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IMPACT OF TARIFFS ON THE U.S. AUTOMOTIVE INDUSTRY

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BEFORE THE

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IMPACT OF TARIFFS ON THE U.S. AUTOMOTIVE INDUSTRY

WEDNESDAY, SEPTEMBER 26, 2018

U.S. SENATE,
COMMITTEE ON FINANCE,
Washington, DC.

The hearing was convened, pursuant to notice, at 10:30 a.m., in room SD–215, Dirksen Senate Office Building, Hon. Orrin G. Hatch (chairman of the committee) presiding.

Present: Senators Grassley, Portman, Toomey, Scott, Cassidy, Wyden, Stabenow, Cantwell, Menendez, Carper, Cardin, Brown, Casey, Warner, and McCaskill.

Also present: Republican staff: Jeffrey Wrase, Staff Director and Chief Economist; Nasim Fussell, Deputy Chief International Trade Counsel; Rory Heslington, Professional Staff Member; and Shane Warren, Chief Trade Counsel. Democratic staff: Joshua Sheinkman, Staff Director; Elissa Alben, Senior Trade and Competitiveness Counsel; Roberta Daghir, Detailee; Greta Peisch, International Trade Counsel; and Jayme White, Chief Advisor for International Competiveness and Innovation.

OPENING STATEMENT OF HON. ORRIN G. HATCH, A U.S. SENATOR FROM UTAH, CHAIRMAN, COMMITTEE ON FINANCE

The CHAIRMAN. The committee will come to order.

I want to say "good morning" and "welcome" to every one of you here today to this hearing on the impact of tariffs on the U.S. auto industry. In particular, I would like to welcome our witnesses and thank them for joining us today.

I intend to focus this morning on the investigation that was self-initiated by the Department of Commerce under section 232 of the Trade Expansion Act of 1962 to determine whether imports of automobiles and automotive parts threaten to impair our national security. Many of us on the committee have already expressed our concerns about the administration's heavy reliance on tariffs.

In June, Secretary Ross appeared before this committee to explain the Department's finding that steel and aluminum imports threatened to impair our national security. As a result of that determination, the United States is currently imposing tariffs of 25 percent on steel products and 10 percent on aluminum products. Combined, these tariffs directly affect almost $50 billion worth of goods, while also affecting many billions of dollars more in downstream goods.

These tariffs cause American manufacturers and farmers to pay more to conduct business and consumers to pay more to buy these

things. One industry that has been harmed by the steel and aluminum tariffs is here before us today—the auto industry.

The American Automotive Policy Council estimates steel and aluminum tariffs will cause a $400 per-car increase. Auto suppliers and consumers are already suffering from section 232 tariffs. That is one reason I was stunned that on May 23rd, the Department of Commerce initiated another investigation under section 232, this time into the national security threat from automobile and auto parts imports. This investigation covers more than $200 billion worth of trade, which is four times larger than that under the steel and aluminum investigations combined.

For most American families, a car is one of the most expensive purchases they make, often second only to the purchase of a residence or home. It is a significant financial commitment for most families, often paid for with debt. And I am shocked that anyone would consider making it more expensive. If the Department of Commerce were to recommend a 25-percent tariff on cars, it would effectively be recommending raising the cost of an average imported car for an American family by as much as $6,400.

According to the American Automotive Policy Council, if a 25-percent tariff is applied to auto parts, the cost to manufacture a passenger vehicle domestically would also increase by about $2,000. That is why I call tariffs a tax on American families. The Tax Foundation estimates that auto tariffs could result in a $73-billion tax increase on American consumers and businesses, erasing some of the benefits of tax reform passed earlier this Congress, something we are very proud of and pleased with.

These taxes will hurt American families and put American jobs at risk. The Peterson Institute calculates that auto tariffs could cause 195,000 workers to lose their jobs. That is nearly 200,000 people out of work. And that is before other countries retaliate, which could put over 600,000 U.S. jobs at risk.

These tariffs could cost the U.S. auto industry up to 2 million lost vehicle sales annually. And it cannot be overlooked that international automakers and dealers significantly contribute to our U.S. economy. Together they accounted for 47 percent of all U.S. vehicle production in 2017, throughout 31 manufacturing facilities, generating 2.47 million jobs in the United States. And this is just the automakers.

Motor vehicle parts suppliers are the largest sector of manufacturing jobs in the United States. Suppliers directly employ over 870,000 Americans, and nearly 8,000 in my home State of Utah alone. Direct employment by parts suppliers has increased 19 percent in the last 5 years, and tariffs threaten the sector's continued job growth.

In short, the U.S. auto industry is a major driver of the U.S. economy, supporting approximately 10 million American jobs and accounting for 3 percent of our GDP. Without question, any tariffs that are imposed will have a negative impact on the U.S. auto industry and our economy.

Our focus should be on building on the benefits from our historic tax reform achievement earlier this Congress. Our trade policy should strengthen our relationships with our allies while targeting

China's most harmful trade practices. Tariffs on autos and auto parts are not going to help us achieve any of these things.

With that, I am going to turn to Senator Wyden for his comments.

[The prepared statement of Chairman Hatch appears in the appendix.]

OPENING STATEMENT OF HON. RON WYDEN, A U.S. SENATOR FROM OREGON

Senator WYDEN. Thank you very much, Mr. Chairman, and I appreciate your scheduling this hearing.

Mr. Chairman and colleagues, the President has made it a practice to get up in front of the television cameras, tout new trade deals, reap splashy headlines, but those announcements have been consistently hollow and the results underwhelming.

This week's announcement about the U.S.-Korea Trade Agreement says it all. The administration touts it as a massive overhaul of a trade deal that they claim had previously cost hundreds of thousands of American jobs. But if you search carefully for significant changes in this agreement, concrete wins that will deliver red, white, and blue jobs on the scale the President has talked about, you are going to come to the conclusion that there is no "there" there. A recent *Bloomberg News* article summed up the U.S.-Korea Free Trade Agreement very bluntly, and I am just going to quote here: "Trade analysts say changes to the South Korea agreement were largely cosmetic."

There is no evidence that the renegotiation will actually result in an increase in the number of American-made cars sold in South Korea. In at least one case, the changes are not even cosmetic. They simply do not exist at all.

Earlier this year, the White House even went on record announcing a deal with Korea on currency manipulation. That is nowhere to be found in the final text or anywhere else. So, when it comes to South Korea, the Trump administration over-hyped and underdelivered. And my view is, that is their record on trade in microcosm.

In recent months, the President has threatened to impose sweeping tariffs on automobiles. Now, if the administration comes up with a coherent strategy that is actually going to produce more high-paying jobs here at home and greater access for American-made cars and markets overseas, I sure want to know about it. But where things stand now, it looks like this may just be more haphazard bluster.

Furthermore, the President's threats to impose auto tariffs are already doing harm at home, stifling investment, likely costing jobs in the long run, and raising costs for American consumers. In one case, Ford announced that it decided not to sell a particular model of car in the United States because of the looming threat of tariffs. So there is the start of Americans having fewer choices when they go out and visit the showrooms.

One last point—and one I feel very strongly about—the President believes he has the authority to impose auto tariffs because the Congress gave it to him. So I want to put the administration on notice this morning. Under the Constitution, it is the Congress that

is in charge of trade and in charge of tariffs. In the absence of a real strategy and tangible wins on trade, perhaps it is time for the Congress to think about reclaiming this authority.

I want to thank our witnesses for coming. This is an important opportunity for the Finance Committee to draw a distinction between two different approaches to trade and autos. The approach I am in favor of is one that is based on concrete well-planned strategies that are actually going to create high-skill, high-wage auto manufacturing jobs and deliver for our workers. But in my view, the administration is delivering—and it's pretty much right out of their playbook—a lot more chaos. It is trade policy dictated by early morning tweets and bluster, and it may end up costing jobs and doing more harm than good.

Mr. Chairman, this is an important hearing, and I thank you for scheduling it.

The CHAIRMAN. Thank you, Senator Wyden.

[The prepared statement of Senator Wyden appears in the appendix.]

The CHAIRMAN. I would now like to introduce each of our witnesses who have graciously agreed to be here today to talk to us and answer our questions. I will begin with Mr. Michael Haughey, who is currently the president and CEO of the North American Stamping Group. Mr. Haughey joined the North American Stamping Group in 1990 as a partner. He encouraged and led the company's NAFTA expansion, increasing its manufacturing footprint in the automotive market. Under Mr. Haughey's guidance, the company continued to expand its operations in the United States and North America.

So we welcome you to the committee, Mr. Haughey.

We will now welcome Mr. Rick Schostek. Mr. Schostek is currently the executive vice president of Honda North America. Mr. Schostek joined Honda in 1987 as an attorney and continued to work within the company in various leadership roles until his promotion in 2012 to senior vice president. He serves on a number of boards, including for Fuel Cell System Manufacturing LLC, Global Automakers, and the National Association of Manufacturers.

I want to thank you for coming to speak with us today. And we appreciate your time.

Now we turn to our third witness, Mr. Steve Gates. Currently, Mr. Gates is the dealer principal at Gates Auto Family in central Kentucky and Indiana. Mr. Gates began his career as a lot attendant at his father's car dealership in 1965. Since then, Mr. Gates started his own company, worked for BMW in financial services and as a used car manager, and now has realized his ambition of becoming a new car dealer. Mr. Gates serves on the American International Automobile Dealers Association board and the Toyota National Dealer Council.

Mr. Gates, we are grateful to have you here and want to thank you very much for being here today.

Our fourth witness today is Mr. Josh Nassar. Mr. Nassar is currently the legislative director of the United Auto Workers. Before this position, Mr. Nassar served as the assistant director of legislation for the Service Employees International Union or the SEIU, one of the most important unions in the world, really. Prior to his

work at the SEIU, Mr. Nassar had been the vice president for federal affairs at the Center for Responsible Lending, and also served as Legislative Assistant for Congresswoman Jan Schakowsky from Illinois.

Mr. Nassar, we thank you for joining us here today as well.

Finally, we have H. David Britt. Mr. Britt is the vice chairman of the Spartanburg County Council. In his 25 years on the Spartanburg County Council, Mr. Britt has led numerous economic development efforts, resulting in the county having the highest international investment per capita in the Nation in recent years.

So, Mr. Britt, we are grateful to have you here and look forward to your testimony.

Let us begin over here with our friend on our left.

STATEMENT OF MICHAEL HAUGHEY, PRESIDENT AND CEO, NORTH AMERICAN STAMPING GROUP, PORTLAND, TN

Mr. HAUGHEY. Good morning, Chairman Hatch, Ranking Member Wyden, and the other members of the committee. My name is Michael Haughey, and I am the president and chief executive officer of the North American Stamping Group.

The North American Stamping Group is a Tier 2 automotive metal stamper and assembler founded back in 1978 that manufactures for both the new original equipment market, as well as the aftermarket. We produce components and assemblies for passenger car, light truck, and commercial vehicles. Our sales have grown annually at a compounded rate of 18 percent for the last 8 years. We are one of the largest Tier 2 suppliers, with annual sales approaching $450 million.

We have 13 facilities in the NAFTA region. Over the last decade, we have deployed nearly $200 million in capital spending for new facilities, expanded facilities, new equipment, technologies, processes, and acquisitions. This investment has allowed us to open up significant capacity throughout the entire NAFTA region to support future growth for our strategic customers.

Our 13 facilities encompass 1.6 million square feet. Ten of the facilities are production facilities, two are research centers, and one is the sales office. Specific to the United States, we have 10 facilities: one in Michigan, five in Ohio, one in Indiana, and three in Tennessee, employing 1,500 team members. NASG is part of a vibrant supply chain, but keep in mind this supply chain depends on a global market to thrive in the U.S.

We applaud the administration and the Republican Congress for the tax cuts. We applaud the administration for the decrease in business regulations that we have enjoyed. We applaud the administration for attempting to level the playing field on trade. However, we do not believe tariffs are the right approach to promote American competitiveness. Our industry is in turmoil. Last year, we were on a bridge from the internal combustion engine to the electric car. However, in the last 6 months, we have come off the rails. Our turmoil includes the administration-proposed changes on CO_2 regulations that are currently unresolved and the administration-proposed changes on CAFE regulations that are currently unresolved. Other factors include section 232 steel and aluminum tariffs already implemented, the other 232 tariffs proposed, section

301 tariffs proposed that since this time have now come into effect, what looks like an inevitable trade war, rising oil prices, rising interest rates, auto manufacturers profits decreasing, electric automobile tax credits expiring, the car discount that is reaching unsustainable levels, and increased forecast of a recession based on the preceding points.

We thank the committee for holding a hearing today on the impacts of tariffs on the U.S. auto industry. The industry is already feeling the effects of tariffs on steel and aluminum. Since the start of the current administration, steel has risen steadily with the ongoing talks of steel tariffs. The market prices peaked up 50 percent from $600 per ton for hot-rolled steel up to $900 per ton today with the implementation of tariffs on March 23, 2018.

Potential outcomes of steel tariffs and the resulting steel price increases include trade partner retaliation—which we have experienced—and a forecast of vehicle prices increasing by $2,000 for U.S.-made and $7,000 for imported vehicles. It is estimated that suppliers like ourselves will have to absorb a third of the steel increases, thereby reducing our earnings. These reduced earnings will result in less technology spending, less capital spending, and fewer wage increases. This will crimp consumer confidence, leading 60 percent of economists to forecast a recession in 2020, which will reduce automobile sales—an estimated decline of 15 percent, resulting in 750,000 to 1.25 million American automobile workers potentially losing their jobs.

From an NASG standpoint, we have experienced steel price increases exceeding $10 million annually. So we can believe the car price increases that I noted above. Our share of steel increases, which we are unable to pass on to our Tier 1 customers and the original equipment manufacturers, has a negative consequence to our business. Our actions have included reducing overtime, putting on hold and dramatically paring down all open team member hiring, putting on hold and dramatically paring down capital spending, and reducing all discretionary spending.

In summary, I have suspended growing our business until uncertainty in the industry is resolved. Obviously, our actions due to the tariffs have a negative effect on our team members, our suppliers, and our surrounding communities. The sentiment in the industry is similar to 2008 just before the Lehman demise. Our business plans include bracing for a 2019–2020 recession.

I thank you for the opportunity to testify today, and I look forward to your questions.

The CHAIRMAN. Thank you, sir.

[The prepared statement of Mr. Haughey appears in the appendix.]

The CHAIRMAN. Mr. Schostek, we will turn to you now.

STATEMENT OF RICK SCHOSTEK, EXECUTIVE VICE PRESIDENT, HONDA NORTH AMERICA, INCORPORATED, MARYSVILLE, OH

Mr. SCHOSTEK. Thank you, Chairman Hatch, Ranking Member Wyden, and members of the committee. We appreciate the opportunity to testify today. My name is Rick Schostek. I am executive vice president of Honda North America. I am here on behalf of

Honda and our 31,000 associates in the United States. But I share the concerns about the potential impact of auto tariffs with all sectors of the auto industry, including domestic and international automakers, suppliers, dealers, and aftermarket companies. The auto industry is not seeking protection and is certainly not asking for additional tariffs which will harm manufacturing in the U.S., harm our workers, and, most importantly, harm U.S. consumers.

Let me give you a brief history of Honda in the U.S. and some statistics. Prior to 1982, when Honda began building the Accord in Ohio, every vehicle we sold in the U.S. was built in Japan—100-percent imported prior to 1982. Since then, a great deal has changed. We have produced more than 25 million vehicles in America. And last year, of the vehicles we sold in the U.S., 66 percent were built in our U.S. factories, 20 percent came from Canada, 7 percent from Mexico, 4 percent from England, and finally—yes, finally—3 percent from Japan. We have gone from 100-percent import to 3 percent from Japan.

Our history in America highlights two factors that are critical to attracting and retaining investment: stability and maintaining a welcoming business environment. So let us start with stability.

The process of developing a new vehicle takes several years. Each vehicle represents hundreds of millions of dollars of investment and advanced planning. This is where disruptions like new taxes in the form of tariffs come in. These taxes represent an addition to the cost of building a vehicle. These costs must either be passed on to our customers or borne by manufacturers. And this diverts money intended for other critical purposes, including investment in future technologies and capital improvements.

The second critical factor is the need for a business environment that welcomes manufacturing. The U.S. has long worked to ensure that manufacturers have an environment that brings the best reasonably priced products to consumers. However, America is now experiencing a fundamental change in the philosophy of open markets, and it is a change that threatens our competitiveness. Tariffs inevitably lead to unanticipated harmful effects. For example, let us talk about the steel tariffs that are now in effect.

More than 90 percent of the steel we use to produce our vehicles here is sourced here in America. So we are paying direct tariffs on the less than 10 percent that we import. But even more significantly, domestic steel manufacturers have raised their prices, and this has burdened us with hundreds of millions of dollars in new costs. So, even though we overwhelmingly source steel in the U.S., we are paying as if we are importing. Does that make sense? And on top of that, we are dealing with retaliatory tariffs on our exports.

In a similar vein, Honda's North American-built vehicles have high U.S. content, but every manufacturer—no matter which one—that builds vehicles does it with both domestic and globally sourced parts. A new tax on imported parts would increase the price of every vehicle built in U.S. factories. And similarly, a 25-percent tariff on imported vehicles would depress sales. The industry would end up purchasing less from U.S.-based suppliers, resulting in U.S. job loss. It is estimated that the tariffs will increase the price of a new vehicle up to $7,000. Industry-wide, these tariffs will hurt

not only jobs in States with auto plants, but wherever there are parts manufacturers, auto dealers, service outlets, and other businesses that serve our industry. In other words, tariffs impact every State in America.

As the price of a new car grows beyond the reach of more Americans, the price of used vehicles will also rise, as will the cost of service parts. These tariffs will ripple across all aspects of the auto industry and the broader economy. They will harm American consumers and American workers.

The auto industry is already dealing with the impact of the steel and aluminum tariffs. Now we face the addition of new auto and auto parts tariffs—and tack on the pending changes to NAFTA, and the cumulative impact on the industry would be unprecedented.

Mr. Chairman, we have seen positive improvements that are helpful to manufacturing, including the historic tax bill which came from this committee and efforts to streamline regulation. We appreciate efforts to remove barriers to trade everywhere, but imposing tariffs in the U.S. will put American workers, American consumers, communities, and the American economy at risk. And for this reason, Honda has joined every automaker doing business in the U.S. in opposing new tariffs on automobiles and auto parts.

I look forward to taking the committee's questions, Mr. Chairman.

The CHAIRMAN. Thank you, sir.

[The prepared statement of Mr. Schostek appears in the appendix.]

The CHAIRMAN. Mr. Gates, you are next.

STATEMENT OF STEVE GATES, DEALER PRINCIPAL, GATES AUTO FAMILY, RICHMOND, KY

Mr. GATES. Good morning, Chairman Hatch, Ranking Member Wyden, and members of the Finance Committee. Thank you for having me here today. My name is Steve Gates, and I am a third-generation car guy. My grandparents, beginning in 1915, would drive from Loogootee, IN to buy one Dodge from the Dodge Brothers and then return to Loogootee to sell it out of a livery stable.

My dad was also a car dealer. He became a Chrysler dealer in the early 1950s and a Chevrolet dealer in 1958. Then in 1970—against all odds and against all advice, including my mom's—my dad bet everything on a new brand, Toyota. My grandparents and dad took unbelievable risks, but they knew with hard work, dedication, a plan, and a little luck, anything was possible.

I never wanted to do anything other than become a car dealer. From the seventh grade through college, I worked in the parts department, the service department, the body shop, and I washed a lot of cars. My life's dream became reality in 1989, when a great man, Bob McCamy, helped me become a Toyota dealer in Richmond, KY. Today, we sell Toyota, Honda, Lexus, Kia, Hyundai, Nissan, and Audi. And we employ over 500 people in Indiana, Kentucky, and Tennessee. Now a fourth generation, my daughter MacKenzie, has entered the business with us.

I have given you my background just so you know that I really understand the retail car business. It is what I love. But why am

I here? Because I was stunned to read that the U.S. Department of Commerce opened an investigation into whether imported cars and automotive parts pose a threat to our national security. So I had to come to Washington to fight for my industry, to fight for my family.

I used to think if I worked hard and I kept my expenses in line and took care of my customers, that I could at least get by. But if a 25-percent tax is levied on imported vehicles and parts, it will not matter how good a car dealer I am—people cannot or will not buy cars. They would just be too expensive.

Affordability concerns are not new to our industry. Over the past 20 years, the average cost of a car has risen 35 percent while household income has grown only 3 percent. And let me dispel a popular myth. All cars sold in the United States contain imported parts. So the cost of all cars will go up.

When a customer visits our dealership, among the first questions are, how much is the car and what is the payment? Well, rising interest rates have already raised monthly payments. And I found that the Center for Automotive Research estimated that under a 25-percent tariff, the price of a new car could rise by as much as $7,000. According to Kelley Blue Book, the average transaction price on a new light-duty vehicle in 2017 was $36,000. Again, a 25-percent tax added to the already rapidly rising price would put a new vehicle out of reach of many, if not most American families.

Those not in the market for a new car will also be affected. The tariff on parts would drive up the cost of maintenance and repairs. According to the Auto Care Association, each U.S. household will pay an extra $700 per year in increased ownership costs. It gets even worse. As the cost of your car goes up and the cost of parts goes up, the cost of insuring your car goes up. The auto insurance industry testified this summer that under a 25-percent tariff, personal insurance premiums will rise by $3.4 billion.

From deregulation to tax reform, the administration and Congress have built a healthy environment for businesses large and small. To maintain full employment, an atmosphere for business investment is crucial to creating a strong economy. Dealers are benefiting from this economy and see new opportunities, but we know that the possible 25-percent tariff will negatively affect our ability to operate and provide work for thousands of Americans.

There are 16,802 franchise car dealers in the United States. We directly employ over 1.13 million American workers. We also account for 1.27 million indirect jobs. The average salary at a dealership is almost $58,000. These are great American jobs that grew out of global trade. The car study that I mentioned earlier predicts that new car dealerships would see a loss of at least 117,000 jobs and a loss of as much as $66.5 billion in revenue if a 25-percent tariff is implemented.

Clearly, I am not an expert on politics or global security, but I know cars, and I know the cars and trucks I sell, the services I provide, and the taxes I pay are not a national security threat. The men and women who show up to work every day, they are not threats to national security either. These proposed tariffs are the real threat and the real danger to our country and our economy.

Thank you.

The CHAIRMAN. Thank you.

[The prepared statement of Mr. Gates appears in the appendix.]

The CHAIRMAN. Mr. Nassar?

STATEMENT OF JOSH NASSAR, LEGISLATIVE DIRECTOR, UNITED AUTO WORKERS, DETROIT, MI

Mr. NASSAR. Thank you for the opportunity to testify today on behalf of our president, UAW president Gary Jones, and our 1 million members and retirees. The vast majority of our members rely directly on the success of the U.S. auto industry, not just our active members, but our retirees as well. So this is a topic of great importance to us. And we really welcome this discussion and thank the committee for having it.

From our point of view—I just want to back up for a second and talk about, well, what is the problem we are trying to fix? In our view, the problem is that we have lost many manufacturing jobs, millions over recent years, and that wages and working conditions for autoworkers have dropped considerably; in fact, for manufacturing workers across the board.

You see a lot of manufacturers that do not even directly hire workers anymore. They use temp agencies to hire their workforce. We see companies that spend millions of dollars to try to intimidate workers into not joining unions. There are problems that have to be fixed as part of the solution here.

We also think we have to look at these policies in a holistic way. We need to have tax policies, for example, that complement trade policies, and we have concerns with provisions in the tax code that actually give greater incentives and benefits to companies that create jobs overseas rather than in the United States. So there are a lot of problems that have to get fixed, including also investing in the workforce. We are falling behind in that as well.

Now, let us talk about trade. So, our fundamental view is that our trade model needs to be changed. If you look at our free trade agreements, we have never had a labor chapter that has effectively improved the standard for workers in other countries. In NAFTA, there is no enforceable labor chapter, but workers in all three countries, auto workers, have seen their wages drop since NAFTA. And what we have seen happen in the case of Mexico is, auto manufacturers and suppliers, dozens and dozens, close shop in the United States then build the exact same product they used to build in the United States and ship it back to the U.S., with the vast majority of auto products from Mexico going to the United States.

This is not a good arrangement for workers in Mexico or the U.S., because in Mexico, they do not have the right to collectively bargain most of the time. They have company unions, and workers rarely even get to see the contracts that they are obliged to follow.

Trade is not a black-and-white issue for us. Of course, we are for trade. Our members build products that are exported around the world, and it is very important that we have functioning, good trade markets. And that is why we think that going back to an actual trade model and trade agreements is an important thing to do. So, we think that is an important part of this.

Now, when it comes to tariffs, we think that at times tariffs can be an appropriate tool to address a problem, but they do not con-

stitute a comprehensive strategy in and of themselves. Looking at the 232—and I want to remind everyone that on the auto 232, we are just having a study at this point. Nothing has actually been implemented. Nothing has happened.

We think the idea of having a study and examination about the loss of a lot of domestic capacity makes sense, and not just now but for the future. For example, we are losing the battle to build electric cars, which are going to be the vehicles of the future. We do not have enough capacity for lithium ion batteries or semi-conductors—and this could provide a situation where in the future, you see our share of the market really drop greatly.

So, we do think the examination is worthwhile, but that does not mean that we are naturally going to endorse whatever the administration decides to do, because we think a targeted approach is needed to address direct problems. Having something that would kind of apply across the board without any real strategic sense does not make sense and would not be a good idea, so we are keeping an open mind on the auto 232s.

I want to emphasize that when we are looking at our competitiveness in the auto industry, we are falling behind. We do not have a comprehensive strategy. The reality is, countries like Germany are spending a lot more resources and energy in trying to ensure they make the vehicles of the future. And we are not doing that. So, there are a lot of problems we need to fix. We think that trade tariffs can be part of the solution, but there is an awful lot to be done.

And again, we really thank the committee for the opportunity to testify and share the views of the United Auto Workers, and I look forward to answering your questions. Thank you very much.

The CHAIRMAN. Well, thank you, sir.

[The prepared statement of Mr. Nassar appears in the appendix.]

The CHAIRMAN. Mr. Britt, we will finish with you.

STATEMENT OF H. DAVID BRITT, CHAIRMAN, SPARTANBURG COUNTY ECONOMIC DEVELOPMENT COMMITTEE, SPARTANBURG, SC

Mr. BRITT. Thank you, Mr. Chairman, Senator Wyden, the rest of the committee. It is my honor to present to you today.

In Spartanburg, SC, we build things. For over 100 years, our mills were the heart of American textile manufacturing. In the 1990s, our once-bustling mills begin to shutter and close. More than 25,000 workers found themselves unemployed, and our county was changed forever.

If you visit Spartanburg County today—and I encourage you to do so—you will see a community that is the economic envy of many States, and indeed, many other countries. The transformation began in 1992 when BMW decided to build its U.S. manufacturing facility in Spartanburg, SC. In the last 26 years, BMW has invested over $9.3 billion in Plant Spartanburg and has produced over 4 million vehicles, and over 70 percent of those are shipped all over the world. BMW employs over 10,000 associates at Plant Spartanburg, and they produce an astonishing 1,450 vehicles every day.

This has helped South Carolina become the Nation's leader in the export sales of completed passenger vehicles, accounting for 16 percent of the total U.S. market. In fact, South Carolina's automotive footprint is so robust that automotive suppliers are in 37 of our 46 counties, employing over 66,000 South Carolinians in our 400 plants.

A 2017 study concluded that for every 10 jobs BMW directly creates at its Plant Spartanburg, 90 more are created as a direct result elsewhere in the U.S. Just last year, the automaker announced plans to invest an additional $600 million in Plant Spartanburg and create 1,000 more jobs. That decision is a testament to the quality of the company and their associates.

Through our success with BMW, Spartanburg County learned we could complete and win on an international stage. Our culture of craftsmanship, which once saw workers spinning and weaving, translated to the economy of innovation. Today, more than 200 foreign-owned companies from 25 countries operate in Spartanburg County, including Michelin, Alcoa Fujikura, Toray, and Kobelco. And less than 30 percent of those companies are automotive-related.

Companies such as Volvo, Mercedes, and Boeing now call South Carolina home, employing thousands and building products used around the world. In 2017, South Carolina won 157 economic development projects, representing $5.24 billion in capital investments and creating nearly 18,500 jobs. And more than half of that investment came from foreign countries. Time and time again, I hear a common refrain from these companies: South Carolina is a handshake state—a place where one's word still means something, and where fairness and partnerships are valued.

In a global economy, it is important to be fair. That is why I initially supported President Trump's efforts for equitable trade agreements with countries. However, such arrangements should not create less incentive for American companies to look for innovative ways to increase their productivity and make products more efficiently. As evidence, look no further than U.S. steel manufacturing. Since March of this year, the price of U.S. steel has increased 23 percent on the heels of President Trump's tariffs. Instead of innovating or even raising prices slightly, U.S. steel manufacturers have increased their prices to just shy of the imported steel price.

This marked price increase will cascade to our consumers, whether they realize it or not. Large construction projects built with precast concrete and steel beams may suddenly seem too costly and be shelved. Infrastructure improvement projects, the roads and bridges crucial to so many, may be delayed or canceled.

This is a perfect example of why government should not use tariffs to pick winners and losers. We have over 100 years of history proving this does not work, from the sugar tariffs of the 1880s to the chicken tariffs of 1963, where in January of 1964, the United States placed a 25-percent tariff on all imported trucks, and it is still in place today, 54 years later. Every truck owner in the United States is paying substantially more for their truck because of this tariff, including me.

The prices on everything from toothbrushes to groceries and cars will rise in 2019, if not sooner. These economic policy decisions do not exist in a vacuum. The impact will not only be felt in boardrooms and capitals but will be passed on to consumers across this country and the world.

I keep hearing, "Be patient. The President has a plan." Well, our trading partners and our citizens are running out of patience. They are asking themselves questions, because their lives and their futures are at stake. Our neighbors are asking themselves, "Can we afford to buy a new home or a car with a trade war looming?" Companies are asking, "Can we risk this new investment in a new or existing facility in Spartanburg, or do we put it elsewhere in the world?"

In Spartanburg and South Carolina, we experienced firsthand the failures of a protectionist mentality. We must not repeat the mistakes of the past. As a community that was given the option to change or die, we have grown and thrived under a new economy, one built with a strong emphasis on education, collaboration, and innovation. In the years since the textile industry collapsed, companies have invested more than $17 billion in Spartanburg County alone, creating over 55,000 new jobs. We are poised for even brighter days to come, provided these tariffs do not put their foot on the throat of growth.

A reporter recently asked me what I might say to President Trump if given the opportunity. I would say, "Mr. President, come to Spartanburg and let me show you firsthand how we have opened our minds, our hearts, and our ingenuity to the world for the benefit of everyone."

Politics is the art of getting things done through people, and in my 32 years of elective office, it has never rung truer than today. In Spartanburg, we have learned to accomplish our objectives through trust and partnerships, not a hammer, because in Spartanburg County, we build things, including relationships.

Again, Mr. Chairman, Senator Wyden, and the rest of the committee members, I thank you for giving me the opportunity and the responsibility to present my testimony before this committee. I will look forward to your questions.

The CHAIRMAN. Well, thank you.

[The prepared statement of Mr. Britt appears in the appendix.]

The CHAIRMAN. We appreciate all of you testifying here today.

Let me start with Mr. Schostek. You have been in this business long enough to experience firsthand the benefits of a business environment that supports manufacturing. You said in your testimony that American policies welcomed Honda's investment and made it possible to begin U.S. production in 1979. As your company is now approaching 40 years in the United States, what is at stake with the prospect of tariffs on U.S. imports of autos and auto parts?

Mr. SCHOSTEK. Thank you, Mr. Chairman.

You are absolutely correct. We came to the United States because we wanted to build product where we were going to sell product. And we found a welcoming environment and grew our footprint step by step, including building engines, transmissions, and full-line R&D right here in the United States.

The problem with the tariffs is, tariffs are taxes. And tariffs are going to increase the cost of manufacturing, which is then going to increase prices to consumers. Demand will fall, and this, as I and the other witnesses have said this morning, will ripple through the entire economy. Tariffs disrupt and distort the market and are going to divert resources that we need to invest in new technologies going forward and will undermine the stability of that welcoming environment that we first found. So we see it, sir, as quite a threat.

There are 14 auto companies producing cars in the U.S. Together, we all have healthy competition. The auto industry is not in need of protective tariffs, and they could destabilize the industry, as you have heard this morning.

The CHAIRMAN. Thank you.

Mr. Gates, you witness daily the joy and often the stress of the companies purchasing a vehicle. A car is one of the largest investments that a consumer will make.

And as you said, one of the most important considerations for your customers is price. What impact would auto tariffs have on your consumers? You can talk about consumers across the Nation.

Mr. GATES. Well, I am afraid that I think I cited some research that perhaps 2 million cars—we would sell 2 million cars less. I think it is greater than that. I know just from my own experience, cars are very price-sensitive. It is all about payment. If cars rose an average of $4,000 to $6,000, that adds—$4,000 adds $80 a month to a payment. Everybody who buys a car cares about the payment.

So to me—and again this probably goes against some of the research—but to me I think it is devastating. I do not think I can survive long-term if this occurs.

The CHAIRMAN. Well, thank you.

I am in agreement with you guys, I will tell you.

Mr. Haughey, let me go to you. You and your fellow witnesses have reminded us today that the automotive supply chain is both dynamic and fragile. One small change can set off a domino effect, ultimately hurting consumers and the economy.

As you noted in your testimony, the supplier industry has already felt the effects of steel and aluminum tariffs. Now, these tariffs are costing your company alone $10 million a year. What would the impact of additional tariffs be on your business as well as the entire supply chain?

Mr. HAUGHEY. Senator, it has had a big impact. It is obviously—we have started delaying our growth. And that is a big problem for us.

We do not import a lot ourselves. We manufacture everything in the country where we use it, but the big effect is going to be just—the overall volumes of the industry go down. We are selling parts for cars that may be supported by imported components.

We have had one layoff in the history of the company back in 2009. If volumes go down, that is where we become very susceptible to our team members.

The CHAIRMAN. Mr. Britt, several witnesses described today the auto industry as highly integrated. Automakers create a great deal of opportunity in the communities in which they operate. How de-

pendent is your community on the health of the automotive industry?

Mr. BRITT. Mr. Chairman, I mentioned the 25 years of growth that we have had since BMW first announced in 1992. It is still fresh on every citizen's mind in Spartanburg—and I think in South Carolina—when the textile industry collapsed, all of those jobs that were lost.

I think it is very important to realize in South Carolina, we are still tied in very carefully to what is going on on the automotive side, as the dealers have already spoken to that. But with BMW being such an impact on Spartanburg and South Carolina, it is not just the employees at BMW, the 10,000 employees there—as Mr. Gates mentioned, very few parts are made by BMW that go into their vehicle, or a Honda, or a Toyota, whatever. In fact, BMW only makes the engine for the most part, so all of those other components are made by the supplier network.

And a lot of them are in South Carolina, but still a lot of those products come in from the international companies. If BMW cannot sell the number of vehicles that they have done in the previous year—and every BMW is sold before it is made. Those 1,450 vehicles being made today are already sold.

So if they cut back—for instance, we do not need 450,000 this year; we need 350,000. So they cut 100,000 cars out. That means a 20-percent to 25-percent reduction in their potential workforce, as well as all the 66,000 across South Carolina.

Take for instance, Magna Seating; they produce seats for BMW. When they came to Spartanburg—they have had two expansions since their first announcement 3 years ago. They make four seats for every BMW that is made, because they make the X cars in Spartanburg, the SUVs. So if they do not need 100,000 vehicles next year at BMW, that means there are 400,000 seats at Magna, then all of the other producers—ZF Lemförder, Dräxlmaier, all the others that support the BMW production—they cut back. But it is not just even the auto suppliers. It is the golf cart sales group in Spartanburg on Highway 221—they stopped me recently and wanted to thank our team, our council and our economic development team, for this growth that we have experienced. That is $17 billion.

