

POLITICAL VEHICLES

**MAKING
SUSTAINABLE
POLICY CHOICES
FOR THE
NORTH AMERICAN
AUTO INDUSTRY**

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EXECUTIVE SUMMARY

The most recent crisis in the auto industry resulted in U.S. and Canadian taxpayers providing nearly \$100 billion in financial help to General Motors and Chrysler. The finances of these two companies have stabilized, and current estimates of the losses on this public investment are \$25.1 billion.¹ It is a good time for taxpayers and their representatives to ask, how did the auto industry get into trouble? And what can we do to prevent another crisis, and future bailouts?

For many who recall the Chrysler bailout in 1980, the question is how the industry got into trouble like this *again*. Are taxpayer bailouts intended to help the auto industry only capable of providing short-term relief? Is there a better way for government to help the auto industry than waiting for crises and then offering cash?

The role of government in the auto sector is complex. It begins with the regulation of market access for domestic and foreign manufacturers and extends to government spending and financial inducements. The combination of

regulation and incentives makes up the government's automotive industrial policy.

Politics have frequently shaped the way that governments exercise these powers. Government help or regulatory approvals sometimes have been given conditionally, with mandates on firms to produce public goods such as restoring wetlands, increasing wages and benefits to workers, agreeing to contract with minority-owned suppliers, promote female executives and board members, or make investments in training or hiring in disadvantaged communities. In addition, as the industry has evolved its engineering capacities and production methods, these changes have not always been appreciated by politicians and government regulators. Sometimes governments have resisted changes in technology or the organization of production with policies that have had the unintended effect of reducing competitiveness in an increasingly global industry.

Automotive manufacturing is a high-risk business. Companies must assemble and maintain a large number of skilled employees, invest in plants and equipment, and have the funds available to buy all the raw materials and components that go into a finished vehicle. Then, when the first car rolls off the line, the company needs to sell it. Only if the car sells will the company make any money back and be able to pay for all the work that went into producing it—bills that must be paid even if the car proves to be a lemon or unpopular with the driving public.

Automotive manufacturing has the potential to generate three things in large quantity. First, terrific economic spin-off benefits (think of all the people who earn a living working to produce cars, or selling things to the car companies, or selling cars and aftermarket items to consumers). Next, huge profits if everything goes right, but also, huge losses when things go wrong.

Governments and citizens love the economic spin-offs as well as taxable profits, and so when losses occur, the natural political temptation is for government to intervene to get the industry to produce desired benefits again. This is how the addiction starts: governments grow addicted to the benefits the industry provides, and companies easily become dependent on help from government when losses occur.

The U.S. and Canadian governments are following European and Asian governments that have taken ownership

stakes in “national champion” automotive companies. The results elsewhere have not been encouraging. When government turns the automobile into a political vehicle it may attain a short-term goal, such as preserving jobs at uncompetitive wages or in an uncompetitive location, or producing uneconomic cars that meet political goals. Over time, however, the societal obligations governments impose on firms hinder their ability to compete with profit-seeking companies. And even governments that do not seek to accomplish political goals through their involvement in the auto industry contribute patient capital to risk-averse, conservative companies—with the result that caution prevails over innovation and the firms' market performance worsens.

North American cars and trucks have gradually become *political vehicles*. Their production is politically relevant, and politics affect their production. Political signals are often as important as market signals in company decision making. This becomes a problem for businesses and governments when political and market signals are at odds. Market signals—consumer preferences, changes in input costs, new market conditions, competition from other vehicle manufacturers, potential technological innovations—drive auto makers toward profit and growth. Profit and growth generate the benefits that governments want. *Sustainable* automotive industrial policies are those that promote profit and growth rather than detracting from them, because profitable firms will not require government help.

This study does *not* argue for an end to automotive industrial policy. It does not call for the deregulation of the industry or for reducing the government's taxation or subsidy of firms in the sector to zero. In laying out a case for *sustainable* automotive industrial policy, the study calls for policy choices to be made to enhance industry growth, avoiding preferential treatment for one firm over another and other interventions that block market signals from operating. The test of sustainable automotive industrial policy is that it avoids the need for future taxpayer bailouts.

Taking a role for government in the auto industry as a given, this study argues that a focus on industry competitiveness as a policy objective will improve policymaking for this sector, lowering costs and raising benefits to society as a whole. The results will benefit government finances, company sales, taxpayers, and consumers.



INTRODUCTION

Why has it been necessary for taxpayers to bail out the North American auto industry twice in the last 30 years? For more than a century, one or more companies in the automotive sector have been rumored to be on the brink of bankruptcy, from William Durant's early troubles with General Motors, to the Chrysler bailout of 1980, to American Motors Corporation's takeover by Renault and eventual sale to Chrysler in the late 1980s, and Ford Motor Company's crisis in the 1990s, up to and including the most recent federal rescue of General Motors and Chrysler. As the century progressed, the crises became more severe and more expensive to fix, and governments bore more and more of the burden of addressing the problem.

It also seems that Detroit automakers that once dazzled the world with technology and innovation have become cautious; more often than not, exciting new technologies, from hybrid powertrains to assisted parking, seem to come first from international car companies, with Detroit play-

Above, President Obama tours the General Motors Orion Assembly Plant in Michigan in 2011



RAW MATERIALS AND MACHINERY TO BUILD PRECISION PARTS THAT WILL FIT TOGETHER PERFECTLY WHEN ASSEMBLED ALL HAVE TO BE PAID FOR BEFORE PRODUCTION CAN BEGIN.

ing catch-up. Is this perception accurate? If so, what can policy do to foster innovation in the automotive sector?

Now that the most recent crisis has passed, it is time to ask why the automotive industry habitually falls into crisis and why serial rescues and policy interventions have been followed by additional industry demands for trade protection and public financial assistance. This questions is becoming more urgent as fiscal challenges mount for governments in Europe, Japan, and North America.

BUILDING CARS IS A HIGH-RISK, HIGH-REWARD INDUSTRY.

Even in Henry Ford's day, building a car required a large amount of capital up front. Raw materials and machinery to build precision parts that will fit together perfectly when assembled all have to be paid for before production can begin. Engineering and design require skilled professionals who also need to be paid first. Skilled labor is needed to produce the components and assemble the finished vehicle. A distribution network needs to be in place to sell vehicles to customers and to service the vehicles when they break down, and this has to be paid for, too, before production can start.

Only when all these things are in place and a vehicle is produced, marketed, and finally, sold to a dealership (which in turn will sell the car to the customer) is any money collected by the manufacturer. Capital from investors is tied up for months before that first sale, and part suppliers, who typically wait for forty-five days after delivery before receiving payment, face similar difficulties. If the car is unpopular and does not sell, the losses are enormous. If the car is a hit, there can be problems producing vehicles fast enough to meet demand, and the full profit potential might never be met.

The result is that car companies around the world are conservatively managed by risk-averse professionals who are wary of losses that could accelerate and crash the firm. Being human, car executives make mistakes and are capable of losing money on their own. They work hard to satisfy the fickle tastes and diverse needs of the car-buying public before anything else.

CONSUMERS AND GOVERNMENTS HAVE EXPENSIVE EXPECTATIONS OF AUTOMAKERS.

At the same time, those of us in the car-buying public want more from car companies than reliable personal transportation. We want the jobs the industry produces, and auto workers and residents of automotive communities want to sustain the relatively high wages this industry has traditionally offered.

We want cars that are affordable, particularly as suburban sprawl lengthens our commutes and makes a car essential to holding down a job or visiting friends and family. We also complain about traffic and wish the car could help us to navigate around congestion.

Car buyers want vehicles that are big enough for large families and small and sporty for singles. We want vehicles that are easy to climb in and out of, particularly as we get older. We want vehicles to help us work and navigate rough road conditions, from trucks to SUVs. Most car buyers want vehicles to last for 100,000 miles or more, and several years of driving beyond the last car loan payment.

Car buyers want vehicles that are safe in the event of crashes and that can give new drivers a chance to become older drivers. We also want options that can help us with parking when our reflexes slow down due to age, and sensors to warn us of obstacles in our paths.

Many car buyers also want greater fuel efficiency to lower operating costs, or lower emissions of carbon dioxide and other gasses to reduce the vehicle's environmental impact.

In some cases, car buyers are content to seek these things in the market, and when they get to a dealership, to compromise on a car that is affordable and comes reasonably close to their wish list. Yet sometimes, a segment of the car-buying public wants government to demand some or all of these things from the auto industry. Politicians use regulation as the means of ensuring that car companies produce what we—or some of us—want. Where policy goals conflict—for example, the desire for a lighter-weight and therefore, more fuel-efficient car, and the desire for a vehicle that will keep passengers safe in a crash—government mandates can put car companies in a difficult situation.

Under pressure from government, carmakers produce



ONLY WHEN ALL THESE THINGS ARE IN PLACE AND A VEHICLE IS PRODUCED, MARKETED, AND FINALLY, SOLD TO A DEALERSHIP IS ANY MONEY COLLECTED BY THE MANUFACTURER.



“political” vehicles; when these prove less profitable or sell in small volumes, companies turn back to government for help.

AUTOMAKERS HAVE EXPENSIVE EXPECTATIONS OF GOVERNMENTS AND CONSUMERS.

Auto companies turn to government as a hedge against competition and to mitigate risk. Firms in the auto industry are keenly aware of competition from other carmakers. When governments try to influence what a car company produces—or how it produces—the first concern is whether all car companies will be forced to operate under the same requirements. Government mandates may add to costs, but if they add to rivals’ costs as well, they are less likely to influence competition.

This leads to demands for tariffs and other protection for domestic manufacturers seeking to avoid competing with foreign manufacturers who enjoy lower costs for labor, materials, or regulatory compliance.² Such protectionism raises the price of vehicles for consumers.

It also leads auto-industry firms to seek subsidies when governments mandate expensive technology that will raise the costs of vehicles for consumers, and it may therefore hurt sales. Companies might also look to governments for tax breaks for investing in communities or employing additional workers.³ Tax breaks for industry mean higher taxes for other taxpayers. Auto-industry firms will take basic research and technology developed with public funds to make cars better, but they tend to be more cautious in producing cars with technology that consumers might not accept or be willing to pay for.

Ultimately, whenever the high risks of the auto industry lead to financial trouble, automotive executives cite all of the jobs and other benefits they generate and try to persuade governments to help them out financially. Car companies must be big enough to attract capital and spread the risk of doing business in this industry across a wide range of models and markets; they also hope to convince governments and taxpayers that they are “too big to fail” when management judges the risks poorly.

GOVERNMENT HELP FOR THE AUTO INDUSTRY COMES AT A PRICE.

Government may help the industry in dozens of ways. The federal government can provide loans, grants, subsidies to car buyers, tax breaks, tariffs, and other protectionist measures (to hobble import competition), favorable regulatory decisions, and more. These benefits, however, are offered to the companies for a price, and governments seek commitments from car companies that satisfy fashionable causes: that they will invest in particular communities; improve their health-care offerings to workers; produce greener vehicles in greener ways; devote resources to securing their supply chains and operations to help in the fight against terrorism; hire more workers in general, and specifically, more women and minorities; export more or import less; diversify their management teams; pay more in taxes and pledge to repay taxpayers for any government aid; offer campaign contributions and other benefits to government benefactors—the list is seemingly endless.

Some of these government demands will help the companies to return to profitability, but most add to costs and further weaken the automakers. It is not government financial assistance that causes the problem, but the conditions that are sometimes attached to it. Car companies in need of taxpayer help have often fallen victim to social engineering experiments and economic redistribution schemes that benefited key politicians and their constituencies. Government aid may help a company temporarily, but before long, the conditions attached to this aid can result in higher operating costs, reduced profits, lower dividends to investors, and corresponding difficulty attracting additional capital.

Government investments in the auto industry have grown over time: the upfront cost of the Chrysler bailout in 1980 was \$1.5 billion, compared with an upfront cost of \$85 billion to bail out General Motors, Chrysler, and several suppliers in 2009. Yet the benefits generated by the industry have begun to shrink. The auto industry employs fewer workers by automating assembly lines, cars get greener but still pollute (and consumers fail to buy the greenest vehicles in large enough numbers to shift the environmental impact of motor vehicle transportation), profits shrink, and plants close amidst global production overcapacity.

IT IS TIME TO BREAK THE CYCLE.

Where is the public interest in all this? Through regulation, politicians offer us good things (jobs for Americans, a cleaner environment, safer roads) at no direct cost to us by making the delivery of those good things a precondition of market access for carmakers. Yet we ultimately pay for these good things in higher vehicle prices.

Automotive industrial policy—the combination of regulations, tax breaks, subsidies, and other measures by which governments seek to influence the auto industry—is not operating efficiently today. The accumulation of government mandates and incentives has grown unwieldy and never seems to be pruned back.

A smarter approach to regulation and public incentives would begin with a reassessment of what government should demand from carmakers, keeping these demands to a prudent minimum.

Next, governments ought to revisit their current policies and eliminate anything that does not add to the economic competitiveness of the industry, since a competitive industry will generate many of the good things we want the industry to provide—including jobs, tax revenue, and economic growth—sustainably and over the long term.

To understand what carmakers need to remain economically competitive, it is important to note how the industry has changed since the 1970s. Today's North American auto industry builds cars with a horizontal supply chain, concentrated geographically along an “auto alley” linking Michigan and Ontario to Texas and Puebla, and is more international—and global—than ever before. Industry competitiveness increasingly comes from automation, energy efficiency, and innovation from outside the industry itself. Governments have a role to play, but they have played favorites, and doing so has raised ethical dilemmas and hurt the industry that public interventions were intended to help.

Firms and governments would do well to trust more in the consumer. Car buyer preferences will guide us toward more fuel-efficient and socially beneficial vehicles, if car buyers are offered affordable choices that meet their performance expectations. Trusting the car buyer will lead to *sustainable* policy choices that promote social goals, without sacrificing industry competitiveness or the fiscal future of the government.

SUSTAINABLE AUTO POLICY CHOICES



Good public policy addresses problems with solutions that fix them, without creating more problems.

When policy choices produce consequences that generate demands for subsequent government intervention, the policies become more expensive. Still, if problems are resolved, this is manageable.

Yet there are cases in which the policy choices made to address one problem have unintended consequences (though not consequences that could not have been anticipated), driving a cycle of more, and increasingly expensive, government interventions.

Automotive industrial policy is currently caught in an escalating cost cycle that will prove unsustainable—if the cycle isn't broken, either more industry firms will fail, or the government will run out of money or political will to help.

HOW AUTOMOBILES BECAME POLITICAL VEHICLES

Government has a significant impact on the automotive industry through its ability to control access to both the domestic market, which it governs, and foreign markets, through trade policy and negotiation with other governments. It can and does place conditions on market access through regulation.

At the same time, government plays a role in the auto industry through fiscal policy: automotive companies are taxed and given tax breaks and offered subsidies and financial assistance to encourage them to conduct research, invest in environmental technology development, and train workers. At times, government has relied on automakers to produce vehicles for national defense, and government vehicle procurement is another boon to industry from the public sector.

