

CAR Research Memorandum: The Impact on the U.S. Economy of Successful versus Unsuccessful Automaker Bankruptcies

Authors:

Sean McAlinden, Ph.D., Executive Vice President for Research
Debra Maranger Menk, Project Manager
Adam Cooper, Research Associate

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1000 Victors Way, Suite 200
Ann Arbor, Michigan 48108
734-662-1287

www.cargroup.org

Introduction

The automotive industry has long been, and continues to be, one of the most important sectors in the U.S. economy. The motor vehicle and parts manufacturing industries employed 597,000¹ workers directly, as of March 2009, and the Detroit 3 employed 202,800² hourly and salary workers in the United States, as of February 2009. The international producers employed 107,500³ people in the United States in January 2009. The auto industry has one of the largest economic multipliers of any sector of the U.S. economy, and is sufficiently large that its growth or contraction can be detected in changes in the U.S. Gross Domestic Product. In many states, employment in automotive and automotive parts manufacturing ranks among the top three manufacturing industries.

In November, the Center for Automotive Research (CAR) released a memo that examined the potential employment impacts if the Detroit 3 companies should experience significant contractions in employment and production⁴. Sadly, we are now seeing the results of these scenarios becoming reality. In CAR's November memorandum, we estimated that a full contraction of Detroit 3 production could result in a 2.5 to 3.0 million decline in U.S. employment within a year. It is very apparent that a portion of this employment decline has already occurred. This memorandum updates those scenarios, examines the future short-run employment impacts of the current bankruptcy of Chrysler and the potential restructuring or bankruptcy facing General Motors and estimates the economic impact—in terms of jobs, compensation and tax revenues. CAR believes such an estimate should be a valuable input into the decision by government authorities to ensure the successful restructuring of GM and Chrysler into viable stand-alone motor vehicle firms. The essential question that needs to be answered is, what is the short-term, economic cost of unsuccessful bankruptcies of the two firms compared to the public cost of producing successful bankruptcies?

The long-term benefits of a domestically owned automotive industry are not examined in this memorandum. Such long-term benefits would include the existence of a viable, highly productive U.S. manufacturing sector, a competitive automotive market for consumers, the economic security of possessing an industry capable of developing and producing high technology/high fuel economy vehicles, or the many strategic national security considerations supported by the existence of a large domestic automotive industry. We also do not investigate the potential shock effect on the U.S. economy of major business failures at GM and Chrysler outside of the parameters of our model described below. However, the psychological impact of a complete collapse of these two companies on a potentially recovering U.S. economy in the Fall of 2009 cannot be discounted by any serious economist.

The Center for Automotive Research has carried out the majority of national level automotive economic contribution studies completed in the United States since 1992.⁵ These reports contain further descriptions of the methodologies used to produce this memo; a list of these studies is footnoted.

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¹ "Automotive Industry: Employment, Earnings, and Hours." The United States Department of Labor, Bureau of Labor Statistics. <<http://www.bls.gov/ces/>>. May 26, 2009.

² CAR proprietary data provided by the companies, excludes direct GMAC employees.

³ The following international firms reported beginning of year employment to CAR: BMW, Honda, Hyundai, Kia, Mazda, Mercedes, Mitsubishi, Nissan, Subaru, Suzuki, Toyota and Volkswagen.

⁴ McAlinden, S. P., Dziczek, K, Maranger Menk, D., **CAR Research Memorandum: The Impact on the U.S. Economy of a Major Contraction of the Detroit Three Automakers.** Center for Automotive Research, Ann Arbor, MI, November 4, 2008.

⁵ These studies include: The Center for Automotive Research. **Contribution of the Motor Vehicle Supplier Sector to the Economies of the United States and its 50 States.** Prepared for the Motor & Equipment Manufacturers Association, Ann Arbor, January, 2007. The Center for Automotive Research. **Contribution of Toyota to the Economies of Fourteen States and the United States in 2003.** Prepared for Toyota Motor North America, Inc., Ann Arbor, June, 2005. Institute of Labor and Industrial Relations, University of Michigan and the Center for Automotive Research. **Contribution of the U.S. Motor Vehicle Industry to the Economies of the United States, California, New York, and New Jersey in 2003.** Prepared for the Alliance of Automobile Manufacturers, Inc., Ann Arbor, May, 2004. Institute of Labor and Industrial Relations and the Office for the Study of Automotive

Two scenarios are presented: first, what would be the impact of quick, concise bankruptcy restructurings of General Motors and Chrysler. In this scenario, Chrysler and General Motors both emerge from bankruptcy in less than 3 months, with capital and ownership structures that allow them to resume vehicle production and continue operations. While there was a time when the prospect of two of three U.S. automakers entering bankruptcy was unthinkable, this is now the most optimistic assessment of the U.S. industry's future. The second scenario portrays a much gloomier outcome: Chrysler's bankruptcy lasts far longer than 3 months, and General Motors enters a lengthy bankruptcy proceeding from which it is never able to fully recover. The circumstances are such that either of these scenarios is possible, and indeed probable, within the next 12 months.

Assumptions and Scenarios

Two scenarios were used to assess the impacts of Chrysler's recent bankruptcy filing plus a potential bankruptcy filing by General Motors. Sensitivity analyses were performed on the mix of job losses at supplier companies; the impact on Ford and international auto manufacturers' ability to produce vehicles was estimated. The two scenarios were chosen for this study as being representative of "best" case and "worst" case outcomes, given the uncertainties in the supplier sector, unprecedented low levels of market demand, the global recession, and unknown government responses. The scenarios provided below are pictures that have been "painted" in order to explain the probable events and outcomes for each scenario. There are a number of "what if" questions encountered during the monitoring of the industry in the months since CAR's first memo was published. These potential variables and uncertainties are discussed in more detail in the last section of this memo – Bankruptcy and Alternate Scenarios. The scenarios contained in this study are the most plausible combinations of job losses and industry responses. It is highly likely that the final outcome of this massive industry crisis and restructuring is contained within the best and worst parameters of these scenarios.

The contraction scenarios explored in this memo should not be interpreted as representing the economic activity that would be lost if the automotive industry never existed in the United States. The two scenarios represent shocks due to restructuring at GM and Chrysler that will vary in intensity and duration. In the first scenario, these shocks will be short in duration because GM and Chrysler will both emerge from bankruptcy quickly and resume operations. In the second scenario, these shocks may be mitigated over time by increases in both imports and domestic production by international automakers and (surviving) Detroit 3 capacity.