They have doubled the size of their shop, their workforce, and have moved into a new facility, all because of this growth. If that growth goes backwards, they have to cut back. They have to lay off. Then they have to face paying their bills for this new building.

This ripples all across Spartanburg and South Carolina. And it is very, very serious and very dangerous.

The CHAIRMAN. Well, thank you.

Senator Wyden?

Senator WYDEN. Thank you very much, Mr. Chairman. This has been a very good panel, and we appreciate all of you being here.

Let me start with you if I could, Mr. Nassar. The steel tariffs seem to be increasing company profits, but not increasing wages for the workers. And I would be interested in having you start by giving us a sense of what mix of policies you would favor that would be good for workers and companies.

Mr. NASSAR. Thank you for that question.

I think, first of all, if you just look at what would be good for workers and for companies, it is for workers to have a voice on the job. And quite frankly, what we have seen in a large percentage of auto parts, but also in auto manufacturing is, fewer and fewer workers do have a voice on the job. And workers who seek to have a voice collectively bargaining are often intimidated, and in fact, the common threat is, if you push too hard, we are going to Mexico.

So I think, (1) is that we really need to have a reexamining of our tax laws and make sure we are not giving incentives to offshore jobs, and (2) we have to reexamine——

Senator WYDEN. That is especially important because, when you look at this tax bill, it is still more profitable to do business overseas than to do it in the United States. So you can be assured that there are a lot of us here who are very interested in that.

Mr. NASSAR. Yes, it contradicts what we are trying to accomplish in trade policy, for sure.

And then the other thing is, we need to reexamine our trade agreements fundamentally. And I want to just make the point that what we have seen is, sometimes an argument is made that, hey, we have lost capacity. We cannot build certain parts here anymore.

Well, those were deliberate decisions that were made by companies to move overseas. And what we have seen is that the truth is—take NAFTA. Auto production has increased rapidly there. And nearly every car manufacturer has plans to expand in Mexico.

What we are also seeing is, the supplier networks that are being talked about here, they are moving to Mexico as well. Why that is such a concern is because, obviously, that means lost jobs here, lower wages here as well.

Also, we have to talk about worker training. We have to talk about apprenticeships. If you look at it, we are not really investing and making that a priority like we need to. And frankly, we need to make sure that we have a stronger middle class, and having a stronger middle class means having a strong safety net, having strong collective bargaining rights, and really a pathway to the future.

We at UAW are proud of that fact that we helped establish manufacturing jobs as middle-class jobs. That is less and less the case today, and it is devastating communities around the country. So really a holistic approach——

Senator WYDEN. I appreciate the answer. We will keep the record open so you can give more to us in writing. But the prism I am talking about is your ideas, and for all of you, so that workers win, companies win, we widen the winner circle for more middle-class, good-paying jobs in America. So I thank you for that.

Mr. Schostek, let me talk to you about this whole question of exclusions that has become a part of this trade bill. And as you know—we talked about it in the office—I think the way this was set up was arbitrary from the get-go. Secretary Ross came here to talk about the so-called "product exclusion process."

I want you all to know I think this comes directly from La La Land. It is almost incomprehensible to figure out how it actually works. We keep hearing from constituents, all of us, that they cannot figure out what is going to happen. Are they going to be approved? Are they not going to be approved?

Mr. Schostek, tell us if you would—and also we have not been able to get answers from Secretary Ross. Members of this committee, in effect, gave him scores of questions with respect to exclusions. Three months later, we have not gotten any answers from him. So my question to you, Mr. Schostek, is, what has been your experience with the suppliers, and what have the ramifications been for your business, because I gather you are having some hassles and they cannot get answers? But walk us through what it really means for you.

Mr. SCHOSTEK. Sure. Thank you, Senator Wyden. That is a very important question, and I am glad you brought it up this morning.

The auto industry supply base, with respect to the steel and aluminum tariffs, is very interdependent. There are many suppliers that have requested exclusions from the Department. There are three, in particular, that we have been tracking along with. There are more than that in our supply chain. But there were three, and in fact, I just checked on them yesterday after we had a chance to speak in your office.

All three of them applied soon after the window opened, so to speak, for exclusion requests. I think they applied in maybe the June timing. None of the three has an answer yet. So they are still waiting to understand if their exclusion request will be granted.

Senator WYDEN. What does that mean for you?

Mr. SCHOSTEK. It means uncertainty, which is what the whole theme of this activity is. We are uncertain if they are going to be able to get an exclusion. Then of course if they do, the tariff would not apply and things would be differently priced in the commerce we have with them.

Now we have heard—to be clear, there has been some improvement very recently in terms of reducing the backlog. But again, as we sit here this morning, those three suppliers that we have been tracking pretty closely are waiting for an answer.

Senator WYDEN. I appreciate it.

My time is up. And we keep hearing that there have been improvements in the backlog. It always reminds me of the marquee at the old movie house where it says, "coming soon." And then it never gets there because, when I talk to companies, my experience is what you have said. They have two or three suppliers, and they have been waiting, and they do not have any sense of when they are finally going to get an answer, and then they do not have the certainty and predictability to go out and invest in jobs.

So I thank all of you, and I know my colleagues are waiting.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you. Senator Stabenow?

Senator STABENOW. Thank you, Mr. Chairman, very much for holding this hearing.

When we talk about trade in the auto industry, put Michigan right at the top of the list. So this is, obviously, a very important topic for our businesses and our workers and communities in Michigan.

I have to say it, Mr. Gates: I grew up on a car lot. My dad and grandfather had the Oldsmobile dealership when I was growing up, Greer Auto Sales. My first job was washing the cars on the car lot. So I appreciate all of your efforts. I am glad that we were able to

actually preserve an American automobile industry with the rescue we did a number of years ago that impacted not only the OEMs and the suppliers, but I think 120,000-plus auto dealers in every community—so very, very important.

First, Mr. Nassar, I wanted to talk to you a little bit. My mantra, always—in Michigan, we are the fifth largest exporting State, both manufacturing and agriculture. We need to make things and grow things. My mantra is that we want to export our products, not our jobs.

So that requires a level playing field. And you have spoken about what that means. It is one thing—we go back and forth across the Ambassador Bridge or other bridges to Canada every day; the supply chain is very comparable. The problem is in Mexico. If they are paying $2 an hour, we suddenly see a race to the bottom, which means that we are are losing middle-class jobs.

If you could, talk about how the administration should be pushing for better labor standards in Mexico. What does that mean to you? And what do we stand to lose if we do not, in fact, have meaningful labor standards and opportunities for people in Mexico to negotiate in the workplace, like we do in the United States and in Canada?

Mr. NASSAR. Thank you for that question. I think, first of all, I want to make sure I am making the point that we care about workers everywhere, but our members really care about what is going on in Mexico because the wages are so low there that it creates a real incentive to bring more and more work down there. So we want to bring the wages up there. It is not just for the workers in Mexico. It is for the workers in the United States.

We view it as, when companies set up in Mexico, create these company unions that often, frankly, rely on repressive State policies to keep workers down, that that is an unfair trade advantage in our view. And the company that chooses to go that way should not just be able to have no consequences.

What we are looking for in NAFTA renegotiations is fundamentally ending these protection contracts and changing Mexico's law so people have a real chance to join unions and to have a voice, if they want to—or not to join the union.

The other thing is, you have to have serious enforcement in order to make that stick, because what we have seen in other trade agreements is, it looks good on paper, but if you have this dispute settlement, really clunky, lengthy, inefficient process, that does not lead to justice. So we think that is another thing.

As far as unfair practices, I just want to say that when you look at many countries around the world, they manipulate their currency to make their products cheaper. There are a lot of countries that highly subsidize their industries. The idea that we should not do anything about that, that we should take no corrective action, just means that we are going to, over time, lose more and more manufacturing. That will be the result if we stick with the status quo. So that is not an option.

The truth is that many of our competitors continue to use unfair trade practices, and they make it really hard for us to export there. We have to deal with all of that to have a level playing field.

Senator STABENOW. I agree that we need trade enforcement. That is something that I worked on for a number of years. I helped create the trade enforcement office that we have now.

And the President had indicated that he would call China a currency manipulator on day one. I was very supportive of him doing that. I am sorry that that has not happened. Currency manipulation is a serious issue. But at the same time——

Let me turn—Mr. Haughey, thank you for being in Michigan with one of your plants. We know that we have a set of issues that need to be addressed to level the playing field, very important, because we want the jobs—I want the jobs in America. I think we all want the jobs here in America, and we want American businesses to thrive.

And we also know most of the jobs come in the supply chain, not in the assembly. It is in the supply chain. So it does matter, though, that we have stability. It worries me, and I understand. But when you said you suspended growing your company because of the instability—deep concern about that. We need to have you doing well and to have stability. And what is happening—unfortunately, we are sort of throwing everything at the wall, which is what they are doing: section 232, section 301, NAFTA, I mean everything, so that there is total instability right now.

So I would just ask you——

The CHAIRMAN. You are way over——

Senator STABENOW. If I could just ask one thing, if I might, one thing——

The CHAIRMAN. You are way over time, but go ahead.

Senator STABENOW. Thirty-six, thirty-seven seconds—so everybody went over 1 minute so far, so if I might.

The CHAIRMAN. It is okay.

Senator STABENOW. Could you walk through what it takes to get new components into the supply chain? And I know you talked about CAFE standards. Nobody in the auto industry I know of is asking for changes there. You are making the new parts. You have retooled already to make the new parts.

So when we look at all of this, what kind of certification and testing is required? How long does it take? When we walk through new components and what it takes to get in the supply chain and how you are impacted by these actions, I wonder if you might just speak a moment to that.

Mr. HAUGHEY. Thank you, Senator.

We would work with our Tier 1 customers to develop new products. Tools that we manufacture for metal forming can take over 6 months, sometimes up to a year, depending on the complexity and the number of different tools. The parts would then go to the Tier 1s and eventually to the OEMs. There is so much testing to be done now, crash testing, all kinds of different validations. So it is a very long chain. It is interdependent on everyone.

Now we have been kind of working on electric vehicles, connected vehicles, shared vehicles, lightweight—there has been a lot of progress made in the industry, but now everyone is kind of sitting back going, "Boy, we are not sure how all the trade is going to work out. Are we going to be disadvantaged in the U.S. by tariffs?"

There is big concern in our industry that if we block off access to the market, a lot of those technologies will be developed over in China or Europe. And we do not want to see that. We obviously want to stay on the leading edge of technologies.

Senator STABENOW. Well, we want you here too.

Thank you, Mr. Chairman, for your patience.

The CHAIRMAN. Well, I apologize for interrupting you.

Senator STABENOW. That is all right.

Mr. BRITT. Mr. Chairman, can I jump in on Senator Stabenow's question? I would like to add a little bit if I can.

The CHAIRMAN. Sure.

Mr. BRITT. She is absolutely right. Both American and international companies depend on predictability and certainty. And in this regulatory climate that we are in right now in 2018, I think it is the worst it has ever been in the country's history.

Companies, again both American and international, depend—it is all about risk avoidance when you are talking about putting money in to expand or to retool, putting new equipment in, in the state that we are in right now. And it goes back to what Senator Wyden was saying too. The complexity, the difficulty of reading all of this change—at our company, the Tindall Corporation in Spartanburg, our purchasing agent got a 125-page document sent to us by one of our suppliers and asked us to read it to decide what was applicable and not applicable.

And we are trying to do business. So when they are asking us—Senator Wyden, you said you had a tough time getting it. You do not want to see it. It is too complex.

Just again, we need this predictability and this certainty. One of our suppliers out of Ohio—I just got this email yesterday from our chief project manager, Ashley Fortenberry. It is an increase in our steel prices effective immediately because of the tariff that was just put into place last week, the 10-percent of 200 billion in China. We just got a 10-percent increase on top of the 23 percent that we got back in March. And we are warned right now that it is going to go up 15 percent more in January. And that is a steel producer supplying steel to a company that uses steel primarily in our product.

Let me say this, just to make sure everyone understands this. For every $1 that the steelmakers contribute to the GDP, the steel users—just like all of the automotive manufacturing companies, just like Tindall and all of those companies in Spartanburg—we add $29 to the GDP compared to that $1. For every 1 job that the U.S. steel manufacturers make and create, we create 46, the steel users. And this is in every State in this United States. And it is very, very important. And it is going to cost the consumers.

Thank you, Mr. Chairman.

The CHAIRMAN. I am concerned about it too. I am on your side, between you and me.

Senator Grassley?

Senator GRASSLEY. In the four or five times I have been to the White House to talk to the President about his trade policies and the tariffs, et cetera—most of the time, obviously, from my State I talk about agriculture, but also within my State, we have thou-

sands of jobs that are connected with parts for cars, even though we do not make cars in my State. So this concerned me very much.

Before I ask a couple of questions, I hope we all would agree, even though we are raising concerns about what is going on right now, that if the President accomplishes his goals of getting intellectual property rights protected and companies not having to give away trade secrets, and getting other countries to lower tariffs, that if he can accomplish that, obviously we are all going to be better off, whether it is automobiles, or our farmers, or our services, or anything else. So I hope we can agree on that, if he can accomplish it. I know that is a big "if." He has made some progress, maybe with Mexico, as an example.

So I am going to go to Mr. Schostek and Mr. Gates. And, Mr. Gates, you spoke to this question, but I want to bring it down to the family level. Could you estimate—now this stems from what I think you said, $6,000 to $7,000, if the proposed tariff goes in, with an increase in the cost of a car.

Could you, Mr. Gates—and you do not need to repeat this, Mr. Schostek, if you agree with what he said. Could you estimate what that means for a person's monthly payments with current interest rates, and how much extra per month does a middle-class consumer have to come up with to finance a new car with these costs?

Mr. GATES Well, $6,000, roughly, is $120 a month.

And believe me, people leave dealerships because of a $5 difference. One hundred twenty dollars is a huge number.

Senator GRASSLEY. Do you have anything to add to that?

Mr. SCHOSTEK. Senator, I would not disagree with Mr. Gates at all, except to add on the fact that as new car prices increase and consumers are priced out of that segment of the market, they are going to be looking for used cars. And used car prices are also going to increase because of demand, and then service parts prices.

So there is a ripple throughout the entire chain of distribution here that is going to hurt American consumers.

Senator GRASSLEY. Okay.

And for you, Mr. Schostek, this question: you mentioned the lead time for designing and launching cars—I think roughly 5 to 6 years. Clearly you have to make decisions years out before production starts.

I doubt that you all have made major plans yet to move production as a result of the tariffs. However, at some point you might. Could you estimate how long the current tariffs and general trade uncertainty could last before your company would start seriously considering making significant production changes to lower costs?

Mr. SCHOSTEK. Senator, we came to the U.S. to build products where we sell them. And we found here a welcoming environment, and we have grown in America. We do full-line manufacturing, full-line R&D here in the United States. We plan to stay, but the current environment is unsettling. It is certainly unsettling for us. And that is why I came here today. I wanted to talk to the committee about this.

You mentioned being from an agriculture State, and certainly retaliation. We can see it there. We can see it in other aspects. The problem with the tariffs is, they are a kind of unintended consequence. So we have an action, which is a tariff. Then we have

a reaction, which is retaliation. Workers lose on both ends of that, and consumers lose on both ends of that.

We are experiencing retaliation in our business right now. For example, in Swepsonville, NC we are making lawnmowers. Those lawnmowers are sold in the United States. We also export them to Canada. Canada has put a 10-percent tariff on the lawnmowers we are making in Swepsonville, NC, disadvantaging our workers there in North Carolina. Further, we are sending transmissions from Tallapoosa, GA to China.

So we have a new product, the Acura RDX. We make that product for the U.S. market in Ohio in East Liberty, OH. And we provide the transmission from Georgia to Ohio. But in addition, for the China market—and China is a big market—we make the RDX in China as well. We are sending transmissions from Tallapoosa, GA to China. And those are now subject to the retaliatory tariffs, again, affecting the work of Americans—Americans in Georgia.

And there are other examples as well, just within our company. And then we can talk about the supply chain as well. This is happening all over the place, Senator.

Senator GRASSLEY. Thanks to both of you.

The CHAIRMAN. Thank you, Senator.

Senator Brown?

Senator BROWN. Thank you very much, Mr. Chairman.

Mr. Nassar, let me start with you. Earlier this year, GM announced it was laying off the second shift at the Lordstown Plant in northeast Ohio where they make the Chevy Cruze. Twelve hundred workers at the plant got pink slips. That was in addition to the more than 1,000 workers on the third shift that had lost their jobs.

Senator Portman and I have done everything we could, and still Mary Barra, GM's CEO, will not commit to keeping the plant open, will not commit to retooling it to make a better-selling, probably, SUV. To make bad matters worse, on the day that the second shift left, GM announced, literally the same day, they were going to build the Chevy Blazer in Mexico.

There is something wrong with this picture. A company decides to lay off more than 2,000 experienced auto workers at a historic auto plant in the United States, then announces they are going to build cars for the American market in Mexico.

Do you agree GM's decision is proof that our policies do not do enough to encourage U.S.-based production?

Mr. NASSAR. It is absolutely proof. And it is proof that we have seen time and time again. Unfortunately, we have a situation where there are no negative economic consequences for companies taking big tax breaks, breaking promises, and creating jobs overseas. So, it absolutely is a failure of policy that encourages this offshoring.

Senator BROWN. Let me talk about a potential solution. In response to that decision, I introduced the American Cars, American Jobs Act. The bill has two parts. First, customers who buy cars that are made in the U.S.—roughly 50 percent domestic content—and assembled here get $3,500 off at the dealership. The discount would apply to nearly 100 cars, trucks, and SUVs, including all passenger vehicles assembled in Ohio.

Second, companies that cut the number of American jobs they had on the day the much-vaunted GOP tax bill passed, and add those jobs overseas, lose a tax break they get on some of their overseas profits. Essentially, they lose their 50-percent-off tax coupon that this committee and this Senate gave them a year ago.

Would this bill help keep auto jobs in the U.S.?

Mr. NASSAR. Absolutely it would help keep auto jobs in the U.S., because it incentivizes more purchasing in the U.S. markets, which is really important. And also because it, frankly, addresses an abuse we see, where companies are saying they cannot invest in the United States, but then they are investing overseas, and they are taking no consequences for it.

Our laws absolutely should react to that abuse, and your legislation would surely help.

Senator BROWN. Thank you, Mr. Nassar.

Mr. Schostek, welcome to the committee. Welcome all five of you to the committee.

Thank you for the work that Honda has done as a leading auto producer in Ohio for decades. I remember the late 70s when Honda broke ground in Marysville and built motorcycles. Obviously, you have come a long way from motorcycles, to cars, to lawnmowers—a new product that most people in this room probably did not know was also a Honda product.

Your company made its first Accord in Marysville, northwest of Columbus, 36 years ago. In the last 25 years, you have assembled 11 million Accords at that plant. You now have 15,000 employees. They work in Ohio alone. They work at Marysville. They work at the world-renowned research facility and logistics center, engine plant, transmission plant, the East Liberty assembly plant, which you mentioned.

My understanding from my visit to Honda and my discussions with you and others, and Ed Cohen and others, is you have never once laid off a shift of workers. If more auto companies invested in the U.S. like Honda has invested in Ohio, this conversation would have been very different today.

So give us a couple of minutes on the policies you think we should consider in this body to encourage other companies to invest in the U.S. as extensively as Honda has.

Mr. SCHOSTEK. Thank you, Senator Brown. Good to see you again, and thank you for the support. I have talked about the welcoming environment we have found in Ohio. You are a key part of that. Your support on workforce development and many other topics over the years has been invaluable for us. So we appreciate it.

Your understanding about not laying off a shift is correct. So I can confirm that for you. And we found a very welcoming place in Ohio and elsewhere in this country.

There are 14 companies producing cars in the United States right now. That is a lot of companies. So we have a healthy competition that exists among the auto industry. This industry is not in need of protective tariffs, and that is what brought me here today. That is why we are concerned. So we are concerned that the tariffs will increase the cost of manufacturing, and, as we have discussed, the price to consumers, both for new vehicles as well as for used vehicles.

But we are going to keep strong. Our operations in Ohio—which by the way, as you mentioned, include our largest engine plant in the world in Anna, OH. And we have a very, very strong R&D operation in Ohio.

We have developed 30 different automobile and light truck models in the U.S. exclusively by Americans working in Raymond, OH, as well as their colleagues in the Los Angeles, CA area. So we are a full-line, full-value chain manufacturer here in America.

The CHAIRMAN. Thank you.

Senator Warner?

Senator WARNER. Thank you, Mr. Chairman. I appreciate you holding this hearing.

I am not even sure where to begin when it comes to talking about this administration's approach on trade. When you have a President of the United States who starts by stating that trade wars are good—and we have absolutely no factual basis on that—I think you end up in the circumstances where we are right now.

Let me tell you, I would be the first to agree that China does not play by the fair international rules. We have seen that in terms—I have seen it, particularly in my old industry in technology, where the price of admission for an American company into the Chinese market is giving up their intellectual property. We have seen it with Chinese efforts in intellectual property theft. We have seen it on Chinese use of their students who attend our universities, again to steal intellectual property. And we have seen it where the Chinese firms do not operate on market-based principles. They have enormous direct state subsidies.

I would argue that the way to approach that would have been to build an international coalition. I think there was a growing recognition about the real threat that China poses over the last couple of years, and there was an opportunity to build a coalition, not only with our North American allies, but our European allies, many Asian nations that have been direct targets of this Chinese aggressive action. But instead, we have seen this administration use a part of our law, the section 232, under national security provisions, to basically call out allies like Canada. And the Canadians have a right to be upset with our administration, this administration's portrayal of Canada. They are our friend, not a national security threat—as are our European allies and others.

And clearly in the realm of, whether you are talking about Toyota, whether you are talking about the supply chain that has been integrated across North America, these policies are going to hurt American consumers. They are going to hurt American jobs.

In a State like mine, in Virginia, where we actually have enormous net surpluses with many of our trading partners, this is going to hit us at the bottom line—so action against China makes sense. This administration's approach, I do not believe meets that criteria. So I want to make sure I do get in a couple of questions rather than just my views here.

Mr. Gates, one of the things that I think you mentioned in your testimony I would like you to expand on a little bit, and that is the fact that if this trade war in autos is allowed to continue, not only will American consumers feel that price increase on the front end when they go out and purchase a new car, but in many ways the

real hit may come to the pocketbook when they go back and service their cars, because many of the auto parts will also be penalized. Could you expand on that a little?

Mr. GATES. Of course; thank you for the question.

I will start by saying in Kentucky, the legislature recently passed a law which now charges a 6-percent tax on labor. So not 25 percent, just 6 percent. And that has caused many people to put off maintaining their vehicles. So a 25-percent tax on parts would clearly, I think, be devastating.

It is easy to put off maintenance. It is a little frightening though, because part of that is certainly safety-related. And I, sort of, hate to be driving around with people who have unsafe cars on the road.

Senator WARNER. Amen to that.

I think people have not felt the full burden of the Trump trade war yet. I do not think Americans are going to come to the consensus this is good. I do think China is a threat, but you could have rallied the international coalition.

Mr. Schostek, can you speak to one of the areas I know your company is investing in? Even though there are going to be some bumps, I think the notion of autonomous vehicles holds a great deal of possibility, and we are talking about direct price penalties.

But can you speak to the question about R&D and R&D that your company might otherwise have chosen to do here in America? You have an international market, so how do you make the decisions around tariffs that will affect your decisions about where to do your R&D on autonomous vehicles and otherwise?

Mr. SCHOSTEK. Great. Absolutely, Senator. Thank you for the question.

The concern about tariffs is, they are diverting resources. Right now the auto industry is at quite an inflection point in terms of many items: electrification, connected and autonomous vehicles. These require major investments by us, the OEMs, by the supply community, in order to make these changes that are necessary for the future. The fact that we have tariffs and retaliation going on is doing nothing but diverting resources from very important R&D and technology activity that we need to perform in order to stay viable into the future. So it is certainly a key issue for us.

Senator WARNER. Mr. Chairman, I know you have been a big advocate, as the ranking member has been, about technology development in this country. I hope, again, we can send this message that this is not only hurting Americans in their pocketbook, but it is curtailing the ability for auto companies to do the needed R&D investment in this Nation.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator. I agree 100-percent with you.

Senator Cantwell?

Senator CANTWELL. Thank you, Mr. Chairman.

I thank the witnesses. I have stayed for most of this hearing because I think it is such an important topic.

I think the United States of America figuring out how it keeps U.S. manufacturing jobs and jobs related to manufacturing is a very key point to our economy. Why? Because manufacturing jobs help people move from working-class to middle-class. So I am not

saying other sectors cannot do that, but certainly the manufacturing sector can.

I think we are probably one of the few States that—we definitely import a lot of cars through the State of Washington. We export some as well, but I am struck by the commonality of the views at the table as opposed to the divergence of your ideas.

And I just want to make sure I am clear on this, because one of the things that I think is, if you want to have manufacturing in the United States of America, you make sure you are making all of those investments in the supply chain. Because if you own the supply chain and it can be lean manufacturing, that is the best bet to what Mr. Nassar was saying and to what everybody was saying. So is that right? To the greatest degree possible, keeping a robust and lean supply chain in the United States helps us to continue to produce jobs here? Is that correct?

Mr. SCHOSTEK. Senator, as an OEM, absolutely. Absolutely correct.

Senator CANTWELL. Anybody else?

Mr. HAUGHEY. From our standpoint, if you go back to 2009, the different suppliers, when they start to fall, it affects everyone. There is such an interdependency. A company like Honda deals with all kinds of different suppliers. All you need is just one weak link and you get into trouble.

Senator CANTWELL. Mr. Nassar?

Mr. NASSAR. Yes, I would say definitely maintaining supply chains in the United States is absolutely critical. Most of the work done on a car is in the supply chain.

But that is also why it is important that we look at where automakers are investing in new plants. And I think there is the distinction between where the workers and companies stand when it comes to our bottom lines. For corporations, it is shareholder value at the end of the day. If they could invest overseas and make a lot of money doing it, that helps their shareholders. That does not help American workers.

Our main thing is having the jobs in the United States and having good-paying jobs. So——

Senator CANTWELL. Do you believe in the supply chain? This is my point.

Mr. NASSAR. Absolutely.

Senator CANTWELL. You are in agreement with these gentlemen.

Mr. Britt, I am assuming you agree with the supply chain?

Mr. BRITT. Absolutely, Senator.

And again, a great example is Spartanburg, SC and the State of South Carolina. We have over 400 companies that are in the supply chain for all of these automotive manufacturers. It is not just BMW. It is Honda, Toyota, Kia—you name it. Those suppliers supply for everybody in the United States. The key thing is, when they move offshore, they do not come back.

Senator CANTWELL. Yes. So in keeping the supply chain—my guess is you all agree on this too—having a well-trained and highly skilled workforce in the United States is key to keeping that supply chain. Is that right?

Mr. BRITT. Can I answer that question, Senator?

Senator CANTWELL. Yes.

Mr. BRITT. I am going back to my testimony earlier where I talked about 100 years of textile manufacturing in Spartanburg and in South Carolina. We were used to a protectionist State. Our State was designed and our tax laws were designed to keep industry out, to protect the home team, the textile manufacturing in the upstate, the agricultural industry in the lower part of the State.

I grew up on a small tobacco farm in Dillon County where the floods are now hitting. And I am thinking and praying about all those folks down in the Pee Dee. But that State's tax setup for over 50/60 years now was designed to keep those other companies out.

The first international company to come to Spartanburg County was Michelin in 1978, outside of the textile manufacturing equipment suppliers. Since that date, we have changed our community. I mentioned earlier, our focus is on education. It was not supportive of education for those 100 years that we operated in a closed environment. It was not important for a family member to go get a college education or even a high school education, because they had a job in the textile plants, or in the tobacco fields, or in the cotton fields of the lower part of the State.

Take a look at BMW. Again, I said they changed Spartanburg and South Carolina forever. Look at their investments that they do in the BMW scholar program. They have raised that bar on education now because, of those 10,000 associates who work in BMW, a small percentage actually works on the production floor. They are in engineering——

Senator CANTWELL. I only have a few minutes left, so I——

Mr. BRITT. Excuse me.

Senator CANTWELL. I am assuming, Mr. Nassar, you agree, and the other witnesses?

Mr. SCHOSTEK. Senator, just very quickly if I might.

We talked about R&D and new innovations, new technologies before. That is true in the product. That is also true on the plant floor. The plant floor in 2018 is far, far different than in the 1980s. And we as companies have responsibilities to keep our workers trained and up to speed on this new technology.

Senator CANTWELL. I guess my point here is, what you all have articulated in this broad fashion here is the same. If we want to keep these jobs in the United States of America, then we should invest in the supply chain. We should invest in skilling our workforce. We should invest in the R&D, and that is what will keep us competitive.

And I think that the tariff idea—Mr. Britt, you said it best. You guys build relationships. Okay, and building relationships and figuring out how to get access to these markets, but still keeping our eye on what makes America competitive, is what we need to do. And right now, these tariffs are not making us very competitive, I can tell you that. And they are going to make it, as all the witnesses said, more expensive for consumers.

So I just—look, we believe in this. You guys need to keep doing this, because you represent what the consensus is here about the direction for us to grow jobs here.

Thank you.

The CHAIRMAN. Thank you, Senator.

Senator McCaskill?

Senator MCCASKILL. Thank you, Mr. Chairman.

Four weeks ago I chaired a roundtable on trade with representatives of Missouri's manufacturers and agricultural communities. It was a stark several hours listening to the reality that these businesses are facing and these farmers are facing in light of the tariffs that have already been applied.

We are a major auto hub in Missouri. We have over 10,000 members of UAW employed at General Motors, and at Ford and Toyota. We are the birthplace of the Ford F–150, which we are very proud of, along with the Chevy Colorado and the GMC Canyon.

We have—I think 167,000 is the estimate of workers we have in Missouri associated with the manufacturing of automobiles. So it is a big deal to my State how we handle this. So far, these tariffs are impacting farmers in my State, workers in my State, and consumers in my State all negatively—all negatively.

It is a real head-scratcher that this administration is doing this under 232, national security. It seems to me that this is a stretch on national security. You can kind of dress up aluminum and steel, that we need that production capability if we need to go internally to produce weaponry or other things. But the car thing seems to be a stretch for me.

I think what I would like to ask you all is if you agree or want to make a comment on—the Center for Automotive Research estimates a 25-percent tariff on automobiles would add an average of $4,400 to the cost of a car. That seems very high.

Have any of you taken a look at this, because, obviously, if it goes up that much, that ultimately impacts demand, which ultimately impacts jobs negatively for the workers that I am most concerned about in this scenario.

Mr. NASSAR. Well, just as far as the research goes, I think that some of the idea that every penny that gets raised in cost by the company has to be passed on to the consumers is a little bit overstated at times. We are talking about many companies that have a very, very healthy profitability and pay their executives quite handsomely. So the idea that absolutely every penny is going to get passed on is a reach also.

I think the other thing is, when looking at these policies, we also have to keep in mind some of the—I am not saying how it will pan out—but the long-term impacts, because the idea is, you are potentially trying to change behavior, change investment patterns, so some of it does not play out right away.

But I do think that we really need to have a more comprehensive trade policy for sure.

Mr. SCHOSTEK. Senator, you mentioned there are various studies out there. There is a lot of data out there to be had, and we can certainly follow up with you on any of those items.

But you also mentioned the basis for the 232 tariffs. I can tell you as a business person, I cannot begin to understand that. But what I would say is that we are very heavily invested, as we have described, in manufacturing, in R&D, especially in R&D here in the United States and through the entire value chain. So I think we, Honda, and this industry in general, are contributing significantly to the U.S. industrial base.

And then again, as a business person, I can only speak to the impacts that these tariffs would have. And we can see impending harm to U.S. manufacturing, to workers, and as you mentioned, to consumers.

Senator MCCASKILL. Let me—Mr. Nassar, I understand that there is support for the idea that we could bring these jobs back to the United States, many of which have chased lower labor costs, and I completely understand. I would point out to UAW and your thousands of members across the country, that you should look at your brothers in the steel industry and what is going on right now.

We have 30,000 steel workers who have authorized a strike on the heels of very generous tariffs. Clearly the price of steel has gone up dramatically. That is also impacting automobile manufacturing. Clearly it has bumped up to just under the tariff amount. So for all of the people around this country who are manufacturing, this is added cost that is just getting passed on.

But it is not—in the negotiations with the steel workers, they offered the minimal raise, but they cut the health care so much that they ended up going in the hole at this moment in time. It is just amazing to me that this was somehow pitched as great for the workers. That the workers were really going to enjoy this. And a few months later, you have 30,000 steel workers ready to go on strike.

Mr. NASSAR. And if I could respond, I think that that points out the fact that we need to look at these policies in an integrated way. And the fact is that our labor laws are very weak. Enforcement is very weak, and the workers have less power and less voice. So it creates these kinds of decisions where workers can and do get taken advantage of all the time.

I think it speaks to a real power imbalance we have in this country.

Senator MCCASKILL. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Scott?

Senator SCOTT. Thank you, Mr. Chairman. Thank you to the panel for sharing your expertise here this morning and now this afternoon. So I really appreciate that.

South Carolina has greatly benefited from the resurgence of manufacturing exports and foreign direct investment. More than 700 international companies employ more than 130,000 South Carolinians, with most of that in the manufacturing sector.

It might be debatable whether or not South Carolina is the number one automotive State in the country. What is not debatable is the fact that we are at least in the top two or three in the Nation, and certainly always in the conversation. We have 66,000 employees working at 400 companies, as Mr. Britt just stated earlier, in the auto industry, along with vehicle manufacturers like BMW, Daimler, and now Volvo. There has been significant investment from automotive suppliers, both large—Bosch, Continental, Magna—and small.

This industry is essential to continued progress in my State. Good trade policy unlocks opportunities for American families and obviously, it has unlocked real opportunities for South Carolinians without question.

With those thoughts in mind, I would like to ask a few questions. Mr. Britt, I will start with you. I know that you have spent 25 years on the county council in Spartanburg. Thank you for your public service. You have spent years as a part of the economic development apparatus in Spartanburg. You guys have brought in about $16 billion of investment, creating or at least attracting 45,000 jobs.

I wonder, as we think about the 232 autos and parts investigation, what the impact of that is on business? When I talk to business leaders in the sector, what I find is real concern and hesitation. The question for you is, are you hearing similar things back at home, or am I just hearing from a few people?

Mr. BRITT. Senator, you are hearing exactly right. And I appreciate the kind comments. Actually, I have served on the council 28 years.

Senator SCOTT. Excuse me.

Mr. BRITT. And the reason I point that out is, I was elected May 7, 1991, when we were in the depths of the biggest depressing time in the history of Spartanburg County and in the upstate because all of those 25,000 jobs had left the textile industry. So I was there to help recruit BMW. I was just one of the players.

As you know, our great Governor, former House member——

Senator SCOTT. Carroll Campbell.

Mr. BRITT. Carroll Campbell.

Senator SCOTT. Absolutely.

Mr. BRITT. He was the quarterback. Foster Chapman, Carter Smith, and David Britt were just players on that team, but we worked hard to help Governor Campbell bring that company to Spartanburg.

You, yourself, you started as a council member in Charleston County. And you and I share a lot of our upbringing.

Senator SCOTT. Absolutely.

Mr. BRITT. As I said, I grew up in Dillon County on a small tobacco farm. You grew up in Charleston—single mom, at the age of 7 supported three children. And now you are a United States Senator.

But when you were a council member, you knew how it was. When you go to the grocery store, you go to the YMCA, you go to church, people talk to you.

Senator SCOTT. Yes, sir.

Mr. BRITT. When you were in the State House, you actually got to go to Columbia a little bit. My friends who are actually in the House in Columbia say, "I do not know how you deal with it on council. You see these people every day."

And that is right. That is why I have done it for so long, because I feel like that is my calling. I listen to them in the grocery store. Dick Mahon is stopping me and my wife is calling me on the phone and saying, "You have been there for an hour. All you needed to do was go get milk. What are you doing?"