Through regulation of market access and targeted spending, governments have always helped to shape the competitive environment in which the auto industry operates. This constitutes automotive industrial policy. However, governments have exercised these powers in different ways, with differing emphases, in different periods of recent history. This variation is the result of politics, and to the extent that politics, rather than market forces, have been dominant in shaping the mix of regulation and subsidy of automobiles, automotive industrial policy has

arguably come at the expense of the economic health and competitiveness of the sector, at times tolerably, and at times with sharply negative consequences.

When government aims to direct the auto industry to help achieve political goals unrelated to economic growth and industry competitiveness, cars and trucks become *political vehicles*, produced to satisfy politicians and not consumers. Political leaders argue that consumers are also the voters who elected them, and that therefore, the result of reorienting automotive industrial policy toward social engineering is still ultimately to satisfy consumers. Yet we reconcile our roles as consumers and voters differently, and the most reliable test of whether a vehicle satisfies consumers as well as voters is sales, just as the best test of whether a policy satisfies voters as well as consumers is reelection. Politicians have sought and won reelection on the basis of interventions in the auto industry numerous times, and so they can be said to have judged the politics of these interventions well. Low sales figures for political vehicles suggest that car companies have suffered when they have attempted to meet political mandates rather than consumer needs. What perpetuates the cycle of political intervention in the auto industry is that poor sales lead companies to seek more government help—in the form of trade protectionism, subsidies, regulatory favoritism, and public-sector vehicle purchases—so that pleasing governments

IN THE NEW POLICY ENVIRONMENT, ORGANIZED LABOR WAS SUCCESSFUL IN NEGOTIATING HIGH COMPENSATION, WITH THE RESULT THAT COMPANIES REDUCED THE SIZE OF THE MORE EXPENSIVE WORKFORCES AND REPLACED WORKERS WITH MACHINES WHERE POSSIBLE.



SUSTAINABLE AUTO POLICY CHOICES



FIVE PERIODS OF U.S. AUTOMOTIVE INDUSTRIAL POLICY

**PERIOD 1:
SUPPORT FOR INDUSTRY,
1900–1966**

**PERIOD 2:
SOCIAL REGULATION,
1966–1981**

**PERIOD 3:
ROLLBACK,
1981–1989**

**PERIOD 4:
REGULATION FOR
INDUSTRY,
1989–2008**

**PERIOD 5:
RETURN OF SOCIAL
REGULATION,
2008–PRESENT**

becomes more necessary to the companies than ever. This cycle is ultimately unsustainable: either the government runs out of money, or the carmakers do.

How did this cycle begin? In the United States, the relationship between government and the automotive industry has evolved through five historical periods of automotive industrial policy, each of which has struck a different balance between the public interest and private-sector freedom. Over time, the North American industry has grown in size, while becoming vulnerable to shocks that were the direct and indirect results of these policies.

PERIOD 1: SUPPORT FOR INDUSTRY, 1900–1966

As the auto industry emerged from a group of engineers and inventors in the late nineteenth century, the U.S. federal government gradually became interested in its potential. The nascent automotive firms could produce vehicles for the military. As Henry Ford brought vehicle prices down through the innovation of assembly-line manufacturing, and companies improved the precision of standardized parts to permit easy repair and mass production, the automobile offered a way of improving agricultural and commercial productivity.

Motor vehicles also had the effect of lowering the cost of transportation between rural areas and major urban centers, alleviating the problem of urbanization, which gave cities an advantage in terms of commercial life, but also produced overcrowding. Rural areas were better connected to cities by motorized transportation, and thus the rural communities of the country could sell their wares to people in cities, and city dwellers could visit the countryside for recreation or shopping. Gradually, suburbs formed, thanks to motor vehicles, which allowed American society to bring together the less-expensive land costs of the country with the economic advantages of metropolitan areas.

The automotive industry was also a major engine of economic activity, dubbed by Peter Drucker (1946) “the industry of industries” because the manufacture of a car or truck requires iron, steel, glass, rubber, chemicals and

colloids, plastics and electronics. A healthy auto industry boosted all of these other industries and was viewed as a source of national strength.

The economic benefit of a thriving auto industry was seen in the recovery of the German and Japanese economies following the Second World War: in both cases, automotive industries emerged as the locus of economic revitalization, boosting ancillary industries as well. During the postwar period, governments around the world sought to foster the development of domestic automotive production.

In North America, the auto industry was also a major employer, valued by governments because it paid well and hired new immigrants, people who had grown up on farms, returning soldiers and sailors, African Americans who migrated from the South to the Midwest to escape racial discrimination, and women—from wartime employment for “Rosie the Riveter,” to postwar jobs for thousands of young women newly entering the workforce.

During this first period, state and federal governments in the United States made support for the industry the top priority for automotive industrial policy. Though he is often mocked today, when former General Motors president Charles Wilson said, during his 1953 confirmation hearing for the position of U.S. secretary of defense, that “for years I thought what was good for the country was good for General Motors and vice versa,” his view was consistent with that of most policymakers at the time. (He was confirmed by the Senate by a vote of seventy-seven to three.)

If the industry was seen as a source of strength and public benefits during this period, it was also viewed as vulnerable by citizens and policymakers alike. Between 1896 and 1930, roughly 1,800 firms were established to produce motor vehicles, often using components from other manufacturers. Most of these firms failed, quite a few due to the Great Depression, or were bought and consolidated into larger companies like General Motors. And while General Motors grew larger than Ford as a result of these acquisitions, the company had a turbulent financial history, with company founder William Durant frequently seeking financial help from Wall Street and major investors as he struggled to keep the company together.

As motor vehicles became more common in the United

States, they had many critics. The noise and air pollution, traffic accidents and related deaths, inadequate roads and parking places, and their effects on the horse-driven economy, led to calls for governments to ban or regulate cars and trucks in the public interest. Overall, during this first period, these calls led only to minor changes. The industry’s contributions were seen by policymakers as too vital to the national interest, and the firms themselves as too vulnerable to financial disaster, for aggressive regulation. Governments sought instead to help the U.S. domestic auto industry to thrive.

This was particularly true with regard to foreign market access after the war. As postwar governments sought to create auto industries in order to rebuild their war-torn economies, the United States fought for market access for U.S.-made exports of motor vehicles. Initially, this effort succeeded because there was little alternative production that had not been destroyed in the war, but over time, foreign governments such as Japan’s and West Germany’s raised barriers to U.S. exports that were increasingly significant.

PERIOD 2: SOCIAL REGULATION, 1966–1981

Attitudes toward the automotive industry had changed in the United States by the 1960s. The consolidation of the industry into a handful of large firms made these companies seem secure and less vulnerable economically. The gradual closure of foreign markets slowed and then stalled the growth of industry employment, and labor unions clashed with management and portrayed industry executives as arrogant and heartless. Automobiles were now so common that traffic congestion, commuting headaches, and road accidents were widely shared problems.

In 1966, Congress passed the National Traffic and Motor Vehicle Safety Act, the first piece of major legislation to mandate changes in vehicle design in the public interest. For the first time, industry profitability was not the paramount goal of policymakers, and this was the beginning of a change in U.S. automotive industrial policy.

The auto industry was not singled out: during this

period, the United States government was expanding its regulatory reach throughout the domestic economy in the name of social improvement. Stan Luger (2000, 77) summarizes this change concisely:

At least 120 regulatory programs were enacted between 1969 and 1979, and in the twenty-year period from 1960 to 1980 the number of federal regulatory agencies grew from twenty-eight to fifty-six. The tremendous explosion of federal regulatory responsibilities was reflected in the *Federal Register*, the publication that collects the regulatory actions of the federal government. Between 1960 and 1980, the annual number of pages went from approximately 14,500 to 86,000.

The drive for regulation of the automotive industry began with vehicle safety, but soon after, measures sought to address the environmental impact of vehicle manufacture, raise the efficiency of gasoline usage, and improve the bargaining position of organized labor.⁴ Regulation by states and localities followed, which tried to tax some cars as “luxury goods,” limit parking in urban centers and some neighborhoods, tax fuel and commuters, and encourage the use of public transportation.

The automotive industrial policy of this period sought to promote social goals through regulation and taxation of motor vehicles. The Detroit assemblers⁵ fought these regulations, and during this period, the lobbying expenditures of the U.S. automotive industry grew dramatically, but with limited short-term success. The public generally supported the social goals of this legislation and these regulations. Policymakers saw a chance to make social gains, at little or no direct cost to the taxpayer, by targeting an industry that was large and successful and would therefore be able to bear the costs easily.

At the same time, U.S. government efforts to secure market access for U.S. vehicle exports made little headway. Even friendly foreign markets like Canada, Mexico, Europe, and Japan resisted efforts by U.S. trade negotiators to convince them to dismantle protectionist barriers. The United States and Canada signed the bilateral Automotive Products Agreement (Auto Pact) in 1965, but shortly af-

terward, the U.S. government accused Canada of manipulating the agreement through separate letters of undertaking with the Detroit assemblers. When gas prices rose in world oil price shocks in 1973 and 1979, cars and trucks imported from Germany, and especially Japan, made significant inroads with U.S. consumers at the expense of the Detroit assemblers.

Meanwhile, environmental design changes were raising the prices of new vehicles at the expense of performance. The Detroit assemblers rushed to introduce small cars as “import-fighters,” but several of these vehicles were plagued by product recalls, and the growing reputation of products made by the Detroit assemblers as being of poor quality led consumers who wanted smaller, fuel-efficient vehicles to choose international brands.

Organized labor was successful, in the new policy environment, in negotiating high compensation, with the result that companies reduced the size of the more expensive workforces and replaced workers with machines wherever possible. Layoffs and plant closings made industry executives even less popular, and politicians alternately sought to chastise the industry and to subsidize its expansion into new plants and capacity.

This period of automotive industrial policy ended with the prospect of the bankruptcy of Chrysler Corporation, the third largest Detroit assembler. Congress authorized a federal bailout in 1980 to keep the company viable, in part because Chrysler’s failure would affect General Motors and Ford, too, by damaging the growing independent automotive supplier sector.

PERIOD 3: ROLLBACK, 1981–1989

The Reagan administration made a direct connection between the Chrysler bailout, the weakness of U.S. manufacturing, and the growth of social regulation. Reagan granted carmakers a two-year reprieve from Corporate Average Fuel Economy (CAFE) standards for vehicles sold in the United States. He also pursued greater market access for U.S. vehicle exports in the 1986 Uruguay Round of global

trade talks and in the Canada-United States Free Trade Agreement. Aggressive challenges to unfair trade practices, new tariffs on vehicle imports, and domestic content regulations were imposed to restrict U.S. market access and force foreign assemblers to establish production in North America.

The Reagan administration's efforts were important symbolically because the Detroit assemblers improved their financial position and began hiring modestly again by the end of the decade. The U.S.-headquartered automakers introduced manufacturing automation equipment pioneered in Japan and Germany to replace expensive workers; in the case of General Motors, the drive for workplace automation proved expensive and not entirely successful, without changes to work rules that needed union support.⁶

Detroit assemblers also began to produce better-quality small and more fuel-efficient vehicles that consumers wanted in the early 1980s, followed by new vehicle types like minivans, and truck variants like the sport-utility vehicle, or SUV, which proved popular later in the decade as gas prices fell. Excess capacity fostered by government location subsidies was trimmed during the recession, and this improved the productivity of remaining plants. These changes helped turn around the fortunes of the domestic auto industry.

The end of the 1979–1982 recession made the U.S. public more optimistic about American manufacturing, and to some extent, the pro-business attitudes of the first period of automotive industrial policy returned. The United Auto Workers labor union had supported the Chrysler bailout, and although union leaders were politically ill-disposed to Reagan, they recognized that the president was popular with their members, many of whom had become blue-collar “Reagan Republicans.” The UAW focused its criticisms on imported vehicles and called for more protectionism, but it supported other aspects of Reagan's approach to automotive industrial policy.

The political economy of the North American auto industry had shifted by the end of the Reagan administration. U.S. producers relied on Canadian and Mexican production to a significant degree, a growing number of “new entrant” assemblers were employing U.S. workers and producing vehicles domestically, and independent component suppliers and automotive retail dealership owners were

important and increasingly vocal constituencies for automotive industrial policymakers.

PERIOD 4: REGULATION FOR INDUSTRY, 1989–2008

The subsequent period of automotive industrial policy sought a balance between regulating the industry in the public interest and promoting a healthy automotive sector, which policymakers viewed as an important, but declining, employer, and a significant, but no longer dominant, part of the U.S. industrial base. This balance was not easily attained, and in practice, the automotive industrial policy of this period often oscillated between regulation and deregulation, demands and incentives. The George H. W. Bush administration was not hostile to the auto industry, but it was considerably less pro-industry in its approach. There was a growing awareness of the international assembler and supplier's investment in North American production, and tensions between the Detroit assemblers—where the UAW represented workers—and the rival international assemblers and domestic and international suppliers, who successfully fought unionization. Public expectations of industry employment had diminished during the previous decade, and competition between organized labor and nonunion workers eventually led to constraints on rising wage and benefit costs in the pattern labor agreement of 2007, the first agreement between the UAW and the Detroit assemblers to begin to rein in pension obligations to retirees.

At the same time, industry innovation helped to alleviate pressure for social regulation. The companies also reorganized production, divesting themselves of large in-house parts divisions and relying on independent suppliers for components to an unprecedented extent. World oil prices that were low, and for a time, stable, combined with greater vehicle fuel economy, reduced pressure for environmental regulation. Improvements to passenger safety technology lowered road fatalities and injuries, so that inebriated driving or cell phone usage were seen as more significant safety hazards, and here, too, vehicle manufacturers offered technological responses.



The financial crisis of 2007-2009 led to a contraction of available credit in the U.S. market, which made it impossible for General Motors and Chrysler to fund operating capital requirements and anticipated pension and retiree health-care liabilities with new borrowing. At the same time, consumers had difficulty borrowing for vehicle purchases, and sales fell.

Trade policy also contributed to the balancing act of automotive industrial policy in this period. The George H. W. Bush administration negotiated NAFTA and continued negotiation of the Uruguay Round of global trade talks, and the Clinton administration brought both agreements to ratification. A period of relative global economic prosperity coincided with the reduction in trade barriers, making automotive exports possible from the United States (and from U.S.-owned plants in Canada and Mexico). This reversed the trend toward local assembly in multiple countries and allowed firms to produce models in fewer locations in higher quantities and with lower costs through economies of scale in production.

At the same time, successful implementation of automation made car manufacturing more productive. Governments came to a growing recognition of the problem of industry overcapacity worldwide; despite the rising demand for vehicles, quality improvements meant that individual vehicles lasted longer, and exports meant that competition for vehicle sales was intense virtually everywhere. Automotive industrial policy was tempered by the sense that car companies were vulnerable under the prevailing conditions of this new, global market.

The social regulation of the industry continued: CAFE standards were revised and tightened in 2007, highway safety requirements strengthened, labor law modified, subsidies offered, and tax incentives provided all to encourage or compel firms in the automotive sector to produce products differently. The economic strength and profitability of the automotive industry was important in U.S. automotive industrial policy, but so, too, was regulation of the product the industry produced, which had important societal consequences, from air pollution to suburban sprawl.

In this period, the Detroit assemblers themselves largely gave up the fight against social regulation and sought instead to participate in writing the rules and regulations that would govern their activities. In doing so, the firms hoped to protect themselves in areas of weakness and to seek an advantage over rivals. This included the international assemblers, and even some suppliers. During this period of automotive industrial policy, Washington lobbying activities related to the auto sector were fragmented into competing efforts and into trade associations that would compete or collaborate, depending on the issue.