Scenario 1: Best Case

The first scenario captures the effects of quick and successful bankruptcy filings by GM and Chrysler. For each corporation, we assume the bankruptcy filings and settlement with debtors are concluded in 60 to 90 days. It is assumed the court will arrange and accept final agreements with organized labor and credit-holders at all levels without delay. It is also assumed the court will approve a re-emergence plan with sufficient funding to create a new company (in part, at least) with a new ownership structure. Declines in employment and production occur according to planned plant closures, as indicated in the filed corporate restructuring plans.⁶

Transportation, University of Michigan and the Center for Automotive Research. **Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States.** A Study Prepared for the Alliance of Automobile Manufacturers, Inc. and the Association of International Automobile Manufacturers, Inc. Ann Arbor, Winter 2001. The Office for the Study of Automotive Transportation, Transportation Research Institute, and the Institute of Labor and Industrial Relations, University of Michigan. **The Contribution of the International Auto Sector to the U.S. Economy.** A study prepared for the Association of International Automobile Manufacturers, Inc., Ann Arbor, March, 1998. McAlinden, Sean P., et. al., **Economic Contribution of the Automotive Industry to the U.S. Economy – An Update – A Study Prepared for the Alliance of Automobile Manufacturers,** Center for Automotive Research. Ann Arbor, Fall 2003. Office for the Study of automotive Transportation, **Competitive survival: Private Initiatives, Public Policy and the North American Automotive Industry** – Prepared for the U.S.-Canada automotive Select Panel. University of Michigan Transportation Research Institute, Ann Arbor, June, 1992. The research staff of the Center for Automotive Research performed a number of these studies when located at the University of Michigan's Office for the Study of Automotive Transportation.

⁶ GM plan filed using SEC form S4 on April 27, 2009 and the Chrysler restructuring plan filed with the U.S. Bankruptcy Court for the Southern District of New York on April 30, 2009.

An important assumption in the “Best Case” scenario is the reaction of the new vehicle consumer in North America to the Chrysler and GM filings. It is assumed that the companies enter and re-emerge from bankruptcy in such a fashion that escalating market share declines are avoided throughout the period, and that sufficient financing can be arranged for buyers of both Chrysler and GM vehicles, as well as for surviving dealerships to finance current and future inventory. It is also assumed that warranty service work and parts can be offered competitively to owners of Chrysler and GM vehicles, and that there are no dramatic declines in residual values for existing Chrysler and GM vehicles.

It is also assumed that Chrysler and GM suppliers of automotive parts, materials and tooling will be able to supply the auto companies when they resume production both during and after bankruptcy. It is also assumed that there are no significant delays in product launches due to interruptions in the final product development process based on inadequate resources, tooling, or revenue for this purpose.

In modeling the best case scenario, we assume that planned employment and production declines will occur in an orderly and linear fashion over 18 months. It is also assumed that there will be no long-term production interruptions by OEMs due to parts shortages. In addition, the first scenario assumes no serious alteration in vehicle prices, no fire-sales of inventories by failing dealerships or bank lenders, and no large changes to the volume of imported light vehicles or the price of imports.

Using information obtained from Chrysler’s restructuring plan filed with the United States Bankruptcy Court for the Southern District of New York, GM’s form S-4 (filed with the Securities and Exchange Commission on April 27, 2009) and CAR research, the first scenario represents a highly probable outcome of a successful bankruptcy.

Modeling assumptions for this scenario are:

- Chrysler and GM production and employment declines are orderly and linear over an 18- month time period.
- Only active employees as input into the model create demands for intermediate products and produce final products.
- Workers who have been laid off are counted in the direct employee tally but are not modeled as active employees
- All laid-off workers will receive Supplemental Unemployment Benefits (SUB) and Transitional Assistance (TA) pay at rates determined by the modified UAW contracts.⁷ CAR estimated the average number of years of seniority based upon company averages.
- Wages and salaries are removed when employment is terminated.
- There are no serious production interruptions for other light vehicle manufacturers.
- There are no large changes in the cost of manufacturing vehicles.
- There is no liquidation of current inventories.
- Government revenues decline due to lost wages and salaries.
- Government employment is not directly changed.

Scenario 2: Worst Case

The second scenario captures the effects of disruptive and disorderly bankruptcies for Chrysler and GM. Disruptive and disorderly bankruptcy proceedings would drag on, causing long-term and unpredictable production interruptions and effects on sales levels and prices throughout the industry. Combined GM and Chrysler sales represent roughly 28 percent of the U.S. light vehicle market. As a result of disorderly

⁷ SUB program modifications have not yet been announced at General Motors.

bankruptcy proceedings, an assumption is made that employment and production at Chrysler and GM facilities immediately fall to 10 percent of their pre-bankruptcy levels (a decrease of 90 percent). A sharp contraction in production, as is likely to be the case in a disruptive bankruptcy, will cause widespread disturbances to non-OEM parts suppliers. As these businesses lose sales and revenue from the collapse of Chrysler and GM, other major auto companies will face severe parts shortages. There will probably be a major wave of supplier bankruptcies (a "supplier shock") that will overwhelm any attempt by Ford or international producers to find alternate sources of parts or funding to keep their suppliers in business.

An important assumption in the worst case scenario is once again the reaction of the new vehicle consumer in North America to the Chrysler and GM filings. It is assumed that the companies enter but do not re-emerge quickly from bankruptcy. Therefore, escalating market share declines are not avoided. Sufficient financing cannot be arranged for buyers of Chrysler or GM vehicles or to finance current and future inventories of surviving dealerships. It is also assumed that warranty service work and parts cannot be offered competitively to owners of Chrysler and GM vehicles, and that there are dramatic declines in residual values for existing Chrysler and GM vehicles.

It is also assumed that suppliers of automotive parts, materials and tooling will frequently be unable to supply the auto companies, so they will not be able to resume production within bankruptcy. It is also assumed that there will be significant delays in product launches due to interruptions in the final product development process based on inadequate resources and tooling.

With a partial collapse in the motor vehicle parts sector, we assumed that Ford and the domestic operations of international producers will suffer a 50 percent reduction in production during the last half of 2009. Beginning in 2010, the parts supplier sector will reorganize and return to allow Ford and the international OEMs to resume production. By the end of 2010 these producers will resume full operations and replace 30 percent of the lost GM and Chrysler production. This effect on international and Ford production is considerably less than that assumed in CAR's November 4th memorandum. CAR assumes (and has reason to believe) that other automakers have partially prepared for the eventual bankruptcies of Chrysler and GM by identifying alternate suppliers and accumulating parts inventories. Even so, a non-producing, bankrupt GM will significantly affect the supply chain of other automakers in North America for some period of time. The second scenario assumes a large increase in the numbers of imported vehicles, and prices paid by consumers. The level of sales that will be provided by remaining domestic capacity was estimated using market share data developed by CAR research.

Though vehicle sales are at historic lows, households will still need to replace aging vehicles and purchase aftermarket vehicle parts for maintenance. Because imports are assumed to replace 70 percent of lost domestic production, it is assumed that the reduction in domestic supply, along with the transportation costs of imports, will effectively increase the price of vehicles and parts by 15 percent.