These people are talking about this concern. So I think Mr. Schostek made a comment earlier, we are dealing with the most educated workforce and consumer group in the history of the United States. With smartphones and the associates who work in these companies, it is no longer that you work on the production

floor, punch in, and go out 8 hours later. You are on teams. You are on management teams. You are on leadership teams.

Just like at Tindall, our associates are the company. They know exactly what is going on. They know how much money we made last month. And there was a comment made earlier that companies make so much money, all of this profit. I would like to know who these companies are, because every company that I deal with—those 211 international companies in Spartanburg as well as the Americans—all operate on very fine margin.

Senator SCOTT. Yes.

Mr. BRITT. And when you increase it, it hurts. But you are hearing it exactly right.

Senator SCOTT. Excellent.

Mr. BRITT. Tremendous concern.

Senator SCOTT. Let me, in my 30 seconds or so that I have left, ask you a question, Mr. Schostek, about the supply chain. You have been pretty clear. I listened to you this morning on the negative impacts on the supply chain, and frankly on American jobs connected to those supply chains.

I think Mr. Britt said it earlier, and Senator Cantwell agreed, that when these supply chains leave, getting them back is very difficult. I think you said earlier, sir, that whether it is $4,000 added cost, whether that goes to the consumer, whether it comes out of the company, the fact is that it matters; a loss of profit does jeopardize jobs. No matter who pays the price, whether it is the consumer or the company, ultimately the workers will feel a negative impact.

So my question to you is, it seems to me that all auto companies are connected and linked to global supply chains. And at the end of the day, is it not true that tariffs on auto and parts imports will raise the cost of vehicles, whether that is $4,000 or $6,000? And if we raise the prices of vehicles, we can imagine that consumers will buy fewer of them. And if the consumers buy fewer of them, then the employee whose work produced those vehicles will be at least more vulnerable to layoffs and challenges.

Mr. SCHOSTEK. Absolutely, Senator Scott, and thank you for the question.

We are proud to make ATVs and side-by-sides in Timmonsville, SC.

Senator SCOTT. Timmonsville, SC. No question.

I did ask to go on one of the side-by-sides, and they told me that I was not an expert at driving, so stay out of vehicles immediately.

Mr. SCHOSTEK. Safety first, Senator.

Senator SCOTT. Safety first.

Okay. I wanted to make sure that was accurate. [Laughter.]

Mr. SCHOSTEK. And we also have 41 suppliers in South Carolina——

Senator SCOTT. Yes, sir.

Mr. SCHOSTEK [continuing]. That support not only our motorcycle business and ATV business, but the auto business as well—so critical.

But you hit the nail right on the head in terms of the ripple effect of these tariffs. So it starts with the raw material right now. It starts with aluminum and steel.

If we add it to the parts that are being imported, and you are absolutely right, every single manufacturer—I do not care if your headquarters is in Asia, if your headquarters is in Europe, or if your headquarters is in Detroit—every single manufacturer, and there are 14 of them operating here in the United States, uses parts they source from the U.S., but also globally.

The suppliers, companies like Mr. Haughey's—he has organized his company to cover various regions. He is not just in one place.

Senator SCOTT. Right.

Mr. SCHOSTEK. Right; so this is a very interdependent and complex supply chain, and the value chain from the beginning of concept and design, doing R&D here all the way to the end of distribution, getting things into Mr. Gates's door—tariffs are going to hurt the whole supply chain. I have seen it ripple right across.

Senator SCOTT. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator.

Senator Menendez?

Senator WYDEN. Mr. Chairman, I think it is Senator Portman and then Senator Menendez.

The CHAIRMAN. I guess that is right.

Senator Portman, I have to leave. Will you wrap this up then?

Senator PORTMAN. Yes, that is fine.

The CHAIRMAN. Thank you.

Senator PORTMAN. First of all, thanks to the ranking member and chair for their patience with those of us who have other responsibilities. I have two markups and two hearings going on at the same time this morning.

I really appreciate you all being here. I was here earlier to hear some of your back and forth, the questioning. And although I heard my colleague from Michigan claim that Michigan is the auto State, Ohio is really the auto State. [Laughter.] In fact, we are the country's leading manufacturer of engines and transmissions. So maybe fewer auto plants per se, but we are a huge auto State.

The CHAIRMAN. Senator Portman, if I could interrupt you. I have to leave, but I just—Senator Portman will take over, but I just want to thank you all for being here. It has been a stimulating hearing and one where I think we are all pretty much in agreement in a lot of ways. And you are not wasting your time. So we are glad you are here.

Senator Portman, if you will forgive me. Will you close this?

Senator PORTMAN. Of course. Thank you, Mr. Chairman.

The CHAIRMAN. I appreciate it.

Senator PORTMAN [presiding]. I think the chairman makes a good point. I think there is actually some consensus building around what I consider the misuse of section 232. It is meant for national security purposes.

And again, for my State it is particularly concerning that we might shift to autos. I do think with regard to steel, you can make an argument that, as to certain countries and certain products, there is a national security issue. I would say electrical steel is a good example of that, where we only have one factory left and we have an enormous increase, almost a 100-percent increase, in terms of electrical steel imports where we need it for the grid.

Autos are a different case. I did listen, again, to some of the back and forth, and I read your testimony. And I think we have to be very careful here, particularly with regard to our allies, because national security is ultimately about us having a concern about enemies, not allies.

Second, I am concerned that this course of action would actually make it harder to make a car in America. And that is my concern. If it is not done—Mr. Nassar, you seem to be the most supportive of 232, but even you have said it needs to be very targeted and specific as to country, as to product, for that very reason.

So the framers of 232 knew this might happen, by the way. And they were concerned that people would take 232, which is for national security, and use it for a broader purpose, what they viewed as protectionism. I think that is kind of where we are today.

The Ways and Means chair at the time said, "The national security exception is to protect and preserve the national security. That is its sole purpose. It is not intended to serve as a device to afford protection to those industries that might claim it." That was many years ago, back in the 1960s. And it has only been used a couple of times since—in the 1970s for oil. But I think this is an issue.

There is legislation that was introduced called the Trade Security Act. Some of you have been involved with that. The Trade Security Act is a bipartisan bill, and it is trying to make good on those words of that chair of the Ways and Means Committee: let us focus on national security.

So it says, instead of 232, you have the Commerce Department making a determination on national security, vested as phase 1 in the Department of Defense, where you have the expertise. And then with regard to the remedy, of course you then turn back to Commerce. Second, it gives the Congress the chance, through a motion of disapproval, to actually weigh in. And I think those two things would make a huge difference.

Mr. Schostek, you are familiar with the bill I know, because Honda has endorsed it. I guess you have more autoworkers than any other company in Ohio. Can you speak briefly about the need for this kind of narrowing of the 232 provision so that it meets its original goals?

Mr. SCHOSTEK. Thank you, Senator Portman. It is good to see you again, and thank you for the kind words about operations in Ohio. A lot of those engines and transmissions are made by Honda workers in Ohio, as you well know.

I was listening intently, because I know you have quite a bit of experience in this area, in the trade area, and I was trying for myself—the basis under 232 for how these tariffs could be applied. And honestly, it is probably over my head or above my pay grade. So I think any clarity we can get in terms of that is very important and why we endorsed your bill.

Again, we are heavily invested in manufacturing. You know our R&D strength in Ohio. And we are really contributing significantly to the U.S. industrial base. I say that for Honda as a company, but I can say that for the entire auto industry. All 14 companies that are doing business or making product here in the United States are contributing to the industrial base.

So we would appreciate some clarity on that as well. So, thank you very much.

Senator PORTMAN. Mr. Haughey, you make a lot of stuff in Ohio too. It is more parts, and we appreciate your suppliers, your companies in Ohio. Talk to us about what the cost to the car is going to be. We have a $2,000 increase on average for a domestically produced car. A car has over 30,000 parts, and they come from all over the world, do they not?

Mr. HAUGHEY. They do. Thank you, Senator.

The price of steel has just gone up. You have to think a little bit too about the timing. So we have seen the tariffs come in, the prices go up, and then as contracts expire—you know, we have only really just started this.

I think it is going to cascade for a long period of time until finally the auto companies have no choice but to take the price of a car up. And then when they do that, volumes will eventually come down because cars will not be affordable.

I think one of the ironic things we see—our operations in Ohio are a good example. We are having a very difficult time hiring people. One of the reasons we did a hiring freeze is just the uncertainty, but the other thing is that, within the U.S., we had probably about 100 open jobs at the time that the tariffs hit and a very difficult time hiring workers.

In our headquarters in Tennessee, as an example, we have had to set up our own school inside the plant. We have a full-time teacher, trainers, and a tool-and-die apprenticeship program.

Senator PORTMAN. I am hearing it all over the State.

Mr. Menendez needs to ask his questions now.

But that is the topic of another hearing. Let us not make it worse by adding to the cost of automobiles for consumers. At a time when our economy is doing well, we need more workers. Let us focus on worker retraining and on better CTE and other skills training for younger people.

So thank you all for being here. And I will now turn to Mr. Menendez.

Senator MENENDEZ. Thank you very much.

Thank you all for your testimony. We were at another markup of the Foreign Relations Committee, so we were not able to get here earlier.

But I want to begin by saying that I am glad that we are focusing today on how to deal with the impact of the global economy on working families in New Jersey and across the country. In my view, tariffs that are tactfully and carefully targeted on the right products and countries could be part of a comprehensive trade and economic strategy aimed at helping working families and businesses succeed. Unfortunately, we do not have such a strategy from this administration.

As our friends in the United Auto Workers have pointed out, "Targeted enforcement approach is needed, and not all trade deficits have the same impact. For example, Canada's 16.7 billion finished automobile deficit is nearly offset by our 14.7 billion surplus in automotive bodies and parts. It should not be held in the light of more egregious actors." I agree.

As is often said, in the case of this administration, I am afraid their scatter-shot, tweet-from-the-hip approach adds more confusion than clarity to the lives of our workers and businesses. A real strategy demands clear and achievable goals.

But what we need is a comprehensive game plan. I had hoped that—there is no doubt that China has unfair trading practices and barriers. But creating a global coalition of the European Union, Canada, Japan, South Korea, Australia, and others at the WTO against China, making China's assault the central point, would be far more productive at the end of the day.

For years, my Democratic colleagues and I have urged this body to include enforceable labor standards in our trade agreements and to more forcibly use our tremendous market leverage to push back on unfair trade barriers by our global partners. It seems to me we have to use our trade agreements to look more seriously at how we protect our jobs, our environment, and our businesses from falling behind in our fast-changing, increasingly interconnected global economy.

From stagnant wages at home, to unfair working conditions abroad, to intellectual property thefts—something I focus a lot on in this committee, because New Jersey is at the apex of creating intellectual property—and government-subsidized businesses, it is a tough world out there. So we are still waiting for a strategy, because a one-size-fits-all approach just is not going to cut it.

I would like to ask the panel this question: the President has said that China is paying us billions in tariffs. Is that true?

Mr. SCHOSTEK. Everybody is looking around, Senator.

Senator MENENDEZ. Well, I appreciate your bravery in coming up to answer the question.

Mr. SCHOSTEK. You know, China is—let me just give some overall perspective on China. It is a huge market. It is a 28 million vehicle market. It is two-thirds larger than the United States, and it is growing.

There are certainly issues with the trading relationship, issues regarding IP, issues regarding foreign investment.

Senator MENENDEZ. But are they paying us billions in tariffs?

Mr. SCHOSTEK. So we have put—there are tariffs that have been in effect. Retaliation from China is affecting our own shipments over there, as I mentioned earlier in my testimony.

I do not know the exact amount of tariffs that China is paying, but I do know that we need to resolve this trading relationship. The right way to solve it would most likely be to work with our trading allies in approaching this issue.

Senator MENENDEZ. Mr. Britt?

Mr. BRITT. Senator, I cannot answer the question whether China is paying us billions. Countries do not pay the tariffs. Consumers pay the tariffs, whether you are in the United States, whether in China, in Japan, Germany, and that is the bottom line.

This whole issue—we will not win a tariff argument. It is not going to happen. We will win tariff agreements through trust and diplomacy, and it is just as you said: with our partners and allies beside us.

The way we impact China and the whole issue of trade is by making our partners and their citizens more wealthy and freer.

That is what puts pressure on China to work with us, not getting into this ill-conceived tariff war. I have a list of 27 countries that are in Spartanburg County. We have caused a problem with every one of them, to the point that they are contacting us. They are concerned about it.

We just need to be building bridges, not digging ditches.

Senator MENENDEZ. All right.

I am for that. I am for building bridges, not building walls. I am for making sure that we have the appropriate policy and create an alliance of allies against an unfair trading partner.

But I think you answered the question that I was looking for, which is "no." China does not pay us billions. No government pays the tariff. Ultimately, it is the private sector and consumers who get hit by the tariffs.

So I am concerned if the President does not even understand how tariffs work, how the hell are we thinking that his policy is ultimately going to be one that can work? You have to understand how tariffs work. China is not paying us anything.

Thank you very much.

Mr. BRITT. Senator, could I add one more thing to that?

The President, again—the question was asked by Senator McCaskill, this whole thing about tariffs and tariff wars. We have never won a tariff war in the United States. And when the President says, "tariff wars are good, they are easy to win," show me one in the history of the United States.

He also tweeted out that if you do not agree with him, you are foolish. So I have to be the biggest fool in Washington, DC today and in America, because I disagree totally with the tariff war.

Senator MENENDEZ. Yes. That is like "debt is good" too. Thank you.

Senator PORTMAN. Senator Wyden?

Senator WYDEN. Thank you very much. Senator Menendez, thank you for joining us. I know you are juggling a lot. I appreciate your points.

So gentlemen, here is where we are 2 hours into this—and I thank you all. It has been an excellent hearing.

What we have seen is a textbook case of how trade policy has been enveloped in chaos. There is no other explanation, in my view, for what we are dealing with.

In my State, trade is so important. One out of five jobs revolves around trade. The trade jobs often pay better than do the non-trade jobs. So this is about as important as it gets.

All of you have talked about the need for certainty and predictability. Mr. Nassar, I very much appreciate your response to my question of how do we come up with winning policies for workers and for companies. We look forward to you elaborating on that.

But I want to just close with where I think we are now. You all have told us that what is needed is some certainty and predictability.

What we are faced with now is the question of whether there are going to be auto tariffs. We are going to have to deal with the exclusions. You should know, during the course of the hearing, I had the staff running down the numbers, and contrary to what Sec-

retary Ross says, this number as to how many have actually been processed is really still quite low.

And then, of course, we want to know whether we are going to have a good deal with Canada or are we just going to say, hey, we will say we are not going to do that. And I have tried to advise this administration that they do not have the authority to do this, that Article 1 says Congress has that kind of authority. But all of that goes into the mix.

There is chaos now, and if those issues are not resolved in a way that brings people together and gives more certainty and predictability, what we are hearing about today is going to look like a small order compared to what is ahead.

And then finally, I very much appreciated what you all have had to say as it relates to the supply chain, because the supply chain literally runs from sea to shining sea. And today—I remember when I came to Congress, people essentially did business with folks who were an hour or two away. Today, the supply chain is not just national, but it is global.

And when you have suppliers—Mr. Schostek said—that are still waiting for answers, you again poor gasoline on the fire of uncertainty for companies and workers. So we have some heavy lifting to do.

I hope you are all walking out of here seeing that there is a lot of common ground in this committee for modern trade policy. Virtually every Senator whom I talk to says they do not want NAFTA abolished, but they want it updated. They want it modernized. They want, as you said, Mr. Nassar, to make it work for workers and for companies.

So, thank you all. This has been an instructive snapshot in modern American trade policy. You have given us a sense of the heavy lifting ahead, and I thank you for it.

I am glad I had 2 hours to make sure that you could enlighten me as to the extent of the problem, because not only does it reaffirm the concerns I walked in here with, I think it is a reason for us to double down and work even harder to modernize trade policy in a manner that works for both our companies and for our workers.

So, I thank you all.

Chairman Portman, thank you.

Senator PORTMAN. Thank you, Senator Wyden.

And to our witnesses, thank you for being here. We have a lot of balls in the air right now with regard to trade. Some are related. The 232 issues we talked about today and a potential for 232 to be used with regard to autos has been the main topic. And it seems like there is quite a bit of consensus around that. Maybe not absolute agreement, but a lot of consensus.

I would argue that it also relates to what we are trying to do with regard to the North American Free Trade Agreement, because when I hear from the negotiators, I get the sense that the potential for a 232, particularly on autos, and a resolution on 232 as it relates to steel and aluminum, are very much related to us coming to a solution with Canada.

I think the Mexican part of the agreement having been resolved, at least on a preliminary basis, is very good news. And I think we are very close with regard to Canada.

But my sense is, 232 is a shadow over those talks, and if not the most important one, one of the more important issues to be resolved. So you being here is very timely as to that issue.

And then of course, there is the broader issue of what we do about China and the 301. I understand Mr. Britt's point of view. I will say that we have kicked the can down the road for a long time on some of these issues with China, particularly the structure issues, even forgetting the enormous trade deficit.

And we do need to face up to those issues, and the question as to what the right approach is, is a legitimate one. And a concern that I have raised, and others have raised, is to be sure that we are being clear about our objectives. It is not just about buying more soybeans, which I would love, from Ohio. It is not just about buying more LNG, which would be good for our economy, Ohio as well. It is about some of these structural changes to ensure that intellectual property can be protected and that we can have a true level playing field with the second biggest economy in the world.

So that is a tougher one, but with regard to 232 and our allies in Canada and in Mexico, one would hope that we could resolve those issues now, soon, and then move on to resolving some of the European issues—and then get in the business of opening markets again by having some new trade agreements, which I know the administration is interested in doing, not just with the UK and Japan that have been in the news, but also with some African countries and elsewhere. I think that is an exciting part of the agenda we should pursue.

So with that, again, thank you for your attendance and participation. All five of our witnesses gave us a lot of great information today focusing, again, on the impact of the tariffs on autos. We appreciate your help.

Any member wishing to submit questions for the record needs to do so by the close of business on Wednesday, October 3, 2018.

With that, this hearing is adjourned.

[Whereupon, at 12:35 p.m., the hearing was concluded.]

APPENDIX

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

PREPARED STATEMENT OF H. DAVID BRITT, CHAIRMAN, SPARTANBURG COUNTY ECONOMIC DEVELOPMENT COMMITTEE

In Spartanburg County, SC, we build things.

For over 100 years, our mills were the heart of American textile manufacturing. In the 1990s, our once-bustling mills began to shutter and close. More than 25,000 workers found themselves unemployed and our county was changed forever.

If you visit Spartanburg County today—and I encourage you to do so—you'll see a community that is the economic envy of many States, and indeed, many other countries. The transformation began in 1992 when BMW decided to build its U.S. manufacturing facility in Spartanburg, SC.

In the last 26 years, BMW has invested over $9.3 billion in Plant Spartanburg, and has produced over 4 million vehicles, over 70 percent are shipped all over the world. BMW employs over 10,000 associates at Plant Spartanburg, and they produce an astonishing 1,450 vehicles a day.

This has helped South Carolina become the Nation's leader in the export sales of completed passenger vehicles, accounting for 16 percent of the total U.S. market share. In fact, the South Carolina automotive footprint is so robust that automotive suppliers are in 37 of our 46 counties, employing more than 66,000 South Carolina citizens in over 400 plants.

A 2017 study concluded that for every 10 jobs BMW directly creates at its Spartanburg plant, 90 more are created as a direct result elsewhere in the U.S. Just last year, the automaker announced plans to invest an additional $600 million in Plant Spartanburg and create 1,000 more jobs. That decision is a testament to the quality of the company and their associates.

Through our success with BMW, Spartanburg County learned we could compete and win on the international stage. Our culture of craftsmanship, which once saw workers spinning and weaving, translated to the economy of innovation. Today, more than 200 foreign-owned companies from 25 countries operate in Spartanburg County, including Michelin, Alcoa Fujikura, Toray Industries, and Kobelco. Less than 30 percent of those companies are automotive related.

Companies such as Volvo, Mercedes, and Boeing now call South Carolina home, employing thousands and building products used around the world. In 2017, South Carolina won 157 economic development projects, representing $5.24 billion in capital investment and creating nearly 18,500 jobs. More than half of that investment came from foreign countries.

Time and again, I hear a common refrain from these companies: South Carolina is a handshake State—a place where one's word still means something, and where fairness and partnerships are valued.

In a global economy, it's important to be fair. That's why I initially supported President Trump's efforts for equitable trade agreements with countries. However, such arrangements should not create less incentive for American companies to look for innovative ways to increase their productivity and make products more efficiently.

As evidence, look no further than U.S. steel manufacturing. Since March, the price of U.S. steel has increased around 23 percent on the heels of President

Trump's tariffs. Instead of innovating, or even raising prices slightly, U.S. steel manufacturers simply have increased their prices to just shy of imported steel.

This marked rise in steel prices will cascade to consumers, whether they realize it or not. Large construction projects built with precast concrete and steel beams may suddenly seem too costly and be shelved. Infrastructure improvement projects, the roads and bridges crucial to so many, may be delayed or canceled.

This is a perfect example of why governments should not use tariffs to pick winners and losers. We have over 100 years of history proving this does not work, from the sugar tariffs of the 1880s to the chicken tariffs of 1963, where in January 1964 the United States placed a 25-percent tariff on all imported passenger trucks and it is still in place to this day, 54 years later. Every truck owner in the United States is paying substantially more for their truck because of this tariff, including me.

The prices on everything from toothbrushes, groceries, and cars will rise in 2019 if not sooner. These economic policy decisions do not exist in a vacuum. The impact will not only be felt in board rooms and in capitals but will be passed on to consumers across the country and this world.

I keep hearing: "Be patient, the President has a plan." Well our trading partners and citizens are running out of patients they have their lives and futures at stake. Our neighbors are asking themselves, can we afford to buy a new home or car with a trade war looming? Companies are asking, can we risk this new investment in a new or existing facility or do we put it elsewhere in the world?

In Spartanburg and South Carolina, we experienced firsthand the failures of a protectionist mentality. We must not repeat the mistakes of the past. As a community that was given the option to change or die, we have grown and thrived under a new economy, one built with a strong emphasis on education, innovation, and collaboration.

In the years since the textile industry collapsed, companies have invested more than $17 billion in Spartanburg County alone, creating over 55,000 jobs. We are poised for even brighter days to come provided these tariffs do not put their foot on the throat of growth.

A reporter recently asked what I might say to President Trump if given the opportunity. I would say, "Mr. President, come to Spartanburg and let me show you firsthand how we have opened our minds, hearts, and ingenuity to the world for the benefit of everyone."

Politics is the art of getting things done through people, and in my 32 years of elected office it has never rung truer than now. In Spartanburg, we have learned that you can accomplish our objectives through trust and partnership—not a hammer.

Because in Spartanburg County, SC, we build things—including relationships.

PREPARED STATEMENT OF STEVE GATES, DEALER PRINCIPAL, GATES AUTO FAMILY

This statement is submitted by Steve Gates, Dealer Principal of Gates Auto Family. Today there are 16,802 auto dealers across the county, with over 1.1 million employees. Tariffs would harm our business, the communities we serve, and our customers across the U.S. seeking affordable, safe transportation for their families.

FOUR GENERATIONS OF CAR PEOPLE

My name is Steve Gates, and I'm a third-generation auto dealer operating multiple stores and providing work for 500 employees in Kentucky, Indiana, and Tennessee. I am proud to say The Gates Auto Family has recently expanded into the fourth generation as my daughter, MacKenzie, has chosen to join me in the auto business. I currently have franchise dealerships that sell Audi, Toyota, Nissan, Hyundai, Honda, Lexus, and Kia. In the course of my career I have also owned and sold Chevrolet and Ford dealerships.

The Gates Auto Family began in 1915, when my grandparents, Bernard and Marian, took a chance selling Dodge Desotos out of an Indiana livery stable, imported one at a time from Detroit, with Grandma Marian behind the wheel. Their spirit of entrepreneurship still runs in our blood. That's why in 1970 my dad, at the time one of the largest Chevy dealers in the Midwest, risked buying a start-up brand

called Toyota. It's why I continue to bet on the future, investing in new stores, and encouraging my daughter to continue in the family business with me.

I learned the car business from the ground up. In 1965 I started as a lot attendant at my father's dealership, Bud Gates Chevrolet. Throughout junior high school, high school, and college, I worked in parts, service, and in the body shop at Bud Gates Chevrolet-Toyota. I went on to explore the other side of the auto business after college by starting a company that sold accessories and financial services to new car dealers in Indianapolis. I sold that business in 1982 and went to work for BMW Financial Services/Dealer Services establishing finance and insurance departments for BMW dealerships. In 1986, I decided to reenter the retail automobile business as the used car manager for Dreyer and Reinbold BMW. Finally in July of 1989, I decided to go all in and became a partner at Toyota South in Richmond, KY, and I have never looked back.

COSTING THE CONSUMER

There's nothing easy about being a car dealer in the United States today, but the work is always interesting, and rewarding in more ways than I could ever explain. That's why it was so important to me to take time away from my business and fly here to talk with you today.

It was alarming to learn that the U.S. Department of Commerce in May opened an investigation into whether imported automobiles and automobile parts are a threat to our national security, with a 25-percent tariff on those imported cars and parts as a possible outcome. In a market where costs are already rising and sales are flattening, adding a 25-percent tax on autos and auto parts causes alarm bells to go off for me.

Unfortunately, affordability concerns are not new to the auto industry. According to Cox Automotive,[1] over the past 20 years the cost of a new car has increased by 35 percent, while household income has only grown 3 percent. A 25-percent tariff would make this already difficult situation truly impossible for many middle-class families.

Not surprisingly, when a customer walks into one of my dealerships, one of the most important considerations for them is price. Following the purchase of a house, a car is often a consumer's largest investment, and the vehicle they buy has to fit their needs and fit their budget. A recent study by the Center for Automotive Research (CAR)[2] for the National Automobile Dealers Association estimated that under a 25-percent auto tariff, the price of a new vehicle would rise by as much as $6,875. The same study found that the used car market would be impacted as well, as many would-be new car buyers are driven into the used car market, increased demand and constricted supply would drive up used car prices. The chart below tracks the steadily increasing averages for new and used car prices over a 5-year period. As you can see, according to Kelley Blue Book, the estimated average transaction price for new light vehicles in 2017 was $36,113, an increase of $583 from 1 year prior. At the same time, according to Edmunds, the average price of a used car rose to $19,400 in 2017. In the first quarter of 2018, the average price of a used car hit a new 13-year high[3] of $19,657, up 17.6 percent from 5 years ago. Adding a 25-percent tax to these already rapidly rising prices would put a new car or truck out of reach of many, if not most, American families.[4]

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[1] Cox Automotive is a leading provider of products and services spanning the automotive ecosystem. No matter the stage of the auto buying or selling process, we have a solution for clients of any size.

[2] Center for Automotive Research (CAR): *https://www.cargroup.org/wp-content/uploads/2018/07/NADA-Consumer-Impact-of-Auto-and-Parts-Tariffs-and-Quotas_July-2018.pdf.*

[3] Used-car prices hit a 13-year high as more late-model cars came off lease: *https://www.usatoday.com/story/money/cars/2018/06/15/used-cars-price-hit-record-high/700362002/*.

[4] *RoadLoans.com,* Average New and Used Car Prices, and The Advantages of Flexible Financing: *https://roadloans.com/blog/average-car-price.*

Those not in the market for a vehicle—new or used—will still feel the pain of an auto tariff as higher automotive parts prices drive up the cost of maintenance and repairs. According to the Auto Care Association, each U.S. household will spend an extra $700 per year in increased ownership costs. Current car owners unable to pay the higher prices an auto tariff would bring to our service centers, will likely put off needed repairs and safety improvements, making for a dangerous situation for them and others on the roads. As the cost of your car goes up and the cost of your parts go up, the cost of insuring your car will also go up causing customers to pay higher premiums. In testimony submitted to the Department of Commerce this summer, the auto insurance industry estimated that under a new 25 percent auto tariff, personal insurance premiums will rise by 2.7 percent or $3.4 billion.

When Americans are priced out of safe, affordable transportation, those who least can afford it will be the first to suffer. According to a recent study by the Tax Foundation,[5] a new 25-percent tariff on automobiles and auto parts would reduce after-tax incomes for all taxpayers by 0.47 percent in 2018 while making the distribution of the tax burden less progressive. These tariffs would fall harder on those taxpayers in the bottom 80 percent, reducing their after-tax income by 0.49 percent, and by 0.45 percent for the top 20 percent. The relief provided to families through tax reform would therefore be greatly reduced and in fact these tariffs would amount to a $73 billion tax increase on American consumers.

If these tariffs are implemented, our customers will pay more to buy their car, pay more to fix their car, and pay more to insure their car.

HURTING DEALERSHIP SALES AND EMPLOYMENT

From deregulation to tax reform legislation, the administration and Congress have built a healthy environment for businesses, large and small, to thrive. Maintaining high employment and an atmosphere for business investment is crucial to creating a strong economy that is vital to national security. Dealers welcome this economy and see new opportunities to grow, but we worry that the possible 25-percent tariff will negatively affect our ability to operate and provide work for thousands of Americans. The reason tariffs present such a possible catastrophe for the auto retail industry is twofold; our business is incredibly price-sensitive, and our margins are already razor thin. There isn't much wiggle room in today's flattening retail market for cars and trucks. And it isn't just imported brands that will be impacted. All vehicles sold in the United States today contain imported parts.

Facing rising prices, along with increasing interest rates, customers will delay or even avoid a purchase all together. Currently, the average age of a vehicle on our roads is 11.7 years. That's the highest it's ever been. Americans are already holding onto the cars longer because they can't afford to replace them. Unfortunately, we all know there is a direct correlation to the number of cars we sell and the number of Americans we employ.

[5] Tax Foundation, "Automobile Tariffs Would Offset Half the TCJA Gains for Low-income Households," *https://taxfoundation.org/automobile-tariffs-2018/*.

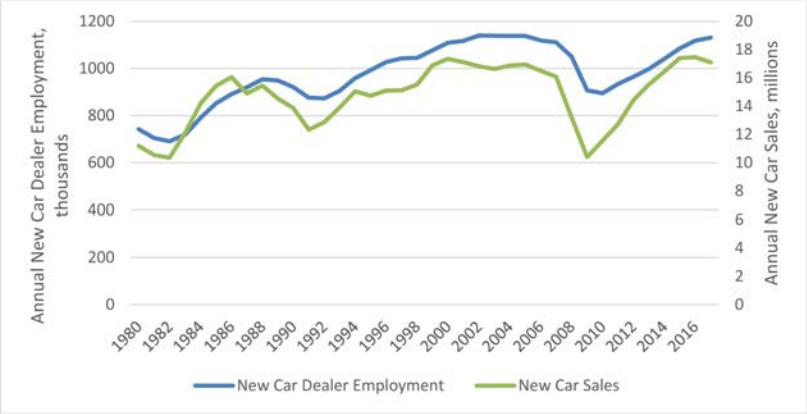
Across the United States and in communities large and small, Americans are employed in the automobile retail industry, including the over 1.13 million who are employed at 16,802 automobile franchises. Dealerships like mine have a combined annual payroll of $65.3 billion, and also account for an additional 1.27 million indirect jobs. The average salary at a dealership is $57,800. These are good, American jobs that grew out of free trade. These are jobs you can raise a family on and we need more of them, not less.

The CAR study I mentioned earlier predicts new vehicle dealerships would see a decline by as many as 117,500 jobs and a loss of as much as $66.5 billion in revenue if a 25-percent tariff is implemented.

Another study by LMC Automotive[6] on the effects of a 25-percent tariff on automobile sales found similarly that sales of new cars and trucks will also be negatively impacted. Assuming automakers and dealers absorb at least half the cost of a possible 25-percent tariff, these tariffs would still lead to a loss of 1 million annual unit sales. If the full burden of the tariff is passed on to the consumer that jumps to a loss of 2 million units per year, more than 10 percent of annual U.S. sales.

It's no wonder that, according to Cox Automotive,[7] 56 percent of franchised new car dealers believe an auto tariff will hurt their business.

As you can see from the below chart, there is a direct correlation between auto sales and auto dealership employment. A loss of sales would certainly result in a corresponding loss of jobs at auto dealerships across the country.[8]



TRADE AGREEMENTS, NOT TARIFFS

Global trade is an engine of economic growth and is a proven strategy for building global prosperity. Open trade and investment policies play a vital role in allowing international nameplate dealers, many of whom, like me, operate multigeneration family businesses, to compete on a level playing field in cities and towns across the U.S.

I believe we should always learn from history and look back to avoid mistakes that should not be repeated. The United States has experimented with auto tariffs in the past, and it is still affecting us negatively today. In 1963, President Lyndon B. Johnson signed Presidential Proclamation No. 3564 in response to Europe imposing a tariff on chicken imports. Among the items included in the list of retaliatory tariffs was a 25-percent tariff on imported trucks, and it is the only one on the list still implemented today. That's why I can't sell a Hyundai or an Audi pickup truck at my franchises. The 25-percent "chicken tax" on trucks limits choices for con-

[6] *Bloomberg,* "Trump Tariffs May Cost Carmakers at Least 1 Million Annual Sales," *https://www.bloomberg.com/news/articles/2018-06-12/trump-tariffs-may-cost-carmakers-at-least-1-million-annual-sales.*

[7] Cox Automotive Dealer Sentiment Index, Third Quarter 2018: *https://www.coxautoinc.com/news/CADSI-Q318/*.

[8] NADA, National Automobile Dealers Association, *https://www.nada.org/nadadata/*.

sumers and increases costs. And now we're talking about doing it to every motor vehicle and all their parts. That is what I consider a real threat.

American auto dealers strongly support a pro-growth economic agenda, and believe it can be accomplished with a positive trade message, not the threat of tariffs and taxes. We don't need more tariffs. We need more trade agreements. Trade keeps our economy open, dynamic, and competitive, and helps ensure that America continues to be the best place in the world to do business.

CONCLUSION

It is very difficult to understand how a tariff on imported vehicles and parts would improve national security, but quite clear how it would actually harm our economic security. Regardless of which study you reference or which math you use, an auto tariff would significantly increase the cost of buying, owning, and maintaining a car for American families.

If these tariffs are applied to our vehicles and vehicle parts, my partner and I will do all we can to keep the lights on in our stores. We'll cut every expense possible. And then we'll do what no small business owner wants to do—we'll start cutting jobs. At the Toyota store in Richmond, KY, where I spend most of my time, we'll start to let people go—put good people with families to support out of work.

Before long, there will come a point when there are no costs left to cut. I won't be able to floorplan—that's what we call it when we buy and finance our vehicles from the manufacturers to sell. Just like in the downturn of 2008, it will be harder and harder to be financed and no banks will lend me the money.

The ripples from these tariffs will continue to spread. Dealers might directly employ 1.13 million Americans, but we're also responsible for an additional 1.27 million indirect jobs. When I say these tariffs will be a catastrophe, I don't only mean for my stores or the auto industry—I mean a catastrophe for our entire country.

I've been in this business my whole life. I may not be an expert on politics or global security, but I know cars. And I know the cars and trucks I sell, the services I provide, and the taxes I pay, are not a national security threat. The men and women who show up to work for me every morning, rain or shine, they aren't threats to our national security either. These proposed tariffs are the real threat, and the real danger to our country and our economy.

PREPARED STATEMENT OF HON. ORRIN G. HATCH,
A U.S. SENATOR FROM UTAH

WASHINGTON—Senate Finance Committee Chairman Orrin Hatch (R–Utah) today delivered the following opening statement at a hearing entitled "Impact of Tariffs on the U.S. Auto Industry."

I intend to focus this morning on the investigation that was self-initiated by the Department of Commerce under section 232 of the Trade Expansion Act of 1962 to determine whether imports of automobiles and automotive parts threaten to impair our national security.

Many of us on the committee have already expressed our concerns about the administration's heavy reliance on tariffs. In June, Secretary Ross appeared before this committee to explain the Department's finding that steel and aluminum imports threaten to impair our national security.