The result was that the expansion of social regulation faced limited resistance. While an attempt was made in this period of automotive industrial policy to balance social regulatory goals with the economic health of the sector, the expansion of regulatory reach increasingly tilted the balance toward social limits on corporate activity.

PERIOD 5: RETURN OF SOCIAL REGULATION, 2008–PRESENT

The U.S. government’s attitude toward the auto sector was changed again by the financial crisis of 2007–2009. In the first decade of the twenty-first century, each of the three assemblers faced serious internal problems that weakened their ability to survive the financial turmoil ahead.⁷

The crisis led to a contraction of available credit in the U.S. market, which made it impossible for General Motors and Chrysler to fund operating capital requirements and anticipated pension and retiree health-care liabilities with new borrowing. At the same time, consumers had difficulty borrowing for vehicle purchases, and sales fell. Ford had reorganized its debts earlier in the decade and was financially healthy enough not to need emergency help from the government (Hoffman 2012). However, the company would be vulnerable if General Motors and Chrysler faced bankruptcy reorganization or liquidation and were unable to pay suppliers they shared with Ford.

The Detroit assemblers were burdened with the legacy costs of prior contracts with the UAW, including payments to workers who were laid off and significant pension and health-care obligations to retired workers. Unfunded pension liabilities were a concern for Wall Street investors looking at the financial health of General Motors, Ford, and Chrysler prior to the financial crisis. In addition, since the bankruptcy of any of these firms could shift the pension liability to the public-sector Pension Benefit Guaranty Corporation, the federal government could be exposed to major costs.

Tough contract negotiations between the Detroit assemblers and the UAW in 2007 had led to a reduction in starting wages and wage scales for union workers, so that

these rates approached parity with those of nonunion workers at international assembly plants in the United States. While a gap remained, it was modest. However, for many years, the UAW had fought to protect existing workers and union members, with the result that the Detroit assemblers offered generous early retirement and retained an aging workforce for a longer period that was more prone to injury and less efficient in adapting to new automation technology, and that firms did little new hiring. This produced a workforce bubble that consumed an increasing proportion of company resources.

The George W. Bush and Obama administrations each offered financial assistance to forestall bankruptcy and avert a worsening of the economic crisis. The Canadian federal government of Prime Minister Stephen Harper and the provincial government offered proportional assistance for the Canadian divisions of each company. The 2009 bailouts of these auto firms are recent and remain controversial in the United States, although less so in Canada. It is clear, however, that these marked a new period in U.S. automotive industrial policy: government financial assistance was given on the condition that the companies reorganize and grant equity stakes to the U.S. federal government and the UAW (in lieu of pension contributions) and UAW representation on boards of directors. President Obama termed this conditionality “shared sacrifice for all stakeholders” (Rattner 2010, 229), but some shareholders ended up losing significant amounts of money in the process.

The automotive bailouts helped General Motors and Chrysler to survive a cash flow crunch caused by the financial market crisis: they could not obtain operating capital from Wall Street to finance production, and consumers could not get auto loans to finance consumption. The firms should have had more operating capital on hand, but they had unfunded pension liabilities and other obligations that they had not managed prudently. Consumers should have had more credit available, but subprime mortgages and high personal debts limited what suddenly risk-averse and precarious banks and other financial institutions were willing to lend.

Governments in Europe, Japan, and Korea provided direct financial assistance to their auto industries, though on a smaller scale. Ford, Toyota, Honda, Nissan, Hyundai-Kia, and other North American assemblers benefited indirectly

from the financial assistance the U.S. and Canadian governments provided to General Motors and Chrysler: without it, many automotive suppliers would have been in danger of bankruptcy if General Motors and Chrysler had been unable to pay their bills. Keeping the supply chain afloat helped the entire industry survive the financial crisis.

Weak consumer demand worldwide was another consequence of the credit contraction, and governments in North America and Europe initiated “cash for clunkers” programs which, with varying conditions, provided a cash incentive to consumers to trade in certain older models and purchase new vehicles. This did not generate new demand, but in many cases strengthened sales during a weak period by getting consumers to buy today, rather than tomorrow. In effect, governments enabled the auto industry to borrow on future demand.

Compounding these problems was overcapacity in worldwide auto-industry production, with factories in numerous countries producing more vehicles than markets could absorb. With the onset of economic recession, rising production and falling sales put General Motors and Chrysler, weakened by internal factors, in an untenable position, with no option but to reduce capacity.

Government financial help was enough to get the auto industry past the financial crisis of 2008–2009, but it did

not address the structural problems facing General Motors and Chrysler: expensive labor contracts that gave limited flexibility in workforce management; overhead costs associated with design, marketing, and other support for too many vehicle brands and models; and inefficient dealerships that intimidated consumers.

A second form of government help came with bankruptcy, which allowed for renegotiation of contracts with suppliers, labor unions, and retail dealerships. Bankruptcy procedures also permitted the companies to restructure their brands and management, and this, in turn, allowed time for Chrysler to be acquired by Fiat.

Despite U.S. and Canadian federal investments in the auto sector in 2009 and a clear desire to see the automotive sector prosper, the federal governments in the United States and Canada did not abandon social regulation of the industry intended to reduce the impact of vehicle emissions on the environment. By making union representation on the boards of directors of General Motors and Chrysler part of the negotiated federal rescue package for these companies, they embedded labor into company decision making on a permanent basis.

A Pew poll in March 2009 showed that 63 percent of U.S. respondents disapproved of the auto bailouts (Kohut et al. 2009). The Obama administration responded by



touting a potential “green” return on the public investment when the auto industry began producing environmentally friendly vehicles in larger numbers, and President Obama toured Michigan in July 2010 to test drive a Chevy Volt to illustrate the argument (Rattner 2012, 309). This was the logical extension of the argument for social regulation: after socializing the losses of some auto companies (to taxpayers), the public was promised a social dividend.

The unprecedented public intervention in the auto sector in 2009 returned U.S. automotive industrial policy to an emphasis on social regulation. While the Obama administration claims credit for saving the U.S. auto industry, the industry’s future health will depend not on the conditions politicians and regulators can attach to financial assistance to firms in the industry, but on whether the federal government can exercise its influence in a manner that benefits the economic viability and competitiveness of these firms.

Put another way, it is not yet clear whether the Obama administration’s auto-industry bailout was a one-time emergency measure to put General Motors and Chrysler on the road to recovery, or whether the conditions attached to the government rescue will make any recovery unsustainable.

This is the challenge of the fifth period of U.S. automotive industrial policy and may lead in time to a sixth approach. The critical issue will be whether policymakers appreciate how the automotive industry has changed and how it manufactures cars today.

BEYOND 2012— ANOTHER SHIFT?

The relationship between governments and firms in the auto industry has changed over time, as this discussion has briefly illustrated. The trend toward greater government involvement in the auto sector through regulation, subsidy, protectionism, and financial help has increased the importance of automotive industrial policies—decisions made in government circles—in relation to private-sector decision making about how and where to build cars and trucks.

This has turned motor vehicles into intensely *political vehicles*. The focus by auto executives on policy and politics

can displace the focus on consumers to the detriment of the economic health of auto companies themselves. Financially weak companies have turned to government for help, which has further increased the importance of political calculations in corporate strategy.

Raymond Vernon (1971) introduced the idea of an “obsolescing bargain” between government and firms in which, at first, the government will make concessions to a company to secure an investment. Later, Vernon observed, the company’s fixed assets (plant and equipment) make the company vulnerable to governments, which can reassert themselves and begin revising the original bargain to favor the government. Government gets the upper hand, and the bargain changes.

In the auto industry today, the bargain is obsolescing again, and this time no one has the upper hand. Current U.S. automotive industrial policy, founded on this bargain, is unsustainable.

The failure of the firm-state bargain underpinning automotive industrial policy comes down to us. When, as citizens who would be consumers, we demanded that government support, and firms produce, affordable transportation to meet our needs and aspirations, automotive industrial policy worked: that was Period 1, from 1900 to 1966. When governments gained the upper hand over businesses with huge sunk costs in North America, they sought to deliver more benefits from the industry to us as taxpayers, and we ended up paying twice for the auto industry—as consumers and as taxpayers—during the back-and-forth tug-of-war between government and the auto industry from 1967 to 2012.

Beyond 2012, there is an opportunity to strike a new, sustainable bargain over automotive industrial policy that puts the focus on industry productivity and growth. Firms focused on consumers have the chance to thrive, and generate collateral benefits directly—jobs, economic activity, innovative products—and indirectly, through generation of more taxable income and reduction of the need for public financial assistance.

Such a bargain would involve changing the way that government approaches the auto industry so that it would be working with, rather than against, seven important trends that are transforming the auto industry in North America today.

SEVEN TRENDS TRANSFORMING THE NORTH AMERICAN AUTO INDUSTRY

Political considerations have skewed the way that governments and ordinary citizens view the North American auto industry. We have come to see automotive manufacturing as a vehicle for our aspirations for income equality, environmental improvement, technological innovation, and more. The question often asked of the industry is, “Where is my flying car?” The industry today satisfies some, but not all, of our expectations.

The financial problems in the North American auto industry in recent years, combined with the failure to meet our more aspirational expectations, have convinced many people and political leaders to see the auto industry as a loser. A dinosaur among industries, some claim, on its way to extinction.

Yet while we focused on the financial bad news, the North American auto industry has been changing.

■ Today it employs fewer unskilled and unionized workers, but more high-tech workers, from software programmers to environmental engineers.

■ Today, auto plants are more likely to be found along a corridor that runs from Ontario, Canada through Michigan and the U.S. Midwest, to Texas and south to Puebla, Mexico, rather than being clustered around Detroit.

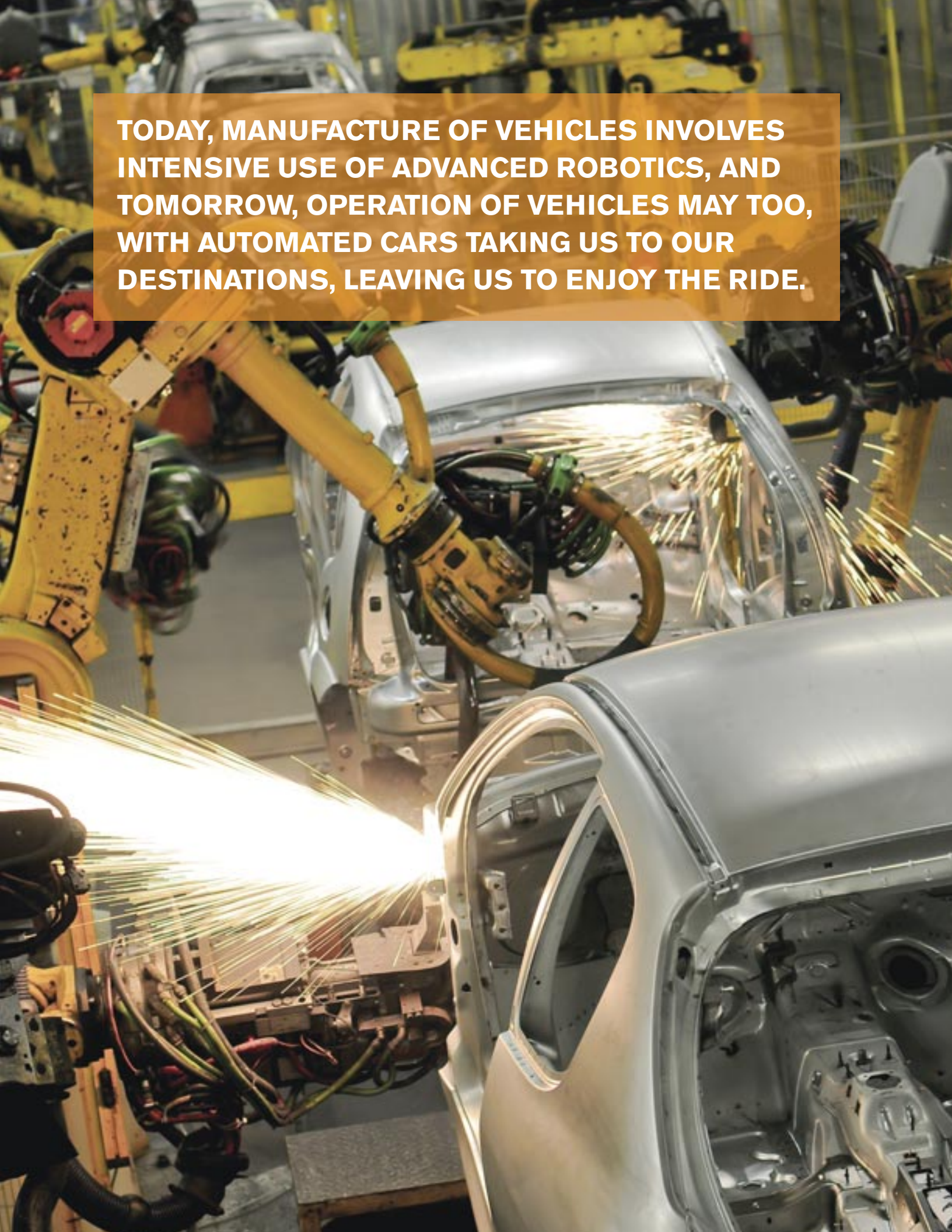
■ Today, the North American auto industry is not dominated by domestic brands but is fully international, providing the best of the world’s technology to our drivers and exporting the best North American products to drivers around the world.

■ Today, the North American auto industry produces more vehicles, each of which contains as much computing power as your desktop or laptop. Today, it uses less energy to build each vehicle, and each vehicle takes less energy to operate and has a smaller environmental impact than ever before.

■ Today, manufacture of vehicles involves intensive use of advanced robotics, and tomorrow, operation of vehicles may too, with automated cars taking us to our destinations, leaving us to enjoy the ride. The days of being isolated in a metal box with no communication with the world outside except for the car radio will seem as outdated as the horse-drawn carriage (though perhaps not as charming).

■ Today, it takes dozens of companies to produce the components that are assembled into a finished vehicle, and innovation can be introduced by entrepreneurial companies and tech start-ups at several points along the supply chain. The annual Consumer Electronics Show is nearly

TODAY, MANUFACTURE OF VEHICLES INVOLVES INTENSIVE USE OF ADVANCED ROBOTICS, AND TOMORROW, OPERATION OF VEHICLES MAY TOO, WITH AUTOMATED CARS TAKING US TO OUR DESTINATIONS, LEAVING US TO ENJOY THE RIDE.



as big an event for the North American auto industry as the North American International Auto Show in Detroit. And some of the most exciting new technologies for cars and trucks come from outside the auto industry, whether they are sensor technologies from the defense and aerospace sectors, applied research conducted at a U.S. national laboratory or major university, or a new idea for passenger safety from a research hospital.

■ Today, government is more involved in the North American auto industry than ever before, as a regulator of competing workplace safety, highway safety, energy consumption, and environmental impacts, in addition to a source of finance of last resort and now co-owner (on behalf of taxpayers) of General Motors.