The increase in imports and their cost has the effect of contracting the U.S. economy. As the U.S. increases imports of higher priced motor vehicles, the amount of household spending previously stimulating the domestic goods and services market is reduced, which lowers economic activity.

Modeling assumptions for this scenario are:

- There will be an immediate and persistent 90 percent reduction in GM and Chrysler employment at the end of 2009
- No workers receive Supplemental Unemployment Benefits (SUB) or Transitional Assistance (TA) pay.
- 50 percent of Ford and international production will be lost through 2009.
- By the end of 2010, Ford and international producers fully resume production and replace 30 percent of GM/Chrysler production.

- Ford and international producers will hire new employees in 2010 as they replace 30 percent of GM/Chrysler production. The majority of the new employment will be hourly manufacturing workers; some non-manufacturing workers (salaried) will also be hired, but the ratio of salary-to-hourly for these new hires will be far less than what it was at GM or Chrysler.
- The level of imported vehicles and parts rises
- Imports will replace the remaining 70 percent of lost GM/Chrysler production.
- Prices of imports will rise by 15 percent.
- There will be no liquidation of inventories.
- Government revenues decline due to lost wages and salaries.
- Government employment is not directly changed.

Methodology

The estimates of economic impacts presented in this memo were generated through the use of an economic/demographic forecasting and policy model constructed by Regional Economic Models, Inc. (REMI). The version of the model used in this study represents the economies of all 50 states (individually) and the District of Columbia, in addition to the U.S. national economy. Specific industry-level variables for 169 industrial sectors in the U.S. economy are integral components of the model. The multi-regional property of the model allows the user to “shock” a regional economy by causing a change in the level of employment or output for a given industrial sector in any or all of the states. The model calculates the indirect and induced impact of the economic shock within the region of impact, as well as the impacts on all the state economies, the national economy, and the interactions between these state economies, and provides an accounting of interregional trade and migration. The model simulates economic impacts that may occur in any one state resulting from changing the manufacturers’ level of activities in any or all of the other states. Inter-state trade flow effects vary from state to state. The economies of some states are more isolated than others, and hence, less affected by inter-state trade flows.

The U.S. Gross Domestic Product (GDP) in the model was calibrated to the March 18, 2009 U.S. Economic Outlook forecast released by the University of Michigan’s Research Seminar in Quantitative Economics (RSQE).⁸ Similarly, the Michigan employment forecast in the model was calibrated to the April 1, 2009 Michigan Economic Outlook forecast released by RSQE.⁹ With this calibration, the model includes the national and regional recessions and monetary policies through February, 2009.

The analysis begins with a baseline simulation, and then subtracts the proposed losses to GM and Chrysler activities in each of the regions through another set of simulations. The difference between the simulations’ outputs represents the impacts the assumed losses at the automakers will have on each state.

CAR used public and proprietary databases to develop well-reasoned modeling assumptions. Employment data for each of the major automakers and the supplier industry was gathered on a state-by-state basis. The data input into the model included not only state-level employment numbers, but also job categories and average wages and salaries. Information was drawn from Chrysler and GM restructuring plans, the Motor Vehicle Manufacturers Association (MEMA), the Original Equipment Manufacturers Association (OESA), the National Automobile Dealers’ Association (NADA), and the Alliance of Automobile Manufacturers (AAM).

Simulations estimating economic impacts on the U.S. economy and state economies were run for two years after the assumed changes in GM and Chrysler operations. The model simulates three types of impacts:

⁸ Crary, Joan P., Sedo, Stanley A., **The U.S. Economic Outlook for 2009-2010**. University of Michigan, Research Seminar in Quantitative Economics, Ann Arbor, MI, March 18, 2009.

⁹ Crary, Joan P., Fulton, George A., **The Michigan Economic Outlook for 2009-2010**. University of Michigan, Research Seminar in Quantitative Economics, Ann Arbor, MI, April 1, 2009

1. Direct changes in employment, compensation and tax revenues as a result of GM and Chrysler contractions in production and employment. A drop in the number of people employed at GM or Chrysler reduces the earnings of these employees as well as the tax revenues derived directly from their income and spending.
2. Indirect changes in employment, compensation and tax revenues as a result of a cancellation of purchased inputs to automotive production (any employment, compensation or taxes related to firms that sell commodities, products or services directly and indirectly to the automakers). This is the "supplier effect," which includes both manufacturing and non-manufacturing suppliers to the industry and suppliers to suppliers.
3. Spin-off or expenditure-induced effects in the general economy. This represents the loss of economic activity generated by the reduced spending of the employees of GM or Chrysler and their suppliers in the U.S. economy.

The sum of the direct, indirect and expenditure-induced or spin-off impacts represents the reduction in the total contribution of these automakers to the national economy and the states' economies.

The REMI model, which has been fully documented and peer-reviewed, was designed for the type of analysis employed in this current study and has been used by CAR and other organizations for over two decades.