As a result of that determination, the United States is currently imposing tariffs of 25 percent on steel products and 10 percent on aluminum products. Combined, these tariffs directly affect almost $50 billion worth of goods, while also affecting many billions of dollars more in downstream goods. These tariffs cause American manufacturers and farmers to pay more to conduct business and consumers to pay more to buy things.

One industry that has been harmed by the steel and aluminum tariffs is here before us today—the auto industry. The American Automotive Policy Council estimates steel and aluminum tariffs will cause a $400 per-car price increase. Auto suppliers and consumers are already suffering from section 232 tariffs. That's one reason I was stunned that on May 23rd the Department of Commerce initiated another investigation under section 232, this time into the national security threat from automobile and auto parts imports.

This investigation covers more than $200 billion worth of trade, which is four times larger than that under the steel and aluminum investigations combined.

For most American families, a car is one of the most expensive purchases they make—often second only to the purchase of a home. It is a significant financial commitment for most families, often paid for with debt, and I'm shocked that anyone would consider making it more expensive. If the Department of Commerce were to recommend a 25-percent tariff on cars, it would effectively be recommending raising the cost of an average imported car for an American family by as much as $6,400. According to the American Automotive Policy Council, if a 25-percent tariff is applied to auto parts, the cost to manufacture a passenger vehicle domestically would also increase by about $2,000. That's why I call tariffs a tax on American families.

The Tax Foundation estimates that auto tariffs could result in a $73-billion tax increase on American consumers and businesses, erasing some of the benefits of tax reform passed earlier this Congress. These taxes will hurt American families and put American jobs at risk. The Peterson Institute calculates that auto tariffs could cause 195,000 workers to lose their jobs. That's nearly 200,000 people out of work. And that's before other countries retaliate, which could put over 600,000 U.S. jobs at risk. These tariffs could cost the U.S. auto industry up to 2 million lost vehicle sales annually.

And it cannot be overlooked that international automakers and dealers significantly contribute to the U.S. economy. Together, they accounted for 47 percent of all U.S. vehicle production in 2017 throughout 31 manufacturing facilities, generating 2.47 million jobs in the United States. And this is just the automakers. Motor vehicle parts suppliers are the largest sector of manufacturing jobs in the United States. Suppliers directly employ over 870,000 Americans and nearly 8,000 in my home State of Utah alone. Direct employment by parts suppliers has increased 19 percent in the last 5 years, and tariffs threaten the sector's continued job growth.

In short, the U.S. auto industry is a major driver of the U.S. economy, supporting approximately 10 million American jobs and accounting for 3 percent of our GDP. Without question, any tariffs that are imposed will have a negative impact on the U.S. auto industry and our economy.

Our focus should be on building on the benefits from our historic tax reform achievement earlier this Congress. Our trade policy should strengthen our relationships with our allies while targeting China's most harmful trade practices. Tariffs on autos and auto parts are not going to help us achieve any of these things.

PREPARED STATEMENT OF MICHAEL HAUGHEY, PRESIDENT AND CEO, NORTH AMERICAN STAMPING GROUP

ABOUT NORTH AMERICAN STAMPING GROUP

North American Stamping Group (NASG) is a Tier 2 automotive metal stamper and assembler, founded in 1978, that manufacturers for both the new original equipment vehicle market, as well as the aftermarket. NASG produces components and assemblies for passenger car, light truck, and commercial vehicles. Sales have grown annually at a compounded rate of 18 percent for the last 8 years. NASG is one of the largest Tier 2 suppliers with annual sales approaching $450 million.

NASG has thirteen facilities in the North American Free Trade Agreement (NAFTA) region. Over the last decade, the company has deployed nearly $200 million in capital spending for new facilities, expanded facilities, new equipment, technologies, processes and acquisitions. This investment allowed the company to open significant capacity throughout the entire NAFTA region to support future growth requirements with strategic customers. NASG's thirteen facilities encompass 1.6 million square feet. Ten of the facilities are production facilities, two are technical centers and one is a sales office. In the United States, NASG operates ten facilities: one in Michigan, five in Ohio, one in Indiana and three in Tennessee. These facilities employ over 1,500 team members.

NASG is a member of the Original Equipment Suppliers Association, a division of the Motor and Equipment Manufacturers Association.

ABOUT THE MOTOR AND EQUIPMENT MANUFACTURERS ASSOCIATION

The Motor and Equipment Manufacturers Association (MEMA) represents more than 1,000 vehicle suppliers[1] that manufacture and remanufacture new original equipment (OE) and aftermarket components and systems for use in passenger cars and heavy trucks. Our members lead the way in developing advanced, transformative technologies that enable safer, smarter, and more efficient vehicles, all within a rapidly growing global marketplace with increased regulatory and customer demands.

Vehicle suppliers are the largest sector of manufacturing jobs in the United States, directly employing over 871,000 Americans in all 50 States. Together with indirect and employment-induced jobs, the total U.S. employment impact of the supplier industry is 4.26 million jobs.[2] Nearly $435 billion in economic contribution to the U.S. GDP is generated by the motor vehicle parts manufacturers and its supported activity.

Suppliers provide about 77 percent of the vehicle value. To put this into perspective, a typical vehicle contains more than 30,000 components. Vehicle suppliers manufacture materials, parts, and systems for a wide range of customers including new vehicle manufacturers (a.k.a. "OEMs") and other Tier 1–3 suppliers. They also manufacture for the vehicle aftermarket by way of multiple channels to provide vehicle service technicians, commercial fleets, and consumers the parts and materials needed for vehicle maintenance and repair. The variety of service applications ranges widely too: from passenger cars, SUVs and pickups to heavy-duty vocational trucks, semi-tractor trailers and military tactical vehicles—suppliers provide the components necessary to support the production of millions of these vehicles annually. MEMA members make a wide array of vehicle components for new vehicles as original equipment and for the aftermarket as replacement parts. They manufacture and produce essential vehicle components and materials—such as axles, brakes, tires, wheels, batteries, wire harnesses, seats, front/rear lights, bearings, oil filters, fluids, plastics, metals, composites, and thousands more. Suppliers also innovate and create complex and highly integrated vehicle systems—such as advanced refrigerants and HVAC systems, emissions control technologies, regenerative braking technologies, alternative propulsion systems, advanced driver assistance systems, vehicle-to-vehicle communications, and automated driving systems.

EXECUTIVE SUMMARY

NASG and MEMA support the administration's agenda to assure free, fair, and reciprocal trade and a level playing field for all Americans. However, we are very concerned about the adverse impact on manufacturing jobs resulting from the section 232 steel and aluminum tariffs and section 301 China tariffs already in place. The combined impact of these tariffs has thrown many supplier companies close to a financial crisis and has made some of them question their future investments in the U.S. Tariffs are having a negative impact on these manufacturers, the jobs they create, and ultimately the American consumer. The threat of further tariffs from the section 232 automotive and auto parts investigation will increase the cumulative negative effect on suppliers.

NASG and MEMA strongly oppose any broad, unilateral, and import-restrictive measures—such as tariffs, quotas, or other adjustments—on imported automobiles or motor vehicle parts. We recognize the Department of Commerce is currently investigating these matters and that no specific recommendations have been made. However, recent actions and statements from the administration signal that tariffs will soon be imposed on our industry.

The imposition of section 232 tariffs on imported autos and motor vehicle parts will place manufacturers at a competitive disadvantage to their global counterparts, erode U.S. jobs and growth, and will not protect the national security of the United States. Such actions would weaken our Nation's economy by harming U.S. manufacturers of vehicles and vehicle parts and would deter U.S. investments in new innovative technologies. In fact:

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[1] MEMA represents vehicle suppliers through the following four divisions: Automotive Aftermarket Suppliers Association (AASA), Heavy Duty Manufacturers Association (HDMA), Motor and Equipment Remanufacturers Association (MERA), and Original Equipment Suppliers Association (OESA).

[2] "Driving the Future: The Employment and Economic Impact of the Vehicle Supplier Industry in the U.S.," available here: *https://www.mema.org/sites/default/files/MEMA_ImpactBook.pdf,* released by MEMA in January 2017.

- Tariffs will jeopardize 871,000 parts manufacturing jobs in the United States;
- Tariffs will harm global competitiveness of the United States;
- Tariffs, quotas, or other adjustments will diminish investment in the United States; and
- The broad scope of the investigation has negative consequences for the United States.

NASG and MEMA urge this committee to work with the administration to reset our discussions with our trading partners to pursue our joint goal of free and fair trade.

STRUCTURE OF THE SUPPLIER INDUSTRY

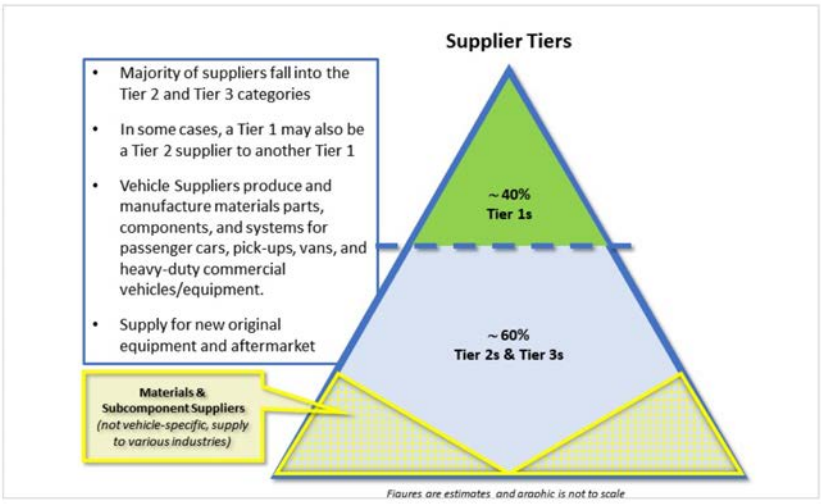
In the vehicle manufacturing industry, suppliers are categorized in tiers. Tier 1 manufacturers provide new original equipment (OE) finished parts, components, and systems directly to their vehicle manufacturer customers. Tier 2 manufacturers are often niche or specialty component manufacturers that provide subcomponents and other content to Tier 1 manufacturers. Tier 3 companies are typically the suppliers of raw or semi-finished materials, such as metals or plastics, for both Tier 1 and 2 suppliers. Often, Tier 2 and 3 suppliers may also provide products and supply customers in other industry sectors outside of the vehicle industry (such as, computer chips, PCB boards, sensors, cameras, metals, glass, plastics, chemicals).

In Figure 1 below, we estimate that approximately 40 percent of the suppliers are Tier 1s and about 60 percent are Tier 2s and 3s. The dashed line indicates the frequent crossover of suppliers that may be a Tier 1 to several vehicle manufacturers, but also a Tier 2 supplier to a Tier 1. The vehicle aftermarket provides finished components via a variety of channels directly either to consumers or to vehicle service technicians and repair facilities. These goods are used for the maintenance and repair of over 260 million cars, trucks, and buses on our Nation's roadways.

The supply chain, their customers, and the jobs they support are highly interdependent. Like a stone in a pond, one small change to the chain can cast off multiple ripple effects. The vehicle industry has repeatedly witnessed the narrow threads that bind its successes and prevent its weaknesses. This past May, a fire at a U.S. supplier facility stopped production and pinched availability of specialized parts that only a few suppliers make. Multiple vehicle manufacturers were impacted and had to pause production of finished vehicles.[3] Certainly, other examples of supply chain disruption and the short- and long-term ripple effects include the worldwide economic crisis in 2008, which drastically slowed overall vehicle production, and the "Great Sendai Earthquake" in 2011, which impacted capacity for the materials and subcomponents. The point is that these are just a few examples that demonstrate how the U.S. vehicle industry relies on both its global suppliers and its local domestic component manufacturers to be viable with as little disruption and as much predictability as possible.

[3] "Supplier fire isn't just hurting Ford, supply issues are rippling across auto industry," by Phil LeBeau, *CNBC.com,* published May 10, 2018, updated May 11, 2018, *https://www.cnbc.com/2018/05/10/supplier-fire-isnt-just-hurting-ford-gm-and-others-may-feel-impact.html.*

Figure 1



The Figure 2 below, sourced with permission from IHS Markit, illustrates the interconnectedness of the North American supply base and their OEM customers. For example, looking at General Motors, this chart shows that GM shares 76 percent of suppliers with Ford Motor Company. OEM after OEM show significant percentages of shared supply base for their vehicles. The interdependency is clear. This chart underscores the interconnectedness of our industry and the North American region.

Figure 2

North American Supply Base Independence

OEM Supply Base for NA Vehicles	Also supply to									
	GM	Ford	FCA	R-N-M	Honda	Toyota	Hyundai/ Kia	VW	Daimler	BMW
GM	100%	58%	61%	47%	41%	29%	32%	47%	42%	44%
Ford	76%	100%	66%	50%	49%	30%	35%	50%	46%	49%
FCA	72%	60%	100%	51%	46%	32%	32%	46%	49%	47%
R-N-M	64%	52%	59%	100%	60%	40%	28%	50%	44%	39%
Honda	60%	55%	56%	65%	100%	45%	32%	49%	41%	41%
Toyota	56%	44%	51%	56%	59%	100%	25%	40%	32%	33%
Hyundai/Kia	54%	46%	46%	36%	37%	23%	100%	39%	31%	36%
VW	72%	59%	59%	56%	51%	32%	35%	100%	60%	64%
Daimler	66%	55%	64%	51%	45%	26%	29%	62%	100%	61%
BMW	80%	68%	71%	52%	52%	32%	38%	76%	70%	100%

Source: IHS Markit North American Component Forecast Analytics (CFA) as of 2017 calendar year. IHS Markit CFA tracks the supply of 90+ major light vehicle components/systems sourced from over 280 Tier 1 suppliers.

Disruption to one implies disruption to all. As suppliers and OEMs develop new technologies and vehicles, this interconnectedness is critical to the long-term viability of the industry. Not only for new car production, but also the aftermarket production of the components needed to maintain vehicles.

Taken together, these figures paint a picture of this industry. They illustrate that there are relatively few suppliers at both the top and bottom of the supply chain and there are a substantial number of jobs dependent on the success of many. Suc-

cessful suppliers must have a wide range of customers in the vehicle industry providing content to a number of vehicle manufactures.

As the cost of manufacturing in the U.S. increases for a non-traditional vehicle manufacturer, the entire supply base suffers. A supplier with only one manufacturing facility in the U.S. will find its market limited to the Tier 1s as the Tier 1 suppliers find their markets limited to its customer base. Indeed, smaller, more locally based Tier 2 and 3 suppliers may find it more difficult to reorganize their business models since they do not have other global facilities to move business to or absorb the economic impacts.

There should be no doubt that the implementation of additional tariffs or quotas under a section 232 investigation on motor vehicle parts will cost U.S. jobs. In fact, some members have shared with MEMA that—if tariffs are implemented—the length of time it would take to feel the ramifications and impact is within one quarter for larger companies, and significantly less than that time for smaller to medium companies. In order to make adjustments, the first resources to get cut will be jobs. A majority of vehicle suppliers fall into that small/medium size and would be hardest hit because they will be squeezed on both ends to absorb the cost increases. These smaller companies have less capacity to absorb cost increases, and little or no ability to pass increases on to their customers. Suppliers are facing the cumulative effect of increased costs from section 232 steel and aluminum tariffs, section 301 tariffs and retaliatory tariffs from China, and the very real prospect of section 232 tariffs on imported vehicle parts.

IMPACT OF STEEL AND ALUMINUM TARIFFS ON SUPPLIER INDUSTRY

The supplier industry is already feeling the effects of tariffs on steel and aluminum. Steel prices have risen steadily with the ongoing talks and then implementation of steel tariffs. The market prices increased by 50 percent with an increase from $600 per ton for hot rolled steel up to $900 per ton today following the date the tariffs took effect on March 23, 2018.

Steel and aluminum tariffs have led to retaliatory action by U.S. trading partners. In addition, it is forecasted that these tariffs could increase vehicle prices by $2,000 to $7,000 based on material price increases. All of these actions will have a detrimental impact on our economy. It is estimated that suppliers, like NASG, will have to absorb a third of the steel increases, thereby reducing earnings, which will result in less technology investment spending, less capital spending and lower wage increases. These cuts will lower consumer confidence, leading 60 percent of economists to forecast a recession in 2020. If this forecast comes to pass, the results will include reduced automobile sales with an estimated 15 percent decline and between 750,000 to 1,250,000 American automobile workers losing their jobs.

NASG has experienced steel price increases exceeding $10 million dollars. As a supplier, NASG is unable to pass steel price increases to Tier 1 customers and vehicle manufacturers, regardless of whether the higher price was due to tariffs or increased prices as the domestic steel producers inflate prices. This has had negative consequences to their business. To mitigate the increases, NASG has reduced overtime; put on hold and dramatically pared down all open team member hiring requisitions, put on hold and dramatically pared down capital spending and reduced all discretionary spending. The decisions of NASG have been repeated throughout the supply chain.

STEEL AND ALUMINUM EXEMPTION AND EXCLUSION PROCESSES ARE INEFFECTIVE

At the same time, the Department of Commerce and the U.S. Trade Representative (USTR) have implemented exclusion and exemption processes that are problematic and uncertain. After months of reviewing and posting over 31,000 exclusion requests, Commerce has begun to grant and deny applications. As of today, fewer than 10 percent of requests have been finalized. The process is opaque, inconsistent, and inaccessible. Some companies have described the experience as arbitrary and capricious, lacking substantial evidence for the denial determinations.

On September 11, 2018, the Commerce Department's Bureau of Industry and Security (BIS) published a second Interim Final Rule (IFR) in the Federal Register. The IFR made a number of changes to the process that are welcomed by the industry, including development of a rebuttal and surrebuttal process and changing the date of refunds to the date of receipt of the request by Commerce.

Suppliers have reported to MEMA that some objections have been filed by steel and aluminum producers that have failed product testing and validation. Other ob-

jections have been filed by producers that are late on current deliveries. In cases where objections have been filed and the request denied, the direction from BIS is that the company must start from square one and file a brand-new application and include any refuting information. This is inefficient and burdensome on both the company and the government resources required to re-process refuting applications.

The rebuttal process, while welcome, is short. Supplier companies have shared frustration with MEMA that thousands of seven-day rebuttal comment periods opened the day the IFR was published and closed seven days later. This short turn around left many companies scrambling to complete rebuttal forms on dozens or more requests to submit before the comment periods closed. The quick turn around made this process unnecessarily difficult.

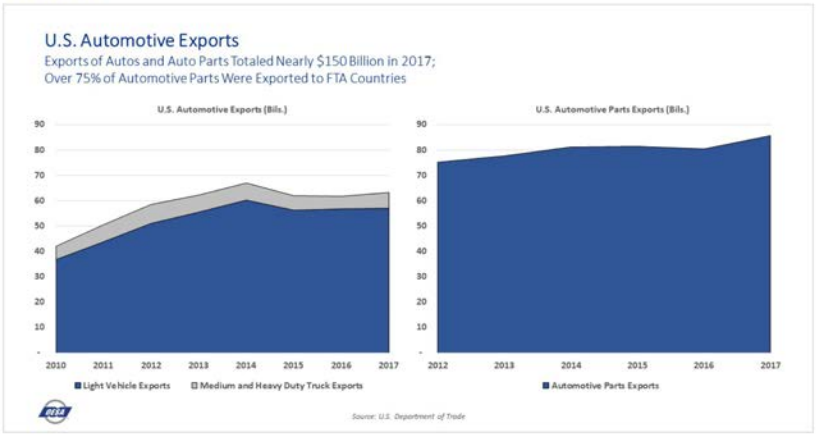
NASG and MEMA encourage the committee to continue to monitor the implementation of the exclusions process and country exemptions and work with the administration to ensure that the process is fairly and justly implemented.

Additionally, on August 29, 2018, the President signed a new proclamation making several changes to the exclusion project. These changes, such as extending retroactive relief back to the date of filing, were welcome. However, some changes did not do enough to improve the program. For example, the administration has lifted tariffs on specified grandfathered steel from quota countries for construction projects. This change should be expanded to allow all grandfathered steel and aluminum for manufacturers assuming contracts were in place before the tariffs took effect.

TARIFFS ON IMPORTED AUTOS AND PARTS WILL HARM GLOBAL COMPETITIVENESS OF THE UNITED STATES

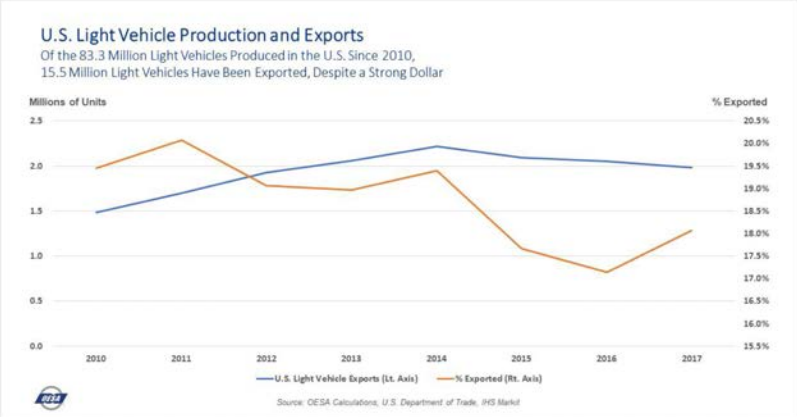
The United States is one of three main areas in the world that has a significant vehicle manufacturing industry, along with Europe and Asia. As shown in Figure 3, the U.S. has dominated North American vehicle and vehicle parts production totaling almost $150 billion in 2017. Notably, over 75 percent of U.S. manufactured automotive parts were exported. As part of the North American region, the U.S. can compete with Asia and Europe in almost every facet of motor vehicle production. For the past 10 years, the vehicle industry has grown and thrived, due in part to the improving economy and the strength of the region's supply chain.

Figure 3



The U.S. is also strong on exports. Of the 83.3 million light vehicles produced in the U.S. since 2010, 15.5 million light vehicles have been exported despite a strong dollar (*see* Figure 4).

Figure 4



The U.S. automotive industry is running near full production capacity. Current capacity utilization for suppliers is at the highest it has been since 2000 (*see* Figure 5). Investment in duplicate capacity could slow U.S. research and development (R&D) investments in new technologies. Also, a common concern among various manufacturing sectors is finding enough skilled U.S. workers due in part to the currently strong economy and low U.S. employment rate. These factors make adding more U.S. capacity difficult. Thus, to remain competitive, U.S. vehicle suppliers leverage the global supply chain to source the materials, subcomponents, and parts needed for further component manufacturing and system integration.

Tariffs on motor vehicle parts will jeopardize the vehicle industry's growth and success and—more importantly—the U.S. jobs and American innovation that comes with trade. Tariffs or other broad trade-restrictive measures would cause significant disruption and upheaval to the vehicle industry. Given the strength of the North American region's supply chain, certainly, if Canada and Mexico were to be exempted from these types of measures, the impact would be substantially reduced. Most OE and aftermarket suppliers have well established footprints in North America to support regional requirements. It is typical and normal for parts and subcomponents to be shipped back and forth over borders, often multiple times, within the region. If this accessibility is abruptly constrained or closed off, the results with be chaotic and catastrophic to the U.S. vehicle industry.

The U.S. cannot simply stand on its own and manufacture the most fundamental components as well as the newest advanced technologies and remain competitive in a tariff compulsory environment. The supplier industry has long urged this administration to consider alternative policies and actions instead of tariffs to encourage and retain the development and deployment of the newest innovations in the United States.

QUOTAS OR OTHER ADJUSTMENTS WILL DIMINISH INVESTMENT IN THE UNITED STATES

Vehicle suppliers lead the way in developing advanced, transformative technologies that enable safer, smarter, and more efficient vehicles, all within a rapidly growing global marketplace with increased regulatory and customer demands. As key innovators, suppliers provide upwards of 77 percent of the content of vehicles manufactured in the United States.

Figure 5

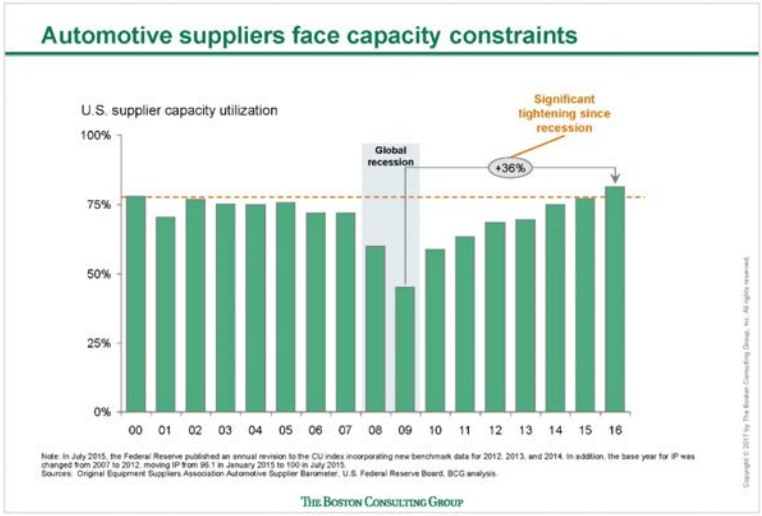
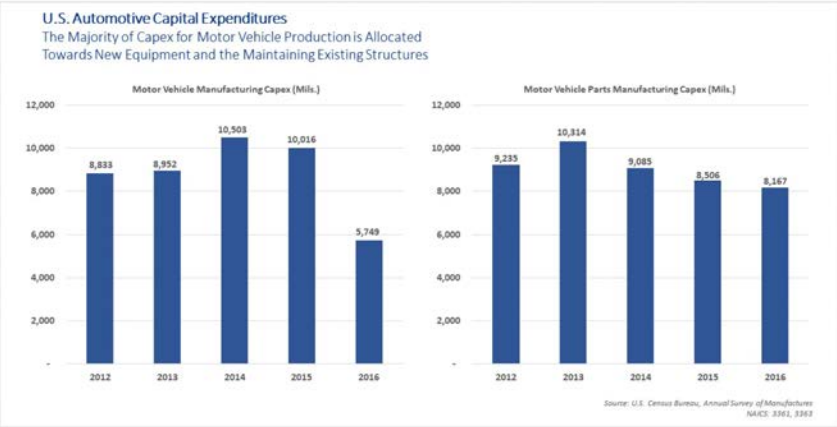


Figure 6 below shows the capital expenditures ("capex") investments for automakers and vehicle parts manufacturers. The capex invested in the U.S. is in the billions of dollars. The right side of the chart indicates that over the past 5 years $45 billion in capital expenditure investments have been made by U.S. vehicle parts manufacturers. About half of suppliers' capex spending is invested heavily into facilities, machinery, and tooling. Those investments go towards ensuring they can meet production demands for long product cycles. More importantly, these investments result in high-value U.S. jobs—whether it is skilled labor for manufacturing or engineers for product development.

Moreover, suppliers invest a significant amount on R&D here in the United States, to innovate and create the advanced technologies necessary for the vehicles of today and tomorrow. Many suppliers have established U.S. technical centers and R&D facilities. This enables them to test and validate a whole host of systems and components for their customers.

The vehicle industry finds itself at a critical inflection point with the development of transformative innovations in advanced safety, efficiency, and automated technologies. These technologies for advanced vehicle safety and efficiency systems are the building block technologies to automated driving systems, which require substantial development costs. The U.S. investment and research over the next several years in the vehicle industry—from Silicon Valley to Detroit and across America—may well determine global leadership in transportation and technology for generations to come. The United States has long been a leader in innovation. However, the imposition of trade-restrictive actions—like tariffs or quotas—on vehicle parts manufacturers will put these U.S. investments in jeopardy. Unfortunately, the uncertainty of the proposed actions and the potentially broad scope has made planning for future investments very difficult. In fact, many of our members have indicated that their companies are delaying, deferring, or canceling plans for further U.S. investments. These are the kinds of critical investments we need domestically to support jobs as well as support our Nation's economic growth and success.

Figure 6



The U.S. has a strong history of being a leader in innovation. Our Nation is uniquely positioned to lead the world in automated technology development and increasingly efficient propulsion systems. Unlike other manufacturing sectors, however, this innovation will occur in places in the world that provide the best economic and trading opportunities. Therefore, if suppliers are unable to access and import into the U.S. the needed materials, components, and technologies from other parts of the world, they may simply establish their centers of innovation elsewhere. Consequently, this current and future development depends on the free flow of trade for new and state-of-the-art parts, systems, and raw materials. Limiting access to these products in the U.S. will make other regions of the world more attractive for future investments.

CONCLUSION

The motor vehicle sector requires long-term investments in facilities and employees, and thus depends on regulatory and market stability. The implementation of tariffs on steel and aluminum, which are important raw materials for the production of vehicle parts and finished automobiles in the United States, has already caused significant uncertainty and added costs to domestic manufacturers in the vehicle sector. The looming threat of additional tariffs or quotas on vehicle parts further jeopardizes U.S. innovation and investment in research and development.

Given the immense complexity and ramifications of the broad scope of "automotive parts," MEMA has urged the Department of Commerce to take following the actions in the pending section 232 investigation:

- Remove entirely "automotive parts" from the scope of this investigation.
- Exclude key U.S. allies, particularly Canada and Mexico, from the scope of this investigation.
- Clarify exactly which parts are subject to the investigation and how to delineate the parts. Parts used in commercial vehicles over 10,000 lb. GVWR should not be included in the scope of the investigation at all since those vehicles are not subject to the investigation.

Finally, the administration must fully take into account the benefits of the vehicle industry to our economic and national security. Motor vehicle suppliers provide needed content for the Department of Defense and our armed forces. The imposition of tariffs will jeopardize this supply chain and, in turn, our national security.

MEMA urges this committee to support these actions. If there is any additional information MEMA can provide for the committee, please contact Ann Wilson, MEMA senior vice president of government affairs, at awilson@mema.org or at 202–312–9246, Thank you for your consideration.

PREPARED STATEMENT OF JOSH NASSAR, LEGISLATIVE DIRECTOR, UNITED AUTO WORKERS

Chairman Hatch, Ranking Member Wyden, and members of the Senate Finance Committee, thank you for the opportunity to share our views on this important matter. It is my honor to testify on behalf of UAW President Gary Jones and 1 million active and retired members of the International Union, United Automobile, Aerospace, and Agricultural Implement Workers of America (UAW).

The state of the domestic auto industry and the impact of policies emanating from Washington, DC is of great importance to our economy and working people throughout the country. Over 900,000 people work in the auto and auto-parts manufacturing sectors alone.[1] The economic impact of the auto industry reaches far beyond the workers employed at the plants. When jobs from other linked industries are included, the auto industry is responsible for over 7.25 million jobs nationwide.[2]

As researchers, engineers, and skilled trades and production workers in the automotive, aerospace, and agricultural and construction equipment industries, we welcome this long overdue discussion. In fact, the majority of UAW members and retirees work in, or are retired from, the auto industry. All of these workers, their families, and their communities are impacted by trade policy.

When examining the question of the impact of tariffs in the auto industry, it is important to define the goal. Our goal is to create good paying U.S. jobs now and in the future. We proudly support policies that strengthen the middle class, create good paying jobs providing benefits and retirement security in the United States and reduce income inequality both here and abroad. It has been demonstrated time and time again that a vibrant middle class is needed in order to have a strong economy and democracy.

We, as a country, need to take a holistic approach to succeed. It is a mistake to look at trade in isolation. We need to consider how tax law, worker training programs, labor rights, and other policies interact. For example, provisions in our tax laws that reward offshoring undermine trade policies that are intended to prevent jobs from leaving the U.S. We need a comprehensive strategy if we are to remain competitive.

1. AUTO TRADE WITH MEXICO

Since NAFTA, the U.S. automotive and auto parts trade deficit with Mexico has grown significantly. In 1993, the U.S. had an automotive (NAICS 3361) trade deficit with Mexico of $3.5 billion dollars. By 2016, that deficit had grown to $45.1 billion. For auto parts, the situation is significantly worse. In 1993, the U.S. had a very small auto parts (NAICS 3363/HS 8708) trade deficit with Mexico of $1 billion.[3] By 2016, it was 20 times larger at $23.8 billion. As the trade deficit increased, wages declined. Adjusted for inflation, auto parts production workers' average hourly wages declined by 23 percent in the past decade. Between 2000 and 2014 alone, employment in U.S. parts suppliers declined 36 percent.[4] Changes in technology and attacks on workers' rights to collectively bargain have contributed to the decline. NAFTA has also played a big role in creating the enormous trade deficits we face in this sector today.

In 2016, the U.S. automotive (NAICS 33611/HS 8702) trade deficits within NAFTA were:

Country	2016 Automotive (NAICS 3361) Trade Deficit	Change 1993–2016
Canada	$20.6 billion	+11.4%
Mexico	$45.1 billion	+1,288%

Source: The North American Free Trade Agreement, CRS, May 24, 2017.

[1] *https://www.bls.gov/iag/tgs/iagauto.htm.*

[2] Kim Hill, Deb Menk, Joshua Cregger, and Michael Schultz, "Contribution of the Automotive Industry to the Economies of All Fifty States and the United States," January 2015.

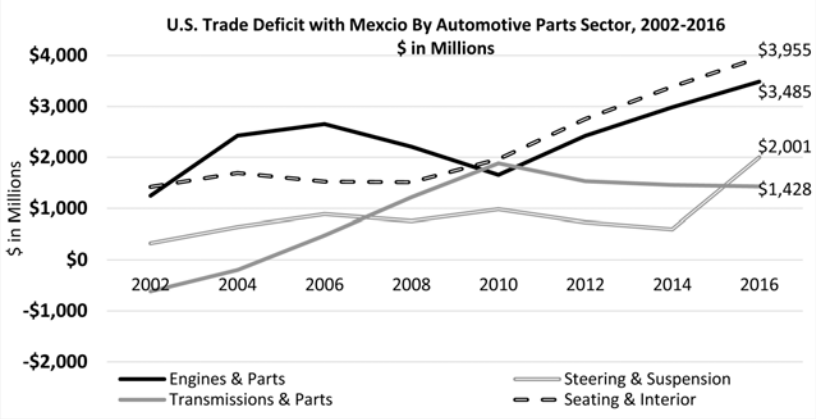
[3] Business data from the U.S. Census Bureau, Industry Statistic Portal. NAICS codes more accurately capture the auto parts sector. While a NAICS to HS crosswalk would include 8708, it would also include several non-auto specific codes.

[4] William A. Galston, "How the Vise on U.S. Wages Tightened," *The Wall Street Journal,* March 31, 2015.

The United States has an auto surplus (NAICS 3363) with Canada but a large deficit with Mexico.

Country	2016 Auto Part (NAICS 3363) Trade Deficit	Change 2006–2016
Canada	−$12.4 billion (surplus)	57% (larger surplus)
Mexico	$23.8 billion	23,700%

Source: The North American Free Trade Agreement, CRS, May 24, 2017.



The United States had a trade surplus with Mexico in 1993, the year before the North American Free Trade Agreement (NAFTA) was implemented. Since the passage of NAFTA, U.S. trade deficits with Mexico cost almost 700,000 U.S. jobs by 2010 per the Economic Policy Institute.[5] Most of the jobs displaced were in manufacturing.

Over the first 11 years of NAFTA (1994–2005), there were new production facilities in both the U.S. and Mexico. This was primarily due to foreign-based auto manufacturers adding production capacity in the region. However, in the subsequent 11 years (2005–2016), a different trend emerged. Production capacity was eliminated in the U.S. and Canada and added in Mexico. In many cases work was moved from the U.S. to Mexico. Between 1993 and 2014, Mexico's share of NAFTA production increased from 8 percent to 19 percent.

Light Vehicle Final Assembly Plants in NAFTA 1994–2016

	1994	2005	2016	Change 1994–2016
Canada	14	13	10	−4
Mexico	9	11	17	+8
United States	59	62	49	−10
NAFTA	82	86	76	−6

Source: Ward's Automotive.