Together, these trends have already dramatically transformed the industry of the 1950s, 1960s, and 1970s into a new, competitive, high-tech sector that has expanded to include additional participants, as the traditional “big three” automakers—General Motors, Ford, and Chrysler—have become, in the words of the *Economist* (January 13, 2011), the “magnificent seven”—these three plus Toyota, Honda, Nissan, and Hyundai-Kia.

In most cases, these seven important trends were resisted or ignored by recent automotive industrial policies. By understanding these trends and adapting automotive industrial policy to support them, governments can foster economic growth through the auto sector to better match our expectations and aspirations as vehicle consumers and as taxpayers.

TREND 1: THE SHIFT FROM VERTICAL INTEGRATION TO HORIZONTAL INTEGRATION

At the beginning of the twentieth century, assemblers vied for control of a handful of innovative suppliers via exclusive relationships or outright acquisition. Vertical integration of the supply chain under assembler management was the result, but this later proved too inflexible to generate

innovation, and unionization of the major U.S. assemblers’ parts divisions raised costs.

In the 1980s, struggling assemblers began to outsource work to independent parts suppliers. Through competitive contracting, the assemblers hoped to retain as much exclusivity as possible and achieve cost savings. At the same time, suppliers were encouraged by assemblers to deliver innovation on the basis of R&D conducted at their own expense.

By the 1990s, the supplier community had developed its own hierarchy with Tier 1 firms—those with a direct customer relationship to the assembler—integrating components produced by other firms (Tier 2, Tier 3, etc.) into sophisticated subassemblies, and even taking responsibility for installing these in “modular assembly” facilities.⁸ Tier 1 firms extended their supply chains overseas, importing low-cost components from China and elsewhere to remain competitive. To mitigate risk, suppliers avoided reliance on a single assembler and frequently diversified into non-automotive business lines (or were acquired by firms in other sectors).

Eventually, assemblers spun off their in-house parts divisions, which became competitors with the already independent (but generally much smaller) suppliers. However, legacy costs associated with union contracts made them uncompetitive, and doubts about the firms’ relationships to their former assembler-owners made it difficult for them to diversify their customer bases.

Shifting partnerships and competition among suppliers has made the North American automotive industrial base more dynamic and innovative, and North America’s supplier community is a major reason why this continent remains a globally competitive place to source components, find innovative new automotive solutions, and assemble automobiles. The supplier sector now employs more workers than the assembler sector: according to Susan Helper at Case Western Reserve University, in 1990, there were 1.2 U.S. workers at automotive supplier companies for every 1 U.S. worker at an assembler plant, but by 2009, the ratio had shifted to 3.5 workers at supplier companies for every 1 worker at an assembler (Helper 2010).

While policy has continued to focus on assemblers, in the current horizontally integrated auto industry, there are dozens of major firms that are less well known, but are

TOP 20 NORTH AMERICAN SUPPLIERS BY SALES (2001, 2011)

2001	Sales	2011	Sales
1. Delphi Automotive	18,867	1. Magna International	14,716
2. Visteon Corp.	12,878	2. Johnson Controls	7,874
3. Johnson Controls	8,444	3. Continental Automotive	5,799
4. Lear Corporation	7,888	4. Robert Bosch	5,565
5. Magna International	7,140	5. Denso International	5,464
6. Dana Corporation	5,553	6. Delphi Automotive	5,133
7. TRW Automotive	4,992	7. Lear Corporation	4,955
8. Robert Bosch	4,140	8. Faurecia	4,725
9. Denso International	3,721	9. TRW Automotive	4,621
10. ArvinMeritor	3,229	10. Cummins Inc.	4,136
11. American Axle	2,952	11. Mobis North America	3,811
12. ThyssenKrupp	2,887	12. Dana Holding	3,416
13. DuPont Automotive	2,600	13. Aisin World	3,291
14. Yazaki North America	2,350	14. Flex-N-Gate	3,066
15. Valeo Inc.	1,836	15. Yazaki North America	3,051
16. Tower Automotive	1,776	16. Tenneco Inc.	2,714
17. Cummins Engine	1,737	17. ZF Group NAO	2,679
18. Dura Automotive	1,684	18. BASF Corp.	2,634
19. Eaton Corporation	1,630	19. Alcoa Inc.	2,475
20. Continental Automotive	1,620	20. Autoliv North America	2,387
Source: Automotive News		All figures are in millions of U.S. dollars	

important to the industry's health, employment, and innovation. Additionally, coordinating the activities of engineers working for assemblers and suppliers to ensure quality and efficiency has created new industries that manage logistics and facilitate communication and coordination along the supply chains that now link firms in vehicle production. These new coordinating jobs are part of the rise in service-sector employment in North America and are generated by the manufacturing sector. They are not, as some have suggested, the only recourse for workers displaced by the decline of manufacturing-industry employment; the services necessary to maintain efficient manufacturing supply chains are part of the transformation of manufacturing processes themselves.

The high capital requirements in the auto industry grew as automotive assembly became more complex and mechanized. (Basically, money needs to be raised to employ engineers and designers, purchase assembly equipment, and buy all of the materials before a single vehicle can be produced, and there will be revenue only when the first one is sold.) This is a significant barrier to entry into the industry, and it favored the industry's concentration in a handful of firms in each country or major market. Ocean shipping was costly and often damaged vehicles in transit before the Second World War (the need to ship military equipment led to improvements), and so automakers seeking foreign customers opted to ship components for assembly in the foreign market—a process known as complete knock-down (CKD), or kit assembly. Cost-effective for small volumes, this was often a means to establish a presence in small, protected markets.

In the 1960s and 1970s, ocean transportation had improved and its costs had been lowered so that manufacturers shifted to an export orientation. This allowed assemblers to obtain significant economies of scale, lowering their costs. As the U.S. market was the largest and most open in the world, it became the target of export strategies of Japanese, German, and other automakers. This dramatically altered the North American vehicle market, with a sharp divide between imported and domestic brands that confronted consumers as well as politicians. "Buy American" preferences competed in consumers' minds with the fuel economy, lower prices, and fresh appeal of many imported vehicles. Politically, the auto industry was a big

business with a powerful labor union, a combination that was difficult to resist when it was united in calls for trade protection and regulatory preferences from the federal government and state and local governments.

Import barriers and the rules of origin incorporated in the Canada-United States Free Trade Agreement and the North American Free Trade Agreement—along with growing sales volumes for the imported brands prompted international automakers to establish production in North America. State, provincial, and local governments offered the new entrant assemblers subsidies and other incentives to locate plants and bring jobs to their communities. Gradually, the North American automotive industrial base was transformed from four major assemblers headquartered in Michigan to today's array of a dozen major firms assembling vehicles locally. And in addition to these assemblers, a number of international companies design and produce automotive parts and components in North America as well.

The internationalization of the North American automotive industrial base through the increased participation of global firms corresponds to growth in the overseas assembly of vehicles by U.S.-headquartered automakers in countries like China. Yet the North American aspect of this global trend is important in that it indicates the ongoing competitiveness of North American manufacturing, labor, and innovation.

There is a significant distinction to be made, however, among the new entrant assemblers and suppliers, based on how they have chosen to structure their North American operations. The most successful new entrant firms—those with the largest market shares—have expanded to continental production, with operations in the United States and Canada, Mexico, or both. Like the U.S.-headquartered assemblers, these new entrants rely on local companies for parts and components and share, to an extent that varies by vehicle model, the same supply chain. Continental assemblers, whether headquartered in North America or not, contribute to the economies of the United States, Canada, and Mexico, helping to keep suppliers competitive and able to innovate.

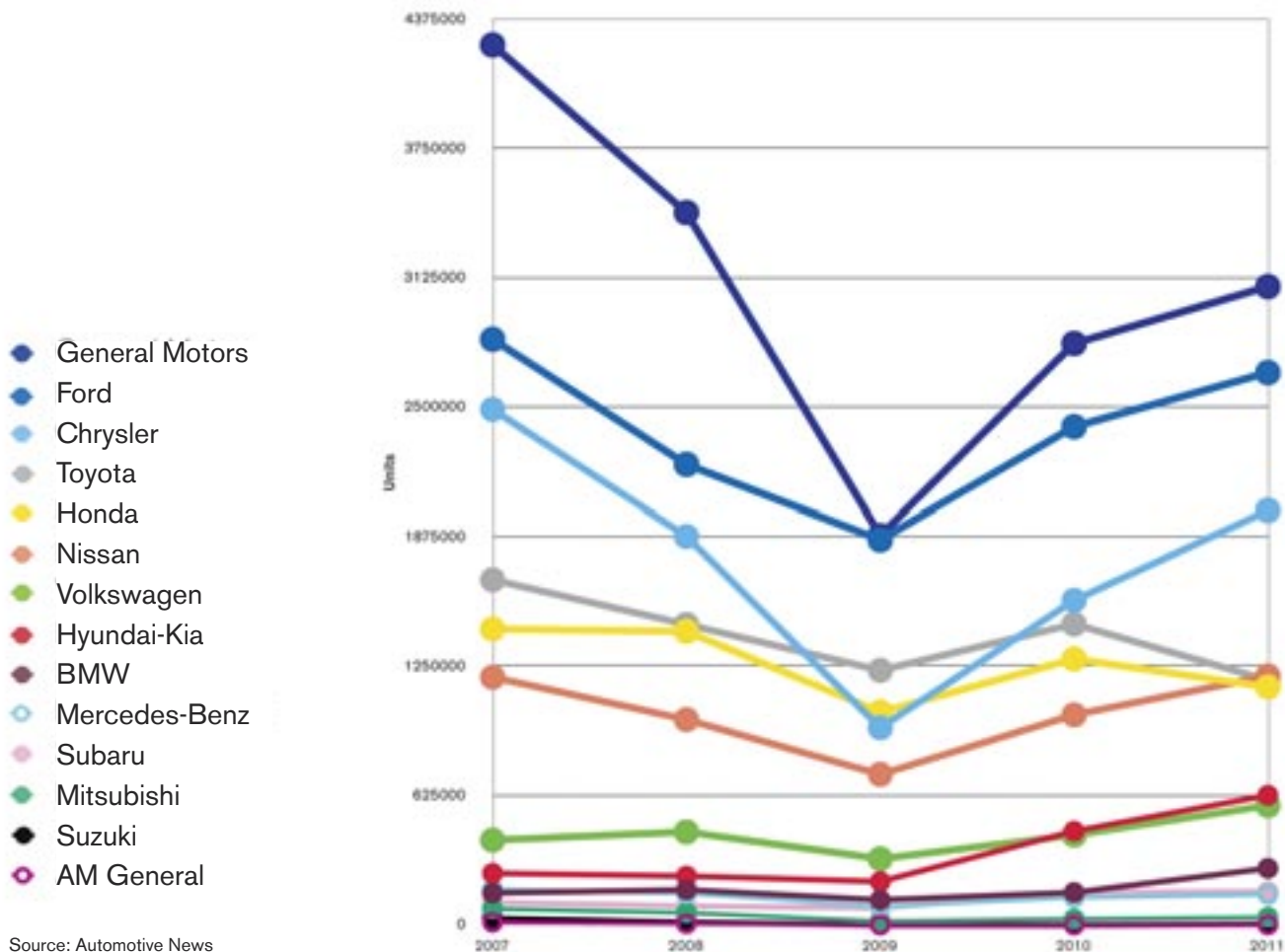
The term "magnificent seven," which added Toyota, Honda, Nissan, and Hyundai-Kia to the "big three" based on the newcomers' dominance of vehicle sales in the United States, may gradually replace the outdated "big three" label.

By contrast, where a new entrant assembler has a more limited market share in North America (enough to justify North American production, but on a smaller scale), it often establishes an assembly plant far from the core of the auto alley and encourages its usual suppliers in foreign markets to locate nearby. The result is a small pocket or island of foreign assembly and supplier manufacturing that is less reliant upon, or even independent of, the North American supply chain. Island assembly makes sense on a smaller scale—for example, Mercedes and BMW have adopted this approach for certain luxury vehicles, where profit margins are worthwhile even at limited sales volumes, and production in the local market is economic. Some U.S. firms have adopted this approach in China as well.

This shift in the structure of production within the

North American automotive industrial base is significant when answering the question, “Who is ‘us’?” In previous decades, the lines between “us” (the assemblers and suppliers headquartered in the United States, as well as those in Canada and Mexico with which U.S. firms were closely intertwined) and “them” (the imports) was much clearer. Today, it is more accurate to describe “us” as the firms that assemble vehicles and produce components for “them” *in North America, using local labor*. Within the North American automotive industrial base, there is a meaningful distinction to be made between the continental assemblers and the island assemblers when it comes to the beneficial economic impact of their presence in this market, but this is a matter of degree—both are beneficial. And in this regard, production is a more salient indicator than sales.

NORTH AMERICAN MOTOR VEHICLE PRODUCTION BY ASSEMBLER



Source: Automotive News

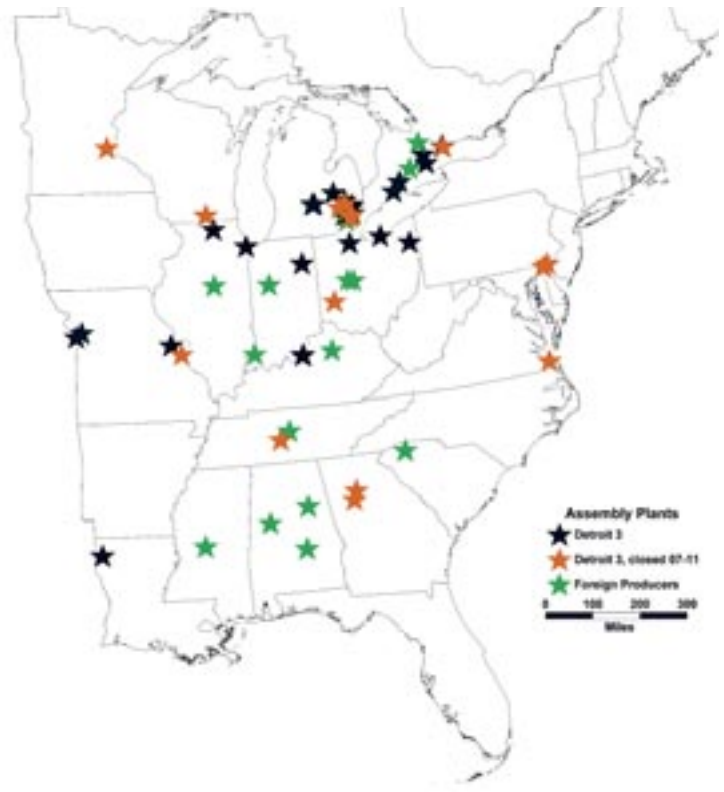
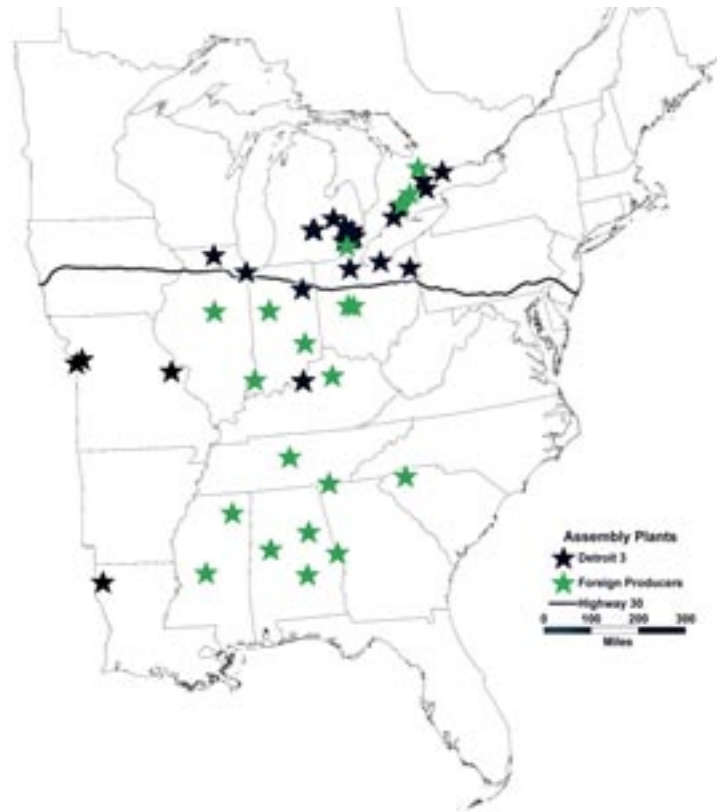
What is difficult to justify from an economic or practical standpoint is what is now a solely political distinction between the Detroit assemblers and the new entrants, based largely on the fact that the latter were once (and remain, to some extent) importers. The persistence of the notion of a “big three” U.S. auto industry is largely due to the fact that General Motors, Ford, and Chrysler have unionized assembly workers, whereas the often-overlooked suppliers and the new entrant assemblers and suppliers have remained non-union (although offering competitive wages in each market, necessitated by the value of skilled labor).

