period, is not sufficient to explain the growth in the share of imported parts per vehicle, which increased more than 300 percent over the past 16 years. In the same period of time, U.S. auto parts employment dropped by 44 percent. There used to be 7 U.S. automotive parts workers per 100 vehicles produced, now there are only 5.3 workers per 100 vehicles produced. Both the number of automotive parts establishments and size of establishments shrunk during this period. It is clear that the U.S. automotive parts industry has been shrinking fast in the past decade.

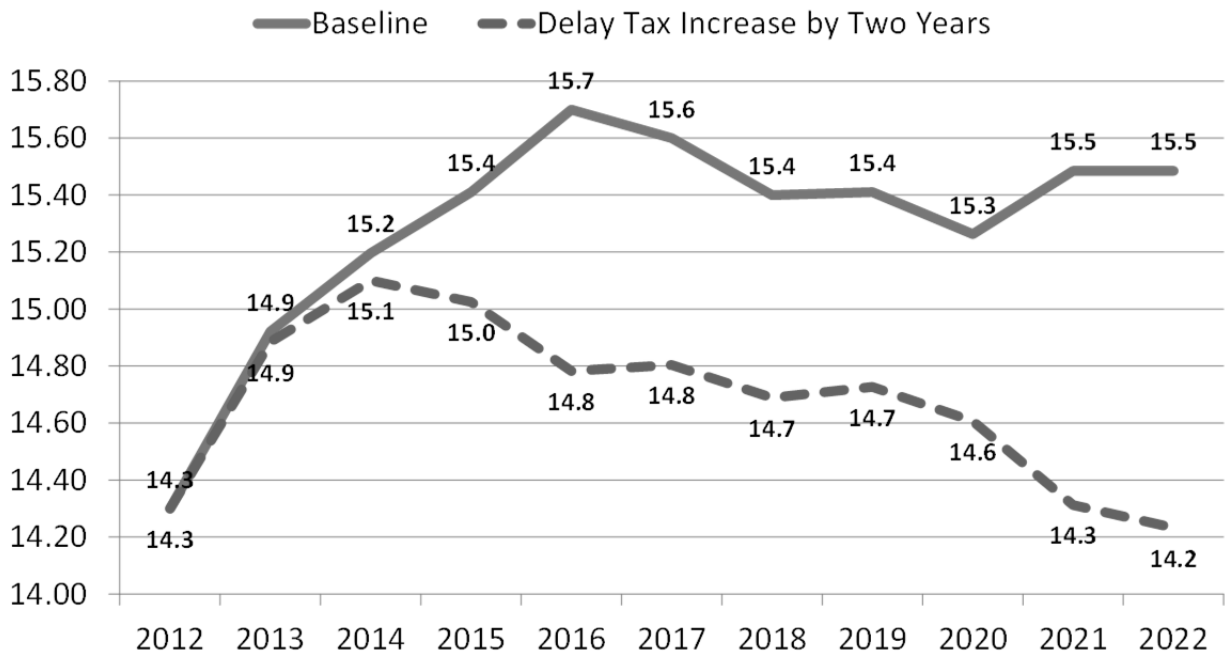
Table 2: CBO's Baseline and Alternative Budget Projections ($ Bil.)