[5] *See, e.g.,* Robert E. Scott, Jeff Faux, and Carlos Salas, "Revisiting NAFTA: Still Not Working for North America's Workers," Economic Policy Institute, 2007.

Share of NAFTA Production

Country	1993	2016
Canada	15%	13%
Mexico	8%	19%
U.S.	77%	67%

We have every reason to believe Mexico's auto industry will continue to grow. Auto production in Mexico is up from 2 million cars and light trucks in 2008, to 3.2 million today. Production is expected to hit five million units by 2018. Mexico is now the fourth largest auto exporter, behind Japan, Germany, and South Korea. Nearly 80 percent of Mexico's exports come to the United States.

Almost every major automaker has increased or plans to increase capacity in Mexico. Many major automakers have opened new plants or announced plans to do so. Currently, there are almost as many auto part workers in Mexico (400,000+) as there are in the U.S. (480,000). Autoworker in Mexico often makes $3.00 an hour, with many making well below that amount.[6]

The impact of trade agreements on the entire supply chain must be considered when analyzing the economic impact of motor vehicle manufacturing, not just final assembly. More assembly plants mean more 1st tier parts, then more 2nd tier parts, and on and on. It is a vicious cycle for UAW members whose jobs have moved to Mexico. All of the following UAW-represented parts suppliers are now also in Mexico: Lear, Johnson Controls, IAC, Flex-n-Gate, Federal Mogul, Faurecia, Bosch, Magna, TRW, American Axle, and Metalsa.

If it's not a first-tier assembly and it's stackable and shippable, it can be imported. Unfortunately, this has happened a great deal since NAFTA to the detriment of the U.S. economy and workers.

II. AUTO TRADE WITH CHINA

Since 2002, the U.S.'s trade imbalance with China has increased $244 billion, or 237 percent. Between 2001 and 2015, it is estimated 3.4 million American workers lost their jobs to unfair trade with China.[7] While the U.S. has an automotive trade surplus with China, an auto parts trade deficit has exploded. In 2002, the U.S.'s auto parts trade deficit with China was $972 million, since then it has grown elevenfold to $10.7 billion.[8] For American workers, this trend is untenable.

China tilts the playing field by propping up domestic companies and state-owned enterprises through direct subsidies and suppressing workers' rights.[9] It uses unfair market access processes and policies to force technology transfers from foreign firms. Together these actions have caused a dramatic loss of U.S. manufacturing jobs, suppressed American wages, and potentially stifled innovation.

III. U.S. AUTO INDUSTRY TODAY

The UAW is proud of the its role in creating middle-class jobs which have enabled workers to provide for their families and see their children pursue their dreams. Unfortunately, our standard of living is under attack and auto jobs are not what they used to be.

Since 2000, the U.S. has lost of over 3 million manufacturing production jobs—with trade playing a significant role.

Another disturbing trend is the change in the mix of parts the U.S. is importing. The U.S. has growing deficits in high value auto parts like engines, transmissions,

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[6] Alex Covarrubias V., "A Status Quo of the Mexican Auto Industry: Prospects and Tendencies" (presentation, The College of Sonora, July 2014).

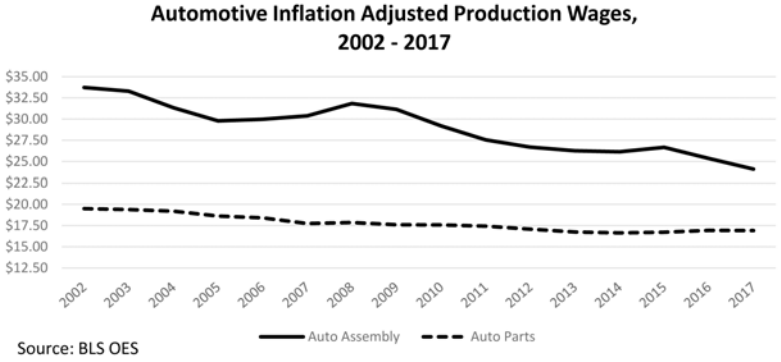
[7] Robert E. Scott (January 31, 2017), "Growth in U.S.-China trade deficit between 2001 and 2015 cost 3.4 million jobs," Economic Policy Institute. Retrieved from *http://www.epi.org/publication/growth-in-u-s-china-trade-deficit-between-2001-and-2015-cost-3-4-million-jobs-heres-how-to-rebalance-trade-and-rebuild-american-manufacturing/*.

[8] *https://usatrade.census.gov./*.

[9] "Annual Report 2016," Congressional-Executive Commission on China (October 6, 2016), p. 18.

seating, steering, and suspensions (see graph below). These components employ tens of thousands of American workers.

Over the past 15 years, U.S. automotive production workers' wages have shrunk dramatically. When adjusting for inflation, final assembly production workers' (BLS Occupational Code 51–0000) wages have dropped 29 percent, while parts production workers' wages have dropped 13 percent.



The U.S. is in a race with other advanced countries to develop the automobiles and technologies of the future. We recognize that trade enforcement actions alone will not get the job done. While Germany and other industrial countries have developed policies that are investing in its citizenry and infrastructure, the U.S. has instead taken a low-road approach. American companies may develop new products, but they have increasingly outsourced manufacturing to low-cost countries. As noted above, with job losses and decreases in wages, this has hollowed out much of middle America. Maintaining the status quo is not an option.

Wages have fallen even though productivity has substantially improved. The average factory worker makes less than the median wage for all occupations. Real wages in manufacturing fell between 2003 and 2013 at a faster rate for workers overall.[10] One fourth of manufacturing jobs make less than $13.07 per hour.[11] U.S. autoworkers wages have been suppressed and bad trade agreements have contributed to this troubling reality.

The number of workers in temporary or contract positions are on the rise in various industries including automotive. Perma-temps, the use of temps for extended periods of time with no path to full-time employment is becoming all too common in the auto industry—contract work is shifting from administrative jobs to blue collar occupations. Jobs in transportation and material moving and production now account for 42 percent of the temp industry. Furthermore, perma-temps earn 22 percent less than private-sector workers and work with little to no benefits.[12] The median worker in the staffing industry earns $12.40 an hour, compared to an hourly wage of $15.84 by all private-sector workers, regardless of industry.[13] The growing use of temp work drives down wages, benefits and job security in the auto industry and undermines good, middle-class jobs. Congress must stop ignoring the loss of good full-time jobs.

Workers often face both direct and implied threats if they attempt to form a union. In many cases, employers will openly threaten to close their plant and move to Mexico when workers fight for job security, better wages, health and safety improvements and retirement security. Veiled threats force workers to accept lower wages for fear that the company will ship their jobs abroad.

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[10] "Catherine Ruckelshaus and Sarah Leberstein, "Manufacturing Low Pay: Declining Wages in the Jobs that Built America's Middle Class," November 2014.

[11] *https://www.bls.gov/iag/tgs/iag31-33.htm.*

[12] Rebecca Smith and Claire McKenna, "Temped Out: How Domestic Outsourcing of Blue Collar Jobs Harms America's Workers," National Employment Law Project, September 2, 2014.

[13] *Ibid.*

IV. POLICIES TO STRENGTHEN DOMESTIC MANUFACTURING AND THE MIDDLE CLASS

As referenced earlier, our objective is to maintain and create strong middle-class jobs in the United States. Trade can play a key role towards achieving this objective.

Yet, any effort to reset Americas trade policy must also be accompanied by a strong industrial policy focused on education, workforce training, research and development, support for advanced manufacturing and technologies, building a 21st-century infrastructure, and creating penalties for companies that turn their back on American workers. A properly crafted industrial policy will create new industries, as well as re-shore old ones. We also need Congress to advance equitable tax policies that uplift working families and not reward billionaire CEO's with massive tax breaks while incentivizing businesses to outsource jobs overseas. A comprehensive approach will improve living standards, reduce poverty, mitigate our environmental impact, and vastly improve American's quality of life.

The right to collectively bargain strengthens the economic security of workers. On average, a worker covered by a union contract earns 13.2 percent more in wages than a peer with similar education, occupation, and experience in a nonunionized workplace in the same sector.[14] Unionized workers are more likely to have healthcare benefits, access to paid leave, employer provided pension plans, and safer working conditions compared to their non-union counterparts. Strengthening our labor laws and increasing penalties against employers who do not recognize worker's legal right to have a voice on the job will strengthen the middle class and reduce income inequality.

V. SUPPORTING DOMESTIC PRODUCTION OF FUTURE VEHICLES

Most of the production footprint of tomorrow's advance automotive technology is overseas. Today, the U.S. only produces 13 percent of the world's semiconductors. By 2021, the U.S. will produce only 14 percent of the world's lithium-ion batteries unless significant steps are taken.

Lithium-ion batteries are the most valuable component in electric vehicles (EVs). With the growth of demand from EVs, global lithium-ion battery production capacity is expected to grow by 73 percent between 2017 and 2021[15] and lithium-ion batteries could become a $40 billion market by 2025. This has sparked a race to develop the production capacity to meet growing battery demand and it is this race that will determine the geography of much of the EV value chain.

Based on developments so far, the U.S. is falling behind Asian and European countries in lithium-ion battery capacity. It is projected that by 2021, 56 percent of battery manufacturing capacity will be located in China and another 19 percent will be in Europe. The U.S. will only have 14 percent of global battery production capacity.

China and Germany have plans to push the electric vehicle market forward. The United States does not have such a plan. Again, we need a comprehensive strategy to ensure the vehicles and technologies of the future are made in the United States and that good-paying jobs are linked to vehicles of the future.

VI. TRADE REFORM

More needs to be done to address the disinvestment in America's workers, deteriorating infrastructure, and stifled innovation. A new trade model that is fair, balanced, and puts workers first will make the U.S. economy more competitive and create real opportunities for American workers.

Tariffs can be effective when appropriately targeted to specific trade practices and are a part of a comprehensive strategic plan to address unfair trade actions. However, tariffs alone are insufficient to boost U.S. jobs and strengthen our industrial base. The UAW believes that tariffs are a tool, not a comprehensive plan for ensuring industries of the future are created and built in the U.S.

It would be shortsighted to categorically rule out using tariff and other enforcement mechanisms to level the playing field. We shouldn't compete with one arm tied

[14] Economic Policy Institute, "How Today's Union's Help Working People," *https://www.epi.org/publication/how-todays-unions-help-working-people-giving-workers-the-power-to-improve-their-jobs-and-unrig-the-economy/*.

[15] Bloomberg New Energy Finance, *https://about.bnef.com/electric-vehicle-outlook/#toc-download*.

behind our back. For this very reason, we believe the administration should continue their auto 232 investigation. We hope the administration will ultimately take a measured and targeted approach to bolster domestic manufacturing.

It is critical to guard against non-tariff barriers, like currency manipulation, that has cost millions of U.S. jobs. Modern agreements must take this pervasive non-tariff barrier on directly.

We cannot repeat the mistakes of the past. NAFTA and broken trade deals have had long lasting and deep impacts for workers, communities, businesses and our trade partners. We need a new trade model that is worker centric and values people over investor profits and discourages companies from outsourcing good paying jobs abroad.

Thank you for the opportunity to share our views. I look forward to answering questions you may have.

From *Bloomberg,* May 5, 2017

HOW MEXICO'S UNIONS SELL OUT AUTOWORKERS

Wage contracts are inked years before plants open and workers never get a say.

By David Welch and Nacha Cattan

At a ceremony at Mexico's Los Pinos presidential residence in July 2014, BMW Chief Executive Officer Harald Krüger pledged to spend $1 billion to build a factory in the northern state of San Luis Potosí that will employ 1,500 workers. To mark the occasion, he presented President Enrique Peña Nieto with a model of a silver BMW race car.

The German automaker had unwrapped its own gift two days earlier, a labor contract signed by a representative from the state chapter of the Confederación de Trabajadores de México (CTM), the country's largest union confederation, and notarized by a Labor Ministry official. The document, which Bloomberg reviewed, sets a starting wage of about $1.10 per hour and a top wage of $2.53 for assembly-line workers. The starting rate is only a bit more than half the $2.04 an hour that is the average at Mexican auto plants, says Alex Covarrubias, a lecturer at the University of Sonora in Hermosillo.

The paperwork was filed 2 years before BMW broke ground on the new plant, which will turn out $45,000 3 Series sedans. When workers begin to stream into the factory sometime next year, there's a good chance most won't know they belong to a union.

So-called protection contracts—agreements negotiated between a company and a union that doesn't legitimately represent workers—are illegal in the U.S. and Germany. But Lance Compa, a senior lecturer at Cornell's School of Industrial and Labor Relations, says they're standard operating procedure in Mexico, where deals are cut factory by factory rather than collectively across a company or industry. Experts say this is a primary reason that wages in the auto sector have stagnated in recent years, despite a fresh wave of investments by foreign carmakers, most recently by German and Japanese manufacturers. Mexico's union bosses and politicians are more interested in keeping corporations happy than in raising the living standards of workers, Covarrubias argues. "Protection contracts are a way to keep wages artificially low," he says.

Since 2010, automakers have announced $24 billion in investments through 2019, while parts makers have committed another $3 billion, according to the Center for Automotive Research in Ann Arbor, MI. Companies often cite the trade agreements Mexico has signed with 45 countries as a key reason they want to locate their plants there. Auto executives will rarely say they chose Mexico because its workers are among the cheapest in the world.

Mexican assembly-line workers earn about one-tenth of what their U.S. counterparts make. Adjusted for productivity, base wages for workers in plants that make transportation equipment rose 20 percent in Mexico between 2006 and 2016, according to calculations by Boston Consulting Group Inc.; in China, they climbed 157 percent over the same period.

Alejandra makes about $1.45 an hour working at a factory in Guanajuato state owned by Hirschmann Automotive GmbH, an Austrian parts maker. The machine

operator, who asked that her last name not be used for fear of retaliation, says she has no idea if she and her co-workers are represented by a union. A public records search revealed that a CTM affiliate registered a contract in July 2015, almost 2 years before the factory was formally inaugurated. Perhaps Alejandra is in the dark because the union collects dues from Hirschmann, rather than employees—a common practice in Mexico.

Alejandra's wage is about double the minimum in her state, but she says it's not enough to support her and her young son. She can't afford to buy shoes or fish and rarely eats out. "As long as the authorities are lining their own pockets, the rest of us can all drown," she says. Hirschmann did not comment.

On the campaign trail, Donald Trump vowed to renegotiate the North American Free Trade Agreement, to keep American carmakers and other manufacturers from shifting production to Mexico. Yet tweaking tariffs and rejiggering local-content rules may not do much to stop the sucking sounds of auto jobs moving to Mexico. "Protection contracts are at the heart of the pressure on factory wages in the U.S. and beyond," says Harley Shaiken, a labor professor at the University of California at Berkeley.

The contracts trace their roots to the 1930s, when labor laws allowed unions to initiate a strike at a factory whether it had employee membership at the plant or not, says Héctor Barba, a labor lawyer for the National Workers Union, a CTM rival. This allowed unions to extort money from companies looking to prevent crippling work stoppages, he says. To protect investors, Mexico introduced laws in the 1980s allowing employers to register with one union, thus barring other syndicates from organizing strikes at their plants.

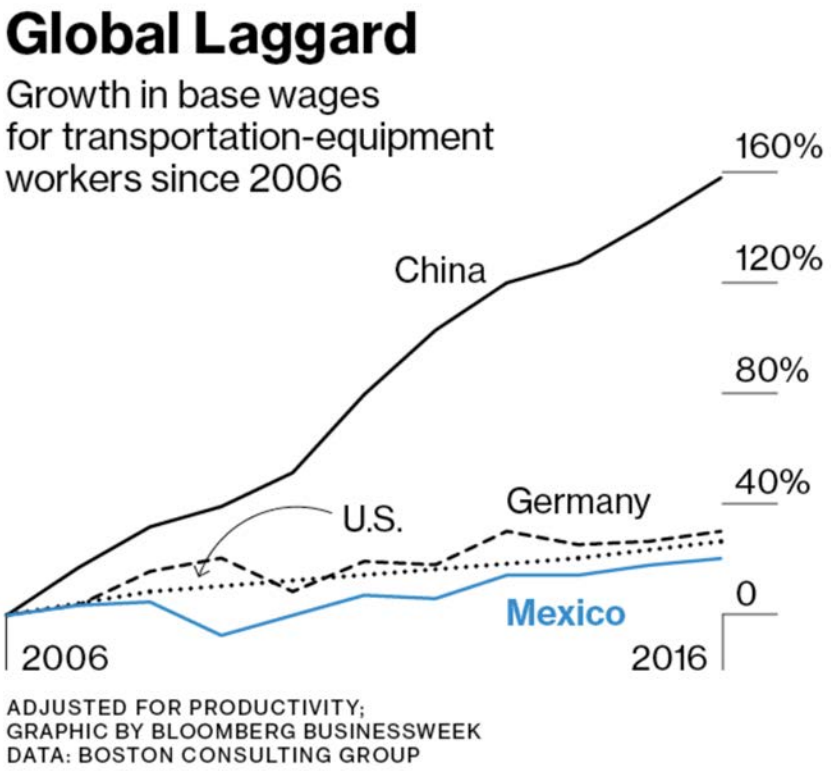
That established a pattern that continues in which a company signs a contract with a union of its choosing as soon as it announces a new project. Ford Motor Co. unveiled plans to build a $1.6 billion plant in San Luis Potosí in April 2016; a collective contract was signed in July. It scaled back the investment after Trump called out the company for exporting jobs to Mexico.

Ludwig Willisch, president and CEO of BMW of North America, says his company chose to build its newest plant in San Luis Potosí because auto exports from Mexico have low-tariff or duty-free access to twice as many countries as those from the U.S. When asked if BMW's German union had expressed concerns about wages in Mexico, he answered, "IG Metall worries about what happens in Germany."

That's not what Angélica Jiménez-Romo, an IG Metall board member, says. Her organization "has significant concerns," she says. "Unions in Mexico and the CTM, too, often have mafia-like structures and many are directly linked to the Mexican ruling party. In those unions, workers don't get a say in their wage deals and don't get asked to participate either."

Founded in 1936, with the support of then-President Lázaro Cárdenas, the CTM had a stranglehold on organized labor in Mexico during the more than 70 years the country was ruled by the Partido Revolutionario Institucional (PRI). Although its influence has waned somewhat with Mexico's transition to multiparty rule, the confederation, along with its affiliates, remains a force, with some 4 million members; the National Workers Union claims just 600,000 members. The CTM's current leader, Carlos Aceves del Olmo, is a member of the PRI who's served terms in both houses of Congress. Critics who accuse the CTM of signing protection contracts "don't take into account the fact that workers in Mexico are mature and highly skilled, and when they don't receive the salaries they deserve, they quit," the CTM said in a statement.

BMW spokesman Jochen Frey says, "We checked closely which unions that are present in the San Luis Potosí area, and it was clear very quickly that CTM was the most common one." Frey said the automaker "strives to pay wages that are in the top third level of what's typical for an area," and that Mexico is no exception.



The International Labour Organization, a United Nations agency that monitors labor rights worldwide, called on the Mexican government in 2012 to address the issue of protection contracts. A constitutional reform signed into law in February requires unions to prove they legitimately represent workers and shifts responsibility for arbitrating labor disputes from the executive branch to the courts. In an interview, Deputy Labor Minister Rafael Avante acknowledges that the old system "opened the door to vices," which is why the government has for more than a year now been inspecting plants to ensure that workers are aware of their contractual rights. Yet he says allowing employees to vote on contracts isn't desirable, as it could embroil companies in bitter negotiations. "We have to bring order," Avante says.

His boss, President Peña Nieto, has on several occasions boasted that labor tensions have diminished under his watch. "There hasn't been a single strike in a year and a half under federal jurisdiction," Peña Nieto said during a ceremony in 2015 to mark International Workers' Day. He added: "I express my highest regard to unions and worker confederations in the country for this constructive spirit, that without a doubt signals certainty and stability for investors, both national and international."

The bottom line: *Wages in Mexico's auto sector have stagnated because of contracts that give workers no input on pay.*

ECONOMIC POLICY INSTITUTE

How Today's Unions Help Working People

Giving workers the power to improve their jobs and unrig the economy

Report

• By Josh Bivens, Lora Engdahl, Elise Gould, Teresa Kroeger, Celine McNicholas, Lawrence Mishel, Zane Mokhiber, Heidi Shierholz, Marni von Wilpert, Ben Zipperer, and Valerie Wilson

August 24, 2017

Americans have always joined together—whether in parent teacher associations or local community organizations—to solve problems and make changes that improve their lives and their communities. Through unions, people join together to strive for improvements at the place where they spend a large portion of their waking hours: work.

The freedom of workers to join together in unions and negotiate with employers (in a process known as collective bargaining) is widely recognized as a fundamental human right across the globe. In the United States, this right is protected by the U.S. Constitution and U.S. law and is supported by a majority of Americans.[1]

Over 16 million working women and men in the United States are exercising this right-these 16 million workers are represented by unions. Overall, more than one in nine U.S. workers are represented by unions. This representation makes organized labor one of the largest institutions in America.[2]

By providing data on union coverage, activities, and impacts, this report helps explain how unions fit into the economy today; how they affect workers, communities, occupations and industries, and the country at large; and why collective bargaining is essential for a fair and prosperous economy and a vibrant democracy. It also describes how decades of anti-union campaigns and policies have made it much harder for working people to use their collective voice to sustain their standard of living.

"Collective Bargaining" Is How Working People Gain a Voice at Work and the Power to Shape Their Working Lives

Almost everyone has at one point felt unheard or powerless as an employee. Joining a union simply means that you and your colleagues have a say because you negotiate important elements of employment conditions together. That could mean securing wage increases, better access to health care, workplace safety enhancements, and more reasonable and predictable hours. Through collective bargaining negotiations, the union also works with management to develop a process for settling disputes that employees and their managers are unable to settle individually.

Once a collective bargaining agreement (CBA) is agreed to, union representatives work with employees and with management to make sure the rights and obligations spelled out in the agreement are honored. And they represent workers in high-stakes situations, such as when a safety violation has resulted in injury. By these means, collective bargaining gives workers a say in the terms of their employment, the security of knowing that there are specific processes for handling work-related grievances, and a path to solving problems.

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[1] Article 23 of the Universal Declaration of Human Rights declares that everyone has a right to form and/or join a trade union. The right of labor unions to gather is given under the First Amendment to the United States Constitution, which protects the right to exercise freedom of speech in peaceful protest. The U.S. Congress enacted the National Labor Relations Act (NLRA) in 1935 to protect the rights of employers and employees, including the right to form, join, or assist labor organizations and to bargain collectively. Americans of all ages broadly support the ability of workers in various sectors to unionize, with shares supporting unions ranging from 62 percent to 82 percent, depending on the sector. *See* "Mixed Views of Impact of Long-Term Decline in Union Membership: Public Says Workers in Many Sectors Should Be Able to Unionize," Pew Research Center, April 27, 2015.

[2] In 2016 there were 16.3 million wage and salary workers age 16 and older who were represented by a union, either because they were union members or (if they weren't union members) were in jobs covered by a union or an employee association contract. The share of workers who belonged to a union was 10.7 percent, and the share of workers covered by collective bargaining was 11.9 percent. (Source: EPI analysis of Current Population Survey Outgoing Rotation Group [CPS ORG] data for all workers age 16 and older).

To cover expenses for negotiating contracts, defending workers' rights, resolving disputes, and providing support to members of the bargaining unit, unions collect dues.

The National Labor Relations Act (NLRA) of 1935 and amendments govern private-sector unions and collective bargaining. While states generally have no jurisdiction over private-sector unions, the NLRA as amended does allow states to enact certain laws that govern fees paid by workers in unionized private workplaces (discussed later in this report).

Nearly half (48.1 percent) of workers covered by a union contract are public-sector workers. Collective bargaining among federal workers is covered by the Federal Labor Relations Act of 1978 (FLRA). State laws (enacted from the late 1950s forward) govern state and local government employee unions. Each state has its own set of laws that govern collective bargaining for state and local public employees. Some states allow the full set of collective bargaining rights, others (approximately one-fifth) prohibit collective bargaining, and still others limit some activities, such as the right to strike or the right to collect dues automatically during payroll processing. About one in 10 states have no state law addressing collective bargaining rights in the public sector.[3]

Union Workers Are Diverse, Just Like America

The typical union member is often thought to be a worker on a manufacturing line in the Midwest. Manufacturing does have a strong union tradition but people join unions in many industries and occupations. Union members include dental hygienists in Wisconsin, graduate students in Massachusetts, firefighters in Illinois, television writers and scientists in California, security guards in Washington, DC, digital journalists in New York, and major league baseball players in Georgia and other states.[4]

It is also true that, in the past, union workers were predominantly white men. But as of 2016, roughly 10.6 million of the 16.3 million workers covered by a union contract are women and/or people of color.[5]

- About two-thirds (65.4 percent) of workers age 18 to 64 and covered by a union contract are women and/or people of color.
- Almost half (46.3 percent) are women.
- More than a third (35.8 percent) are black, Hispanic, Asian, or other nonwhite workers.
- Black workers are the most likely to be represented by unions: 14.5 percent of black workers age 18 to 64 are covered by a collective bargaining agreement, compared with 12.5 percent of white workers and 10.1 percent of Hispanic workers.

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[3] The source for public sector's share of workers covered by a union contract is EPI analysis of Current Population Survey Outgoing Rotation Group [CPS ORG] data for all workers age 16 and older; the source for state laws covering collective bargaining is Jeffrey Keefe, *Laws Enabling Public-Sector Bargaining Have Not Led to Excessive Public-Sector Pay,* Economic Policy Institute, October 16, 2015.

[4] Cathy Hester Seckman, "The Unions: How Organized Labor Is Lending a Helping Hand to Dental Hygiene," *RDH* vol. 24, no. 4 (April 2004); Liat Shapiro, "Grad Students Vote in Majority for Labor Union," *The Justice,* May 23, 2017; Mark Konkol, "Latino Firefighters Bullied into Taking Race-Based Promotions, They Say," *DNAinfo Chicago,* May 22, 2015; Jeffrey Fleishman, "Working Hollywood: Writers Are the 'Labor' and 'Leprechauns' Behind TV's Latest Golden Age," *Los Angeles Times,* June 23, 2017; Tian Harter, notes from a talk by Paul K. Davis (Ames Federal Employees Union—IFPTE Local 30, Santa Clara County, California), titled "Scientists and Engineers in Labor Unions?—Yes"; website of the Law Enforcement Officers Security Unions—DC, *www.leosudc.org* and "Why Join AFEU?"; Ames Federal Employees Union, website accessed August 22, 2017; Gary Weiss, "An Unlikely Big Player in Digital Media: Unions," *Columbia Journalism Review,* June 21, 2017; Jeff Fannell, "The MLBPA: What We Do," *MLBPlayers.com,* August 31, 2016.

[5] Non-Hispanic white men make up 34.5 percent of total persons represented by unions. These estimates are based on EPI analysis of Current Population Survey Outgoing Rotation Group (CPS ORG) data for all workers ages 16 and older. As of 2016, there are 15.5 million workers age 18 to 64 who are covered by a union contract; 10.1 million are women and/or people of color. The breakdowns by race and ethnicity, gender, and occupations in this section focus on workers age 18 to 64 who are represented by a union, as do our estimates of union wage premiums (advantages) discussed later in the paper. We rely on our own tabulations in order to obtain race/ethnicity breakdowns that are mutually exclusive.

Unions Represent Workers of All Levels of Education

- More than half (54.5 percent) of workers age 18 to 64 and covered by a union contract have an associate degree or more education.
- Two out of five (42.4 percent) have a bachelor's degree or more education.

Union Workers Hail From a Variety of Sectors, but the Biggest Share Work in Education or Health Services

- Nearly two in five workers (39.8 percent) age 18 to 64 and covered by a union contract work in educational and health services.
- One in seven workers (13.9 percent) covered by a union contract work in public administration.
- One in eight workers (12.2 percent) covered by a union contract work in transportation and utilities.
- One in 11 workers (9.1 percent) covered by a union contract work in manufacturing.

Unions Are Most Widespread in Public Administration and Transportation Industries

Because industries vary in size, industries with the highest numbers of union workers aren't always the industries with the highest union coverage *rate.* The five industries with the highest shares of 18- to 64-year-old workers covered by a union contract (the "union coverage rate") are:

- Public administration (33.2 percent).
- Transportation and utilities (27.3 percent).
- Education and health services (20.0 percent).
- Construction (15.7 percent).
- Information (10.6 percent), which includes publishing, motion pictures, broadcasting, telecommunications, data processing, and other communications services.

Unions Are Thriving in Diverse Workplaces—Including "New Economy" Workplaces

Working people join unions to have some say over their jobs and their workplaces. Given the self-determination unions afford, it is no surprise that they are thriving in some of the companies, industries, and occupations undergoing the most change.

- ***Television writers in Hollywood.*** Streaming services, cable offerings, and multiple viewing platforms are fueling what is referred to as "the New Golden Age of Television." In 2016 the six major media companies that dominate film and television (CBS, Comcast, Disney, Fox, Time Warner, and Viacom), reported almost $51 billion in operating profits. Those profits have doubled in the last decade and continue to grow. Much of the industry's success is attributable to the roughly 13,000 men and women who write television shows and films and who belong to the Writers Guild of America. Despite this contribution to the industry's record profitability, TV writers' incomes were in decline. WGA and the Alliance of Motion Picture and Television Producers (which represents the studios, networks, and independent producers) recently agreed on a collective bargaining contract that gave writers increases in compensation and digital residuals and preserved broad health care benefits.[6]
- ***Graduate students and adjunct faculty working at universities across the country.*** More than 64,000 graduate student employees are unionized at

[6] Certain residual formulas in the pay TV and the subscription video-on-demand (SVOD) industries needed to be increased because they did not adequately reflect the value of the content created by WGA members. The WGA health fund had been running a deficit due to the rapid inflation in health care costs, and the WGA determined that the period of record profitability for the studios and networks was a good time to reverse the current trend to deficits with additional employer contributions. (Sources: Email correspondence with Neal Sacharow, Director of Communications, Writers Guild of America West, August 14, 2017; Jeffrey Fleishman, "Working Hollywood: Writers Are the 'Labor' and 'Leprechauns' Behind TV's Latest Golden Age," *Los Angeles Times,* June 23, 2017.

28 institutions of higher education in the public sector, including universities in California, Florida, Illinois, Iowa, Massachusetts, Michigan, Oregon, Pennsylvania, Wisconsin, and Washington.[7] While graduate teaching assistants in some public universities have practiced collective bargaining for nearly 50 years, the law has recently opened up the possibility in private universities: teaching and research assistants for universities such Yale, Brandeis University, Columbia, and Tufts University are now organizing for better compensation and working conditions.[8]

- ***Professional and technical employees in the Washington, DC, region and throughout the United States and Canada.*** The International Federation of Professional and Technical Engineers (IFPTE) includes more than 80,000 women and men in professional, technical, administrative, and associated occupations in the United States and Canada. Members work for a wide range of federal, public, and private agencies and companies. They include administrative law judges working for the Social Security Administration, scientists working for NASA, engineers and technicians working for General Electric and Boeing, and engineers, architects, and project managers working for Santa Clara County, California. The Economic Policy Institute is one of many unionized Washington-based nonprofits (including the Center for American Progress and DC Jobs With Justice) represented by IFPTE Local 70.[9]
- ***United Parcel Service (UPS) drivers, hub workers, pilots, and mechanics.*** UPS is the country's largest private-sector, unionized employer. Of 440,000 workers worldwide, nearly 250,000 (mostly drivers and hub workers) are represented by the Teamsters. UPS pilots are represented by the Independent Pilots Association, and UPS mechanics are represented by the International Association of Machinists. According to research firm Brand Keys, UPS is number one in parcel delivery loyalty, ahead of nonunionized FedEx.[10]
- ***Maine lobster fishers.*** The Maine Lobstering Union formed in 2013 after a glut in the spring of 2012 that drove the "boat price" for lobster down about 33 percent to a 20-year low. It was the first fishing union in Maine in more than 75 years. While people who fish for a living in Canada and off the Washington and Alaska coasts have been organized for years, the 500-member Maine Lobstering Union seeks to close the growing gap between what consumers pay to eat lobster and what lobster fishers get. So the union is buying a wholesale lobster business. Union lobster fishers who sell to the union co-op will get market price for their lobster but also a share of cooperative profits.[11]
- ***Cafeteria and other contract workers in Silicon Valley.*** In July 2017, more than 500 cafeteria workers who serve food at Facebook's Menlo Park, California, campus joined Local 19 of UNITE HERE, a labor union of more than 265,000 hotel, food service, laundry, warehouse, and casino workers in the United States and Canada. The Facebook cafeteria workers cannot afford housing in the extremely high-cost Bay Area and are seeking higher wages and more affordable health benefits from their employer, Flagship Facility Services. According to the San Jose Mercury News, "thousands of contract workers such as janitors, security guards, and shuttle bus drivers at other major Silicon Valley tech firms, including Apple, Intel, and Google," have already unionized. The effort to unionize these workers is being led by Working Partnerships USA and the South Bay AFL–CIO Labor Council but counts other faith, community, and

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[7] *Columbia University,* 364 NLRB No. 90 (Slip. Op. 2016).

[8] The National Labor Relations Board in 2016 reversed an earlier decision and ruled that graduate students could unionize in the private sector. For more on recent graduate student organizing, *see* David Ludwig, "Why Graduate Students of America Are Uniting," *The Atlantic,* April 15, 2015; Liat Shapiro, "Grad Students Vote in Majority for Labor Union," *The Justice,* May 23, 2017; Stephen Markley, "Adjunct Professors and Grad Students Are the Working Poor, and They Need Unions," *Paste,* January 19, 2017.

[9] *See* the "About" and "About: Whom We Represent" pages on the IFPTE website *(ifpte.org)*; the IFPTE Local 70 website *(ifptelocal70.org)*; and "Center for American Progress Staff Sign First Contract" [press release], International Federation of Professional and Technical Engineers, May 15, 2017.

[10] Joe Allen, "A Big Win at UPS Would Help Build Union Support at Amazon," *In These Times,* March 30, 2017; Sean Williams, "UPS or FedEx: Which Company Is Best at Keeping Its Customers Loyal?", *The Motley Fool,* May 9, 2014.

[11] Fellow locals in the International Association of Machinists and Aerospace Workers (IAM) are lending some of the funds for the purchase. *See* Penelope Overton, "Maine Lobstermen's Union Votes to Buy Hancock County Lobster Business," *Portland Press Herald,* February 25, 2017.

labor groups (including Communications Workers of America, Teamsters, and Service Employees International Union) as partners.[12]

- ***Digital journalists.*** The changing media landscape has been a recent catalyst for newsrooms to organize. Since 2014, editorial employees at many media outlets—including *In These Times, Vice,* Gizmodo Media Group (formerly *Gawker*), *Salon, The American Prospect, Fusion, The Root,* and *ThinkProgress*—have formed unions. *The Huffington Post,* for example, ratified a contract in January 2017 that has provisions addressing editorial independence, the need to enhance newsroom diversity, comp time, discipline and dismissal policies, and severance in the event of layoffs.[13]

Unions Strengthen Democracy by Giving Workers a Voice in Policy Debates

Managers, business owners, and CEOs organize to advocate for their economic interests. That's what chambers of commerce, business associations, and national trade associations do. Unions provide working people who are not executives or company owners with an opportunity to get their voices heard in policy debates that shape their lives.

Americans have a constitutionally protected right to associate and ask for change. Americans join together to change speed limits, school policy, laws governing gun ownership and drug possession and use, and more. And when Americans have wanted to make the economy fairer and more responsive to the needs of workers, they have traditionally joined together in unions to do so.

Unions fought for—and work to strengthen—many of the humane standards and norms that protect and uplift Americans today. These essential laws and programs include Social Security, child labor laws, antidiscrimination laws, health and safety laws, unemployment insurance, compensation for workers who get hurt on the job, the 40-hour work week, and the federal minimum wage.[14] Unions were a major force behind all the Great Society laws on discrimination, housing, and voting rights.