TREND 2: THE EMERGENCE OF AUTO ALLEY

Although Detroit, Michigan became the center of the North American auto industry very early in the twentieth century, vehicles were produced for many years in other parts of the United States, Canada and Mexico by companies without a Detroit headquarters. The need for collaboration among innovative engineers (many of whom ran small, entrepreneurial companies) led to a concentration of activity in Michigan that was later intensified by vertical integration.

U.S. domestic automakers first established assembly plants on the east and west coasts in the to meet growing consumer demand for vehicles. They also expanded assembly capacity in Canada and Mexico in the 1980s to capitalize on lower production costs (in Canada due to exchange rates and less-expensive public health care, in Mexico due to lower wages and rising Mexican consumption).

In the 1990s, this began to change, as assemblers sought to reduce the need for large inventories of parts on hand to keep assembly lines running if new shipments did not arrive on time. The Detroit assemblers abandoned their coastal plants as the branch plant assembly system stopped making sense because it was more efficient to produce high-volume models at a single plant than at multiple assembly locations. Once the decision was made to have one plant produce for the entire market, it was logical to locate that plant in the center of the continent.



Source: Klier, Thomas, and James Rubenstein. 2008

Another key to this shift was the development of just-in-time logistics management, which made deliveries more predictable through coordination with suppliers and assembly plant managers and electronic tracking of trucks and cargo containers. Reducing the idle inventory time of parts at an assembly plant to mere minutes resulted in a significant improvement in productivity and a reduction in costs.

Just-in-time logistics are easier to manage when supply chains are physically less attenuated. In other words, when shipments travel a shorter distance from supplier to assembly plant, there is greater predictability and less risk of an unexpected delay. This also favored a more geographically concentrated automotive industrial base in North America.

A third factor encouraging geographic concentration of automotive manufacturing was the global overcapacity in vehicle production. The size of the market for new vehicles in North America grew, and reductions in import barriers and transportation costs meant that imported vehicles and vehicles from new assemblers (such as Korean and East European automakers) were able to compete with vehicles from U.S. domestic auto companies for North American customers. Many countries, including Canada, Mexico, South Korea, and now China, annually produced far more vehicles than their domestic markets could absorb, relying on U.S. export sales for profits. Despite U.S. government attempts to impede imports using trade policy, the burden of reducing global overcapacity frequently fell to U.S. domestic assemblers, which closed plants (and increased output at remaining plants to partially offset this lost capacity).

Working against these trends have been the attempts by governments to provide incentives for the location of new plants in particular locations. Location incentives have been offered, and were often solicited by the firms themselves, to try to influence investment decisions. These have included tax abatements, free land or property improvements, supporting infrastructure, such as roads and highway access ramps, worker training at public expense, and other benefits to firms. As Middleton (2001) and others have noted, there is little evidence that these incentives are effective in general, but they became an increasingly expensive part of local economic development programs after 1945.

The result of these factors has been the emergence of

what Thomas Klier and James Rubenstein (2008) have called “auto alley,” a geographic concentration of the assembler and supplier plants in the North American auto industry within a long, narrow corridor that stretches from Ontario, Canada to Puebla, Mexico, and runs through the traditional Midwestern heart of the U.S. auto sector to southern states like Tennessee, Missouri, and Texas. With the exception of some U.S., German, and Korean productive capacity in South Carolina, Georgia, and Alabama that extends to the east of the auto alley, the North American automotive industrial base has become more concentrated geographically.

This is significant because it means that the infrastructure necessary to support the North American automotive industrial base—for both transportation, such as rail lines and highways, and energy—is more limited. Just as important, the links to production in Canada and Mexico are essential to the competitiveness of automotive manufacturing in North America; post-2001 border security measures have resulted in an unpredictable situation where just-in-time logistics schedules have to be padded to allow for possible border crossing delays. This padding results in unproductive inventory and added costs for manufacturers.

It also indicates the futility of state and local governments attempting to lure automotive manufacturing investments with location incentives (such as dedicated infrastructure, tax incentives, and worker training funds) *outside* the emerging auto alley. The geographic concentration of automotive production in North America follows the economic logic of concentrating production and just-in-time logistics, and new plants outside this corridor are uneconomic.

TREND 3: AUTOMATION, FROM ASSEMBLY TO OPERATION

Henry Ford did not invent the automobile, but he did invent the assembly line, and as a result, he became known worldwide. By automating the assembly process, Ford made more efficient use of skilled labor, which allowed

him to mass-produce vehicles quickly, sell them at lower prices, and pay his workers more.

Since Ford's time, the process of assembling vehicles, along with the process of designing and manufacturing components for them, has become increasingly automated. The assembly line where workers used hand tools to attach parts became a place where precision machine tools produced parts to order, and then programmable machine tools could be reset to perform different tasks for different models. The Japanese took the lead in introducing robotics to the assembly line, with robotic welders and lifters taking over repetitive tasks that bored humans and led to hazardous mistakes, and other automakers soon followed.

As a result, the auto industry today needs fewer workers, and these need to be more highly skilled on average than in the past. The possibility that auto-sector jobs will migrate to low-wage countries has been averted by automation: low-skill, low-wage workers are of limited value in manufacturing modern vehicles because they are simply not as productive, fast, consistent, or capable as assembly-line robots. Even lower-wage countries like Mexico have had auto-sector wages rise faster than average wages as workers upgraded skills and improved their productivity. Firms in countries like China and India hoping to compete on the basis of lower wages will find it difficult to excel in automotive manufacturing unless they can simultaneously

improve labor productivity through higher skills and automation.

The computer and the Internet changed the practice of automotive engineering and design. It is now possible to design a vehicle virtually in three dimensions and determine whether all of its thousands of parts will fit within the design parameters. Pieces can be prototyped in plastic and fit together before an investment is made in more expensive materials. Engineers and designers working in different locations, or for different companies (for example, some working for the assembler, others for suppliers), can collaborate virtually in real time to produce vehicle designs or make adjustments and refinements to them. This has lowered the cost of experimentation and innovation and has fostered more inclusive collaboration and brainstorming by teams of engineers along the supply chain.

By automating the design process, auto companies have made it faster and easier to introduce model changes, incorporate new features (designed to meet changes in regulatory standards or simply to appeal to consumers), and correct design flaws. In the beginning, most auto-industry employees worked on the plant floor, in blue-collar jobs; the industry is now changing so that more of its employees are highly compensated white-collar workers, from engineers to programmers to marketers to designers. This a tangible example of the shift of the U.S. workforce away

MOTOR VEHICLE EMPLOYMENT AND OUTPUT 2000, 2010, AND 2020 (PROJECTED)

Industry	2007 NAICS	Employment						
		Thousands of jobs			Change		Annual rate of change	
		2000	2010	2020	2000-10	2010-20	2000-10	2010-20
Motor vehicle manufacturing	3361	291.4	151.3	166.1	-140.1	14.8	-6.3	0.9
Motor vehicle body and trailer manufacturing	3362	182.7	107.6	114.6	-75.1	7.0	-5.2	0.6
Motor vehicle parts manufacturing	3363	839.5	415.1	394.9	-424.4	-20.2	-6.8	-0.54

from manufacturing jobs as we knew them toward jobs in the manufacturing sector that resemble what we think jobs in Silicon Valley are like. This is good news not only for the workers of the future; it is good news for consumers, because vehicles are becoming more sophisticated and capable with fewer defects than ever before.

Automation is transforming not just assembly; it is beginning to transform the operation of vehicles as well. Since the introduction of cruise control, automakers have steadily introduced new technologies to make driving easier and to automate more of the car's functions. Anti-lock brakes do a better job stopping the car than humans pumping the brakes in slippery road conditions. GPS navigation does a better job finding a route to the destination than a driver with a stack of maps. Automatic headlights illuminate even when drivers forget.

More recent innovations are available on today's luxury models and will gradually become commonplace: automated parallel parking, voice-operated entertainment and communications systems, sensors that warn drivers when the vehicle approaches an obstacle while backing up or changing lanes. All of these are steps toward fully automated driving, that is, cars that drive themselves to destinations selected by passengers.

The technology necessary to fully automate driving is available today, and computer-operated vehicles' superior

performance will lead insurance companies to prefer them over consumer-driven vehicles. The thrill of driving will be available to those who want it, but for many, the mundane nature of their daily commutes, routine errands, and chauffeuring of children will be enough reason to let the car do the driving most, if not all, of the time. This will allow the former drivers to concentrate on phone conversations, email, and texting (which we do too often now while operating vehicles distractedly) and create new opportunities for leisure, entertainment, and even productivity in transit.

Already the cars and trucks we drive have more computing power than our desktops, laptops, and mobile devices. Automated automobile operation will usher in a dramatic transformation in the automobile's role in our lives and a new platform for consumer electronics and workplace software. The second century of the automobile will redefine the motor vehicle as a place of business, a place for family interaction, and a marketplace opportunity. The trend toward automation of vehicle manufacturing and operation will lead to the loss of some manufacturing jobs but the gain of new jobs for programmers, entertainers, and technologists. It will also generate one of the largest gains in labor productivity in U.S. history by reclaiming time now lost to transit.

The trend toward automating manufacturing and operation will also undermine the competitiveness of low-wage countries in the auto sector. Producing high-tech motor vehicles in a high-tech way is necessary to keep them affordable for consumers in developed countries. It will give the advantage to countries with a relatively greater endowment of capital and ingenuity over countries that currently copy or appropriate technology and rely on low-cost labor and mass production—the elements of competitiveness in the twentieth century. Even so, the most sophisticated technologies could render vehicles too expensive for consumers in many developing countries. The result may be that today's challenge of overcapacity⁹ in the manufacture of automobiles will be resolved through a reduction in capacity in two segments of the industry: high-tech high-cost vehicles, and low-tech low-cost vehicles. Automation may lead to a differentiation in the vehicle market between high-tech and low-tech vehicles that alters the supply and demand equilibria that have shaped industry calculations for more than a century.

Source for both charts: Employment Projections Program, U.S. Department of Labor, U.S. Bureau of Labor Statistics

Output				
Billions of chained 2005 dollars			Annual rate of change	
2000	2010	2020	2000-10	2010-20
233.3	186.3	267.0	-2.2	3.7
28.1	20.3	28.8	-3.2	3.6
198.9	151.3	206.7	-2.7	3.2

It would be wrong to see this shift as the end of the auto industry, just as it was wrong to see the migration from rural areas to cities and the demise of less-efficient small family farms as the end of agriculture. However, to promote the future strength of the North American automotive industrial base, it is important to recognize that the transformation already underway in manufacturing will result in more output and fewer industry jobs. The benefits for the U.S. economy will grow as industry navigates this transition, but in order to facilitate this ongoing trend, government policies must encourage automation of production and operation of vehicles instead of placing barriers in the way of firms seeking to adopt these technologies.

TREND 4: INCREASED ENERGY EFFICIENCY

According to the U.S. Energy Information Agency, the energy demand of the United States has remained stable for more than half a century, with 50 percent of energy consumption accounted for by industry, 30 percent by transportation, and 20 percent by commercial and residential consumers (EIA 2010). The motor vehicle is the largest contributor to transportation demand for energy, and reducing the energy needed to power cars, trucks, and buses has been a goal of governments and the auto industry in recent years.

As the assembly and manufacturing of motor vehicles and their components has become more automated, these processes have become more energy intensive. The North American auto industry includes hundreds of large and small factories where energy efficiency has become a priority, from recapturing energy generated in the production process to making buildings green, with grass planted on roofs and water conservation measures in place. There is altruism in these efforts, and real concern for the environment, but at the same time, lowering energy consumption and reducing waste saves money and helps firms to compete.

The internal combustion engines used in most vehicles in the world today are more fuel efficient and powerful

than those sold by Henry Ford at the beginning of the twentieth century. A number of important innovations have made the internal combustion engine, using a standard gasoline fuel mixture, more efficient at generating more torque than ever before. These include continuously variable transmissions, cylinder deactivation while cruising at speed to reduce fuel consumption without loss of power, direct fuel injection, integrated starter/generators that allow the engine to shut down during idling, turbo- and super-charging, and variable valve timing and lift. For many environmentalists, the internal combustion engine is the target of criticism, but companies in the auto industry around the world have been refining and improving on this core technology with significant results.

The energy efficiency of new vehicles in North America has also been improved by changes in liquid fuels that allow them to burn more cleanly, producing less carbon that is released into the atmosphere as they do so. New refining techniques have lowered the sulfur content of gasoline, and ethanol and other biofuel additives have improved fuel quality and reduced the reliance on oil imports from outside North America. In addition, there is promising ongoing research on the use of natural gas, ammonium, and other unconventional fuels in current or slightly modified internal combustion engines.

Another breakthrough improvement to the energy efficiency of today's cars and trucks has been the development of hybrid engines that utilize a mixture of electricity and gasoline. Thousands of these vehicles are on the road today, and they have whetted the public appetite for more. Plug-in hybrids, which draw electricity from the grid rather than relying on electricity generated by the car as it operates, offer greater energy efficiency in the use of electricity than battery-powered hybrids. And after decades of research, there has been progress toward improved electric batteries that are lighter and offer better storage and longer range for vehicles.

Despite these efforts, the breakthrough battery that offers the performance and environmental benefits that consumers want has yet to be developed. The mass production of electric vehicles (with attendant economies of scale that would reduce their price tag for consumers) gets closer each year, as the use of advanced composites make vehicles lighter, and new designs reduce drag and the amount of

energy required to propel the vehicle. Research toward the electrical storage breakthrough and the electric vehicle of the future is proceeding in tandem, and the electric car is likely to emerge suddenly on the scene when the engineering challenges involved are resolved.