CAR Research based on CBO's Baseline Budget Projections, August 2012												
Assumed TWO YEAR extension of most expiring tax provisions except for the lower tax rates on high income tax payers, and index the AMT for inflation.												
	Actual 2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Revenue	2,303	2,435	2,625	2,863	3,541	3,817	4,083	4,328	4,551	4,790	5,039	5,295
Outlay	3,603	3,563	3,554	3,595	3,754	4,003	4,206	4,407	4,681	4,932	5,183	5,509
Deficit (-) or Surplus	-1,300	-1,128	-929	-732	-213	-186	-123	-79	-130	-142	-144	-214
Deficit reduction-full		172	199	197	519	27	63	44	-51	-12	-2	-70
Deficit reduction-half			99.5	98.5	259.5	13.5	31.5	22	-25.5	-6	-1	-35
CAR Research based on CBO's Alternative Budget Projections, August 2012 (in red circle) and November 2012 (in blue circle)												
	Actual 2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Revenue	2,303	2,435	2,583	2,825	3,111	3,361	3,596	3,808	3,996	4,196	4,399	4,608
Outlay	3,603	3,563	3,621	3,748	3,921	4,193	4,430	4,678	4,999	5,298	5,599	5,970
Deficit (-) or Surplus	-1,300	-1,128	-1,038	-923	-810	-832	-834	-870	-1,003	-1,102	-1,200	-1,362
Deficit reduction-CBO alternative		172	90	115	113	-22	-2	-36	-133	-99	-98	-162
Increase Revenue (Tax increase)		0	42	38	430	456	487	520	555	594	640	687
Decrease spending		0	-67	-153	-167	-190	-224	-271	-318	-366	-416	-461

Source: Center for Automotive Research based on two CBO studies: Economic Effects of Policies Contributing to Fiscal Tightening in 2013, Congress of the United States, Congressional Budget Office, November 2012; An Update to the Budget and Economic Outlook: Fiscal Years 2012 to 2022, Congress of the United States, Congressional Budget Office, August 2012.

A number of tax provisions will expire in 2013 if Congress and the President do not come to an agreement to change current tax and spending laws. As a result, personal income taxes may increase dramatically starting in January 2013. This so-called “fiscal cliff” would have an impact on personal disposable income as well as private investment. The Congressional Budget Office (CBO) estimated in August 2012 that real GDP could decline by 0.5 percent, and the unemployment rate could rise to about 9 percent in 2013. In November 2012, CBO released an estimate update titled “Economic Effects of Policies Contributing to Fiscal Tightening in 2013.” In this update, CBO assumed a two-year extension of most expiring tax provisions (except for the payroll tax cut), and indexing the alternative minimum tax. CBO estimated in the short term (2013 and 2014), GDP would grow by 2.2 percent. Table 2 shows CBO’s baseline and alternative budget projections based on the agency’s two studies on this subject in 2012. The circle on the left indicates a small increase in revenue due to the extension of tax provisions, and the circle on the right shows a large revenue increase when all tax provisions expire.

Figure 24: U.S. Auto Sales Forecast: The Fiscal Cliff



Source: Center for Automotive Research based on Congressional Budget Office's baseline and alternative projection, November, 2012