Results

Table 1: Employment Impacts for the United States

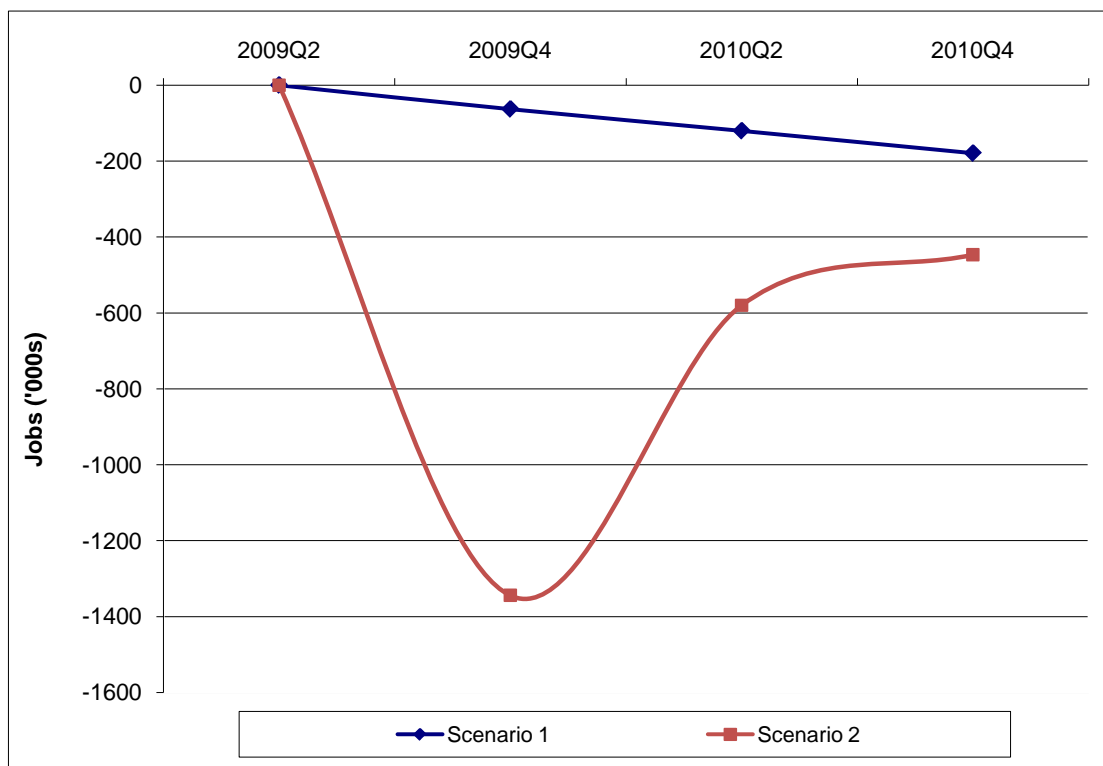
Scenario 1: Best Case	End of 2009	End of 2010
Direct	9,700	29,000
Intermediate	24,000	69,600
Spinoff	29,500	80,800
TOTAL	63,200	179,400
END OF YEAR		
INCOME LOSSES (\$ BILLIONS)	3.4	9.9
Scenario 2: Worst Case	End of 2009	End of 2010
Direct	203,800	82,700
Intermediate	480,700	160,100
Spinoff	659,500	203,900
TOTAL	1,344,000	446,700
END OF YEAR		
INCOME LOSSES (\$ BILLIONS)	68.7	26.4

Under the best case scenario in the first year (2009), the total employment impact of planned, orderly, and well executed bankruptcies of GM and Chrysler, would result in a loss of 63,200 jobs in the U.S. economy. This figure represents 9,700 direct jobs, of which 3,500 are OEM parts producers that supply parts to assembly plants slated for closure, 24,000 indirect/supplier jobs and 29,500 spin-off (household-expenditure-induced) jobs. Under the best case scenario in the second year (2010), the employment outlook remains negative with

179,400 jobs lost as more plants are closed across the country. According to the GM and Chrysler restructuring plans, 19 motor vehicle assembly and parts plants will cease operations and will be permanently shut down by the end of 2010. In our simulation modeling the majority of these closures will occur in 2010. It should be noted that these results are predicated on the assumption that the facility closures follow the timetables presented in the restructuring plans.

Under the worst case scenario in the first year (2009), employment levels take a sharp dive due to massive employment reductions at GM, Chrysler, Ford, and the international domestics. Such a disruptive bankruptcy would negatively impact the general U.S. business environment and result in a projected loss of 1.3 million jobs by the end of 2009. A closer look at the total employment loss reveals that 203,800 of the job losses would be direct OEM employees engaged in manufacturing vehicles and parts, research & design, engineering, corporate management, administration, and other job functions. Indirect/supplier job losses total 480,700, and the employment induced by spinoff activity (household expenditures) falls by 659,500.

Chart 1: Job Losses, Two Bankruptcy Scenarios, U.S.



Under each scenario, the employment picture begins to recover in 2010 due to the reemergence of a functional parts supplier sector and a larger U.S. auto sales market. This permits Ford and the remaining automakers to resume production. Seizing the opportunity to capture the previous GM and Chrysler market share, Ford and the internationals are assumed to absorb 30 percent of GM's and Chrysler's lost market share. Even with this recovery in vehicle production, the total losses in 2010 remain negative, with 446,700 jobs lost.

Revenue Impacts

Scenario 1

In economic terms, the planned consolidations at GM and Chrysler, as represented in Scenario 1, would reduce U.S. personal income by \$3.4 billion in the first year (2009). Given the assumption of a linear contraction, additional losses mount in the second year (2010), leading to an additional loss of \$9.9 billion. In total, quick and successful bankruptcies by GM and Chrysler will reduce U.S. personal income by \$13.3 billion.

This personal income loss impacts local, state, and federal tax revenues and creates additional social program obligations. Transfer payments from government to individuals will increase and social security receipts and personal income taxes paid will decline. The net impact of reduced tax revenue, increased transfer payments and the decline in personal taxes paid is negative on the government balance sheet, resulting in a loss to the government of \$1.3 billion in 2009 and \$3.8 billion in 2010, for a total loss of \$5.1 billion over two years.

Table 2: Scenario 1 Revenue Impact, \$ Billions (Current)

YEAR	2009	2010
Personal Income	-3.4	-9.9
Increase in Transfer Payments	0.3	0.9
Decline in Social Security Receipts	-0.5	-1.3
Decline in Personal Income Taxes ¹⁰	-0.5	-1.6

Scenario 2

In economic terms, the 90 percent reduction in GM and Chrysler employment, along with a 50 percent temporary contraction by Ford and the other automakers (modeled in Scenario 2) would reduce U.S. personal income by \$68.7 billion in the first year (2009). In the second year (2010), the scenario assumes a recovery by Ford and these automakers and a partial absorption of GM's and Chrysler's collective market share. However, the U.S. personal income loss remains net negative at \$26.4 billion. Due to reduced domestic employment and a greater reliance on higher priced imports, this scenario generates a total personal income loss of \$95.1 billion over two years.

The impact of permanently contracted domestic employment and associated personal income losses negatively affects local, state, and federal tax revenues and creates additional obligations. Transfer payments from government to individuals will increase and social security receipts and personal income taxes paid will decline. The net impact of all three of these categories is negative on the government balance sheet, resulting in a loss to the government of \$27.1 billion in 2009 and \$10 billion in 2010, for a total loss of \$37.1 billion over two years.

Table 3: Scenario 2 Revenue Impact, \$ Billions (Current)

YEAR	2009	2010
Personal Income	-68.7	-26.4
Increase in Transfer Payments	6.6	2.3
Decline in Social Security Receipts	-9.5	-3.5
Decline in Personal Income Taxes	-11.0	-4.2

Though not reported in the personal income figure, additional losses to an employee's supplemental earnings (including contributions to employee pension and insurance funds) should be taken into account when considering the effects of a disruptive bankruptcy. Hospital systems will likely see reduced revenue and profits, as people lose their jobs and their health insurance benefits. Policy makers should take dutiful notice that a

¹⁰ Personal Taxes are tax payments by persons that are not chargeable to business expense, and certain other payments that are made by persons to government agencies. These taxes include Federal, state, & local income taxes, including realized net capital gains, and personal property taxes and excluding tax refunds. Contributions for government social insurance are not included. Personal Taxes does not include real estate taxes, sales taxes, or any tax filed by a business entity and collected through a non-personal, corporate tax form.

rapid collapse within the automotive industry will have more serious effects than the collapse of other industries, such as the textile and wood products sectors. The automotive industry has a much higher value-add component and provides far more healthcare benefits than did textiles and wood products. Assistance by the government, in the form of Medicaid and Medicare, would be unable to replicate the level of healthcare provided to pensioners and former employees.