Hudson scholar B. Bruce-Briggs warned (1977) about “the war against the automobile” waged by environmentally conscious citizens who had come to see cars and trucks as incompatible with clean air, water, and soil. The popularity of personal transportation had led to urban and suburban sprawl and a host of related ills that critics believed were unsustainable. These concerns resulted in the expansion of public transit and the new urbanist movement in design, both of which hoped to make North American communities “livable” and, to the extent possible, car-free.

Today, the automobile is as popular as ever, but its use is also more environmentally sustainable. The limits of public transit in the vast spaces of North America are one reason that drivers, rich and poor, need their cars to live and work and must dig deep into their wallets when gasoline prices rise.

This need is what has driven the energy efficiency of vehicle manufacture and operation to continually improve. It has fostered the growth of a green supply chain of technology entrepreneurs working to make vehicles better, and thereby has created real green jobs for engineers and researchers. With this trend in mind, it would be a mistake to dismiss the automobile as a fossil-fuel-addicted dinosaur doomed to extinction. The North American auto industry has evolved, and it is adapting to consumer demands for more energy-efficient vehicles.

At the same time, there are limits to the capacity of policy to “push” new engineering breakthroughs. In the 1990s, the California Air Resources Board (CARB) mandated that automobiles sold in California would have to be low-emission or even zero-emission vehicles. The size of the California market—in some years, as much as 20 percent of U.S. vehicle sales—fueled the hubris of CARB members, many of whom seemed convinced that car companies could produce environmentally friendly vehicles but chose not to do so because of a tacit alliance with oil companies or for some other conspiratorial reason.

In fact, automakers in North America are eager to pro-

duce alternative vehicles, but in a highly competitive market, they must also ensure that new vehicles are safe and affordable and meet consumers’ expectations for performance. Car owners can almost always put off purchasing a new vehicle, so pioneering technology is often met by customers who prefer to see how the vehicle is rated by government regulators, consumer advocates, and car magazines before they buy. Some will even wait until there is resale information available before committing to a new purchase.

This is the logic behind the caution with which automakers assess new technology, and it does not reflect a lack of motivation to innovate. Take any rumored breakthrough in technology that is not yet on North American roads, and you will soon discover that there is a flaw holding it back. Policy may be able to address some of these challenges, but it is a mistake—a common one—to use policy as a bludgeon to force technologies before they are road-ready.

TREND 5: INNOVATION FLOWING FROM OTHER SECTORS

Innovation in the U.S. auto industry generally arises from one of four sources: (1) automotive assemblers; (2) firms that supply the automotive industry with components and subsystems; (3) universities; and (4) public-private research consortiums, which aim to accelerate the development of technology to provide public benefits, often leveraging research conducted by U.S. national laboratories or the military.

Each of these routes to innovation has strengths and limitations. For example, firms in the industry tend to focus on the immediate needs of the market, i.e., how to build appealing and innovative vehicles that will sell in profitable quantities at a particular price point. This limits their propensity to invest in potentially game-changing technologies that may—or may not—ultimately be successful.

At the same time, innovation activity undertaken in the auto industry extends far beyond the automaker itself, as nearly three-fourths of a vehicle’s value is added by other

companies. This makes clear the need to coordinate efforts across a producer's supply chain. In fact, the innovative capability of a carmaker's supply chain has come to represent a crucial factor for success in the marketplace.

In his 1946 study of General Motors, *The Concept of the Corporation*, Peter Drucker called the automotive industry "the industry of industries." To manufacture a motor vehicle, it was necessary to draw on a range of other industries, from the makers of glass and plastic to precision tool and die makers, and today, computer programmers and fabricators of steel, rubber, aluminum, and advanced composites.

The North American auto industry is now the hub of a technology of technologies. The automobile is increasingly the platform for an array of personal entertainment and information technologies, from iPods to mobile phones, which enhance the experience of driving. Satellite radio and on-board navigation, DVD entertainment for back-seat passengers, and twenty-four-hour roadside assistance all provide improved road awareness and concentration for the driver.

When Drucker wrote his book about General Motors, it was common to observe the "arrogance" of the Detroit automakers. It is not just recent hard times that have brought humility to auto executives in North America; they are now more reliant on the rest of the economy for innovation and more curious about the best practices and new ideas generated by start-up companies and university student projects than they were in the past. Today, even the most far-fetched consumer suggestions can lead to an automotive innovation.

In this way, the North American auto industry is opening up a host of market opportunities for firms outside the sector, with thousands of jobs generated in the process. The fate of this industry is now of greater concern to more people than ever before.

For policymakers, this matters because the links between the North American auto industry and communities around the country are often invisible to voters. Tracing these interconnections is important for mitigating demands for action that could harm the industry and much of the rest of the economy.

At the same time, policymakers must consider the distinction between innovation and the diffusion of that in-

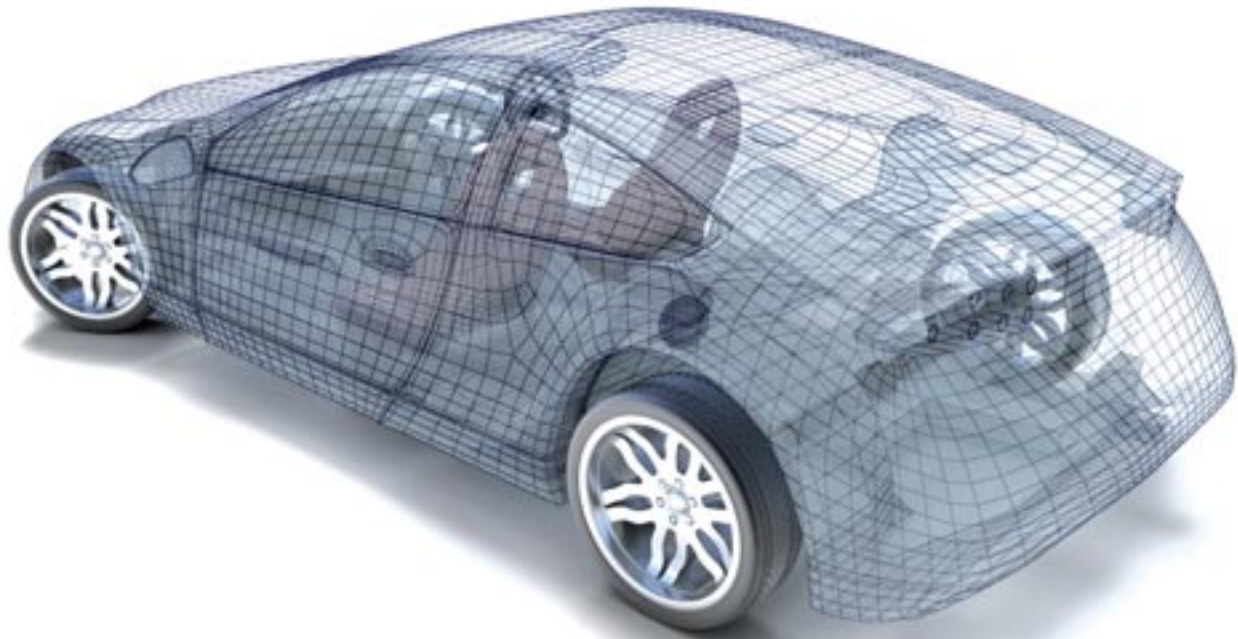
novation throughout the country's vehicle fleet; even very exciting new technology will take time to become common enough to have an impact. Past experiences with the introduction of unleaded gasoline, air bags for passenger safety, and even centered rear brake lights tell us that it can take seven to ten years before enough drivers have made the switch that improvements in environmental or safety performance can be detected.

In the United States, auto-industry innovation also can flow from the public sector. Private- and public-sector R&D programs are different because they tend to focus on different goals.

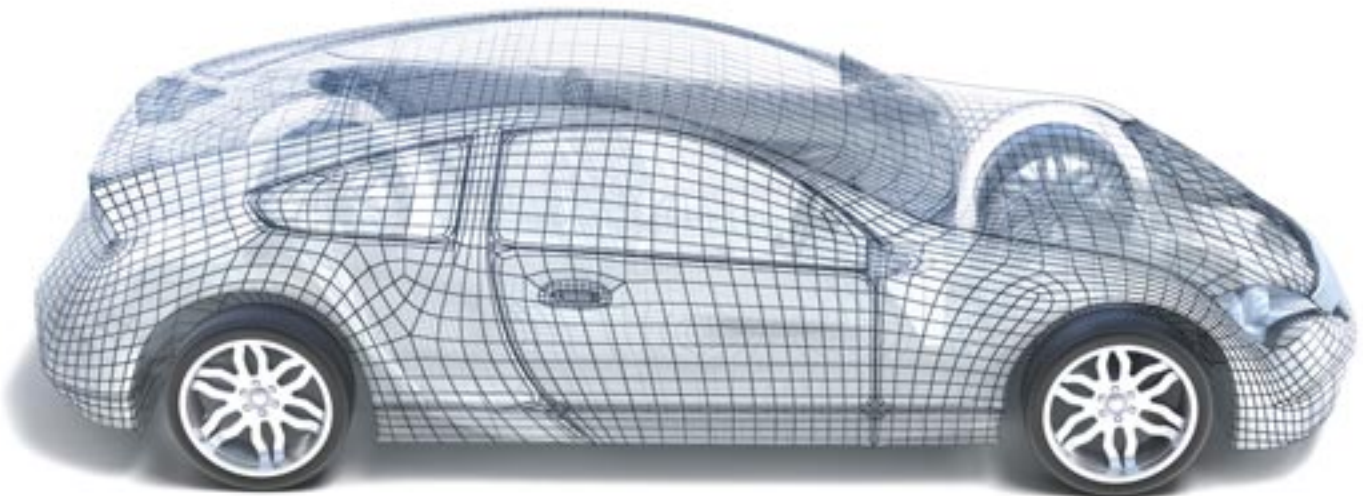
Private-sector automotive research is governed by the discipline of the market. Firms invest in R&D, testing, prototyping, building new production lines, and securing the operating capital to finance each new unit—often a multimillion dollar enterprise—and cannot recoup any of the cost until a unit is sold. And in the case of bold new technology, there can be an additional step: securing regulatory approval(s) to permit the use of the technology on the road. The risk involved in private-sector investment in innovation keeps auto company R&D programs oriented toward practical near-term improvements and tweaks to existing and proven technologies.

Public-sector automotive research, in contrast, is directed toward public purposes—such as reducing traffic fatalities or U.S. dependence on foreign oil. Some publicly funded research with potential application in the auto sector is initially intended for another purpose, such as national defense. Scientists and engineers whose current research could improve automobiles are working for (or funded by) the U.S. Departments of Commerce, Defense, Energy, Interior, and Transportation, as well as federal agencies like the Environmental Protection Agency (EPA) and NASA. In addition, the federally funded National Science Foundation invests in research by university-based investigators, while the twenty-one national laboratories that operate under the Department of Energy contribute to the development and testing of innovations that are often a decade or more ahead of potential commercial application.

Universities operate somewhere in between the public and private sectors. Many have engineering schools with automotive specialties, and universities seek collaborative



TO MANUFACTURE A MOTOR VEHICLE, IT IS NECESSARY TO DRAW ON A RANGE OF OTHER INDUSTRIES, FROM THE MAKERS OF GLASS AND PLASTIC TO PRECISION TOOL AND DIE MAKERS, COMPUTER PROGRAMMERS, AND FABRICATORS OF STEEL, RUBBER, ALUMINUM, AND ADVANCED COMPOSITES.





If a car can be sold in more than one market, the engineering, design, and management costs associated with developing it can be spread over more units. This is the basis for the idea of a “world car”—a model, or a basic design, that can be inexpensively modified for local markets and produced in large quantities.

partnerships with both public-sector and private-sector researchers—along with public- and private-sector funding. The source of funding will shape the orientation of the research—either practical and short term or visionary and long term, in keeping with the funder’s goals.

In the late 1980s, the U.S.-based assemblers, American Motors, Chrysler, Ford, and General Motors, were under severe competitive pressure and were losing market share in the United States to competitors. They responded by closing plants, laying off workers, and cutting R&D expenditures. The cuts to R&D led directly to less-innovative vehicles, and this ultimately caused further erosion in market share, both in the United States and in foreign markets.

Recognizing their mistake, but still facing financial constraints that limited potential R&D investments, Chrysler, Ford, and General Motors joined forces to establish the United States Council for Automotive Research (USCAR) in 1992. Its purpose is to engage in “pre-competitive” research that would be developed further by each firm (and its suppliers) independently. USCAR became a natural vehicle for partnering with the public sector in advancing auto-sector innovation.

What makes USCAR particularly important as a response to U.S. automotive industrial policy is that it permits the private sector to select from an array of publicly funded R&D and then to apply and commercialize the technologies in vehicles marketed to consumers. Automakers are able to take into consideration the cost of technologies, additional weight they may add to the vehicle (which affects vehicle fuel efficiency), the space that these technologies may take inside the vehicle at the expense of the passenger compartment or luggage space, and other factors that will ultimately be considered by the consumer. With extensive consumer market research, the companies will attempt to determine whether a technology is commercially viable, anticipating market acceptance by consumers in ways that government-funded engineers and scientists cannot. USCAR is a means for the government to promote commercialization of technology and innovations it has financed, while letting the private sector, not government, pick the “winners” among the new technologies available.

USCAR was established at the instigation of the George H. W. Bush administration to promote long-term R&D collaboration by Chrysler, Ford, and General Motors.

Government support for this pre-competitive exchange of information and engineering was intended to shield it from anti-trust actions by foreign automakers charging that the Detroit-based assemblers were engaging in a “research cartel.” The three automakers have set up USCAR as a limited liability corporation that they own shares in, and therefore, they can all harvest innovations that arise from the research sponsored under USCAR. Federal government departments and agencies, including the Department of Energy, NASA, the EPA, the National Science Foundation, the Commerce Department, the Defense Department, and the Transportation Department, participate in particular projects.

USCAR serves as a basic platform for several specific research collaborations, including the U.S. Advanced Battery Consortium, to bring automotive engineers into contact with the domestic electrochemical energy storage (EES) industry and to maintain a consortium that engages automobile manufacturers, EES manufacturers, the National Laboratories, universities, and other key stakeholders. USCAR has also launched the U.S. Automotive Materials Partnership, the Vehicle Recycling Partnership, and the Electrical Wiring Component Application Partnership. Industry takes the lead in setting up particular research programs under the USCAR umbrella.

An example of public-private collaboration is the Partnership for a New Generation of Vehicles (PNGV), established in 1993 between USCAR and the U.S. Departments of Commerce, Defense, Energy, Interior, and Transportation, as well as the National Science Foundation. The PNGV set the goal of exploring all possible technologies to produce a vehicle capable of operating for 80 miles on a gallon of fuel (80 mpg) by 2004. Ultimately, the PNGV engaged researchers at more than 20 national laboratories and more than 300 companies and produced a number of engineering breakthroughs before it was canceled in 2004. PNGV was replaced by the FreedomCAR partnership between USCAR and the Department of Energy, which aims to develop plug-in hybrid components and systems for light-duty vehicles that could be commercialized by the auto industry for mass production in the 2016 model year.