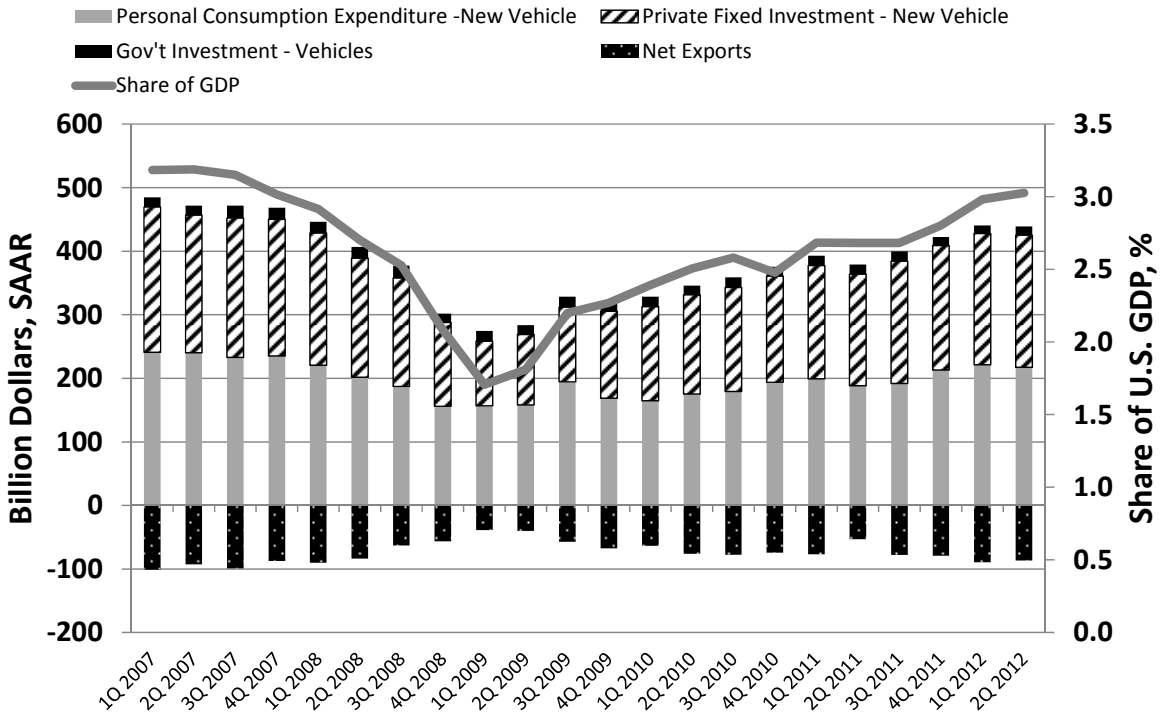
CAR estimates the impact of the "fiscal cliff" will affect vehicle sales immediately, and that the U.S. light vehicle market will be more than 6 million units smaller in the next decade as a result. Figure 24 shows CAR's baseline sales estimate (extending all tax provisions), and an alternative sales estimate (all tax provisions expire in 2015). The tax revenue difference between CBO's two projections (baseline and alternative) will increase to $430 billion in 2015 and to $687 billion by 2022. The projected tax increases will lower personal disposable income by about 3.0 percent starting in 2015. CAR estimates the income elasticity on motor vehicle demand ranges from 0.84 in the short run to 1.20 in the long run. Therefore, the impact of this reduction in personal disposable income could affect motor vehicle demand by as much as 4.0 percent by the end of this decade.

Section III: The Auto Industry's Contribution to Economic Growth

The output of the U.S. auto industry, manufacturers and retailers, has always contributed a significant share to GDP. However, the industry's share of GDP has fallen over time with the growth of other sectors and of the government in the economy. As Figure 25 shows, the industry's share was about 3.3 percent of GDP (and about 5.0 percent of private sector GDP) through the first three quarters of 2007. The following recession period, however, saw the industry's share fall to perhaps an all-time low of 1.7 percent by the first quarter of 2009. The recovery of sales since 2009 has seen a recovery in the industry's share of GDP to just over 3.0 percent. Although several components of auto output such as personal consumption expenditures or private fixed investment have not yet recovered to pre-recession levels, net-exports are more positive than before the recession by about $20 billion.

Even though the U.S. automotive industry has lost nearly half of its employment in the past decade, it is still the largest manufacturing industry by gross output in the United States. Not only do people buy motor vehicles for personal use, but businesses and governments also buy vehicles. In fact, personal consumption expenditure on new motor vehicles accounts for only half of total motor vehicle output. The remainder of vehicle sales goes to private and public investment. Without a viable domestic automotive industry, the country could only rely on imports, which will cost the U.S. economy hundreds of billions of dollars each year.