Job Loss Detail by Sector

Due to the interconnectedness of industries in the U.S., the automakers support many jobs throughout the economy. An estimate of major sector job losses resulting from contractions modeled under each scenario is shown in table 4. Not surprisingly, 28 percent of the estimated jobs lost in 2009 are in manufacturing (durable and nondurable goods) under the first scenario, and under the second scenario, 22 percent of the job losses are in manufacturing. The business and professional services sector, education, health and personal services sector and retail or wholesale trade are other sectors in the economy that will also experience significant losses.

Table 4: Job Loss Detail, by Type of Job

Scenario 1: Best Case	2009 % of Total		2010 % of Total	
Durable goods mfg.	-14,873	24%	-41,991	23%
Profess, Tech, Mgmt and Admin Services	-10,344	16%	-29,793	17%
Retail and Wholesale Trade	-9,760	15%	-27,490	15%
Transp, Inform, Fin Act	-8,744	14%	-24,500	14%
All other services	-5,946	9%	-16,793	9%
Accom, Food Services	-4,007	6%	-11,030	6%
Construction	-3,136	5%	-10,250	6%
Health Care, Social Asst	-2,879	5%	-7,988	4%
Nondurable goods mfg.	-2,278	4%	-6,113	3%
Education	-1,226	2%	-3,431	2%
Total Jobs Lost, U.S.	-63,193	100%	-179,379	100%
Scenario 2: Worst Case	2009 % of Total		2010 % of Total	
Profess, Tech, Mgmt and Admin Services	-286,780	21%	-110,750	25%
Retail and Wholesale Trade	-201,100	15%	-62,690	14%
Transp, Inform, Fin Act	-183,900	14%	-57,630	13%
Durable goods mfg.	-251,435	19%	-55,284	12%
Construction	-63,510	5%	-42,920	10%
All other services	-123,624	9%	-38,125	9%
Accom, Food Services	-91,500	7%	-31,800	7%
Health Care, Social Asst	-68,230	5%	-25,370	6%
Nondurable goods mfg.	-45,809	3%	-12,358	3%
Education	-28,150	2%	-9,810	2%
Total Jobs Lost, U.S.	-1,344,038	100%	-446,737	100%

Job Loss Detail by State

Estimates of the job losses that would occur in each of the fifty states and the District of Columbia are shown in tables 5 and 6. In each state, the estimated employment losses are shown for direct, indirect and expenditure-induced job categories. In both scenarios, states with little direct employment (such as Alaska, Wyoming, and North Dakota), as well as the District of Columbia, still lose employment due to the number of indirect (as a result of supplying the automotive industry) and expenditure-induced jobs in those states.

The states that would lose the most employment due to these bankruptcies are Illinois, Indiana, Michigan, Missouri, New York, Ohio, Tennessee, and Texas. In the best case scenario, Pennsylvania and Wisconsin are also among the top ten states losing employment. In the worst case scenario, these two states are spared, and Kentucky and California join the ranks of states most affected by the GM and Chrysler bankruptcies and the spillover to other automakers.

Table 5: Job Loss Detail, by State, Scenario 1

SCENARIO 1: Best Case. Job losses by type by state.									
2009	Direct	Indirect	Spin-off	TOTAL	2010	Direct	Indirect	Spin-off	TOTAL
Alabama		-296	-754	-1,049	Alabama		-889	-2,152	-3,041
Alaska		-11	-23	-34	Alaska		-29	-60	-89
Arizona		-69	-119	-187	Arizona		-176	-279	-455
Arkansas		-103	-341	-444	Arkansas		-305	-965	-1,270
California	-12	-481	-594	-1,088	California	-35	-1,312	-1,413	-2,760
Colorado		-100	-176	-276	Colorado		-284	-455	-739
Connecticut		-128	-314	-442	Connecticut		-369	-862	-1,231
Delaware	-198	-473	-205	-876	Delaware	-1,000	-1,441	-196	-2,637
District of Columbia		-23	-90	-113	District of Columbia		-65	-250	-315
Florida		-648	-794	-1,442	Florida		-1,283	-2,720	-4,003
Georgia		-682	-871	-1,553	Georgia		-1,432	-3,030	-4,462
Hawaii		-11	-28	-39	Hawaii		-29	-67	-96
Idaho		-18	-34	-52	Idaho		-48	-79	-127
Illinois		-1,431	-1,493	-2,924	Illinois		-3,194	-5,072	-8,265
Indiana	-281	-1,184	-1,909	-3,374	Indiana	-850	-3,578	-5,309	-9,736
Iowa		-110	-358	-468	Iowa		-320	-991	-1,311
Kansas		-97	-326	-423	Kansas		-290	-926	-1,217
Kentucky		-315	-977	-1,292	Kentucky		-954	-2,794	-3,747
Louisiana	-35	-201	-340	-576	Louisiana	-108	-602	-958	-1,668
Maine		-28	-80	-108	Maine		-77	-211	-288
Maryland		-155	-442	-596	Maryland		-455	-1,235	-1,690
Massachusetts		-187	-401	-588	Massachusetts		-534	-1,081	-1,615
Michigan	-6,159	-4,136	-2,741	-13,036	Michigan	-15,400	-13,957	-6,338	-35,695
Minnesota		-218	-423	-642	Minnesota		-632	-1,147	-1,779
Mississippi		-107	-423	-530	Mississippi		-323	-1,209	-1,532
Missouri	-419	-1,710	-1,197	-3,326	Missouri	-1,574	-5,216	-3,174	-9,964
Montana		-13	-44	-57	Montana		-37	-113	-150
Nebraska		-62	-164	-226	Nebraska		-183	-449	-632
Nevada		-44	-124	-168	Nevada		-124	-331	-455
New Hampshire		-31	-102	-132	New Hampshire		-88	-274	-362
New Jersey		-241	-750	-991	New Jersey		-696	-2,077	-2,772
New Mexico		-19	-52	-71	New Mexico		-51	-127	-178
New York	-429	-916	-1,430	-2,775	New York	-1,300	-2,670	-3,878	-7,849
North Carolina		-372	-843	-1,215	North Carolina		-1,794	-1,626	-3,420
North Dakota		-12	-45	-57	North Dakota		-33	-119	-153
Ohio	-536	-2,171	-3,319	-6,026	Ohio	-3,096	-6,432	-7,830	-17,357
Oklahoma		-73	-209	-282	Oklahoma		-212	-573	-785
Oregon		-43	-66	-109	Oregon		-111	-144	-254
Pennsylvania		-587	-1,333	-1,920	Pennsylvania		-1,498	-3,906	-5,404
Rhode Island		-20	-61	-81	Rhode Island		-56	-163	-219
South Carolina		-175	-496	-671	South Carolina		-513	-1,378	-1,892
South Dakota		-24	-49	-73	South Dakota		-42	-155	-197
Tennessee	-1,456	-4,397	-1,899	-7,752	Tennessee	-4,815	-12,506	-5,996	-23,317
Texas		-635	-1,040	-1,675	Texas		-1,817	-2,795	-4,611
Utah		-46	-83	-129	Utah		-127	-210	-337
Vermont		-14	-54	-68	Vermont		-40	-144	-184
Virginia		-285	-728	-1,013	Virginia		-842	-2,033	-2,875
Washington		-59	-72	-130	Washington		-159	-145	-304
West Virginia		-49	-231	-280	West Virginia		-143	-642	-785
Wisconsin	-215	-732	-819	-1,766	Wisconsin	-800	-1,567	-2,662	-5,029
Wyoming		-8	-36	-44	Wyoming		-24	-98	-122
TOTAL US	-9,740	-23,951	-29,502	-63,193	TOTAL US	-28,978	-69,560	-80,841	-179,379