As union coverage has declined and the voice of workers has correspondingly diminished, many of the key workplace standards past generations counted on have been eroded. For instance, there has been an erosion of overtime pay protection, slashing of workers' compensation programs, and a decline in the real value of the minimum wage, which is lower now than it was in 1968.[15]

Unions Reduce Inequality and Are Essential for Low- and Middle-Wage Workers' Ability to Obtain a Fair Share of Economic Growth

The spread of collective bargaining that followed the passage of the National Labor Relations Act in 1935 led to decades of faster and fairer economic growth that persisted until the late 1970s. But since the 1970s, declining unionization has fueled rising inequality and stalled economic progress for the broad American middle class. Figures A and B show that when unions are weak, the highest incomes go up even more, but when unions are strong, middle incomes go up.

Research by EPI and other institutions shows this correlation is no accident. First, unions have strong positive effects on not only the wages of union workers but also on wages of comparable nonunion workers, as unions set standards for entire industries and occupations (these union and nonunion wage boosts are explored in detail in the next section of this report). Second, unions make wages among occupations more equal because they give a larger wage boost to low- and middle-wage occupations than to highwage occupations. Third, unions make wages of workers with similar characteristics more equal because of the standards unions set. Fourth, unions

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[12] Queenie Wong, "Hundreds of Facebook Cafeteria Workers Join Union," *San Jose Mercury News,* July 24, 2017; Angelo Young, "A Labor Movement Is Brewing Within the Tech Industry," *Salon,* June 10, 2017; Silicon Valley Rising [fact sheet], accessed July 2017.

[13] Dave Jamieson, "Staff of *In These Times* Magazine Joins Communications Workers of America Union," *Huffington Post,* February 25, 2014; Hamilton Nolan, "Vice Writers Get a Union Contract With a Big Raise," *Gawker,* April 15, 2016; Corinne Grinapol, "The American Prospect Staff Unionize," *Adweek,* April 24, 2017; Dave McNary, "Fusion Staff Unionizes with Writers Guild of America East," *Variety,* November 11, 2016; Michael Calderone, "The Huffington Post Ratifies Union Contract," *Huffington Post,* January 30, 2017.

[14] "11 Reasons to be Thankful for Labor Unions," Hiden Rott and Oertle, LLP (accessed July 27, 2017).

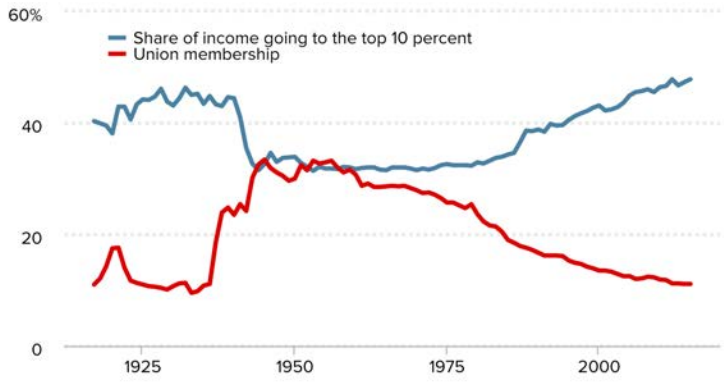
[15] Economic Policy Institute, *The Agenda to Raise America's Pay* (last updated December 6, 2016).

have historically been more likely to organize middle-wage than high-wage workers, which lowers inequality by closing gaps between, say, blue-collar and white-collar workers. Finally, the union wage boost is largest for low-wage workers and larger at the middle than at the highest wage levels, larger for black and Hispanic workers than for white workers, and larger for those with lower levels of education-wage increases for these groups help narrow wage inequalities.[16]

We know how big a force for equality unions are by looking at how much their decline has contributed to inequality between middle- and high-wage workers: union decline can explain one-third of the rise in wage inequality among men and one-fifth of the rise in wage inequality among women from 1973 to 2007. Among men, the erosion of collective bargaining has been the largest single factor driving a wedge between middle- and high-wage workers.[17]

Figure A

Union membership and share of income going to the top 10%, 1917–2015



Source: Data on union density follows the composite series found in Historical Statistics of the United States; updated to 2015 from unionstats.com. Income inequality (share of income to top 10%) data are from Thomas Piketty and Emmanuel Saez, "Income Inequality in the United States, 1913–1998," *Quarterly Journal of Economics* vol. 118, no. 1 (2003) and updated data from the Top Income Database, updated June 2016.

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Unions Raise Wages for Both Union and Nonunion Workers

For typical workers, hourly pay growth has been sluggish for decades, rising 0.3 percent per year or 9.9 percent in all from 1979 to 2015. If pay had risen with productivity during that period, as it did in the decades before 1979, pay would have gone up 63.8 percent.[18] But pay for typical workers is not rising at this clip because ever-larger shares of economic growth are going to the highest wage earners. Income growth for the highest 1 percent of wage earners rose by nearly *190 percent* between

[16] The classic reference for the union impact on inequality, and many other matters, is Richard B. Freeman and James L. Medoff, *What Do Unions Do?* (New York: Basic Books, 1984). *Also see* Brantly Callaway and William J. Collins, "Unions, Workers, and Wages at the Peak of the American Labor Movement," National Bureau of Economic Research, Working Paper no. 23516, June 2017, for evidence from the early postwar period. More recent estimates of union wage premiums by wage fifth, occupation, and education can be found in Lawrence Mishel, Josh Bivens, Elise Gould, and Heidi Shierholz, *The State of Working America, 12th Edition,* an Economic Policy Institute book (Ithaca, N.Y.: Cornell University Press, 2012), Table 4.37.

[17] Bruce Western and Jake Rosenfeld "Unions, Norms, and the Rise in U.S. Wage Inequality," *American Sociological Review* 76 (2011), 513–37; Lawrence Mishel, Josh Bivens, Elise Gould, and Heidi Shierholz, *The State of Working America, 12th Edition,* an Economic Policy Institute book (Ithaca, N.Y.: Cornell University Press, 2012), Table 4.37.

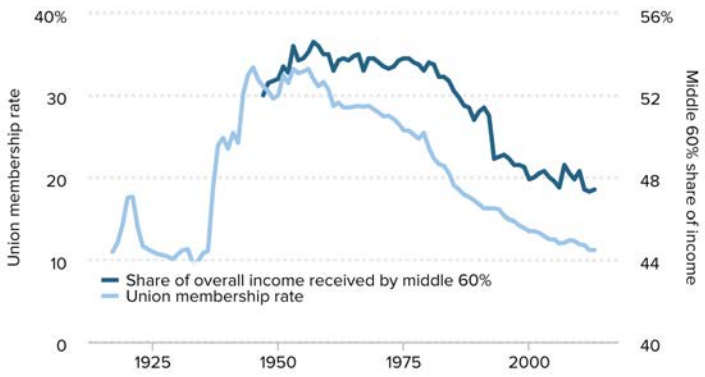
[18] From 1979 to 2015, productivity rose 63.8 percent while hourly compensation of the typical worker (production/nonsupervisory workers in the private sector) increased only 9.9 percent. *See* underlying data from Economic Policy Institute, *The Productivity-Pay Gap* (last updated August 2016).

1979 and 2015, meaning that the highest-earning 1 percent have claimed a radically disproportionate share of income growth.[19]

Working people in unions use their power in numbers to secure a fairer share of the income they create. Employers who have to bargain with workers collectively cannot pursue a strategy of "divide and conquer" among their workers. Workers who are empowered by forming a union raise wages for union and nonunion workers alike. As an economic sector becomes more unionized, nonunion employers pay more to retain qualified workers and norms of higher pay and better conditions become standard. For example, if a union hospital is across town from a nonunion hospital and the two hospitals are competing for workers, then the nonunion workers will benefit from the presence of the union hospital.

Figure B

Union membership rate and share of income going to the middle 60% of families, 1917–2013



Source: Data on union density follow the composite series found in Historical Statistics of the United States; updated to 2013 from unionstats.com. Data on the middle 60%'s share of income are from U.S. Census Bureau Historical Income Tables (Table F-2).

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- **Union workers earn more.** On average, a worker covered by a union contract earns 13.2 percent more in wages than a peer with similar education, occupation, and experience in a nonunionized workplace in the same sector.[20] This pay boost was even greater in earlier decades when more American workers were unionized.[21]

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[19] Thomas Piketty and Emmanuel Saez, downloadable Excel files with 2015 data updates to Thomas Piketty and Emmanuel Saez, "Income Inequality in the United States, 1913–1998," *Quarterly Journal of Economics* vol. 118, no. 1 (2003).

[20] The regression-based gap controls for gender, race and ethnicity, education, experience, geographic division, major occupation and industry, and citizenship. The log of the hourly wage is the dependent variable. The gap uses a 5-year average of wages from 2012 to 2016. Source: "Union Wage Premium by Demographic Group, 2011," Table 4.33 in *The State of Working America, 12th Edition,* an Economic Policy Institute book (Ithaca, N.Y.: Cornell University Press, 2012), updated with 2016 microdata from the Current Population Survey Outgoing Rotation Group microdata.

[21] There are three groups of workers whose wages have been affected by the decline of unionization. First, there are the remaining union members, who according to research have experienced a decline in the earnings premium that comes from belonging to a union—a decline especially large for female members. For instance, the union wage premium fell over the 1973 to 2009 period by nearly a third for private-sector women. Among private-sector men, after peaking in the early 1980s, the earnings premium that comes from union membership had fallen slightly by 2009 (Jake Rosenfeld, Patrick Denice, and Jennifer Laird, *Union Decline Lowers Wages of Nonunion Workers: The Overlooked Reason Why Wages Are Stuck and Inequality Is Growing,* Economic Policy Institute, August 30, 2016). The estimates referenced are from Figure 3.1 of Jake Rosenfeld, *What Unions No Longer Do,* Cambridge, Mass.: Harvard University Press, 2014).

- **Unions also raise pay for workers by helping to enforce labor standards, like guarding against wage theft.** Union workers are more knowledgeable about their rights, and union staff members communicate when needed with government enforcement agencies, which enhances enforcement of wage violations. For example, workers covered by a union are half as likely to be the victims of minimum wage violations (*i.e.,* to be paid an effective hourly rate that is below the minimum wage). This form of wage theft is costing workers over $15 billion a year, causing many families to fall below the poverty line.[22]
- **When union density is high, *nonunion* workers benefit from higher wages.** When the share of workers who are union members is relatively high, as it was in 1979, wages of nonunion workers are higher. For example, had union density remained at its 1979 level, weekly wages of nonunion men in the private sector would be 5 percent higher (that's an additional $2,704 in earnings for year-round workers), while wages for nonunion men in the private sector without a college education would be 8 percent, or $3,016 per year, higher. (These estimates look at what wages would have been in 2013 had union density remained at its 1979 levels).[23]
- **Where unions remain strong, unions have an ability to raise wages sector-wide.** An example is the hospitality industry in Orlando. Negotiations between six local affiliates of the Services Trade Council Union (STCU) and Disney World in 2014 led to wage increases for union members to at least $10 an hour starting in 2016. These local affiliates represent housekeepers, lifeguards, cast members, and other service workers. Disney then extended the raises to all its 70,000 Orlando employees, including nonunion employees. According to *The Orlando Sentinel,* the wage increases prompted much of Orlando's hospitality and retail sector, including Westgate Resorts, to raise wages.[24]
- **Where unions are strong, wages are higher for typical workers—union and nonunion members alike.** Compensation of typical (median) workers grows far faster—four times faster—in states with the smallest declines in unionization than it does in states with the largest declines in unionization.[25]
- **Unions bring living wages to low-wage jobs.** Unions have transformed once-low-wage jobs in hospitality, nursing, and janitorial services into positions with living wages and opportunities for advancement. For example, after unionizing, dishwashers in Las Vegas hotels made $4 per hour more than the national average for that job, and they were offered excellent benefits. And hospitality workers in unionized Las Vegas enjoy a much higher living standard than those in Reno, where unions are weaker. In Houston, a 2006 first-ever union contract for 5,300 janitors resulted in a 47 percent pay increase and an increase in guaranteed weekly hours of work.[26]

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[22] Workers not covered by unions—those who are neither in a union themselves nor covered by a union contract—are almost twice as likely (4.4 percent) to experience minimum wage violations as those in a union or covered by a union contract (2.3 percent). *See* David Cooper and Teresa Kroeger, *Employers Steal Billions from Workers' Paychecks Each Year: Survey Data Show Millions of Workers Are Paid Less Than the Minimum Wage, at Significant Cost to Taxpayers and State Economies,* Economic Policy Institute, May 10, 2017.

[23] Union density is the share of workers in similar industries and regions who are union members. For the typical nonunion man working year-round in the private sector, the decline in private-sector union density since 1979 has led to an annual wage loss of $2,704 (2013 dollars). For the 40.2 million nonunion men working in the private sector, the total loss is equivalent to $109 billion annually. The effects of union decline on the wages of nonunion women are not as substantial because women were not as likely to be unionized as men were in 1979. *See* Jake Rosenfeld, Patrick Denice, and Jennifer Laird, *Union Decline Lowers Wages of Nonunion Workers: The Overlooked Reason Why Wages Are Stuck and Inequality is Growing,* Economic Policy Institute, August 30, 2016.

[24] Paul Brinkmann, "Disney World Union Seeks to Reopen Wage Negotiations," *Orlando Sentinel,* July 26, 2017.

[25] The 10 states that had the least erosion of collective bargaining saw their inflation-adjusted median hourly compensation grow by 23.1 percent from 1979 to 2012. The 10 states that had the most erosion of collective bargaining saw their inflation-adjusted median hourly compensation grow by 5.2 percent. Erosion is measured by the percentage-point decline in the share of workers in the state covered by a collective bargaining contract. See David Cooper and Lawrence Mishel, *The Erosion of Collective Bargaining Has Widened the Gap between Productivity and Pay,* Economic Policy Institute, 2015.

[26] *See* Matt Vidal and David Kusnet, *Organizing Prosperity: Union Effects on Job Quality, Community Betterment, and Industry Standards,* Economic Policy Institute and UCLA Institute for Research on Labor and Employment, 2009; C. Jeffrey Waddoups, "Wages in Las Vegas and

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By joining together, working people can transform not just their workplaces but sectors and communities. Here are two examples of how today's workers are using their "power in numbers" to raise wages in the workplace and for all working people:

- **Raising the minimum wage for food service and other low-wage workers.** Millions of Americans who work full time are not paid enough to make ends meet; many rely on public assistance, including food stamps, housing subsidies, or cash assistance to pay their bills. Food preparers, for example, earn a median hourly wage of $9.09; home health aides earn $10.87. A big reason that low-wage workers are struggling is the erosion of the value of the federal minimum wage, which, at $7.25 per hour, is worth 25 percent less in inflation-adjusted terms than it was 50 years ago. The Service Employees International Union (SEIU) was an early and critical backer and remains a strong supporter of the Fight for $15, a campaign to raise wages for low-wage workers by enacting minimum wages increases in communities and states around the nation. Begun in New York and Chicago in 2012, the campaign has led to laws establishing $15 minimum wages in New York, California, the District of Columbia, and 21 cities and counties. The Fight for $15 movement has also added momentum to successful campaigns for smaller minimum wage increases in 18 other states since 2014. (Through the campaign, some workers are also seeking paid sick time so that all workers, regardless of their job or wage level, can take paid time off when they are sick or need to care for a family member.) While many business owners have endorsed minimum wage increases, business owners who oppose raising the minimum wage have a voice too, through such groups as the National Restaurant Association, which lobbies in Washington, DC and in state capitals against minimum wage increases and paid sick days.[27]
- **Eliminating subminimum wages for farmworkers.** In June 2017, Familias Unidas por la Justicia (FUJ) and Sakuma Brothers Berry Farm, one of the Pacific Northwest's largest berry growers, signed a collective bargaining agreement that ensures good wages for the more than 500 immigrant farmworkers who harvest berries at the farm. The contract ensures that the berry pickers—many of whom had been earning less than the state minimum wage of $9.47 an hour under the former piece-rate system (based on how many pounds of berries they picked)—now earn at least a minimum wage of $12; the revised piece-rate system it establishes seeks to deliver an average wage of $15 an hour. The contract is the culmination of four years of organizing, first as a workers organization and then as a recognized independent union in September 2016. Through strikes, informational pickets, and other efforts, FUJ gained national support for its successful efforts to change a host of practices at the farm, including 12-hour-plus workdays. FUJ also countered Sakuma Brothers' attempt in 2014 to replace its workforce with workers entering the United States under the H–2A temporary visa program.[28]

Unions Help Raise Wages for Women and Lessen Racial Wage Gaps

Unions help raise the wages of women and black and Hispanic workers—whose wages have historically lagged behind those of white men—by establishing pay "transparency" (workers know what other workers are making), correcting salary discrepancies, establishing clearer terms for internal processes such as raises and promotions, and helping workers who have been discriminated against achieve equity.

Unions also narrow the racial wage gaps. Black workers for example are more likely than white workers to be in a union and are more likely to be low- and middle-wage workers, who get a bigger pay boost for being in a union than do higher-wage workers. This effect is an important tool in closing the black-white wage gap, which has actually grown somewhat since 1979, largely due to growth in the gap since 2000;

Reno: How Much Difference Do Unions Make in the Hotel, Gaming, and Recreation Industry?", *UNLV Gaming Research and Review Journal* vol. 6, no. 1 (2001).

[27] David Cooper, "How We Can Save $17 Billion in Public Assistance—Annually," *Talk Poverty,* February 18, 2016; Economic Policy Institute, *Why America Needs at $15 Minimum Wage* [fact sheet], April 26, 2017; Economic Policy Institute, *Minimum Wage Tracker* [online interactive], July 10, 2017.

[28] C. Cosner, "Historic Union Contract Signed by FUJ and Sakuma Bros. Berry Farm," *Familias Unidas por La Justicia,* June 17, 2017; Steve Leigh, "Sakuma Workers Win Their First Contract," *Socialistworker.org,* June 20, 2017; "Combative Farm Workers in Only Indigenous-Led U.S. Union Win Labor Rights Defenders Award," *teleSUR,* May 24, 2017.

while wages since 2000 have stagnated for both black and white workers, the decline in wage growth has been larger for black workers.[29] Today, black workers are, on average, paid 85 cents for every dollar paid to white workers of the same gender and with similar education, experience, and location of residence.[30]

- **Unions help raise women's pay.** Hourly wages for women represented by unions are 9.2 percent higher on average than for nonunionized women with comparable characteristics.[31]
- **Unions raise wages in the female-dominated service occupations.** Union-represented workers in service occupations (which include food service and janitorial services) make 87.0 percent more in total compensation and 56.1 percent more in wages than their nonunion counterparts.[32]
- **Unions help close wage gaps for black and Hispanic workers.** Black and Hispanic workers get a larger boost from unionization than their white counterparts. Black workers, both male and female, are more likely than white workers to be covered by collective bargaining and the wage boost they get from being covered by collective bargaining is above average. The result is that collective bargaining lifts wages of black workers closer to those of their white counterparts. Hispanic workers have slightly lower union coverage than white workers but have much higher union wage advantages: thus wage gaps between Hispanic workers and their white counterparts are also smaller because of collective bargaining.[33]
- **Unionized black workers earn even more in some sectors.** Unionized black construction workers in New York City earn 36.1 percent more than nonunion black construction workers in New York City.[34]

These data showing that unions raise wages for all workers—and especially for women and black and Hispanic workers—do not erase the problematic historical episodes of sexism and racism practiced by unions. Unions are an American institution, and like nearly every other American institution their past includes clear instances of gender and racial discrimination. But there has been significant progress in increasing the shares of women represented and in leadership. There has also been significant progress in the racial integration of unions and in ensuring that nonwhite workers have equitable access to apprenticeships, as illustrated by the progress in New York City construction unions.[35] AFL–CIO President Richard Trumka recently claimed, with justification, that "the labor movement is the most integrated institution in America."[36] Labor leaders are calling for broad and sus-

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[29] Valerie Wilson and William M. Rodgers III, *Black-White Wage Gaps Expand With Rising Wage Inequality,* Economic Policy Institute, September 20, 2016.

[30] The wage gap is adjusted and is as of 2016; it comes from Economic Policy Institute, *State of Working America Data Library,* "Wage Gaps: Black-White Wage Gap," last updated February 13, 2017.

[31] The regression analysis producing this estimate controlled for education, experience, race, citizenship status, geographic division, industry, and occupation. (Source: "Union Wage Premium by Demographic Group, 2011," Table 4.33 in *The State of Working America, 12th Edition,* an Economic Policy Institute book [Ithaca, N.Y.: Cornell University Press, 2012], updated with 2016 microdata from the Current Population Survey Outgoing Rotation Group microdata.)

[32] Data are unadjusted for factors such as demographics and employer size. Data are as of March 2017 and are drawn from EPI analysis of Bureau of Labor Statistics, "Employee Benefits in the United States—March 2017" [news release], U.S. Department of Labor. In 2016, women made up 56.6 percent of those employed in service occupations but only 46.8 percent of all workers employed in 2016 (Bureau of Labor Statistics, "Household Data, Annual Averages" [data table], *Current Population Survey,* 1, 4). Service occupations include protective service, food preparation and serving, healthcare support, building and grounds cleaning and maintenance, and personal care and service.

[33] EPI analysis of 2016 microdata from the Current Population Survey finds that hourly wages for black workers represented by unions are 14.7 percent higher than wages paid to their nonunionized counterparts. Hispanic workers represented by unions are paid 21.8 percent more than their nonunionized counterparts. In contrast, non-Hispanic white union workers have a smaller—9.6 percent—wage advantage over nonunionized white workers. The regression analysis producing this estimate controlled for education, experience, gender, race, citizenship status, geographic division, industry, and occupation.

[34] Lawrence Mishel, *Diversity in the New York City Union and Nonunion Construction Sectors,* Economic Policy Institute, March 2, 2017.

[35] Lawrence Mishel, *Diversity in the New York City Union and Nonunion Construction Sectors,* Economic Policy Institute, March 2, 2017.

[36] Richard Trumka, speech given at the Steelworkers convention, July 1, 2008.

tained attention to addressing racism and sexism where they continue to violate labor's democratic ideals.[37]

Unions Improve the Health and Safety Practices of Workplaces

More than 4,800 workers are killed on the job every year. An estimated 50,000 to 60,000 more die of occupational diseases each year, and the estimated number of work-related injuries and illnesses exceeds 7 million.[38] Unions have always championed worker safety by investing in programs to educate workers about on-the-job hazards and working with employers to reduce worker injuries and the time lost due to injury.[39] In unionized workplaces, workers generally have a right to involve a union representative in injury and fatality investigations, which gives workers a voice in their own safety. And researchers have suggested that unions create safer workplaces because union workers protected by their union from repercussions are more likely to report not only injuries but near misses that can lead to reducing work hazards.[40] The union contribution to safety is particularly important because government health and safety regulations are being weakened.[41]

- **Union construction sites are safer for workers.** In 2014, OSHA inspected New York state construction sites and found twice as many health and safety violations at nonunion construction sites as at union construction sites.[42] Another study, of Missouri construction sites, found higher levels of OSHA violations among nonunion St. Louis residential construction job sites than at unionized St. Louis residential job sites.[43]
- **Mine workers in union mines are less likely to be severely injured or die on the job.** Unionization is associated with a substantial and statistically significant drop in traumatic injuries and in fatalities in underground bituminous coal mines from 1993 to 2010.[44]
- **Unions ensure that employers are held accountable. Tragedies arise when employers cannot be held accountable.** Miners in the Upper Big Branch Mine in West Virginia tried and failed to a join a union three times, according to In These Times. Each time, at least 65 percent of the miners signed cards saying they wanted to be members of a union And each time, these workers were repeatedly intimidated by management at Massey Energy, which owns the mine: Massey CEO Don Blankenship delayed the election process for months while he threatened to close the mine if the workers voted for a union-and the workers ended up voting against joining a union to save their jobs.[45] On April 5, 2010, an explosion collapsed the mine's roof, killing 29 miners and injuring two. In the aftermath, reports surfaced that the nonunion mine had a record of safety violations and that coal miners who worked in the mine knew about the dangerous working conditions. Blankenship was found guilty on a charge of conspiracy to willfully violate mine health and safety standards and was sentenced to a year in prison.[46]

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[37] Liz Shuler, Speech on Women and Work, posted October 28, 2015; Leslie Tolf, "5 Women Labor Leaders Speak Their Minds on the Future of Labor," *Huffpost* [blog], September 7, 2015; "AFL–CIO Chief Denounces Trump's 'Spirited Defense of Racism and Bigotry,'" CBS News, August 16, 2017; "Major 'I Am 2018' Initiative Announced to Mark 50th Anniversary of Memphis Sanitation Strike, MLK Assassination" [press release], June 28, 2017.

[38] AFL–CIO, *Death on the Job: The Toll of Neglect 2017,* April 26, 2017.

[39] Roberto Ceniceros, "Workplace Safety Is a Major Push for Unions," *Business Insurance,* February 12, 2012.

[40] Benjamin Amick et al., "Protecting Construction Worker Health and Safety in Ontario, Canada: Identifying a Union Safety Effect," *Journal of Occupational and Environment Medicine* vol. 57, no. 2 (December 2015), 1337–42.

[41] Heidi Shierholz and Celine McNicholas, "Understanding the Anti-regulation Agenda: The Basics" [fact sheet], Economic Policy Institute, April 11, 2017; Economic Policy Institute, "The Perkins Project on Worker Rights and Wages."

[42] New York Committee for Occupational Safety and Health, *Deadly Skyline: An Annual Report on Construction Fatalities in New York State,* January 2017.

[43] Harry Miller, Tara Hill, Kris Mason, and John S. Gaal, "An Analysis of Safety Culture and Safety Training: Comparing the Impact of Union, Non-Union, and Right to Work Construction Venues," *Online Journal for Workforce Education and Development* vol. 6, no. 2 (2013).

[44] Overall, unionization is associated with a 14- to 32-percent drop in traumatic injuries and a 29- to 83-percent drop in fatalities. *See* Alison D. Morantz, "Coal Mine Safety: Do Unions Make a Difference?", *ILR Review* vol. 66, no. 1 (January 2013), 88–116.

[45] Mike Elk, "Overlooked DC Victory Shows Linking Safety, Labor Rights Is Winning Formula," *In These Times,* July 12, 2010.

[46] Mark Berman, "Former Coal CEO Sentenced to a Year in Prison After 2010 West Virginia Coal Mine Disaster," *Washington Post,* April 6, 2016.

Here are some specific ways unions have improved safety in the workplace by representing workers' concerns in public and testifying before Congress and state legislatures:

- **Nurses win violence prevention standards.** In the past decade or so, the rate of reported violence against health care workers (who make up 9 percent of the nation's workforce) has more than doubled. The increase stems from cuts in state funds for mental health services and hospital budget cutbacks thinning the ranks of nurses and security guards. National Nurses United (NNU), which represents more than 160,000 nurses across the country, has fought for and won workplace violence prevention standards in California, Minnesota, and Massachusetts. NNU is now petitioning the federal Occupational Safety and Health Administration (OSHA) for a formal workplace violence prevention standard that would apply nationwide.[47]
- **Laborers, autoworkers, and others secure protections for workers from deadly silica dust.** Roughly 2.3 million workers are exposed to silica dust, which causes silicosis (an incurable and often deadly lung disease), lung cancer, other respiratory diseases, and kidney disease. Silica dust is produced by grinding stone or masonry in mines or on construction sites. Although the hazards of silica dust have been known for at least a century, existing regulations limiting exposure were outdated and were not keeping up with worker exposure to silica in new industries such as stone countertop fabrication and hydraulic fracturing. A broad section of the labor movement—including the United Automobile Workers and the Laborers' International Union of North America—helped persuade OSHA to issue a new rule that reduces workers' exposure to silica.[48]
- **Firefighters get relief from post-traumatic stress disorder (PTSD).** Firefighters who develop PTSD after witnessing repeated trauma on the job don't always have recourse if the disorder means they cannot work while they seek treatment. When independent studies showed that post-traumatic stress rates are on the rise for Texas firefighters, the Texas State Association of Fire Fighters (TSAFF) launched an education campaign for state lawmakers leading to legislation to improve workers' compensation coverage for Texas first responders diagnosed with line-of-duty-related PTSD. The legislation (HB 1983) was signed into law by Governor Greg Abbott on June 1, 2017.[49]

Unions Support Strong Families With Better Benefits and Due Process

About 6 in 10 adults (63 percent) say the average working person in the United States has less job security now than 20 or 30 years ago.[50] And the lack of paid sick days is depriving many workers of funds needed for basic necessities—an especially difficult problem for the lowest-wage workers, about three-fourths of whom

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[47] The federal standard would include an assessment of risk factors (such as staffing levels), a postincidence response procedure, employee participation in the creation of a plan, and prohibition on retaliation against an employee who may seek legal assistance after an incident. *See* Alexia Fernández-Campbell, "Why Violence Against Nurses Has Spiked in the Last Decade," *The Atlantic,* December 1, 2016 (updated June 19, 2017); "NNU Petitions Violence Prevention in Workplace," National Nurses United, August 2, 2016. *See also* a Government Accountability Office report that found that workplace violence is a serious and growing concern for 15 million health-care workers and can be prevented through violence prevention programs: U.S. Government Accountability Office, "Additional Efforts Needed to Help Protect Health-Care Workers from Workplace Violence," March 2016.

[48] Associated Press, "OSHA Seeks New Limits on Silica Dust," *Washington Post,* August 23, 2013; "Heeding the Science (Finally) to Fight a Preventable Workplace Killer," Union of Concerned Scientists, September 2013; Centers for Disease Control and Prevention, "Notes From the Field: Update: Silicosis Mortality—United States, 1999–2013," *Morbidity and Mortality Weekly Report,* June 19, 2015; Occupational Safety and Health Administration, "OSHA's Final Rule to Protect Workers From Exposure to Respirable Crystalline Silica," U.S. Department of Labor (accessed July 26, 2017); United Auto Workers, "New Crystalline Silica Rule Long Overdue," June 13, 2016; Stan Parker, "Industry, Unions Lock Horns in OSHA Silica Rule Dust-Up," *Law360,* November 21, 2016; James Melius, "Testimony Before the U.S. House of Representatives Education and Workforce Committee, Subcommittee on Workforce Protections, Hearing on Reviewing Recent Changes to OSHA's Silica Standards," April 19, 2016; Alexia Elejalde-Ruiz, "Workers Breathe Easier Over Silica Dust Rules as Construction Industry Winces," *Chicago Tribune,* March 24, 2016.

[49] "TSAFF Wins Workers' Compensation for Members With PTSD," IAFF FireFighters (accessed July 27, 2017).

[50] Anna Brown, "Key Findings About the American Workforce and the Changing Job Market," *Fact Tank* (Pew Research Center), October 6, 2016.

don't get any paid sick days.[51] Uncertain work hours, last-minute shift changes, and other scheduling practices are also hurting families. And research shows that jobs that are insecure, unpredictable, and risky also affect communities and society as a whole.[52]

But working people in unionized workplaces are more likely to have benefits that strengthen families and improve job security and predictability. (Some of the items in the list below provide union-nonunion comparisons not adjusted for personal characteristics and other factors, while some, where indicated, provide adjusted comparisons.)[53]

- **Union workers are more likely to be covered by employer-provided health insurance.** More than nine in 10—94 percent—of workers covered by a union contract have access to employer-sponsored health benefits, compared with just 67 percent of nonunion workers. When adjustments are made for other characteristics that may affect benefits coverage—such as sector (public or private), industry, region, employee status (full- or part-time) and establishment size—union workers are 18.3 percent more likely to be covered.
- **Union employers contribute more to their health-care benefits.** Unionized employers pay 77.4 percent more (per hour) toward their employees' health coverage (providing better benefits for a greater share of workers) than comparable nonunion employers. Occupations with higher-than-average union impact on employer-provided health care include transportation, services, construction, extraction, and installation/maintenance/repair.
- **Union workers have greater access to paid sick days.** Almost nine in 10—87 percent—of workers covered by a union contract have access to paid sick days, compared with 69 percent of nonunion workers. Almost all—97 percent—of union workers in state and local government have paid sick days, compared with 86 percent of their nonunion peers. In the private sector, 79 percent of union workers have paid sick days compared with 67 percent of their nonunion peers.
- **Union workers are more likely to have paid vacation and holidays.** In the private sector, 89 percent of workers covered by a union contract get paid vacation and paid holidays, whereas 75 percent of nonunion workers get paid vacation and 76 percent get paid holidays. For workers overall (private and public) 80 percent of union workers get paid holidays while 75 percent of nonunion workers do. Equal shares of union and nonunion workers (74 percent) get paid vacation.[54] When adjustments are made for other characteristics that may affect benefits coverage-such as sector (public or private), industry, region, employee status (full- or part-time), and establishment size-union workers are 3.2 percent more likely to have paid leave.
- **Employers contribute more to paid vacation and holidays for union workers than nonunion workers.** Union employers contribute 11.4 percent more toward paid vacation and holidays for their workers than do comparable

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[51] Eighty-seven percent of private-sector workers in the highest 10 percent of wage earners have the ability to earn paid sick days, compared with only 27 percent of private-sector workers in the lowest 10 percent. For the average worker who does not have access to paid sick days, if the worker needs to take off 3 days, the lost wages are equivalent to the household's entire grocery budget for the month. *See* Elise Gould and Jessica Schieder, *Work Sick or Lose Pay? The High Cost of Being Sick When You Don't Get Paid Sick Days,* Economic Policy Institute, June 28, 2017.

[52] Bertil Videt and Danielle de Winter, "Job Insecurity as the Norm: How Labour Market Trends Have Changed the Way We Work," *The Broker,* March 10, 2014. Videt and de Winter cite A. Kalleberg, "Precarious Work, Insecure Workers: Employment Relations in Transition," *American Sociological Review* vol. 74., no. 1 (2009), 2.

[53] Unadjusted data (comparisons based just on union status, which include the by-industry comparisons) are as of March 2017 and come from Tables 2 and 6 in Bureau of Labor Statistics, "Employee Benefits in the United States—March 2017" [news release], U.S. Department of Labor, July 21, 2017. Adjusted data are based on analysis of fourth-quarter 1994 Employment Cost Index microdata as presented in Table 4.35 in Lawrence Mishel, Josh Bivens, Elise Gould, and Heidi Shierholz, *The State of Working America, 12th Edition,* an Economic Policy Institute book (Ithaca, N.Y.: Cornell University Press, 2012) and drawn from Brooks Pierce, "Compensation Inequality," U.S. Department of Labor Statistics Working Paper no. 323, 1999.

[54] Union-nonunion gaps in access to paid vacation and holidays are much narrower in state and local governments because teachers make up a large portion of state and local government employment and they are not usually offered paid vacation. *See* Tech Notes on page 3 of Bureau of Labor Statistics, "Employee Benefits in the United States—March 2017" [news release], U.S. Department of Labor, July 21, 2017.

nonunion employers. Industries and occupations with higher-than-average employer contributions toward paid vacation and holidays include production, transportation, office and administrative support, service occupations, and construction.