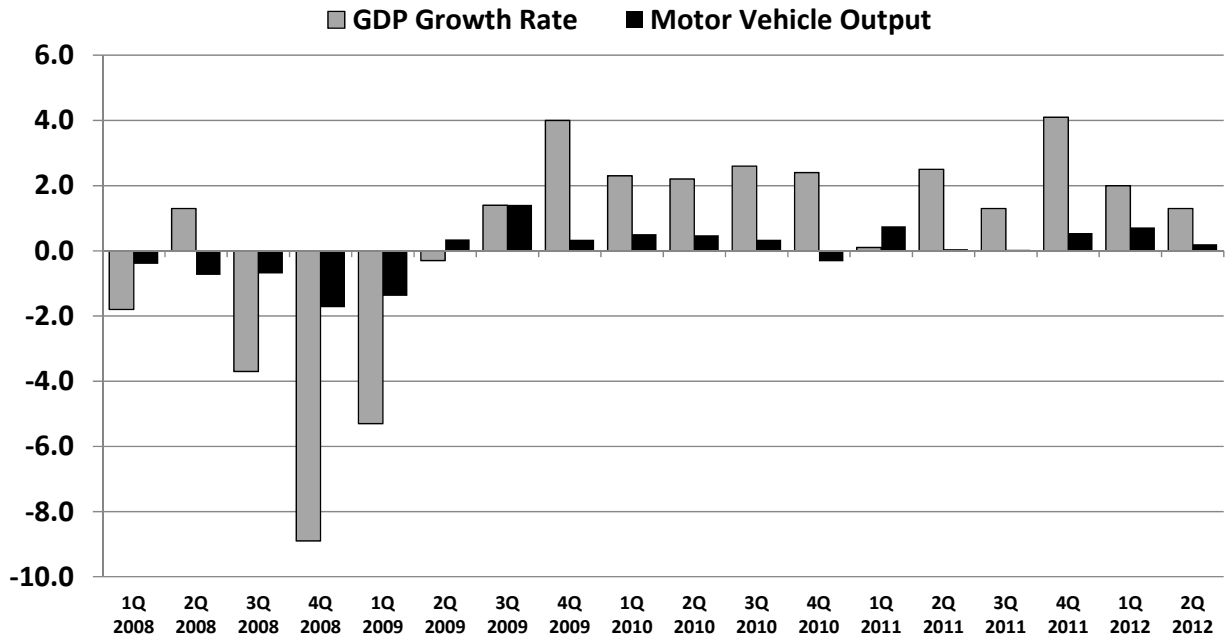
Figure 25: U.S. Motor Vehicle Output and share of GDP, 1Q2007 – 2Q 2012



Source: Bureau of Economic Analysis

A more important topic perhaps than the industry's share of GDP is its contribution to change in real GDP or economic growth. As stated previously, auto sales seem to be outpacing the overall growth of the economy. Figure 26 shows the contribution of the auto industry to percentage change in quarterly real GDP during 1Q 2008 through 2Q 2012. In a number of quarters, the industry contribution ranges from 25 to 100 percent of change in real GDP. Continuing strong growth in auto output could greatly assist future growth in the overall economy.

Figure 26: Auto Contributions to Percent Change in Real GDP, 1Q 2008 – 2Q 2012



Source: Bureau of Economic Analysis

The potential of the industry to contribute to long run economic growth depends on a number of familiar trends in the population, preferences for vehicle ownership, the sourcing of automotive output, and the efficiency of automotive production. The top half of Table 3 reviews these trends which are explained below,

Table 3: Potential for U.S. Automotive Growth?

	Annual Improvement	
• **Growth in # of Households**	**<1%**	
• **Veh./Household, %of Households w/ Veh.**	**<0%**	
• **Overseas Exports**	**<1%**	
• **Reducing Imports**	**<0%**	
• **Manufacturing productivity**	**0%**	
• **Beneficial Innovations ($ gross annual value):**		
◦ **Fuel economy performance (increase by 100%)**		**+ $200 B**
◦ **Improved safety (reduce fatalities by half)**		**+ $119 B**
◦ **Lower congestion costs (by half)**		**+ $ 50 B**
◦ **Other attributes?**		**- ???**
But related innovation and infrastructure costs may be greater than benefits!		