These ongoing public-private partnerships vary in the extent to which they are led by one sector or the other, with those led by the private sector tending to focus on imme-

diated challenges and those led by the public sector looking further ahead at generating game-changing technologies.

However, there is a problem of openness. Participation is dominated on the private-sector side by USCAR, which is a consortium of Chrysler, Ford, and General Motors. Two groups of private-sector firms that are engaged in considerable R&D activity in the United States each year are marginalized and often excluded from the process: automotive suppliers and the international firms from Asia and Europe that employ thousands of American workers and sell vehicles here. (“Automotive suppliers” includes the Tier 1 suppliers who sell integrated subsystems and major components to the final assemblers, and the Tier 2 and Tier 3 firms that sell components and materials to Tier 1 firms in the complex design and manufacturing supply chains that are characteristic of the automotive industry.) Their uncoordinated R&D expenditure and innovation is segregated from the federal government’s investment in auto-sector innovation, which is a loss for the goal of innovation in the public interest.

This is where the distinction between innovation and diffusion is critical: if policy aims to promote innovation, it must promote not only R&D, but also its dissemination. And the pre-competitive research performed with public money must be shared with *all* manufacturers that are part of the North American auto industry—including the major suppliers and the international assemblers that represent a significant share of the cars and trucks sold each year. Discrimination against suppliers and international assemblers, already mentioned, works against U.S. policy goals when it comes to innovation as well.

TREND 6: GLOBAL PRODUCTION AND COMPETITION, REGIONAL MARKETS, AND NATIONAL REGULATION

The year 2011 provided several dramatic illustrations—if these were necessary—of the importance of global supply chains to the cars and trucks produced in North America. Floods in Thailand and the earthquake and tsunami in

Japan led to disruptions in shipments of critical components, and the result was fewer vehicles produced in North America and Europe.

The terrorist attacks of September 11, 2001 had a similar effect once truck traffic across the U.S. borders with Canada and Mexico slowed to a dead stop due to increased inspections. Workers in assembly plants across the Midwest were sent home, since they could not build vehicles that day.

Very few cars and trucks are produced wholly in one country because of the logic of economies from scale: the more units of something produced, the lower the cost per unit. This is because, even though the raw materials cost the same for each unit, design, factory, machinery, management, marketing, and legal costs associated with producing them can be spread over a larger number of units.

In the auto industry, there is pressure to lower the cost of every component that goes into a vehicle. While some parts are specific to a certain vehicle or brand, many are standard or are hidden under the hood. Bolts and microprocessors, brake drums and light bulbs can be used on dozens of models sold by a major assembler, and even on cars and trucks sold by rival manufacturers. From the supplier's point of view, the more units sold, the lower the price they can be sold at, which in turn attracts more customers.

Assemblers follow a similar economic logic. If a car can be sold in more than one market, the engineering, design, and management costs associated with developing it can be spread over more units. This is the basis for the idea of a "world car"—a model, or a basic design, that can be inexpensively modified for local markets and produced in large quantities. Modifications for local markets vary; sometimes, a new owner manual and safety labeling will suffice, and other times, a more elaborate transformation is required to meet local safety and environmental regulations.

Governments impose requirements on vehicle manufacturers to ensure safety and health, but also to encourage companies to employ local labor to make necessary modifications and to help the company comply with legal obligations. Governments often want local content as a precondition of selling in their market, ensuring work for local firms; sometimes, governments insist on local assembly, and the manufacturer must either establish a CKD assembly operation or consider local production on a larger scale. There is a tension between governments, which want

manufacturers to do as much as possible locally to maximize local benefits, and firms, which seek to minimize local variations to achieve scale economies and boost their profits and the return on their fixed capital investments.

For most of the first century of automobile manufacturing, this tension was resolved with compromises that worked against global scale economies and generated higher vehicle costs and inefficient production. The problem was not just governments seeking rents from automakers in exchange for preferential regulatory treatment; firms that invested in particular countries sought to have the local regulatory and tariff systems adjusted to give their products an advantage over competitors in local markets. The complicity of firms and governments in establishing and sustaining this inefficient system prevented it from being changed.

Meanwhile, technological advances and high labor costs in developed country markets raised the minimum efficient scale of production—the number of units that must be produced at a particular assembly plant for it to operate profitably. Though there is significant variation from plant to plant, an efficient assembly plant operating today should be able to produce roughly 200,000 units per year. If it produces less, it could lose money.

The same is true for particular models: those that sell only 10,000 units a year are unlikely to be profitable, while those that sell 500,000 units a year almost certainly will be.

These calculations have gradually changed the way firms and governments bargain over regulation and investment. Governments seek to trade regulatory and tariff concessions for as many industry benefits as possible. With less room for error, automotive assemblers will walk away from small-country markets where they are required to produce inefficient quantities at a loss, but at the margin, they will accept the best deal they can obtain to continue to do business in favorable locations.

This shift has given rise to regional production systems that rely on cross-border transactions and seek to locate production where it is most efficient, allowing for costs such as transportation. Despite the trend toward globalization of production, the minimum efficient scale of production for automobiles is not global, but regional: economies with a sufficient number of consumers warrant local production because the need to tailor products to

meet local regulations is justified by the local sales volume of those products.

This logic has been seen in North America, where Canada is too small to sustain an automotive industry solely for its domestic market but is able to participate in production for the entire North American market (including U.S. and Mexican consumers) and thereby achieve the scale economies necessary for competitive production there. Similar regional production platforms have emerged in Europe and in major markets in Latin America and Asia.

Regional production systems are highly vulnerable to protectionist measures that impose external costs on market access and are often subject to political manipulation by domestic interests. Protectionism was once a matter of tariffs, but today it includes regulation, or administration of regulations, that favors domestic producers.

The establishment and enforcement of national systems of regulation are an important obligation of governments acting in the interest of public safety. Even without protectionist intent, national regulation can place barriers in the form of separate review, testing, and approval processes in each jurisdiction. The idiosyncrasies of different regulations and rules that have emerged over time make it challenging for companies to sell a single product unmodified in multiple markets.

The United States is working with other national governments to reduce regulatory differences that inhibit the industry trend toward regional global production. Talks are underway with Canada and Mexico bilaterally, and multilaterally within the Transatlantic Economic Council (the United States and European Union countries) and the Trans-Pacific Partnership (Australia, Brunei, Canada, Chile, Malaysia, Mexico, New Zealand, Peru, Singapore, and the United States; Japan is considering participation).

Without greater regulatory cooperation among governments, companies must adapt to compete. Firms will bear added costs but will seek equivalent savings through cost reductions from their suppliers, wage reductions for their employees, or replacing employees with more efficient machines. This makes it more difficult for protectionist measures to have a sustainable beneficial impact for the country that imposes them. Protectionism at its most effective redistributes economic activity rather than producing economic growth.

TREND 7: UNPRECEDENTED GOVERNMENT INTERVENTION

The automotive industry has always attracted government attention, in North America and around the world. Governments have regulated the industry in the name of passenger safety, environmental impact, labor relations, taxation, and competitiveness. To attract a major source of jobs and economic activity, governments have frequently subsidized the building of automotive assembly and component factories as well as worker-training cost offsets.

National governments have also provided tariff protection, established and maintained rules of origin in order to qualify producers for benefits, and pursued market access for automotive manufacturers. In North America, trade agreements, from the 1965 U.S.-Canada Auto Pact, to the 1988 Canada-United States Free Trade Agreement, to the 1993 North American Free Trade Agreement, have established a North American automotive trade regime that has fostered continental production, with supply chains that link the U.S. core of the North American automotive industrial base with production in Canada and Mexico.

Government involvement in the North American auto industry has slowly increased as vehicles became more complex and regulatory approval processes more robust. What makes the current state of this trend unprecedented is the aftermath of the economic crisis of 2008, which prompted a major change in the role of government in the auto industry, as the United States took an ownership stake in General Motors. In China, France, and other countries, state ownership of automotive production has traditionally been significant; in North America, this change raises several concerns.

The first concern about increased government ownership in the auto sector is the effect on the firms themselves. Governments, known as providers of “patient capital,” are willing to forgo profits and dividends for social benefits such as sustained employment. As noted previously, the automotive industry is naturally conservative, since it must raise and invest millions of dollars to design and engineer a new model, set up production, hire and train a sufficient



The moral and ethical dilemmas posed by government ownership of one or more auto companies translate into even greater caution by industry managers, whether at firms where government holds an ownership stake or at firms forced to compete with them. Investors, whether in new technology and innovation or in traditional manufacturing, are unable to assess the risk involved when the government is both the referee and owner of one of the competing teams.

workforce, and support retail and service networks, all before earning a dollar. Patient capital and a conservative industry combine to produce dull, safe vehicles that offer collateral benefits to the societies that make them but rarely innovate successfully or excite buyers.

A second concern is the perception, and often the reality, of government favoritism. When a government is not only the regulator of a business, but also its competitor, investors and shareholders view the risks faced by the company differently. Regulatory decisions may be second guessed, and firms will devote more and more resources to lobbying in an attempt to influence political decisions that are perceived to be affecting the market opportunities available to them. Over time, lobbying efforts divert resources from production and innovation and serve as a drag on productivity and growth. This lowers the country's competitiveness as a location for automotive production, and it can lower production levels and exports from that country and increase imports of parts and finished vehicles.

In North America today, this is the situation faced by Ford, which sees the federal government as a stakeholder in its competitor, General Motors. Similarly, suppliers negotiating prices for innovative new automotive technologies must face Ford, Honda, and Toyota as independent customers, but General Motors as a partner with the federal government. Which buyer is likely to win regulatory approval for the introduction of a new technology? Which might fight regulatory approval if the product is sold to a rival?

Suppliers selling to General Motors must also wonder about the federal government's position as a labor-market regulator when the UAW seeks to organize their workers. Will failure to unionize lead to future problems selling to General Motors, or future problems with the National Labor Relations Board?

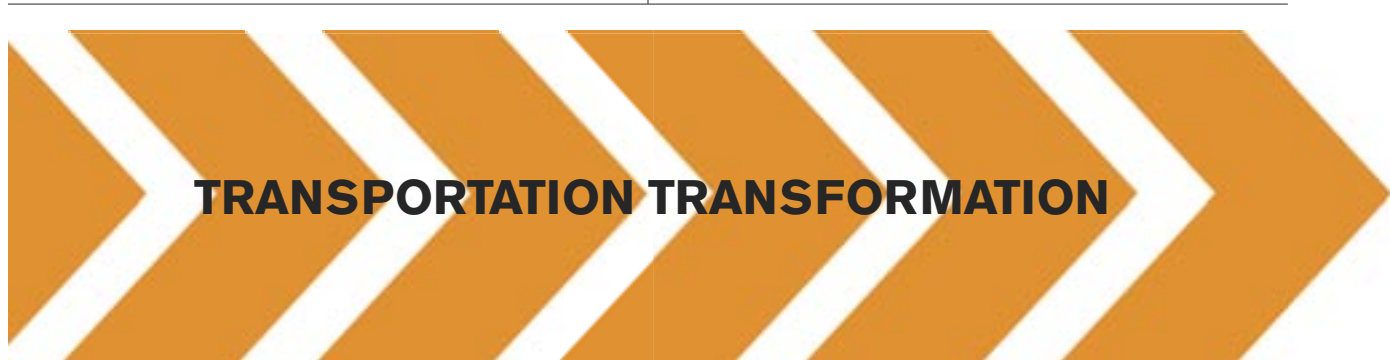
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where (gradually drawing government to invest more in the sector to make up for private-capital flight) or insist on terms that minimize their risk at the expense of the companies' needs.

The U.S. and Canadian governments are following European and Asian governments that have taken ownership stakes in “national champion” automotive companies. The results elsewhere have not been encouraging. When government turns the automobile into a political vehicle it may attain a short-term goal, such as preserving jobs at uncompetitive wages or in an uncompetitive location, or producing uneconomic cars that meet political goals. Over time, however, the societal obligations governments impose on firms hinder their ability to compete with profit-seeking companies. And even governments that do not seek to accomplish political goals through their involve-

ment in the auto industry contribute patient capital to risk-averse, conservative companies—with the result that caution prevails over innovation and the firms' market performance worsens.

With state ownership, the automotive industry truly becomes a political vehicle. It is a condition that works against the competitiveness of the firms owned by governments and hurts automotive manufacturing in countries that have ownership of more than one automaker, through the perception of favoritism. The other six trends flowed from positive developments within the industry, and governments should support them in the interest of an economically vibrant automotive sector. This trend, however, is a response to the weakness of the industry in North America, and prolonged state ownership is a trend that governments should resist.




The auto industry in North America began more than a century ago, and it redefined the future in the popular imagination. It was a disruptive innovation that revolutionized our cities, our work, and our horizons. We are still waiting for that flying car to go on sale.

The North American auto industry has been reinventing itself, and reimagining the automobile conceptually: from how it is powered, to how it is piloted, to how it performs, and how and where it is produced. The companies took risks to make the automobiles, and some companies still bear the scars of their mistakes.

The importance of motor vehicles to the citizen-consumer-taxpayers led governments to intervene in the auto industry and more often than not, government was a reactionary force, working against risky changes or trying to mitigate the effects of those changes when they could not be countered.

Today, at the beginning of the second automotive century, the trends that have transformed the auto industry in North America have positioned assemblers and suppliers to redefine the future in the popular imagination once again. The energy-efficient, self-driving vehicle produced along auto alley in the heart of North America by a horizontal supply chain of networked companies from around the world drawing innovation from across the economy will arrive in showrooms soon. Governments can hasten the arrival of this vehicle with a new approach to automotive industrial policies that supports the positive trends in the industry and eschews public ownership or favoritism.

The de-politicization of vehicles will allow the North American auto industry to grow, improve productivity, and in the process, generate the most important social benefits it can offer: prosperity, innovation, and a future that inspires the public imagination.



THE DETROIT ASSEMBLERS—GENERAL MOTORS, FORD, AND CHRYSLER—ARE GLOBAL COMPANIES WITH IMPORTANT OPERATIONS IN THE UNITED STATES. YET INTERNATIONAL ASSEMBLERS—TOYOTA, VOLKSWAGEN, NISSAN, HONDA, HYUNDAI-KIA, BMW, AND DAIMLER-BENZ —HAVE INVESTED IN NORTH AMERICAN PRODUCTION, CREATING U.S. JOBS DIRECTLY AND INDIRECTLY.

RECOMMENDATIONS FOR SUSTAINABLE AUTO POLICY

Government is important to the North American auto industry, setting the context for design, manufacture, and use of motor vehicles. U.S. automotive industrial policy is unsustainable on its current course, which is putting the government in the driver's seat for too many decisions best left to the market and taxpayers along for the ride, and with the liability for losses when firms fail to serve the market.

This study has explored the problem of *political vehicles* and how we got here. It has also considered the ways in which the North American auto industry has changed and is continuing to change, describing seven important trends that policymakers should keep in mind as they consider how to execute a U-turn to depoliticize vehicles and avoid a head-on collision with the direction of the global industry today.

What would a U-turn to sustainable auto policy look like? It should involve a change of direction in at least ten areas.