Table 6: Job Loss Detail, by State, Scenario 2

SCENARIO 2: Worst Case. Job losses by type by state.									
2009	Direct	Indirect	Spin-off	TOTAL	2010	Direct	Indirect	Spin-off	TOTAL
Alabama	-6,246	-15,066	-13,622	-34,935	Alabama	1,389	1,338	-2,075	652
Alaska	-1	-272	-754	-1,027	Alaska	-1	-113	-266	-380
Arizona	-865	-2,787	-5,366	-9,018	Arizona	-295	-1,217	-1,878	-3,390
Arkansas	-268	-1,852	-6,052	-8,171	Arkansas	-15	-670	-1,761	-2,446
California	-9,128	-32,053	-34,480	-75,662	California	85	-5,734	-10,328	-15,976
Colorado	-838	-3,286	-6,024	-10,148	Colorado	-180	-1,550	-2,553	-4,283
Connecticut	-303	-2,467	-6,387	-9,158	Connecticut	-177	-957	-2,145	-3,278
Delaware	-811	-2,031	-2,013	-4,854	Delaware	-590	-1,390	-859	-2,840
District of Columbia	-36	-516	-2,059	-2,610	District of Columbia	-6	-189	-738	-933
Florida	-1,166	-11,026	-24,478	-36,670	Florida	-527	-4,572	-7,564	-12,663
Georgia	-1,583	-9,605	-20,589	-31,777	Georgia	-658	-3,221	-4,983	-8,862
Hawaii	-31	-408	-1,227	-1,666	Hawaii	-1	-192	-565	-758
Idaho	-6	-497	-1,344	-1,847	Idaho	-5	-224	-515	-744
Illinois	-4,629	-28,745	-43,257	-76,632	Illinois	-2,041	-11,782	-14,812	-28,635
Indiana	-13,520	-37,967	-44,222	-95,709	Indiana	-4,601	-11,861	-11,746	-28,208
Iowa	-383	-2,225	-7,420	-10,028	Iowa	-4	-864	-2,417	-3,285
Kansas	-934	-3,104	-6,389	-10,427	Kansas	-613	-1,728	-2,280	-4,622
Kentucky	-7,612	-18,485	-21,060	-47,156	Kentucky	803	-540	-4,090	-3,828
Louisiana	-1,385	-4,061	-7,614	-13,060	Louisiana	-1,188	-2,172	-2,452	-5,812
Maine	-10	-592	-1,916	-2,518	Maine	-8	-237	-645	-890
Maryland	-1,042	-3,413	-9,139	-13,594	Maryland	-500	-1,575	-3,180	-5,256
Massachusetts	-361	-4,160	-9,593	-14,114	Massachusetts	-103	-1,713	-3,204	-5,021
Michigan	-88,373	-83,952	-52,028	-224,353	Michigan	-53,705	-40,363	-19,587	-113,655
Minnesota	-257	-4,720	-9,552	-14,529	Minnesota	-23	-1,867	-3,150	-5,040
Mississippi	-1,974	-2,826	-7,477	-12,277	Mississippi	466	83	-1,502	-953
Missouri	-7,167	-17,759	-17,354	-42,281	Missouri	-3,053	-6,519	-5,818	-15,391
Montana	-10	-333	-1,281	-1,624	Montana	-6	-149	-415	-570
Nebraska	-149	-1,321	-3,613	-5,083	Nebraska	-3	-499	-1,064	-1,567
Nevada	-400	-1,542	-4,225	-6,166	Nevada	-89	-734	-1,691	-2,513
New Hampshire	-39	-641	-2,294	-2,974	New Hampshire	-27	-298	-821	-1,146
New Jersey	-1,593	-5,289	-15,251	-22,133	New Jersey	-367	-2,027	-5,122	-7,516
New Mexico	-588	-794	-2,027	-3,409	New Mexico	-5	-229	-572	-806
New York	-2,703	-14,691	-30,896	-48,290	New York	-1,549	-5,778	-10,420	-17,747
North Carolina	-984	-7,738	-17,642	-26,364	North Carolina	-172	-2,708	-4,666	-7,546
North Dakota	-6	-255	-1,101	-1,362	North Dakota	-5	-107	-380	-492
Ohio	-24,903	-69,080	-66,887	-160,869	Ohio	-6,875	-15,348	-18,156	-40,379
Oklahoma	-1,504	-2,206	-5,313	-9,023	Oklahoma	-900	-1,084	-1,987	-3,970
Oregon	-329	-1,482	-3,209	-5,020	Oregon	-47	-562	-1,248	-1,857
Pennsylvania	-836	-9,304	-26,121	-36,262	Pennsylvania	-671	-3,826	-8,769	-13,267
Rhode Island	-37	-433	-1,439	-1,908	Rhode Island	-33	-179	-503	-715
South Carolina	-2,828	-8,062	-10,798	-21,688	South Carolina	397	-219	-2,292	-2,114
South Dakota	-260	-398	-1,445	-2,102	South Dakota	-1	-138	-455	-595
Tennessee	-8,354	-19,585	-25,774	-53,712	Tennessee	-1,926	-7,030	-5,802	-14,758
Texas	-5,336	-24,574	-30,054	-59,964	Texas	-2,151	-10,850	-11,263	-24,265
Utah	-65	-1,359	-2,908	-4,332	Utah	-48	-556	-1,049	-1,653
Vermont	-27	-289	-1,201	-1,516	Vermont	-2	-124	-414	-541
Virginia	-277	-5,607	-15,041	-20,925	Virginia	-154	-2,302	-4,925	-7,381
Washington	-85	-1,959	-4,219	-6,264	Washington	-35	-953	-1,971	-2,958
West Virginia	-710	-1,296	-5,155	-7,161	West Virginia	-1	-321	-1,325	-1,647
Wisconsin	-2,893	-8,349	-19,271	-30,513	Wisconsin	-2,507	-4,194	-7,034	-13,735
Wyoming	-1	-190	-962	-1,153	Wyoming	-1	-96	-405	-502
TOTAL US	-203,844	-480,654	-659,541	-1,344,038	TOTAL US	-82,728	-160,143	-203,866	-446,737