Source: See footnotes

- Growth in vehicle sales over the long run depends on **growth in the number of independent households** in the U.S. economy. Typically, for about 87 percent of the working population, a motor vehicle is the preferred means of commuting to work. In fact, for most Americans, the independence of a household depends partly on vehicle ownership. The U.S. Census forecasts the growth rate of households in the U.S. population at about 1 percent a year through 2025.[2]
- The **number of vehicles that are owned per household** can also determine the growth rate of automotive sales. This ratio recently reached an all-time peak of about 2.1 vehicles per household in about 2006 and has declined since. An additional decline to the long-run level of about two vehicles per household appears to be a reliable trend going forward because of slow growth in PDI. Also there is no apparent trend in the percentage of households that own a vehicle.[3]
- Recently, **exports of U.S. produced vehicles to other countries** have been increasing at a very slow rate. This is related to the exchange value of the dollar and to Free Trade

[2] U.S. Census Bureau, "Current Population Survey: Households by type 1940 to Present." January 2009.
[3] Center for Automotive Research based on R.L. Polk vehicle registration data and American Household Survey, U.S. Census Bureau.

Agreements such as that recently established between the United States and Korea. The annual percentage increase, however, is very low and will probably not increase at a high rate in the future.[4]

- Offsetting any increase in exports of automotive output is the strong growth of **automotive imports** especially automotive parts and components. Although this trend was reversed to a certain extent during the Great Recession, it has now been resumed and automotive parts imports will set a record in 2012.[5] (See Figure 23 and above discussion)
- **Productivity in auto manufacturing** can influence economic growth in several ways. First, if automotive output can be produced for less it can also be sold for less and overall sales and production may increase at an even faster rate. Second, if overall sales and production do not increase by much, higher efficiency in production can still allow resources to be released to the rest of the economy for other purposes that increase overall economic growth. Unfortunately, it appears that almost all auto companies operating in the U.S. industry now operate at very high efficiency levels, such as those at Toyota Manufacturing. This has been true since about 2008 and very little progress appears to be likely in the years ahead.[6]

Thus, based on the trends discussed above it appears that maintaining a high level of growth in output will be difficult for the auto industry in the years ahead. However, another source of potential growth is strong innovation in the motor vehicle itself or how it is produced. For example, Henry Ford's innovation of introducing the moving assembly line, the division of labor, and further standardization of parts to auto manufacturing reduced the cost of making automobiles by up to 80 percent but also famously increased the market for the product in exponential terms. Surprisingly, many of the beneficial innovations that may occur in the future are now driven by government regulatory processes and even public investment instead of the market or perhaps the industry itself. The major innovations under discussion include the following,

- **Improvements in fuel economy performance** have now been mandated through 2025 by the both the Environmental Protection Agency (EPA) and the National Highway Safety Administration (NHTSA). Starting with a base of 27.5 miles per gallon (mpg) for passenger cars and a lower level of (23.5 mpg) for light trucks in 2007, the National Standards Act and the most recent CAFE (Corporate Average Fuel Economy) mandates finalized in 2012 will require a combined fleet fuel economy average of 54.5 mpg by

[4] U.S. Department of Commerce, International Trade Administration.
[5] Ibid
[6] Harbour Report 2008, 2009; Interview with Ron Harbour, Oliver Wyman.

2025. If this is achieved, it would reduce fuel consumption by 50 percent. In 2012 terms, such an improvement would result in annual fuel savings worth over **$200 billon**.[7] Of course, motorists would certainly drive additional miles in vehicles with higher fuel economy offsetting some of the fuel savings. However, the cost of new fuel economy performance technologies placed on the vehicle would not be minor as well. CAR has estimated this cost at over $5,000 per vehicle.[8] Finally, it is very likely that some vehicle attributes would have to be sacrificed in order to double fuel economy performance which implies additional costs to the consumer. The success of this program now appears to depend crucially on consumer acceptance of the new technologies and the eventual price of motor vehicle fuel.