1. ADOPT A MORE INCLUSIVE DEFINITION OF THE NORTH AMERICAN AUTO INDUSTRY.

The Detroit assemblers—General Motors, Ford, and Chrysler—are global companies with important operations in the United States. Yet international assemblers—Toyota, Volkswagen, Nissan, Honda, Hyundai-Kia, BMW,

and Daimler-Benz—have invested in North American production, creating U.S. jobs directly and indirectly. The favoritism the government has shown to the Detroit automakers has been justified politically by their U.S. headquarters and unionized workforces. Yet while these companies have struggled, another set of carmakers has grown up alongside them that has less access to government help and yet employs U.S. workers at good wages and sells cars popular with consumers.

By widening the lens and adopting a more inclusive definition of the North American auto industry—companies that produce vehicles in North America—policy can do more to foster industry competitiveness and benefit U.S. workers.

2. SUPPORT SUPPLY CHAINS WITH EDUCATION AND INFRASTRUCTURE, RATHER THAN ATTEMPTING TO REARRANGE THEM WITH LOCATION INCENTIVES.

The days of vertical integration of production in the auto industry are gone, replaced by horizontal integration: supply chains linking tiers of suppliers to final assemblers in complex, multi-firm networks of production. These supply chains thrive by delivering components just in time for use at the next stage of production, thereby eliminating

the need for large inventories of parts. Delivering parts with such precision relies on advanced logistics.

To attract economic activity to a particular location, policy should support linkages in the manufacturing networks between suppliers and assemblers that are both local and global. Rather than bribe companies to invest in certain communities with tax abatements and location incentives, governments would do better to invest in good roads, rail lines, and reliable energy and communications infrastructure. Automotive manufacturing today requires increasingly skilled workers, so support for education and training to create a capable workforce will attract auto industry employers. Together, education and infrastructure would make connected communities able to participate in automotive supply chains, or at the very least, enable workers in those communities to commute easily to plants located within existing supply chains.

3 ■ SUPPORT AUTOMATION OF MANUFACTURING AND DRIVING.

Politicians often view automation as a job-killer, but the automation of manufacturing is the key to improving productivity and the future competitiveness of the North American auto industry. Wages and benefits have to be higher in North America to attract the skilled and talented workers that the auto industry needs. But when output per worker goes up because of applied automation, the labor costs associated with each vehicle can be comparable with that of cars and trucks made in low-wage low-automation countries. Automation has helped North American manufacturers to keep jobs in North America, despite fears that they would have to relocate production to low-wage countries.

Automation can provide an even bigger boost to economic productivity through the automation of driving. Millions of worker-hours are wasted every year in commuting, traffic congestion, and the search for parking. Distracted driving is a growing problem, caused in many cases by the perceived need of some drivers to be more productive while in transit, reading and sending texts and emails or just focusing on a phone conversation while behind the

wheel. By automating vehicle operation, carmakers can help us to recapture time lost to travel, but manufacturers will need regulatory approval to put self-driving cars on the road. Governments can contribute to the safe introduction of automated automobiles by thinking ahead to the regulatory challenges they will introduce.

4 ■ SHIFT TO RELIANCE ON MARKET INCENTIVES FOR ENERGY EFFICIENCY IN MOTOR VEHICLE PRODUCTION AND OPERATION.

Advanced logistics have helped the auto industry to squeeze waste out of nonproductive parts inventories throughout their supply chains and thereby improve productivity. No company wants to waste energy in the production process either, especially in a market characterized by rising energy costs. This market dynamic is sufficient incentive for most companies to improve their energy efficiency, from the manufacturing plants to the trucks that carry vehicles through the supply chain, and ultimately to dealerships. Government credits, incentives, and mandates only distort this dynamic and add to inefficiency.

Similarly, consumers have strong market incentives to lower the energy cost of operating their vehicles. Judgmental city dwellers may sniff at consumers who own minivans, pickup trucks, and sport-utility vehicles, but consumers buy these cars to meet specific needs for carrying capacity to support multi-child families, farms, and small businesses. Rather than punish consumers who have these needs with fuel tax hikes, or provide incentives for expensive hybrids that only a few upper-middle-class families can afford, government should trust the market. Consumers reluctant to purchase electric cars are not averse to aiding the environment; many worry about the high purchase prices, performance, or range of such vehicles. Let consumers choose, and they will weigh the energy efficiency of vehicle operations against other important considerations. When technology meets consumer expectations, it is not necessary for governments to subsidize its adoption. Fiscal sustainability, as well as market impact, should be concerns

for government interventions in the auto industry to promote energy efficiency.

5 COOPERATE WITH OTHER GOVERNMENTS TO BOOST REGULATORY EFFECTIVENESS AND EFFICIENCY.

Auto-industry supply chains connect suppliers and assemblers across national, state, and provincial borders. Regulatory jurisdictions overlap, and regulations often conflict regarding data required from firms. Small differences in standards prevent the same car from being approved for sale in all markets within North America, and the requirement of duplicative testing adds to costs for firms and ultimately, consumers. While the European Union, China, and other major markets offer a single, harmonized regulatory environment for manufacturing, the North American region is often fragmented.

The best automotive industrial policy in response is not deregulation, but smart regulation that shares information and coordinates across jurisdictions to reduce duplication and compliance costs. Through mutual recognition, standards convergence, synchronized permitting review processes, and even common paperwork, governments can create more efficient governance and improve compliance. The U.S. federal government is engaged in bilateral talks with Canada and Mexico to promote better regulatory cooperation, but states and provinces that have often acted more like rivals for auto-sector jobs and investment need to join in the effort to create a cooperative regulatory environment for automotive production in North America.

6 INCLUDE SUPPLIERS TO PROMOTE INNOVATION FROM MULTIPLE SECTORS.

Current automotive industrial policy aims to promote innovation, but to do so effectively it must support not only R&D, but also its dissemination. The pre-competitive re-

search performed with public money must be shared with *all* manufacturers that are part of the North American auto industry—including the major suppliers and the international assemblers that represent a significant share of the cars and trucks sold each year. Discrimination against suppliers and international assemblers, already mentioned, works against U.S. policy goals concerning innovation as well.

Automotive suppliers are not small companies, and together they employ thousands of U.S. workers. With the trend toward Tier 1 and Tier 2 suppliers producing automotive subsystems for assemblers according to the assembler's specified parameters, new technologies or innovations are often introduced in vehicle design by the supplier, rather than the final assembler. For too long, these companies have been forced to gain access to technology paid for with public funds through R&D "gatekeepers" working for the assemblers, whose decisions may have as much to do with supplier "promiscuity"—the fact that major suppliers may offer a technology to a rival assembler as well—as consumer benefit. Governments should get out of this bottleneck, promoting technology-sharing directly with suppliers throughout the supply chain.

7 RECOGNIZE NORTH AMERICA AS A PRODUCTION HUB IN A GLOBAL INDUSTRY, AND REDUCE CONTINENTAL BORDER BARRIERS.

One myth of globalization is that the minimum efficient scale of production for everything is shifting to worldwide. "Soon all our cars will be made in China!" goes the common concern. Yet the scale economies for automotive production are tied to transportation logistics as well as adaptation of vehicles to local consumer tastes and regulatory mandates. As a result, efficient automotive production is possible for markets of 200 million or 300 million drivers. So, despite globalization, automotive production continues in several regional hubs: Europe, China, India, and North America.

Government has a direct impact on the competitiveness of production hubs through compliance costs associated with border security. If a hub loses competitiveness because border-compliance costs rise, the market will attract more imported vehicles, and local production and employment in the auto sector will fall. Similarly, where governments cooperate on border security, cross-border production within a hub can grow, generate exports, and attract international assemblers to establish local production.

U.S. politicians, apparently failing to appreciate the international aspect of automotive production, have talked about the problems of Detroit automakers and domestic auto manufacturing as though they could be segregated from the challenges of global production overcapacity. Similarly, they have failed to see that the competitiveness of vehicle manufacturing in a state like Ohio is tied to the cost of border-security compliance and minute variations in regulations affecting supply chains that extend into Canada and Mexico. To keep this region attractive to the world's best automakers, governments need to update their understanding of global manufacturing in the automotive sector, recognize the competitive strengths of North America as a production hub, and work to reduce compliance costs associated with border security.

8 ■ DIVEST FROM GM AND CHRYSLER, AND REDUCE GOVERNMENT'S FINANCIAL ROLE IN THE AUTO INDUSTRY.

Government aid to General Motors and Chrysler was offered and accepted in an atmosphere of crisis and financial market turmoil. It has had immediate effects, but also lingering ones: falling confidence in government as a neutral regulator in the marketplace, companies producing vehicles to satisfy political goals rather than market needs, and the flight of private capital to other sectors, which will only increase so long as the government remains a part owner of these firms.

State-owned enterprises are a growing feature of the global economy, but in the auto sector, the combination of patient public capital and a risk-averse, capital intensive

industry has proven disastrous for firms and for competitiveness over time. It is a case of a cure that is worse than the disease, fostering a growing reliance by firms on government aid and growing public expectations of a financial or social dividend as a return on the investment of taxpayer dollars.

Without delay, governments should divest themselves from ownership and other stakes in the auto sector. Companies that risk bankruptcy as a result of poor decisions by their executives should have recourse to bankruptcy reorganization. Contrary to some of the political rhetoric, the first step in a bankruptcy is not liquidation of the company and termination of all its employees. This misleading charge was used first to justify intervention in the auto sector by the G. W. Bush administration and later, the Obama administration. It has since been used to claim credit for jobs saved, since ostensibly, without government help, General Motors and Chrysler would have faced total liquidation. The rhetorical inflation of costs and benefits associated with automotive industrial policy distorts the stakes for taxpayers and masks the ethical and moral implications for the rest of the industry, and the economy as a whole, of government intervention on behalf of certain firms.

9 ■ REGULATE WITHOUT FAVORITISM OR SOCIAL GOALS.

The U.S. federal government has favored the Detroit assemblers over international assemblers and suppliers, and unionized workers over nonunion workers. Starting in the late 1960s, the government began to regulate firms to achieve societal goals, from increasing the number of manufacturing workers with health care and generous pensions, to generating employment, reducing environmental problems, and making traffic accidents rarer and less deadly. Politicians promised taxpayers greater social “dividends” from auto manufacturers as the cost of supporting the industry grew less popular.

In the process of shifting U.S. automotive industrial policy to favor some firms and some social goals, and using federal funds and regulatory mandates to do so, the gov-

ernment gradually weakened its favorites, which have struggled in a competitive industry with politically mandated additional costs. This limited what they could do to contribute to the government's political objectives, while increasing their dependence on government for survival. Ultimately, the federal government paid more and demanded more, but got less and less in return.

Governments should seek a more neutral policy stance toward the participants in the North American auto industry, applying rules evenhandedly. The most effective way to increase the collateral social benefits of North American automotive production is through the sector's economic growth. Regulations aimed at passenger safety or the promotion of innovation and other important public concerns should show no favoritism to firms with domestic headquarters or at the assembler's end of supply chains. The public purpose in regulation should be the

public good, the good of vehicle consumers defined to include their health and safety, and the affordability of personal transportation.

10. FOCUS ON GROWTH, PRODUCTIVITY, AND COMPETITIVENESS.

Above all, U.S. government policy should focus on restoring the U.S. auto industry's competitiveness with other production hubs around the world. Those firms that improve their productivity will be competitive and grow, and this growth will benefit the United States through new investment, tax revenue, and economic activity—purchases



from firms across the economy and affordable transportation for individuals and businesses.

The North American auto industry relies on supply chains that extend into Canada and Mexico. Policy decisions on infrastructure, regulation, and border security should support these supply chains by improving the smooth flow of information, goods, and services and lowering compliance costs associated with governance.

In a competitive global auto industry, innovation is demanded by the market. Governments can support industry competitiveness by allowing markets to fuel innovation while ensuring that government policy supports the transfer of publicly funded research to firms across the industry, and regulation encourages the introduction of innovative technologies.

It does not matter whether the firm that invests in North America employs U.S. workers directly or indirectly, and contributes to U.S. economic output is headquartered in Europe or Asia. It also makes no difference whether the firm operating in the United States is an assembler with a global brand name or a less famous supplier. The economic activity from such companies is local and generates local benefits.



Governments can turn automotive industrial policy around and help the North American automotive industry to prosper through a second automotive century. The key to a sustainable policy over time is lowering costs of governing this sector for government, lowering costs producing in this sector for auto companies, lowering the costs of enjoying personal transportation for consumers, and lowering the risk that taxpayers will bear future financial burdens for the sake of rescuing the North American auto industry.

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Christopher Sands is a Hudson Institute Senior Fellow and a Professorial Lecturer at the Johns Hopkins University School of Advanced International Studies. He was a contributor to *The Next Economy: Economic Recovery and Transformation in the Great Lakes Region*, a project of the Metropolitan Policy Program at the Brookings Institution, for which he co-authored (with Thomas Klier) a policy advisory memorandum, “The Federal Role in Auto Sector Innovation,” published by Brookings in 2010. His doctoral dissertation (Johns Hopkins University, 2009) examined firm-state relations in the North American auto industry in negotiation of an automotive trade regime by the United States, Canada, and Mexico. From 2006 to 2009, he served as a member of the Advisory Committee to the U.S. Section of the North American Competitiveness Council, organized by the U.S. Chamber of Commerce to consult with U.S. government officials in negotiations under the North American Security and Prosperity Partnership. Prior to that, he served as co-director (with Sidney Weintraub) of a major study of *The North American Auto Industry under NAFTA* at the Center for Strategic and International Studies, from 1996 to 1998. Michigan Governor James Blanchard appointed him to serve on the Governor’s Task Force on International Trade from 1990 to 1991.

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ENDNOTES

1. Brad Plumer, "Auto Bailout Price Tag Rises to \$25 Billion. How High Will It Go?" *Washington Post*, August 15, 2012, <http://www.washingtonpost.com/blogs/ezraklein/wp/2012/08/15/auto-bailout-price-tag-rises-to-25-billion-how-high-will-it-go/>.
2. Johnston (1997:40–45) provides an excellent discussion of the interaction of corporate average fuel economy (CAFE) standards and trade protectionism in the 1980s and 1990s.
3. Thomas (1997:94–134) reviews several cases of government bargaining with automotive firms over plant locations and the use of subsidies, tax incentives, and other tools in Canada, the United Kingdom, and the United States.
4. For details on proposed and adopted measures to improve the environmental impact of automobile manufacturing, see McCarthy (2007, 153–175); regarding gasoline efficiency see Johnston (1997, 13–32); regarding labor relations, see Green (1996, 161–207).
5. The term "Detroit assemblers" is used here to refer to the U.S.-headquartered manufacturers who assembled vehicles within the municipal boundaries of the city of Detroit throughout the twentieth century, known at various times as the Big Four, the Big Three, and even the Big Two. The term distinguishes assemblers from suppliers, although at times the same firms were active in component production as well as assembly. It also differentiates the Detroit assemblers from the Japanese and European assemblers, referred to as international assemblers, which established production facilities in North America.
6. Keller (1989) documents General Motors ill-fated investments in automation in the 1980s.
7. For a detailed account, see Ingrassia (2010) and Rattner (2010). For the best summary of the impact and aftermath, see Klier and Rubenstein (2012).
8. For more on this process, see Klier and Rubenstein (2008).
9. On the question of global auto-industry overcapacity, the *Economist* (January 13, 2011) reports that "the car industry can produce 94 million cars a year, against global demand of 64 million."

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