- **Unions provide due process.** Private employment in every state except for Montana is generally at will, with employers free to dismiss workers for almost any reason, except for reasons specified by law (*e.g.,* on account of race, religion, disability, or other identities that are protected classes). Union contracts have provisions that allow workers to be fired, but only when the employer shows a proper, documented performance-related reason for dismissing the worker. Usually, contracts include a transparent process for disciplining workers, and the employer—except in extreme cases—must follow that process and give a worker a chance to improve performance before the employer moves to dismiss the worker.
- **Union workers have more input into the number of hours they work.** Almost half (46 percent) of nonunion workers say they have little or no input into the number of hours they work each week, compared with less than a quarter (22 percent) of union workers.[55]
- **Union workers get more advance notice of their work schedules.** More than one in three workers (34.4 percent) who belong to a union get at least a week's advance notice of their work schedules, whereas less than one in four nonunion workers (23.2 percent) do. (These calculations exclude workers whose schedules never change).[56]

Unions also bring better benefits to the broader labor force. Here is a specific example of how unions have helped secure crucial benefits for workers by taking their concerns to the lawmakers and to the public at large:

- **Winning paid sick days for workers.** There is no federal law that ensures all workers are able to earn paid sick days in the United States. For workers who fall ill or whose families depend on them to provide care in the event of an illness, this means sick days can be incredibly costly. This is a particular problem for low-wage workers, 73 percent of whom have no opportunity to earn paid sick days. Unions have participated in coalitions to enact paid sick days laws. For example, voter outreach by the United Food and Commercial Workers (UFCW) helped win passage of a paid sick days law in Oregon, while SEIU was a key player in enacting the nation's strongest paid sick days policy, in Massachusetts.[57]

Unions Are Good for Workers' Retirement Security

Few Americans have enough to live on in retirement. A key part of the story of rising retirement income insecurity is a shift from traditional defined-benefit (DB) pensions that provide a guaranteed income to defined-contribution (DC) plans—401(k)s or similar plans—that force workers to bear investment risk without providing any guarantees.[58] The shift from pensions to 401(k)s has also exacerbated inequality, benefiting only the very rich and leaving the vast majority unprepared for retire-

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[55] EPI analysis of the 2016 General Social Survey Quality of Worklife and Work Orientations supplements. "Union worker" here refers to workers who said they belonged to a union.

[56] EPI analysis of the 2016 General Social Survey Quality of Worklife and Work Orientations supplements. Respondents were asked whether they or their spouses belong to a union. The sample excludes all workers who say their schedules never change.

[57] Eighty-seven percent of private-sector workers in the top 10 percent of wages have the ability to earn paid sick days, compared with only 27 percent of private-sector workers in the bottom 10 percent. Sources: Elise Gould and Jessica Schieder, *Work Sick or Lose Pay? The High Cost of Being Sick When You Don't Get Paid Sick Days,* Economic Policy Institute, June 28, 2017; Justin Miller, "With Oregon's Bill, Paid Sick Leave Gains Momentum," *The American Prospect,* June 16, 2015; "2014: A Banner Year for Workers and Families in Massachusetts," Massachusetts Communities Action Network, November 2014.

[58] DB pensions (such as those historically negotiated by unions) provide more secure, adequate, and egalitarian retirement incomes than 401(k)-style DC plans. Workers are automatically enrolled in traditional pensions and, in the private sector, employer contributions fund the plan, so that the existence of savings does not depend on a worker's ability to set aside wages for retirement; in addition, the amount of retirement income is guaranteed with pensions, not contingent on the state of the stock market at the time when retirees need to access their savings. In contrast, employers that offer 401(k)-style plans typically require workers to contribute to the plans in order to receive an employer match, and these workers shoulder all the investment risk.

ment. Nearly half of all families headed by a working-age adult have zero retirement savings.[59]

Union members have an advantage in retirement security, both because union members are more likely to have retirement benefits and because, when they do, the benefits are better than what comparable nonunion workers receive: union members are more likely to have pensions, and employer contributions to the plans (whether pensions or DC plans) tend to be higher.

- Ninety percent of union workers participate in a retirement plan (of any kind), compared with 75 percent of nonunion workers.
- Seventy-four percent of union workers who have pensions participate in a traditional defined benefit pension, compared with 15 percent of nonunion workers.[60]
- Traditional defined benefit pensions are especially important to black workers, who derive more than a fifth of their household income from these pensions in retirement.[61]
- Union employers (when adjustments are made for various employer characteristics) are 22.5 percent more likely to offer an employer-provided retirement plan and, on average, to spend 56 percent more on retirement for their employees than do comparable nonunion employers.[62]

Unions Create a Path to Sharing Knowledge and Solving Problems

Because they are on the front lines, working people often have some of the best information on how to improve their workplaces and make their workplaces safer and more productive. Unions provide the means for workers to share their knowledge about what works and what doesn't—without fear of retaliation. Unionized workplaces also provide their workers with more transparency about company finances and processes that can help shape responses to problems.

Here are a few examples of specific ways unions have sought to improve their workplaces:

- **Shifting from teacher punishment to professional development.** The Peer Assistance and Review (PAR) system created by the Toledo Federation of Teachers (TFT) in the early 1980s transformed teacher evaluation and professional development in Toledo and subsequently spread to other cities and counties in Ohio and throughout the country, including Boston; Rochester, New York; St. Paul, Minnesota; and Montgomery County, Maryland. Under the PAR program, new teachers—and experienced teachers who have been struggling—work with "consulting teachers" who provide mentoring and evaluation. Only after that process do principals get involved in evaluation. Veteran teachers may be referred to the program or seek it out on their own. Districts that have adopted PAR say that itstrengthens instruction, increases teacher leadership, and helps strengthen the relationship between the district and the teachers union.[63]
- **Training manufacturing workers in new technology skills.** Labor unions and the AFL–CIO Working for America Institute have been key partners in implementing a program that trains workers to operate more technical and highly specialized manufacturing processes. The Industrial Manufacturing Technicians (IMT) apprenticeship program began in Milwaukee and is expanding across

[59] Monique Morrissey, *The State of American Retirement: How 401(k)s Have Failed Most American Workers,* Economic Policy Institute, March 3, 2016.

[60] Data are from Bureau of Labor Statistics, *National Compensation Survey: Employee Benefits in the United States, March 2016,* "Table 2. Retirement Benefits: Access, Participation, and Take-up Rates, Civilian Workers, March 2016."

[61] Income estimate is for all seniors age 65 and older, whether retired or not. Source: Monique Morrissey, *The State of American Retirement: How 401(k)s Have Failed Most American Workers,* Economic Policy Institute, March 3, 2016.

[62] Adjusted data are based on analysis of fourth-quarter 1994 Employment Cost Index microdata as presented in Table 4.35 in Lawrence Mishel, Josh Bivens, Elise Gould, and Heidi Shierholz, *The State of Working America, 12th Edition,* an Economic Policy Institute book (Ithaca, N.Y.: Cornell University Press, 2012) and drawn from Brooks Pierce, *Compensation Inequality,* U.S. Department of Labor Statistics Working Paper no. 323, 1999.

[63] *See* "A User's Guide to Peer Assistance and Review," Harvard Graduate School of Education (accessed July 2017); Saul A. Rubinstein and John E. McCarthy, *Collaborating on School Reform: Creating Union-Management Partnerships to Improve Public School Systems,* Rutgers School of Management and Labor Relations, October 2010; "Peer Assistance and Review (PAR) Program," Boston Teachers Union (accessed July 2017).

eight states. The program, operated by the Wisconsin Regional Training Partnership (WRTP)/BIG STEP, provides workers with 2,700 hours of on-the-job training and 260 hours with technical college instructors. Labor union partners include the International Association of Machinists and Aerospace Workers (IAMAW), the International Association of Sheet Metal, Air, Rail and Transportation Workers (SMART), the International Brotherhood of Electrical Workers (IBEW), the United Automobile Workers (UAW), and the United Steelworkers (USW). "Union support ensures that the firm-specific design of the program is responsive to worker feedback as well as to lessons learned from IMT programs at other employers that the union covers."[64]

- **Ending quotas that force bank workers to sell exploitive loans.** More than 15,000 U.S. bank workers for Spain-based Santander Bank are trying to create the first bank workers' union in the United States (bank unions are widespread in other developed countries). Among Santander workers' goals is to end quotas that force workers to hawk subprime auto loans and other exploitative loans to customers—often people of color and neighbors in their communities—without being able to properly explain the terms of those loans.[65] While there has been no election petition filed for Santander Bank yet, Santander workers have brought attention to what has been a problem for American consumers. By forming unions and gaining a seat at the table, financial services employees could help end predatory practices like those engaged in by Wells Fargo Bank in recent years.[66]

Workers Still Want Unions But Are Being Thwarted by Aggressive Campaigns and Lobbying That Have Eroded Private-Sector Union Membership

Almost half (48 percent) of workers polled said they'd vote to create a union in their workplace tomorrow if they got the chance.[67] But workers are being deprived of that opportunity. Because unions and collective bargaining are effective at giving workers power, they are opposed by corporate interests and policymakers representing the highest-earning 1 percent.[68] For decades, fierce corporate opposition has suppressed the freedom to form unions and bargain collectively in the private sector by promoting antiunion campaigns in workplaces seeking to unionize and by lobbying lawmakers to pass laws depriving private-sector unions of funds needed to operate. This activity has tracked the dramatic, rapid increase of corporate political activity that began in the mid-1970s, with a specific "call-to-arms" for U.S. corporations that quadrupled the number of corporate PACs from 1976 to 1980.[69] More recently, anti-union lobbyists have passed legislation weakening unions in states such as Indiana, Michigan, and Wisconsin that were once union strongholds.[70] Outdated labor laws have failed to provide workers with protection from this employer onslaught against collective bargaining. And corporate lobbyists have blocked reforms to labor laws that would protect worker's collective bargaining rights with meaningful penalties for violations and better processes for organizing. Employers are exploiting loopholes, including by misclassifying workers as independent contractors to get around labor laws that protect employees.

By going after union funding, employer interests and their allied lawmakers can wipe out one of the crucial pillars of support for pro-worker candidates and causes. If unions have fewer members, or if the law hamstrings unions' ability to collect ad-

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[64] "For Good Jobs, Look Beyond the Rust," *New York Times,* July 23, 2017; *Moving Apprenticeship Into Manufacturing's Future: Industrial Manufacturing Technician,* COWS (University of Wisconsin—Madison), February 2017.

[65] "Bank Workers Will Protest to Form Their First U.S. Union—and the Whole World is Watching," *Mic.com,* February 17, 2017.

[66] Keith Ellison, "John Stumpf's Wells Fargo Racket Shows Why Bank Workers Need a Union," *Daily Beast,* September 28, 2016.

[67] In 2012, 48 percent of all nonmanagerial workers surveyed by the AFL–CIO Workers' Rights Survey (May 2012 Hart Research Associates poll) said they would "probably" or "definitely" vote to form a labor union if an election were held tomorrow.

[68] In a roundtable discussion on *PBS NewsHour,* James Hoffa, president of the International Brotherhood of Teamsters, suggested that "the real reason" political leaders in states such as Indiana, Ohio, New Jersey, and Michigan have targeted unions is because they are "the backbone of the Democratic Party . . . the ones that have the boots on the ground" ("Union Leaders Discuss State of U.S. Labor as Attacks Rise, Membership Goes Down," *PBS NewsHour,* September 3, 2012).

[69] Jacob S. Hacker and Paul Pierson, *Winner-Take-All Politics: How Washington Made the Rich Richer—and Turned Its Back on the Middle Class,* Simon and Schuster, 2010.

[70] Colin Gordon, "Right to Work (For Less): By the Numbers," *Dissent,* May 10, 2016.

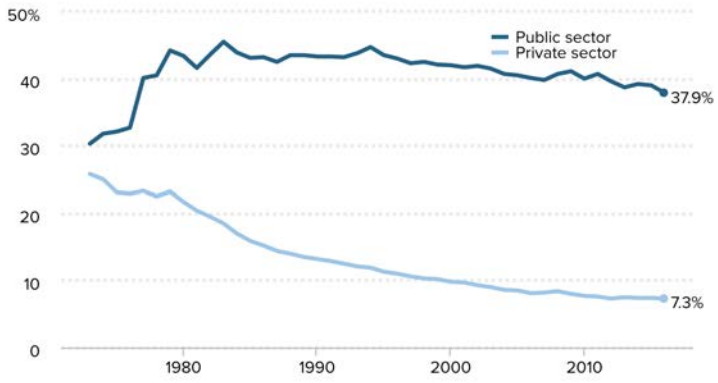
ministrative fees from the workers they represent, there will be less union money spent on advocating for workers in general. As Gordon Lafer, associate professor at the Labor Education and Research Center at the University of Oregon, notes, "The labor movement serves as the primary political counterweight to the corporate agenda on a long list of issues that are not per se labor-related. To the extent that unions can be removed as a politically meaningful force, the rest of the agenda becomes much easier to execute." [71]

These strategies have been effective, as is evident in the differing trends in unionization between private-sector and public-sector workers. Until very recently, public-sector employers have been far less engaged in trying to block unionization efforts than their private-sector counterparts. Just 6.4 percent of private-sector workers belong to a union, down from about 35 percent in the 1950s and about 25 percent in the early 1970s. In contrast, 34.4 percent of public-sector workers belong to a union, up from at or slightly above 10 percent in the 1950s. Overall, 10.7 percent of workers belong to a union, down from about 35 percent in the mid-1950s.[72] Figure C shows the dramatic decline in private-sector unionization since the 1970s.

Figure C

Private-sector unionization has declined as a direct result of anti-union policies

Union coverage rates by sector, 1973–2016



Note: All workers ages 16 and up.

Source: EPI analysis of data from unionstats.com, from Barry Hirsch and David Macpherson, 2017.

Economic Policy Institute

Employers Often Fight Unionizing Efforts With Aggression and Intimidation, Using Legal and Illegal Tactics

Not all employers oppose unions. Some unions featured in this report were voluntarily recognized by employers, and some led campaigns in which the employer provided union organizers with free access to employees.[73]

But often, when private-sector workers seek to organize and bargain collectively, employers hire union avoidance consultants to orchestrate and roll out anti-union campaigns. Intense and aggressive anti-union campaigns—once confined to the most

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[71] Gordon Lafer, *The One Percent Solution: How Corporations Are Remaking America One State at a Time* (Ithaca, N.Y.: Cornell University Press, 2017), 93.

[72] Current membership rates are for 2016 and come from Bureau of Labor Statistics, "Union Members Summary" [economic news release], U.S. Department of Labor, January 26, 2017; 1950s rates come from John Schmitt, "Union Membership Trends, 1948–2012," No Apparent Motive (blog), January 25, 2013; and 1950s and 1970s rates come from the data appendix for figures that accompanies Barry T. Hirsch, "Sluggish Institutions in a Dynamic World: Can Unions and Industrial Competition Coexist?", *Journal of Economic Perspectives* vol. 22, no. 1 (2008), 153–76.

[73] Employers, where law permits, may voluntarily recognize a union based on a simple showing of majority support from the employees.

antiunion employers—have become widespread, leading to a "coercive and punitive climate for organizing that goes unrestrained due to a fundamentally flawed regulatory regime that neither protects [workers'] rights nor provides any disincentives for employers to continue disregarding the law."[74] While the National Labor Relations Act, which governs private-sector collective bargaining, makes it illegal for employers to intimidate, coerce, or fire workers involved in union-organizing campaigns, the penalties are insufficient to provide a serious economic disincentive for such behavior.[75] And many of the tactics that are illegal on paper can be actively pursued because verbal, veiled threats without a paper trail or explicit language connecting the threat to the union effort are difficult to prove and thus prosecute. Finally, the Department of Labor is working to repeal a rule that prohibits employers from keeping the work of anti-union consultants a secret.[76]

- **Three-quarters or more of private employers facing unionization hire union avoidance consultants to quash the union campaign, sometimes spending hundreds of thousands of dollars.**[77] Employer tactics may include one-on-one meetings with supervisors, mandatory employee meetings (also known as "captive audience" meetings), videos, and leaflets. Often consultants work behind the scenes to craft the message that management delivers. The communication strategy typically warns employees that the union will just charge dues and fines without delivering raises or other benefits; will make employees strike; will take years to deliver a contract; and will generally interfere in the employment relationship. Because employers can bar pro-union workers from speaking at mandatory meetings, management can make the case against unions without being challenged.[78] The campaign against a union-organizing attempt at the lifestyle media site *Thrillist* is a classic example of the types of misleading arguments used by employers: that the union would come between management and employees, silence employees by making them talk only through union representatives, make promises it could not keep, and prevent employers from giving wage increases.[79]
- **From the 1990s to the early 2000s, the likelihood that private employers will use 10 or more tactics in their anti-union campaigns doubled,** and the focus on more coercive and punitive tactics designed to intensely monitor and punish union activity increased.[80]
- **One in five to one in seven union organizers or activists can expect to be fired** as a result of their activities in a union election campaign.[81] Roughly

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[74] Kate Bronfenbrenner, *No Holds Barred: The Intensification of Employer Opposition to Organizing,* Economic Policy Institute and American Rights at Work Education Fund, May 20, 2009.

[75] Penalties may consist of posting a notice, reinstating fired workers, giving back pay to a fired worker, or rerunning an election. There are no punitive damages or criminal charges. The most serious penalty, a bargaining order to work with the union on a first contract, is often ineffectual as the anti-union campaign continues.

[76] Marni von Wilpert, "Comment to the U.S. Department of Labor Opposing the Rescission of the Persuader Rule," Economic Policy Institute, August 9, 2017.

[77] A national study of NLRB elections from 1999 to 2003 found that 75 percent of employers used consultants to design and coordinate their anti-union campaigns; *see* Kate Bronfenbrenner, *No Holds Barred: The Intensification of Employer Opposition to Organizing,* Economic Policy Institute and American Rights at Work Education Fund, May 20, 2009. A 2002 Chicago study found that 82 percent of employers hired anti-union management consultants. *See* Chirag Mehta and Nik Theodore, *Undermining the Right to Organize: Employer Behavior During Union Representation Campaigns,* a report by the Center for Urban Economic Development at the University of Illinois at Chicago for American Rights at Work, December 2005. A notice of proposed rulemaking from the U.S. Department of Labor cited estimates ranging from 66 percent to 87 percent, *see* "Labor-Management Reporting and Disclosure Act; Interpretation of the 'Advice' Exemption," Federal Register, vol. 76, no. 119, June 21, 2011, p. 36178.

[78] Marni von Wilpert, "Union Busters Are More Prevalent Than They Seem, and May Soon Even Be at the NLRB," Working Economics Blog, Economic Policy Institute, May 1, 2017; Kate Bronfenbrenner, *No Holds Barred: The Intensification of Employer Opposition to Organizing,* Economic Policy Institute and American Rights at Work Education Fund, May 20, 2009; Chirag Mehta and Nik Theodore, *Undermining the Right to Organize: Employer Behavior During Union Representation Campaigns,* a report by the Center for Urban Economic Development at the University of Illinois at Chicago for American Rights at Work, December 2005.

[79] Hamilton Nolan, "The Dismal Thrillist Anti-Union Campaign," *Concourse,* March 10, 2017.

[80] Kate Bronfenbrenner, *No Holds Barred: The Intensification of Employer Opposition to Organizing,* Economic Policy Institute and American Rights at Work Education Fund, May 20, 2009.

[81] John Schmitt and Ben Zipperer, *Dropping the Ax: Illegal Firings During Union Election Campaigns, 1951–2007,* Center for Economic and Policy Research, March 2009.

a third of employers (34 percent) fire workers during campaigns.[82] By firing one or more union organizers, employers can disrupt the organizing campaign while intimidating other potential bargaining unit members into dropping the campaign or voting no in the representation election.

- **Employers may also threaten to cut workers' hours or pay, suspend workers, or report workers to immigration enforcement authorities.**[83]
- **Fifty-seven percent of private employers threaten to close the worksite if employees unionize.** Forty-seven percent threaten to cut wages and benefits.[84]
- **Sixty-three percent of private employers interrogate workers about union support in mandatory one-on-one meetings between workers and their supervisors,** and 54 percent of employers threaten workers in such meetings.[85]
- **Union elections are not free and fair because the law does not give union organizers equal access to voters.** Employers may block union organizers from accessing the workplace while compelling voters to attend anti-union meetings. Unions may only access voters outside of work. And while, by law, employers that possess contact information such as email addresses for employees must provide that information to union organizers, proposed legislation would severely limit organizers' rights to access that information.[86]
- **The tactics are effective.** A study of private-sector union organizing in Chicago found that, while a majority of workers supported unionization, when petitions were filed to begin the workplace organizing effort (a majority vote is needed to elect to unionize), unions were victorious in only 31 percent of these campaigns, after workers had endured the full range of employer anti-union activity.[87]
- **Loopholes in labor laws allow employers to endlessly delay contract negotiations. Two years after an election, 37 percent of newly formed private-sector unions still had no labor agreement.**[88]

Workers Reclassified as Independent Contractors Cannot Form Unions Because They Aren't Covered by the NLRA

Misclassification occurs when employers classify workers who are in fact employees as independent contractors, which employers do to avoid a host of employment-related obligations, such as paying for unemployment insurance and workers' compensation and even paying a minimum wage. Workers wrongly classified as inde-

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[82] Kate Bronfenbrenner, *No Holds Barred: The Intensification of Employer Opposition to Organizing,* Economic Policy Institute and American Rights at Work Education Fund, May 20, 2009.

[83] Annette Bernhardt et al., *Broken Laws, Unprotected Workers: Violations of Labor Laws in America's Cities,* National Employment Law Project (New York City), Center for Urban Economic Development (Chicago), and UCLA Institute for Research on Labor and Employment (Los Angeles), 2009.

[84] Kate Bronfenbrenner, *No Holds Barred: The Intensification of Employer Opposition to Organizing,* Economic Policy Institute and American Rights at Work Education Fund, May 20, 2009. Another study of 62 union-representation campaigns launched in Chicago in 2002 found that 49 percent of employers threatened to close or relocate all or part of the business if workers elected to form a union. *See* Chirag Mehta and Nik Theodore, *Undermining the Right to Organize: Employer Behavior During Union Representation Campaigns,* a report by the Center for Urban Economic Development at the University of Illinois at Chicago for American Rights at Work, December 2005.

[85] Kate Bronfenbrenner, *No Holds Barred: The Intensification of Employer Opposition to Organizing,* Economic Policy Institute and American Rights at Work Education Fund, May 20, 2009.

[86] Testimony of Guerino J. Calemine III, General Counsel, Communications Workers of America before the U.S. House of Representatives Subcommittee on Health, Labor, Employment, and Pensions, legislative hearing on H.R. 2776, 2775, and 2723, June 14, 2017.

[87] In the Chicago study, for nearly all of 179 petitions filed with the NLRB to represent previously unorganized workers at workplaces in the Chicago, the majority of workers supported unionization when the petitions were filed, but unions were victorious in only 31 percent of these campaigns. Chirag Mehta and Nik Theodore, *Undermining the Right to Organize: Employer Behavior During Union Representation Campaigns,* a report by the Center for Urban Economic Development at the University of Illinois at Chicago for American Rights at Work, December 2005.

[88] Because the law gives employers the right to multiple levels of review (by an administrative law judge, then by the full NLRB, and then by appellate courts), delays between the union election and the final results can last for years. Data come from Kate Bronfenbrenner, *No Holds Barred: The Intensification of Employer Opposition to Organizing,* Economic Policy Institute and American Rights at Work Education Fund, May 20, 2009.

pendent contractors are also deprived of the right to unionize under U.S. laws. These workers are thus unable to join together in a union to negotiate better terms and conditions with their employer. Misclassification is rampant in many industries such as food services and construction. The practice contributes to an economy where wages are flat, profits are soaring, and companies that do not arrange their businesses to avoid their employment responsibilities are disadvantaged.[89]

Corporate Lobbyists Push Laws—Misleadingly Called "Right-To-Work" Laws—That Seek to Defund Private-Sector Unions

Unions provide a range of tangible benefits to their members, from contract and benefit administration and enforcement to legal services. These services cost money. While states generally have no jurisdiction over private-sector unions, the NLRA allows states to pass "right-to-work" (RTW) laws.[90] Contrary to their branding, these laws do nothing to boost workers' chances of finding a job. Rather, right-to-work laws simply prohibit contracts that require all workers who benefit from union representation to help pay for these benefits. Specifically, RTW laws say unions can't require nonunion members of a collective bargaining unit who don't pay union dues to pay "fair share fees"—fees that cover the basic costs of representing employees in the workplace (but are not used for costs associated with union organizing or political activities).

Fair share fees are just that. Under federal law, no one can be forced to join a union as a condition of employment. However, unions *are* required to represent all members of a bargaining unit, whether or not they are in the union. This means that if an employer mistreats a worker who is not in the union, the union must pursue that worker's grievance just as it would a member's, even if it costs tens of thousands of dollars. Nonunion workers also receive the higher wages and benefits their union coworkers enjoy.[91] Eliminating fair share fees encourages "free-riding": workers paying union dues see coworkers who are paying nothing but getting the same benefits, and they decide to leave the union and stop paying union dues.

RTW laws weaken unions by eroding union funding and membership (Figure D shows union density, as measured by shares of workers covered by collective bargaining, in RTW and fair share states). Proponents of RTW laws say they boost investment and job growth but there is no serious evidence of that. While causal impacts of RTW laws are hard to estimate with statistical precision, there is ample evidence that RTW laws hurt all workers—not just union members.[92]

- **Twenty-eight states have "right-to-work" laws that allow workers in the private sector to access the benefits of union negotiations without sharing the costs.**
- **States that passed RTW a long time ago have successfully avoided large-scale unionization.** Historically states in the Deep South and parts of Midwest and West passed RTW laws to weaken unions. Many succeeded. Especially in the Deep South, states that passed RTW laws in the 1940s and 1950s have low private-sector unionization rates that persist to this day.
- **States with strong unions are now being targeted by RTW.** Anti-union lobbyists have succeeded in bringing RTW to heavily unionized states such as Indiana, Michigan, and Wisconsin to weaken worker power.[93]
- **"National Right to Work" legislation has been introduced in the House and Senate: H.R. 785 by Rep. King (R–IA) and S. 545 by Sen. Paul (R–KY).** These companion bills would allow employees who work in a unionized workplace, but who decline to become union members, to refuse to pay a fair share fee to the union that negotiates their benefits.

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[89] David Weil, "Lots of Employees Get Misclassified as Contractors. Here's Why It Matters," *Harvard Business Review,* July 5, 2017.

[90] The 1947 Taft-Hartley amendments to the National Labor Relations Act sanctioned a state's right to pass laws that prohibit unions from requiring a worker to pay dues, even when the worker is covered by a union-negotiated collective bargaining agreement.

[91] Elise Gould and Will Kimball, *"Right-to-Work" States Still Have Lower Wages,* Economic Policy Institute, April 22, 2015.

[92] It is hard to isolate the decision of a state to become RTW from other legislative changes or to separate the RTW effect from the many factors, including recessions, that influence state labor market conditions.

[93] Gordon Lafer, *The Legislative Attack on American Wages and Labor Standards, 2011–2012,* Economic Policy Institute, October 31, 2013.

- **A well-funded, centralized campaign is behind RTW laws.** In the wake of the Great Recession, RTW laws passed and proposed were presented as homegrown responses to state unemployment woes, but the similarity of the text in the laws, and the fact that states with more fiscal distress were not more likely to introduce such legislation, shows "a political agenda funded by a network of extremely wealthy individuals and corporations."[94]
- **RTW laws lower unionization rates even in less-unionized states.** The passage of RTW in Oklahoma decreased private-sector unionization rates by roughly 20 percent.[95]
- **Wages are 3.1 percent lower in RTW states than in fair share states,** after controlling for individual demographic and socioeconomic factors and state macroeconomic indicators, including cost of living. This translates into a $1,558 annual RTW wage penalty for a typical full-time, full-year worker, union or nonunion, in the public or private sector.[96]
- **Proponents of RTW laws say they boost investment and job growth but there is no real evidence of that.** Reviewing claims of faster-than-average employment growth in RTW states, an EPI report found dramatic growth in some RTW states but steep declines in others, with the high-growth states skewing the average. Studies that have found positive employment effects of RTW laws have failed to control for a host of factors that would affect employment, from the education level of the workforce to the proximity of transportation hubs to a state's natural resources to a state's level of manufacturing.[97] A 2015 study similarly found "no pronounced effect of RTW laws on state economies."[98]
- **Rev. Martin Luther King Jr. targeted the misleading nature of the "right-to-work" slogan in 1961** when he said the purpose of "right to work" is "to destroy labor unions and the freedom of collective bargaining by which unions have improved wages and working conditions of everyone."[99]

Corporate Lobbies and Allied Lawmakers Are Dismantling the Rights of Public-Sector Union Workers

When state budget deficits increased after the Great Recession, business-backed governors in a number of states sought to curb the powers of public-sector unions by arguing that government unions were to blame. Though these anti-union laws were presented as homegrown responses to specific fiscal distress in each state, the laws' similarities, and the fact that states with more fiscal distress were not more likely to introduce such legislation, suggest that lawmakers were enacting an agenda driven and funded by national corporate interests. In fact, the financial distress was caused by Wall Street's excessive risk-taking, not by unions.[100] And, **many of**

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[94] Gordon Lafer, *The Legislative Attack on American Wages and Labor Standards, 2011–2012,* Economic Policy Institute, October 31, 2013. According to Lafer's report, one of the most important organizations facilitating this work is the American Legislative Exchange Council (ALEC), a corporate lobbying group whose model bills (establishing RTW, abolishing minimum wage and prevailing wage statutes, etc.) are the basis for over 100 laws adopted annually. *See also* "ALEC," Common Cause website (accessed August 2017).

[95] *See* page 10 of Ozkan Eren and Serkan Ozbeklik, "What Do Right-To-Work Laws Do? Evidence From a Synthetic Control Method Analysis" [author-posted version of article published in *Journal of Policy Analysis and Management,* vol. 35, no. 1 (July 15, 2015), 173–194].

[96] Elise Gould and Will Kimball, *"Right-to-Work" States Still Have Lower Wages,* Economic Policy Institute, April 22, 2015.

[97] The more scholars are able to hold "all other things" equal, the more it becomes clear that these laws have little or no positive impact on a state's job growth. The most recent and most methodologically rigorous studies conclude that the policy has no statistically significant impact whatsoever. *See* Gordon Lafer and Sylvia Allegretto, *Does 'Right-to-Work' Create Jobs? Answers From Oklahoma,* Economic Policy Institute, March 16, 2011.

[98] After a literature review the authors conclude, "Some studies find significant effects of RTW laws on various state outcomes, while others find no effect (*see for example,* Hirsch 1980, Holmes 1998, Farber 2005, Lafer and Allegretto 2011)." The authors did their own study of Oklahoma and found no effect, at least in the short run, on state outcomes including employment and wages. *See* Ozkan Eren and Serkan Ozbeklik, "What Do Right-To-Work Laws Do? Evidence From a Synthetic Control Method Analysis" [author-posted version of article published in *Journal of Policy Analysisand Management,* vol. 35, no. 1 (July 15, 2015), 1].

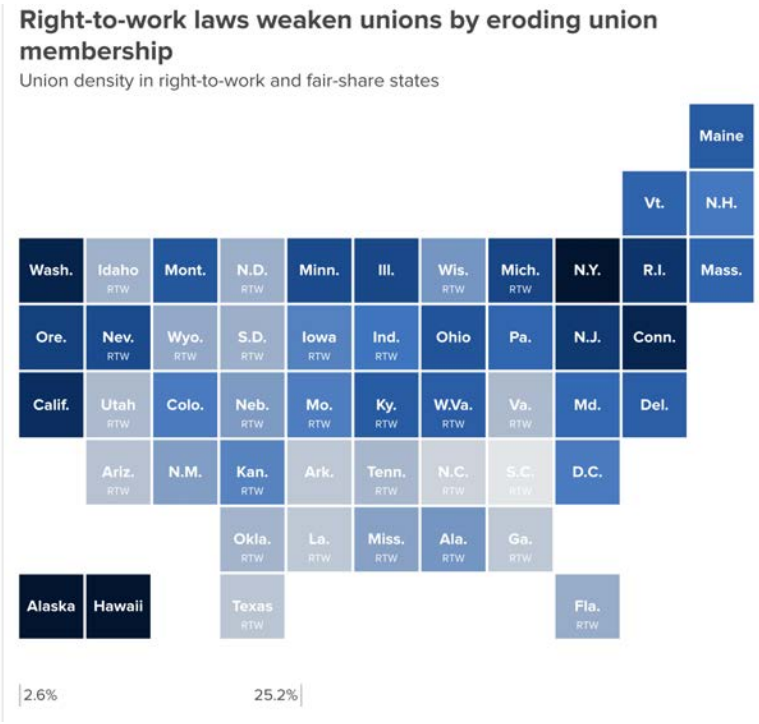
[99] Nathan Newman, "MLK Jr. Died at a Union Picket Line," *Labor Blog,* January 16, 2006.

[100] According to Gordon Lafer in *The One Percent Solution,* the argument that budget deficits were the result of overspending bureaucrats and overly generous union contracts did not fit the facts: there was no statistical correlation between the size of budget deficits and the presence

the same states that curbed state employee unions also enacted new tax cuts for the wealthy.[101]

- **From 2011 to 2015, fifteen states enacted legislation severely limiting or even dismantling collective bargaining rights for public-sector unions.**[102]
  - **Wisconsin's "Budget Repair Bill" (Act 10) largely eliminated collective bargaining rights for the state's 175,000 public employees.** While the law does not explicitly outlaw collective bargaining, it prohibits public employees from negotiating about anything other than wages (and then only to adjust wages for inflation); it outlaws fair share fees; it eliminates the ability to pay union dues through the state payroll; and it requires unions to hold expensive recertification elections every year to remain in existence.[103]
  - **The share of workers in unions in Wisconsin dropped from 15.2 percent in 2009 to 8.3 percent in 2015.**[104]

Figure D



Union density is measured as share of workers covered by collective bargaining. Six states have right-to-work laws that were enacted in the last five years (in 2012 or later): Indiana, Kentucky, Michigan, Missouri, Wisconsin, and West Virginia.

or strength of labor unions. *See* Gordon Lafer, *The One Percent Solution: How Corporations Are Remaking America One State at a Time* (Ithaca, N.Y.: Cornell University Press, 2017).

[101] In Wisconsin, for example, half of the tax cuts enacted from 2011 to 2014 went to the richest 20 percent of the state's population. *See* chapter 1 in Gordon Lafer, *The One Percent Solution: How Corporations Are Remaking America One State at a Time* (Ithaca, N.Y.: Cornell University Press, 2017).

[102] Unless otherwise noted, information in these bullets comes from Gordon Lafer, *The One Percent Solution: How Corporations Are Remaking America One State at a Time* (Ithaca, N.Y.: Cornell University Press, 2017).

[103] Ohio's law was overturned by citizen referendum and Minnesota's bill was vetoed by the governor. The other 13 states are Idaho, Illinois, Indiana, Maine, Michigan, Nebraska, New Hampshire, New Jersey, Nevada, Oklahoma, Pennsylvania, Tennessee, and Wisconsin.

[104] Alana Semuels, "How to Kill the Middle Class," *The Atlantic,* December 7, 2016.

Sources: The Union Membership and Coverage Database *(www.unionstats.com),* compiled by Barry Hirsch and David Macpherson, and "Right-to-Work Resources," National Conference of State Legislatures, web page accessed August 22, 2017.

- **Other state laws eliminated collective bargaining rights for certain groups of workers** (school teachers in Tennessee, municipal employees in Oklahoma, farmworkers and child care workers in Maine, and home care workers in Michigan) or restricted what public employees can bargain about (health care in New Jersey).
- **Beyond curbs to collective bargaining are a set of state measures that target the power of public-sector unions by cutting public-sector wages and benefits** and restricting unions' ability to collect dues through the public payroll.
- **Anti-union laws are gateway laws to broader anti-worker measures.** Some states that succeed in degrading public collective bargaining go on to pass other laws that diminish worker rights.[105] Wisconsin, for example, eliminated the requirement to allow workers at least one day off per 7-day week (that is, the requirement that workers get at least one weekend day per week).[106]

Attacks on Public-Sector Collective Bargaining Are Playing Out in the Courts

In the public sector, there is a similar attack on collective bargaining playing out in the courts. In *Abood v. Detroit Board of Education,* 431 U.S. 209 (1977), the Supreme Court upheld the use of fair share fees in public-sector unions against a challenge based on the First Amendment. The Court held that public-sector employees who elect not to join the union may be charged a fee to cover the cost of collective bargaining and contract administration. Fair share fees may not be used to support union political activities. These fair share fees ensure that all workers represented by the union pay their fair share of the cost of that representation.