- **Improved safety technologies** will soon be mandated by the NHTSA. The stated goal of NHTSA officials is a zero fatality rate on U.S. highways and roads. NHTSA has pursued this regulatory agenda primarily through technology mandates for the motor vehicle. A number of new, primarily electronic, driver-assist, electronic technologies will be mandated in the next several years. It is somewhat possible that the recent record low level of 34,000 highway fatalities may be reduced by the implementation of these technologies (for example, collision avoidance and lane departure warning devices). If the current fatality level is reduced by half it could be worth as much as an annual savings of **$119 billion** using a conservative value for lives saved. In contrast to previous safety mandates that featured protective safety devices such as airbags which saved lives but did not prevent accidents (in fact they may have increased accidents), the new technologies are designed to prevent accidents and survivable injuries. However, cost and consumer acceptance may limit the gains to these new technologies as is the case for fuel economy technologies.
- **Lower congestion costs** may be possible proponents claim if certain "connectivity" technologies are adopted that allow vehicle-to-vehicle communication and communications with the transportation infrastructure. Even the possibility of autonomous (self-driving) vehicles has been discussed. The Texas Transportation Institute (Texas A&M) has estimated national congestion costs at a level of $101 billion[9] in 2010. If the proposed connectivity technologies were successful enough to reduce congestion by half this would produce savings of over **$51 billion** per year. However, previous attempts to relieve congestion have failed because improvements have resulted in an off-setting increase in demand for increased travel. Once again, the

[7] Personal Consumption Expenditure on vehicle fuels, lubricants, and fluids, Bureau of Economic Analysis.
[8] "The U.S. Automotive Market and Industry in 2025,"Center for Automotive Research, June 2011.
[9] Shrank D., T. Lomax, and B. Eisele, TTI's 2011 Urban Mobility Report, Texas Transportation Institute, The Texas A&M University Systems, September 2011, p.1.

required technologies are not without cost and will not generally work without full implementation to the entire vehicle fleet.

- **Other new vehicle attributes** are possible of course, given the normal operation of markets and consumer demand. However, the costs of mandated technologies listed above may leave little room left in vehicle price for the sale of such features. In other words, mandated innovation may crowd out normal innovation in the vehicle and if not valued by the consumer at cost, such mandates may even lower sales and production in the years ahead.

Conclusions

We have provided evidence in this paper on the subject of the Detroit Three's financial "comeback" especially in such areas as prices and profitability. The Detroit companies are now demonstrably better able to withstand future cycles in the North American automotive market compared to their position before the restructurings of 2009. Questions about their international operations or their future market share, however, remain.

CAR has provided a set of forecasts on U.S. automotive sales, production and employment. CAR expects auto sales growth to slow to single digit percentage annual increases from its rapid growth in the last three years. Sales growth will largely be driven by record pent-up demand for new vehicles rather than by a strong performance from the U.S. economy. CAR expects automotive vehicle production to fully recover to pre-recession levels in the next two years. However, recovery in automotive employment is slowing and may not reach pre-recession levels.

A high growth rate in future U.S. automotive output does not appear probable when the usual underlying trends that influence such growth are examined. However, a set of significant innovations have been mandated by the federal government for future motor vehicles that may carry great promise for savings and other benefits not only in the automotive market but throughout the economy. Yet it remains to be seen what the long run costs of these innovations and their final acceptance by consumers will be in an auto industry and market that will see many changes in the years ahead.

Appendix 1: CAR's U.S. Light Vehicle Sales and Production Model

CAR adopts a dual-equation (supply and demand) model to forecast the U.S. light vehicle sales and production. The equations use annual data from 1958-2011 to estimate parameter coefficients that will later on be used in forecasting. The supply and demand equations are shown as follow:

PROD = f(R_GDP, PRICE, SALES)

Where:

PROD = U.S. light vehicle production index (1996=100, roughly 11.5 million)

R_GDP = Real GDP growth rate.

PRICE = New vehicle relative price = $\frac{CPI\_New\ Vehicle}{CPI\_All\ Items}$

SALES = U.S. light vehicle sales index (15 million = 100)

SALES = f(VH, UNEMP, PRICE, NETWORTH, PROD)

Where:

VH = Vehicle stock per household = $\frac{Total\ light\ vehicle\ regristration}{Number\ of\ household}$

UNEMP = Unemployment rate

NETWORTH = Household net worth percentage change

The dual-equation model will take the parameter estimates generated by these equations, along with CAR's macroeconomic assumptions fed into the model, and produce 2012-2022 sales and production estimates that are present in this study.