REMI Model

The REMI model uses annualized data. At the REMI website, www.remi.com, the resources tab provides model documentation detailing every dataset, as well as data scrubbing procedures. The REMI model provides for central bank monetary responses and federal fiscal policy responses to movements in the economy. There are three options that may be chosen for simulation purposes. Each of these options provides varying levels of federal involvement and different rates of policy response. We use the Keynesian closure option. This option has the lowest level of federal response to economic upheavals, with no fiscal intervention to economic shocks in any sector of the economy. This option provides the clearest picture of the true role that any one industrial sector has within the national and regional economies. The purpose of the study was not to forecast Fed response to the automotive industry contraction, but to show the extent to which the auto industry is a large component of the U.S. economy.

Within the REMI model, important algorithms affecting the rate of economic growth or contraction are the migration equations (the movement of population from area or state to another area). Migration occurs due to economic pulls or pushes; the migration equations used in REMI reflect the mobility of the population as experienced in the U.S. economy over the past 30 years. Therefore, the ability of a labor force to recover from this type of industrial shock is reflected in model results.

Trade with other nations, via imports and exports, is part of the model and is affected by economic changes. Exchange rates are not a focus of the model, and are incorporated into the trade effects based on historical data.

Generating meaningful results from an economic model requires:

- having an understanding of the algorithms, datasets and formulae of the model being used,
- familiarity with how changes in various data inputs will impact results, and
- calibrating the model to historical, known outcomes.

In addition, economic simulations are most useful when combined with a theory of how model results can be used against the backdrop of current economic conditions. Every situation has aspects that are not going to be captured in a model in such a way as to produce consistently accurate forecasts. The current economy in the U.S. is extremely volatile. The employment impact results found in this study—in either of the scenarios—are quite low, because many of the employment losses due to GM's and Chrysler's downsizing have already occurred and are part of the model's baseline. For all industries, capital funds are not as readily available as they were even a year ago. Therefore, investment spending (which is needed for economic and employment recovery) is presently not occurring at the healthier levels, seen as recently as 2007. This would indicate that the recovery predictors of the model (which are based on 15-year historical averages) are optimistic for current economic conditions.

Bankruptcy and Alternate Scenarios

The Chrysler bankruptcy is in many ways a test case for a larger General Motors bankruptcy. The most important aspect of the bankruptcy is its duration. A prolonged bankruptcy period would substantially reduce consumer confidence in Chrysler and its vehicles. If drawn out long enough, consumers would dismiss the company and its products, the supply chain would be irrevocably damaged, and resuming production operations might not be feasible. Concluding the bankruptcy in a swift and orderly fashion increases the likelihood that consumers will identify Chrysler, or whatever company emerges, as a dependable company with which they are willing to do business. A quick bankruptcy is a necessary condition to save Chrysler in any significant way.

The U.S. government plans to continue providing financial support throughout the bankruptcy process. This may amount to \$10 billion or more in funding, and Canadian governments will supplement this total. The amount of capital that will be required is directly related to the duration of the bankruptcy. In order for the bankruptcy to be quick, a number of prior agreements must be approved and carried out. During the bankruptcy, the U.S. government will serve as Debtor in Possession (DIP) financier. On May 20, bids from any potential bidders were due, after which it is expected that a 363(b) ruling will be issued. Once this ruling is issued, \$2 billion in secured Troubled Asset Relief Program (TARP) funds will be released to satisfy numerous small creditors.

Larger stakeholders will be compensated with shares in the new firm, resulting in a substantial reorganization of ownership. The plan calls for providing Fiat with a 20 percent stake in the firm, which may be increased if certain conditions are met. The maximum percentage of ownership for Fiat is capped at 35 percent. The largest stakeholder in the new company will be the independent VEBA trust managed by the board appointed by the International Union, United Automobile, Aerospace and Agricultural Implement Workers (UAW) union. Its initial holdings in the new company will be 55 percent. The U.S. government will retain an 8 percent share, while the Canadian government will possess a 2 percent stake. The Board of Directors will consist of nine members representing the major stakeholders. Four members will be appointed to represent Fiat, three for the UAW, and the U.S. and Canadian governments will each have one board member.

Should the bankruptcy proceed quickly enough to allow for a viable new Chrysler, there are several challenges that will face the new company. The UAW has expressed a desire to sell off its stock. In the meantime, the new company may have difficulty securing new capital because investors may shy away until viability is proven. Even the merger with Fiat has many inherent obstacles. Fiat has promised to build two new plants, one in the U.S. and one in Canada, and possibly establish a third plant in Mexico. However, Fiat has also expressed an interest in Opel, GM Latin America and GM Asia Pacific. With limited capital available, these more attractive markets may steer Fiat's attention, energy and effort away from the reemerged Chrysler and its North American operations. In recent years, joint ventures involving foreign partners have had a record of mixed success in the auto industry.

Although General Motors has not yet stated its intention to file bankruptcy, it has until June 1 to provide a viable recovery plan including necessary agreements with the UAW, dealer franchisees, and groups of credit holders. Should this not occur, bankruptcy will be its only option. For all the challenges that Chrysler faces in attempting a successful reorganization, there are many more obstacles for General Motors. The scale and complexity of GM's current situation may make bankruptcy a necessity. GM has an estimated 10,000 bondholders, and there are more than 2,600 dealerships that must be shuttered. Without a bankruptcy filing, renegotiating with bondholders and getting past state dealer franchise laws would be extremely difficult and unlikely. GM must also attempt to renegotiate an estimated \$27 billion in unsecured debt that is held by thousands of creditors worldwide. It is very possible that there are simply too many GM bondholders, creditors and dealers to make restructuring outside of bankruptcy a viable alternative. Without a dramatic recovery of the U.S. light vehicle market or continued and extensive financial support from the U.S. government, GM will have to enter into bankruptcy.

As with Chrysler, the most crucial aspect of a GM bankruptcy is the length of the proceeding. Above all, a successful GM bankruptcy must be brief—60 to 90 days. During the bankruptcy, the U.S. government would have to provide continued support to GM and might have to extend direct support to the supplier sector. A prolonged hibernation by GM would put an unbearable financial strain on many suppliers and dealer franchisees. If not supported, the supplier sector could collapse, resulting in production disruptions for all automakers since the majority of Tier 1 supplier firms are used by all vehicle manufacturers. The U.S. government will also have to ensure that GMAC is able to adequately fund GM dealer floor-plans as well as new vehicle purchases.

If GM were to enter into bankruptcy, a number of prearranged agreements would need to be approved and carried out. For instance, it is estimated that \$24 billion of the \$27 billion in unsecured debt could be eliminated. An additional debt load of \$10 billion owed the UAW-GM VEBA and \$10 billion owed to the U.S. government would be swapped for equity. The ownership of GM would be dramatically altered as a result. It has been suggested that the U.S. government would retain 51 percent of equity, the UAW - 39 percent, and former bondholders would own 10 percent of the new company. The restructured GM would be leaner, centered around four core brands in North America: Chevrolet, Cadillac, Buick and GMC.

Successful restructurings for GM and Chrysler will nonetheless produce hardship and challenges. Employment in regions that have GM and Chrysler facilities will decline. The negative effects of quick bankruptcies are fewer than for prolonged bankruptcies in which both companies could fail to emerge. If GM and Chrysler are able to emerge from bankruptcy and resume operations within 60 to 90 days, the supplier sector—aided by the U.S. government—could remain viable. A key part of assuring the stability of the supplier sector is providing GM and Chrysler with adequate working capital to pay suppliers, keeping the system operating.

If GM and Chrysler are unable to emerge from bankruptcy, there will be substantial disruptions to the U.S. automobile market. Bankruptcy proceedings could be mired with lawsuits by creditors, prolonging the proceedings and preventing the companies from taking the necessary steps to assure future competitiveness. Failure to produce adequate results in the bankruptcy proceedings will also eventually bring an end to the financial support the U.S. government has been providing to the automakers. This is forecasted by CAR to occur about six months into proceedings. A direct consequence of the removal of government support will be the disorderly collapse of hundreds, if not thousands, of supplier firms. Ford and the international domestic automakers could lose 50 percent of their forecasted output in the first year. This would be caused not only by supplier disruptions, but by the liquidation of GM and Chrysler inventories by creditors. Fire sales will temporarily put downward pressure on vehicle prices. After the majority of GM and Chrysler inventories have been cleared, the U.S. will need to increase the number of imported vehicles to satisfy demand. The disarray in the supplier sector not only lowers domestic automakers' production volumes, but causes them to eventually be more reliant on imported parts. This increase in demand for both imported light vehicles and vehicle parts will contribute to rising import prices.

The resulting effect of such dramatic change in the automotive industry on regions with significant GM and Chrysler production is resoundingly negative. Though not simulated, CAR estimates the loss of medical benefits to former GM and Chrysler employees will place considerable strain on the health sector. This may even result in a financial collapse, resulting in federal aid. Even though defaulted pensions are covered by the Pension Benefit Guaranty Corporation, they may be reduced by an estimated 20 percent, as well as delayed. This will then significantly reduce retail consumption and sales tax revenue in a number of states with large populations of GM and Chrysler retirees. Supplemental insurance payments will also cease, lowering income and further reducing consumption. These employment and income shocks would be difficult for any region to absorb, but are compounded by the decline in labor mobility due to the current housing market.

Dealerships

Dealership closings are perhaps the most visible and obvious fallout from the automotive industry's struggles. Thousands of communities in the nation will be affected by the loss of local dealerships. Dealership employment impacts were not directly modeled in the scenarios presented. Dealership employment has a relatively even distribution per capita across the nation, and, and therefore would show impacts in every state. The model partially captures dealership employment conservatively.

Unlike auto production, which can be replaced by imports, employment at surviving dealerships is likely to increase to accommodate greater sales volume at remaining dealerships. Due to productivity improvements; all displaced dealership employment may not be fully absorbed. The economic multiplier effect for new vehicle dealers is much lower than that associated with manufacturing activities. The dealer supplier network is not as

broad as that which supports manufacturing, nor is the compensation for dealer jobs as high on average as it is for manufacturing-related jobs.

Various market impacts

In the worst case scenario, the economy contracts as the prices of imported motor vehicles and parts increases by 15 percent, with the effect that monies paid for these imports leaves the U.S. economy. The foreign trade deficit grows due to our imports assumption. As cited in the memo, assumptions about supplying products to satisfy consumer demands through imports were made. Exchange rates were not modeled explicitly, and are included within the model's simulation algorithms.

As noted in the successful bankruptcy scenario, no major price changes are included in the scenario modeling. However, if creditors are provided vehicle inventories as part of a settlement, there could be a potential for price reduction through quick liquidation. The effect of such an action would be an upfront savings to consumers, but the low prices might encourage a pull forward of planned purchases thereby reducing future demand.

The timing of GM or Chrysler plant closures is subject to company plans. The duration and depth of production interruptions at Ford and other automakers is also subject to debate. The exact timing of such an occurrence is a function of when and to what degree the automotive parts supply sector fails. If assistance to the parts sector is secured either through private investors or public programs, some of the losses which accrue in the first year of the worst case scenario could be partially offset.

Conclusion

The model represents two outcomes of the Chrysler bankruptcy and potential GM bankruptcy. In the best case, a rapid and orderly bankruptcy process will allow both companies to survive, restructure, and continue operations. This scenario still has a negative impact on the U.S. economy. The industry, while drastically changed and smaller in scope, will be able to resume vehicle production. Under the other scenario, GM and Chrysler do not recover, resulting in a significant portion of U.S. vehicle demand being met by imports. The ultimate result could have permanent dampening effects on wealth generation in the U.S. economy. It is reasonable to expect that a permanent contraction in the U.S. auto industry would negatively impact the auto industries of Canada and Mexico, since producers in these regions rely heavily upon U.S.-produced parts and components. This interdependency of the NAFTA automotive producers means that the total economic impacts presented here underestimate the full impact of the scenarios. The decline of GM and Chrysler production in Canada and Mexico would result in further U.S. losses in employment, income, and government revenues. A disorderly bankruptcy of any of the Detroit automakers may have serious implications for their pension funds, as well as the level of obligations of the Federal Pension Benefit Guaranty Corporation. The resulting declines in employment and income, combined with the loss of retiree health care coverage, would strain the nation's public health care system.

This study has shown that the impact of changes in the OEM and supplier sectors are felt across the country and across numerous industries, and can result in noticeable changes in national employment levels. CAR believes this estimation should be a valuable input into the decision by government authorities to ensure the successful restructuring of GM and Chrysler into viable stand-alone motor vehicle firms.

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