In 2016, the Supreme Court heard oral argument in *Friedrichs v. California Teachers Association,* which, among other things, addressed whether *Abood* should be overruled and public-sector fair-share fee arrangements invalidated under the First Amendment. On March 29, 2016, the Supreme Court affirmed *Abood* by an equally divided 4–4 split.[107]

Pro-RTW organizations have continued to litigate challenges to public-sector unions' fair share fee requirements. One of those cases, *Janus v. AFSCME,* will likely be heard in the Supreme Court's upcoming term.[108]

Conclusion: Unions Are Essential to a Fair Economy and a Vibrant Democracy

Unions are a dynamic and ever-evolving institution of the American economy that exist to give working people a voice and leverage over their working conditions and the economic policy decisions that shape these conditions. Collective bargaining is indispensable if we want to achieve shared prosperity.

But it is precisely because they are effective and necessary for shared prosperity that unions are under attack by employers who want to maintain excessive leverage over workers and by policymakers representing the interests of the top 1 percent. These attacks have succeeded in increasing the gap between the number of workers who would like to be represented by a union and the number who are represented

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[105] In the wake of Act 10, Wisconsin enacted a broad rewrite of its civil service law, lengthening the probationary period for new employees (during which time they can be fired for any reason) and centralizing hiring with the Department of Administration, a highly politicized agency; union representatives fear the law will lead back to a system where political appointees have disproportionate power to reward friends and punish enemies. *See* Dan Kaufman, "The Destruction of Progressive Wisconsin," *New York Times,* January 16, 2016; Jason Stein and Patrick Marley, "Scott Walker Signs Civil Service Overhaul," *Milwaukee Journal-Sentinel,* February 12, 2016.

[106] The provision was passed as part of the state budget. *See* Stephanie Bloomingdale, "Walker and GOP Just Took Away the Weekend," *Milwaukee Journal-Sentinel,* July 13, 2015.

[107] A split decision effectively upholds the ruling of the lower court. 136 S.Ct. 1083 (2016).

[108] *Janus v. AFSCME* (7th Cir.) (Docket No. 16–3638); *see* Marni von Wilpert, *Testimony for New York City Council Committee on Civil Service and Labor,* April 19, 2017, and "Janus v. American Federation of State, County, and Municipal Employees, Council 31," *SCOTUSblog* (last accessed August 15, 2017).

by a union. And these threats to the freedom to join together in unions haven't been met with a policy response sufficient to keep the playing field level between organizing workers and the employers looking to thwart them.

Giving workers a real voice and leverage is essential for democracy. While unions historically have not been able to match corporate political donations dollar for dollar, working people organizing together in unions play an equalizing role because they can motivate members to give their time and effort to political causes. For example, one study found that unions are very effective at getting people to the polls—especially increasing voting among those with only a high school education.[109]

As this report has shown, unions—when strong—have the capacity to tackle some of the biggest problems that plague our economy, from growing economic inequality, wage stagnation, and racial and gender inequities to eroding democracy and barriers to civic participation.

And, unions also help to address current workforce trends that are increasing work insecurity, from the rise of part-time work and unpaid internships to the exploitation of student athletes to increasing numbers of Uber drivers and other "gig economy" workers.[110] In a recent *New York Times* op-ed, Kashana Cauley cited some of these trends and called on her millennial peers to lead the next labor movement.[111] Indeed, there is evidence that young workers are primed to do so: 55 percent of 18- to 29-year-old workers view unions favorably, compared with 46 percent of workers age 30 and older.[112] And young people of both political parties are more amenable to labor unions than their older peers.[113] Having entered the workforce during the last recession, these young workers have experienced a labor market with lower wages, diminishing benefits, "noncompete" clauses that make it harder for even entry-level employees to move to better jobs, and other facets of increasing insecurity, Cauley explains.[114]

Certainly, Americans of all ages, occupations, races, and genders have a vested interest in making sure our economy works for everyone. To promote an inclusive economy and a robust democracy, we must work together to rebuild our collective bargaining system.

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[109] Jake Rosenfeld finds that unions increase voter turnout, especially in the private sector. Voting rates are "5 percentage points higher than the rates of non-members" (Jake Rosenfeld, *What Unions No Longer Do* [Cambridge, Mass.: Harvard University Press, 2014], 170–171).

[110] EPI has researched unpaid internships and part-time work. *See for example,* Ross Eisenbrey, "Unpaid Interns Fare Worse in the Job Market," Economic Policy Institute Snapshot, July 6, 2016 and Lonnie Golden, *Still Falling Short on Hours and Pay: Part-time Work Becoming New Normal,* Economic Policy Institute, December 5, 2016. Many news articles have covered the plight of student athletes, who generate substantial sums for their universities but earn no pay themselves. *See for example,* Taylor Branch, "The Shame of College Sports," *The Atlantic,* October 2011. Uber drivers have been trying to organize in Seattle but the company is fighting it, requiring its customer service representatives to call drivers with a script arguing that it would be bad for them. *See* Alison Griswold, "Uber Is Using Its U.S. Customer Service Reps to Deliver Its Anti-union Message," *Quartz,* February 20, 2016.

[111] Kashana Cauley, "Why Millennials Should Lead the Next Labor Movement," *New York Times,* July 13, 2017.

[112] "Mixed Views of Impact of Long-Term Decline in Union Membership: Public Says Workers in Many Sectors Should Be Able to Unionize," Pew Research Center, April 27, 2015.

[113] Elizabeth Bruenig, "Even Conservative Millennials Support Unions," *New Republic,* May 1, 2015.

[114] Kashana Cauley, "Why Millennials Should Lead the Next Labor Movement," *New York Times,* July 13, 2017.

MANUFACTURING PROSPERITY

A Bold Strategy for National Wealth and Security

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Offshore production in advanced manufacturing has reached a critical point in which the strategy of "invent here, manufacture there" has become "invent there, manufacture there." The United States must take bold steps to arrest this development and take advantage of transformational technologies to rebuild domestic manufacturing prowess for national wealth and security. These bold steps require a central national focal point with a comprehensive strategy, and significant and sustained public and private investments:

1. **Invest in translational research and manufacturing innovation.**
2. **Encourage domestic pilot production and scale-up.**
3. **Empower small and medium-sized manufacturers to deploy advanced technologies.**
4. **Grow domestic engineering and technical talent.**

Positive national impacts will justify the needed investments. The United States will:

1. **Regain fundamental manufacturing capabilities;**
2. **Ensure a return on federal investments in R&D;**
3. **Capitalize on technology changes broadly affecting manufacturing;**
4. **Establish leadership in new industries of the future; and**
5. **Restore the broad-based supplier networks that are essential to economic and national security.**

Because of a confluence of economic and technological forces, the United States now has an opportunity to rebuild its manufacturing base and restore its global competitiveness. But another report will not help. Bold steps commensurate with the scale and importance of the objectives are absolutely necessary. Implementing these bold steps requires a national focal point of responsibility with a comprehensive strategy and significant and sustained public and private investments. **Other countries are not standing still. The onus is on us.**

FOREWORD

American manufacturing faces both daunting challenges and transformative opportunities. Ensuring national security, preserving the nation's innovation edge, sustaining jobs, and maintaining global manufacturing leadership will require foresight, skillful cross-sector thinking, and serious investments.

In early 2018, MForesight: Alliance for Manufacturing Foresight conducted a series of roundtables with manufacturing experts, business leaders, and policymakers in cities across the United States. The objective was to gather perspective from multiple regions with industry clusters ranging from advanced technology sectors, such as electronics, biotechnology, and advanced materials, to large traditional, albeit still advanced sectors such as automotive, construction equipment, and food processing. Roundtables were held in Austin, Boston, Detroit, Indianapolis, Raleigh, San Jose, and Washington, DC. To focus the discussion, participants were provided with information on trends in trade, value added, employment, foreign direct investment, research, start-ups, investment, and other key indicators on the state of U.S. manufacturing.

Roundtable discussions focused on several key questions:

1. **Regaining America's Industrial Commons:** What foundational capabilities are essential for the United States to regain a global leadership position and to ensure the strength of the defense supply chain? How can the United States

strengthen its ecosystem of manufacturing expertise and production capacities in key sectors?

2. **Capitalizing on national investments in research and development (R&D):** What steps are needed to ensure that America captures the wealth generated from new products and processes emerging from its large national R&D spending? How can the United States achieve first-mover advantage in research-intensive advanced technology products?
3. **Ensuring financing for hardware start-ups and scale-ups:** What policies and programs would increase opportunities for manufacturing start-ups to thrive, scale their operations, and root production in this country?

These questions are at the heart of the grand challenges facing U.S. manufacturing. Roundtable participants were asked to identify actionable recommendations for both public and private stakeholders that would meet these challenges. Their assessment of the urgency of the challenges and recommendations are presented in this report. Because so much information was gathered about multiple industries, research programs, and competing national strategies, this report is the first of several on grand challenges forthcoming from MForesight.

Advances in production technology are changing manufacturing, presenting an opportunity for dramatic change that can restore national production for both defense and economic security. But, as more than 100 roundtable participants agreed, another report will not restore U.S. manufacturing competitiveness. Bold initiatives, with full understanding of the multi-faceted nature of the challenges, are necessary. The recommendations in this report include such bold steps.

EXECUTIVE SUMMARY

American manufacturing faces both daunting challenges and transformative opportunities. As production has moved offshore over recent decades, manufacturers have steadily moved research and development (R&D) activities offshore as well to be close to the factories where product and process engineering skills reside. These shifts have come with serious consequences. America has seen a decline in its ability to manufacture new advanced technology products. Rebuilding capacity in advanced industries is essential to achieving long-term prosperity, ensuring national security, and preserving the nation's innovation edge. Doing so will require foresight, skillful cross-sector thinking, and serious investments.

New opportunities are also emerging: extensive, pervasive technological change in manufacturing should create a positive future for domestic production. The new parameters play to American strengths:

- Flexibility and adaptability;
- A large capital market;
- Superior higher education; and
- World-leading R&D.

But recapturing industrial leadership will require recognition of the importance of manufacturing and a focus on launching the industries of the future.

In early 2018, MForesight: Alliance for Manufacturing Foresight conducted a series of roundtables with manufacturing experts, business leaders, academic researchers, entrepreneurs, investors, and policymakers in cities across the United States. The objective was to gather perspective on the current state of U.S. manufacturing, the grand challenges facing U.S. manufacturing, and actions that the public and private sectors should take to meet those challenges. Their assessment of the urgency of the challenges and steps to meet them informed the critical next steps identified in this report.

Grand Challenges in U.S. Manufacturing

A simple articulation of the grand challenges that must be addressed to capture this prosperous future include:

1. **Rebuild the Industrial Commons**

The United States has lost fundamental production skills and capabilities—the Industrial Commons—in many industries.[1] This has meant the loss of entire industrial sectors over time, with noticeable impacts on the national innovation system. Production can provide competitive advantages that are difficult to replicate. Maintaining domestic manufacturing capabilities is essential to retaining the know-how needed to produce next generation technologies and to meet critical defense production.

2. Convert national R&D to national wealth and security

Leading the world in R&D spending is not sufficient to ensure prosperity. Technologies invented here are being licensed, sold, or given away to manufacture overseas, which, in effect, is subsidizing R&D for other countries. Results of R&D should be strategically nurtured to create new products, including defense-critical technology products, that are made in America at commercial scale to generate wealth, jobs, and exports.

3. Lead emerging industries

To ensure future economic strength and defense superiority, the United States must have a leadership position in emerging industries such as autonomous vehicles, robotics, multi-material additive manufacturing, bio-manufacturing, energy storage, advanced materials, and quantum computing, to name a few. Dependence on foreign suppliers is creating defense vulnerabilities and significant long-term costs.

Bold steps are needed to ensure that these challenges are met quickly and aggressively. Market forces alone are unlikely to achieve the needed change. They have not so far. With sustained, strategic investments, the United States can:

- Regain fundamental manufacturing capabilities;
- Ensure a return on federal investments in R&D;
- Capitalize on technology changes broadly affecting manufacturing;
- Establish leadership in new industries; and
- Restore the broad-based supplier networks that are essential to economic and national security.

Restoring U.S. manufacturing leadership and, perhaps more importantly, restoring the nation's ability to capture wealth from the national innovation system with a robust manufacturing base, is a challenge to both the private and public sectors. Manufacturers, driven by short-term financial incentives, primarily focus on applied research and incremental product development rather than the translational research needed to commercialize basic research results to capture the "next big thing." Only government can overcome this market failure to ensure that the United States remains globally competitive.

Critical Nest Steps

Addressing these grand challenges in manufacturing will require concerted effort from the nation's public and private sectors. Critical next steps include:

1. Invest in translational research and manufacturing innovation

The innovation cycle that converts R&D results—new inventions and discoveries—into successful commercial products may be working well in software, but it is subject to significant failures with regard to manufactured hardware. Funding for the translational research needed to develop operational prototypes, demonstrate manufacturability, and identify viable markets is frequently unavailable. Promising technologies languish in laboratories. Funding and expertise is needed to fill this gap. Effective investment can result in more prototyped and demonstrated products, reducing technical and market risks and boosting commercialization and production.

2. Encourage pilot production and scale-up

To restore domestic production and overall leadership in emerging industries, America needs to invest in advancing manufacturing technologies, increasing pilot production, and scaling up to viable commercial volume. In some cases—

[1] Pisano, G.P., and Shih, W.C. (2009). "Restoring American competitiveness." *Harvard Business Review* (July–August). Retrieved from *https://hbr.org/2009/07/restoring-american-competitiveness;* Pisano, G.P., and Shih, W.C. (2012). *Producing prosperity: Why America needs a manufacturing renaissance.* Boston, Mass.: Harvard Business Review Press.

semiconductor packaging and pharmaceuticals are examples—new production technologies are creating opportunities for U.S. industry to regain leadership. In others, commercial scale production can be achieved by ensuring patient capital is available and demand is sufficient. Leveraging government procurement is an effective tool.

3. Empower small and medium-sized manufacturers

While these manufacturers form the backbone of industrial supply chains, they tend to implement new technologies slowly. There is a pressing need for mechanisms to accelerate the use of smart manufacturing technologies, increase their access to necessary expertise, and build better links between market demands for production capability and their ability to provide it. Mechanisms are also needed to increase small firms' capacity to commercialize research results, such as simple licensing agreements that will encourage technology transfer from universities.

4. Grow domestic engineering and technical talent

To rebuild the Industrial Commons, a combination of incentives could increase the number of manufacturing apprenticeship programs, train engineering technicians with applied engineering skills, and entice capable domestic graduates to pursue advanced degrees to overcome America's dependence on foreign graduate students in key scientific and engineering fields.

The United States needs a broad national conversation to identify the necessary steps to achieve these objectives. At MForesight's roundtables, diverse stakeholders presented a number of promising ideas, including establishing a "focal point" office in the federal government for leveraging the strengths and outcomes of different agencies to mature Technology Readiness Levels (TRLs) and manufacturing research to mature Manufacturing Readiness Levels (MRLs) so that emerging technologies can be manufactured domestically at commercial scale. Other ideas included establishing university-affiliated Translational Research Centers, launching special competitions focused on manufacturing challenges, creating industry fellowships to harness the expertise of retired manufacturing experts, and building the financial resources to increase investment in hardware start-ups and scale-ups, among other ideas.

Implementation Options

These ideas should be part of a comprehensive national strategy, ideally implemented in a coordinated way with a single point of focus to orchestrate the required funding streams and to maintain strategic program management. The roundtable participants proposed a few implementation options, including creating a national innovation initiative, establishing a national manufacturing innovation foundation, and establishing a manufacturing program within each of the federal science and technology agencies. They fully expect the policymakers to convene and make decisions on how best to implement the critical steps identified in the previous section. A piecemeal approach, addressing one or two critical steps but not all, will not help.

Conclusions

1. Manufacturing *really* matters for economic and national security.
2. Being the best in the world in scientific discoveries and engineering inventions is critical but not sufficient to ensure national prosperity.
3. Manufacturing and innovation are intricately linked. Reaping the full rewards of rapid technological advances, the nation must manufacture today's advanced technology products so it can innovate next generation products.

Because of a confluence of economic and technological forces, the United States now has an opportunity to rebuild its manufacturing base and restore its global competitiveness. But another report will not help. Bold steps commensurate with the scale and importance of the objectives are absolutely necessary. **Other countries are not standing still. The onus is on us.**

INTRODUCTION

"If any particular manufacture was necessary, indeed, for the defense of the society, it might not always be prudent to depend upon our neighbors for the supply."

Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations,* 1776

Advanced technology manufacturing industries in the United States are in a precarious position. After decades of shifting production offshore to reduce labor costs, fundamental production skills and capabilities have been lost; domestic suppliers of essential parts and components are unavailable; and the ability to manufacture new advanced technology products is severely constrained. As production has moved offshore, manufacturers are moving more research and development (R&D) to be close to the factories where the product and process engineering skills reside. The implications for future technology leadership, economic growth, and national security are dire. **Maintaining the trajectory of recent decades—a shrinking manufacturing base and large trade deficits in advanced technologies—will result in a second tier industrial economy, unable to maintain superiority in defense or global economic leadership.** Signs of this ominous future are already apparent.

Fortunately, the possibility of a competitive, prosperous future is also apparent. Extensive and pervasive technological change in manufacturing is creating an opportunity to ensure a positive future for domestic production. The coming decades promise a much more responsive, flexible, and intelligent manufacturing sector. Small batch, customized, local production will be both feasible and necessary to meet evolving consumer demand. These advanced manufacturing technologies are shifting the basis for competitive production in many industries, away from low-cost labor inputs toward effective use of smart, digital, flexible production. This manufacturing revolution is shifting priorities for skill development, capital investment, production location, product features, and multiple other parameters that were once common wisdom. **The new parameters play to American strengths: flexibility and adaptability, a large capital market, superior higher education, and the world's best R&D.** In fact, Deloitte projects that the United States will top its Global Manufacturing Competitiveness Index in 2020, ahead of China, largely based on implementation of advanced manufacturing technologies and a shift to higher value, more sophisticated products.[2] But taking advantage of these strengths to recapture industrial leadership will require national recognition of the importance of manufacturing and a focus on building the industries of the future.

Grand Challenges in U.S. Manufacturing

Despite the federal government investing over $140 billion in R&D year after year, annual U.S. trade deficits in advanced technology products continue to hover around $100 billion. Federal science and technology (S&T) agencies and American universities and national laboratories funded by them continue to be successful in developing promising scientific discoveries and inventions. However, in too many cases, foreign governments and investors have been taking advantage of promising results, building large production capacity, and exporting the products back here. Consumer electronics, personal computers and laptops, lithium-ion batteries, flat panel displays, photovoltaics, nanotechnology, and biomanufacturing are all examples. American taxpayers have funded the basic research, only to create wealth and jobs elsewhere. Fixing this gaping hole in the nation's innovation ecosystem requires that the United States make the investments being made by competing countries—investment in engineering and manufacturing processes and equipment. Science is not engineering. Distinct from science, engineering means not just analysis and discovery but synthesis and innovation aimed at turning promising, albeit abstract, ideas into tangible new products and processes. Committing additional investment funds to translate promising discoveries and inventions into commercial products will be an essential step in restoring U.S. leadership (and the trade balance) in advanced technologies.

The longer the status quo continues, the more difficult and expensive solutions will become. Understanding the extent of the problem should motivate action now. A simple articulation of the grand challenges that must be addressed to capture a prosperous future include:

Rebuilding the Industrial Commons: The United States has lost fundamental production skill and capabilities—the Industrial Commons—in many industries and has lost entire industrial sectors, with noticeable impacts on the national innovation system. Gary Pisano and Willy Shih, professors at Harvard, identified the importance of the Industrial Commons and raised an alarm about its loss in 2009(!).[3]

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[2] Deloitte and U.S. Council on Competitiveness. (2016). *2016 global manufacturing competitiveness index.* Deloitte Touche Tohmatsu Limited. Retrieved from *https://www2.deloitte.com/global/en/pages/manufacturing/articles/global-manufacturing-competitiveness-index.html.*

[3] Pisano, G.P., and Shih, W.C. (2009). "Restoring American competitiveness." *Harvard Business Review* (July–August). Retrieved from *https://hbr.org/2009/07/restoring-american-com-*

Many of the industries they identified as "at risk" then, such as electronic displays and mobile handsets, have already been lost.

Gaining competitive advantage from manufacturing: Production can provide competitive advantages that are difficult to copy and have long-term sustainability. There is a difference between parts and assemblies that become commodities as technology advances and manufacturing *capabilities* that become devalued as a source of competitive advantage because Asian manufacturers, backed by mercantilist government policies, offer to produce for little or no margins. Maintaining domestic manufacturing capabilities is essential to retaining the know-how needed to produce next-generation technologies, and to retaining critical defense production.

Converting U.S. R&D to national wealth and security: Leading the world in R&D spending does not ensure prosperity or national security. The nature of research is such that a relatively small percentage results in the potential for new products, processes, even entire industries. These promising results mustbe nurtured to commercialize them in this country to generate wealth, jobs, and exports. Too often, once a discovery is proven in the laboratory, funding dries up. New inventions either languish for lack of funding to develop proof-of-concept prototypes; cannot be manufactured domestically for lack of capital, skills, or production capabilities; or are made in China. Technologies invented here are being licensed, sold, or given away to manufacture overseas, which, in effect, is doing R&D for other countries. The United States needs both a national strategy and effective mechanisms to build wealth through manufacturing promising research results rather than allow foreign entities to cherry-pick winners.

Capturing the gains from new manufacturing technologies: Advances in technologies ranging from high-performance materials to ubiquitous sensors, from self-correcting robots/machines to autonomous factories, will transform both products and processes. Maximizing the benefits will require rapid, broad implementation, which in turn will require that the necessary equipment and tools, talent and skills are available especially to small and medium-sized manufacturers (SMMs). Adoption of "smart manufacturing" technologies has been too slow to date. Resources, incentives, and support must be mobilized to move quickly, learn from mistakes, and sustain successes across all tiers and industries.

Leading emerging industries: To ensure future economic strength and defense superiority, the United States must have a leadership position in emerging industries such as autonomous vehicles, robotics, metal-additive manufacturing, biomanufacturing, energy storage, advanced materials, and quantum computing, to name a few. Dependence on foreign suppliers, regardless of how much cheaper they may be, is creating defense vulnerabilities and long-term competitive disadvantages. Labor cost differentials across countries are shrinking and direct labor is rarely a significant share of total production costs in advanced industries. There is little excuse not to lead in emerging industries and to maintain a strong competitive position.

Bold steps are needed to ensure that these challenges are met quickly and aggressively. Market forces alone will not achieve the needed change. In fact, market failures have made the problems worse over time. **With sustained, strategic investments, the United States can regain fundamental manufacturing capabilities, ensure a return on federal investments in R&D, capitalize on technology changes broadly affecting manufacturing, establish leadership in new industries, and restore the broad-based supplier networks that are essential to economic and national security.**

LOSING THE INDUSTRIAL COMMONS

The Industrial Commons is the set of knowledge and practical skills, supply chains and production capacity, materials and equipment, and overall industrial ecosystems that enable manufacturing across multiple industries. The term was coined by Pisano and Shih in 2009 and further elaborated in 2012.[4] Even before then, many studies, some dating back to the 1980s, have lamented the loss of U.S. manufacturing competitiveness. Despite remarkable advances in technology and a few government programs intended to strengthen domestic manufacturing, the situation

petitiveness; Pisano, G.P., and Shih, W.C. (2012). *Producing prosperity: Why America needs a manufacturing renaissance.* Boston, Mass.: Harvard Business Review Press.

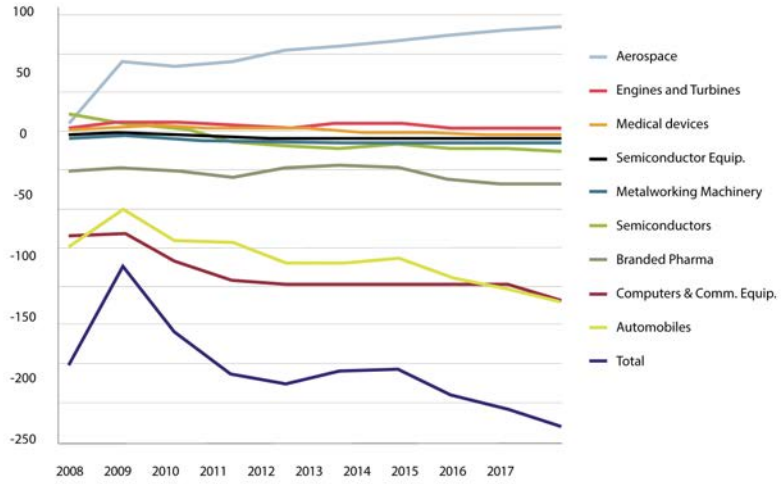
[4] *Ibid.*

has grown progressively worse over decades. Restoring the Industrial Commons is essential to restoring U.S. manufacturing competitiveness, but the more time passes, the more complex and expensive solutions have become.

Current State of U.S. Manufacturing

A few indicators of the current state of U.S. manufacturing are instructive. First consider the U.S. trade balance in advanced industries. As Figure 1 illustrates, in 2016 the United States had a positive trade balance in only two advanced industries: aerospace and (barely) engines and turbines.[5] Even in industries such as medical devices and pharmaceuticals, in which the federal government invests significant R&D and is the single largest customer, the nation does not maintain a positive trade balance. Furthermore, most *domestic* manufacturing industries use substantially more imported content than they did 20 years ago, as illustrated in Figure 2.[6] Imported content in technology-driven innovative products has grown from 45 to 58 percent in the past 15 years with no sign that the trend will change. One direct result from the growth of imports is that real value added in U.S. manufacturing is hardly higher now than in the mid-1990s (Figure 3); excluding computers and pharmaceuticals, it is barely 40 percent higher than in 1980, over 35 years in which U.S. gross domestic product (GDP) grew more than 2.5 times.[7] The United States has already fallen behind Japan, South Korea, Germany, and other European nations in manufacturing value added as a percentage of GDP and in the value added contributed by high-technology industries to total manufacturing value added.[8]

FIGURE 1: Net U.S. Exports in Advanced Industries ($ Billions)



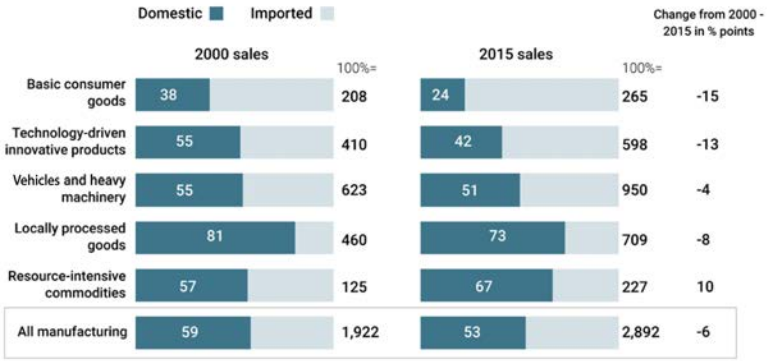
[5] IBISWorld. (2017). [Relevant industry reports]. Retrieved from IBISWorld database.

[6] McKinsey Global Institute. (2017). *Making it in America: Revitalizing U.S. manufacturing.* McKinsey and Company. Retrieved from *https://www.mckinsey.com/featured-insights/americas/making-it-in-america-revitalizing-us-manufacturing.*

[7] *Ibid.*

[8] "Biting the bullet: China sets its sights on dominating sunrise industries." (2017). *The Economist.* Retrieved from *https://www-economist-com.proxy.lib.umich.edu/news/finance-and-economics/21729442-its-record-industrial-policy-successespatchy-china-sets-its-sights.*

FIGURE 2: Change in Imported Content in U.S. Manufacturing (%,$ Billion)

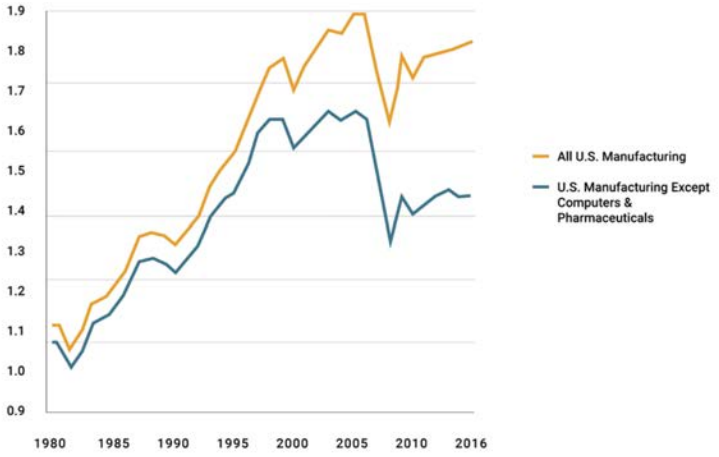


These statistics lend credence to what has become accepted wisdom—the United States is a post-industrial economy, fully globalized and integrated into the international production system. For many, manufacturing has simply followed the same path as agriculture, becoming a smaller proportion of GDP and providing fewer jobs, while national specialization moves to higher value activities. But manufacturing, especially but not exclusively, high-technology product manufacturing, is essential to national security. Manufacturing at scale is intricately linked to the ability to innovate next-generation products, yet domestic manufacturing is not the national priority it should be.

On one hand, it has become common wisdom that "manufacturing is done in China." Kai-Fu Lee, a former senior Google executive, who now runs a venture capital fund and accelerator in Beijing, put it this way: "Innovation moves faster here."[9] On the other, it is increasingly clear that globalization, mostly driven by U.S. manufacturers moving production to low-wage countries in Asia, has had significant detrimental effects on the U.S. economy. **The loss of Industrial Commons means that not only are an increasing number of advanced technologies manufactured abroad but also that the United States cannot manufacture many of them.** Skills have been lost, supply chains nearly eliminated.

[9] "The next wave: China's audacious and inventive new generation of entrepreneurs." (2017). *The Economist.* Retrieved from *https://www-economist-com.proxy.lib.umich.edu/briefing/2017/09/23/chinas-audacious-and-inventive-new-generation-of-entrepreneurs.*

FIGURE 3: Change in Manufacturing Value Added



Moving Production Offshore

Much of the initial offshoring stampede was led by consumer electronics in the 1960s after the invention of transistors, widespread use of standard shipping containers, and low-cost assembly workers in Asia lowered the cost and expanded the market for consumer radios and televisions. Offshoring accelerated significantly after China joined the World Trade Organization in 2001 and as the capabilities of Asian producers increased, leading to U.S. firms contracting design and, ultimately, product development. By abdicating production, U.S. firms lost the ability to innovate and, in many cases became nothing more than brand names—think Sylvania, Magnavox. By the new millennia, virtually all consumer electronics were designed and made in Asia, along with personal computers and laptops. As would be expected, production of almost all the components shifted to Asia, too, despite serious concern by both industry and government in the late 1980s and early 1990s over the urgency of maintaining domestic production in areas such as dynamic random access memory (DRAM).

By the time new consumer electronic devices emerged, such as the iPod and later smart phones, domestic manufacturing was impossible because all the components were manufactured in Asia, despite the research to create these components in the first place all done here (*see* Figure 4). Research funded by the Department of Defense (DoD), the National Science Foundation (NSF), the National Institutes of Health (NIH), the Department of Energy (DoE), and the National Institute of Standards and Technology (NIST) contributed to the breakthrough technologies of magnetic storage drives, lithium-ion batteries, and the liquid crystal display, which came together in the development of MP3 devices and later in iPods and iPhones. The device itself is innovative, but it built upon a broad platform of component technologies, each derived from fundamental studies in physical science, mathematics, and engineering.[10]

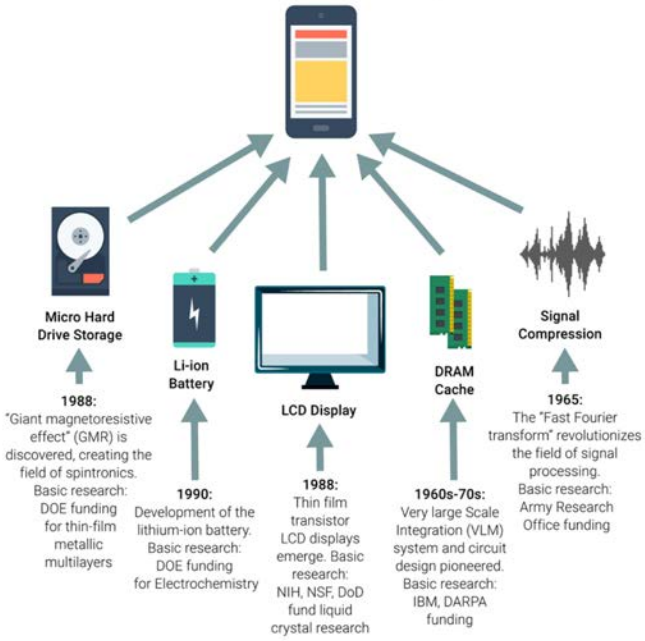
The ramifications of this lost production base have become profound. For instance, the leading disruptive force in the global economy has been mobile communications. The United States invented cellular communication technology and in the early years, companies like Motorola manufactured phones in this country. Although Apple led the shift to smart phones beginning in 2007, no iPhones were ever manufactured here. By then, all the inputs to the iPhone—display, memory, communication chips, etc.—were manufactured in Asia. Even sophisticated application-specific integrated circuits (ASICs) were made in Asian, primarily Taiwanese, semiconductor foundries. Successive generations of iPhones have followed the same pattern, in

[10] Domestic Policy Council. (2006). *American competitiveness initiative: Leading the world in innovation.* Office of Science and Technology Policy. Retrieved from *https://files.eric.ed.gov/fulltext/ED503266.pdf.*

many cases with Apple providing assistance to their Asian suppliers to ensure access to sufficient production equipment and continue to raise their manufacturing capabilities. The results have been stellar for Apple profits, share price, and iPhone consumers, but the United States has no foothold in actually making the single most important product segment of the current era.[11] Even Android smartphones, some designed by Google and other American firms, are not, and cannot, be made in the United States.

Flat panel displays are another broad category of electronics that cannot be manufactured in this country despite their ubiquity. Again, the technologies that enable most flat panel displays were invented by U.S. companies and universities. Few, if any, factories for LCD and LED large diameter flat panel displays were ever opened in the United States.[12] **Without that production experience, U.S. companies have been unable to commercialize the next generation of flexible displays, despite significant R&D investments by the U.S. military.**[13]

FIGURE 4: Example of Domestic Research Results Moving Offshore



At least part of the explanation for the shift of semiconductor and electronic production to Asia is found in the early days of the semiconductor industry. At the outset, American companies such as Intel, AMD, Texas Instruments, and Motorola controlled the entire value chain, from design through manufacturing and packaging of semiconductors. Initially, packaging was a labor-intensive process. Microchips are packaged in plastic or ceramics with pins that fit into circuit boards. Wiring from the chip to the pins was a manual process, with workers using microscopes to attach the wire leads. Low-cost labor in Asia, initially Taiwan, Singapore, and Malaysia, was essential to limit overall production costs. Once packaging moved to Asia, the expertise in packaging technology moved near the factories, and the growth of Asian

[11] Half of all iPhones are assembled by Foxconn in Zhengzhou, China at a factory that employs 350,000 during peak production. Barboza, D. (2016, December 29). "How China built 'iPhone city' with billions in perks for Apple's partner." *The New York Times.* Retrieved from *https://www.nytimes.com/2016/12/29/technology/apple-iphone-china-foxconn.html.*

[12] There are currently two U.S.-based producers of OLED micro displays, Kopin in Westborough, Massachusetts and eMagin in Bellevue, Washington.

[13] The Flexible Electronics and Display Center established by the U.S. Army at Arizona State University in 2004 includes multiple foreign partners such as Sharp, Auo, and LG.

foundries made sense to be near the packaging experts. And once the total semiconductor value chain was mostly in Asia—Intel, GLOBALFOUNDRIES, Samsung, Micron Technologies, and NXP are among the exceptions with semiconductor fabrication facilities (fabs) in the United States—it made sense for major users of semiconductors such as consumer electronics and computers to locate factories in Asia, too.

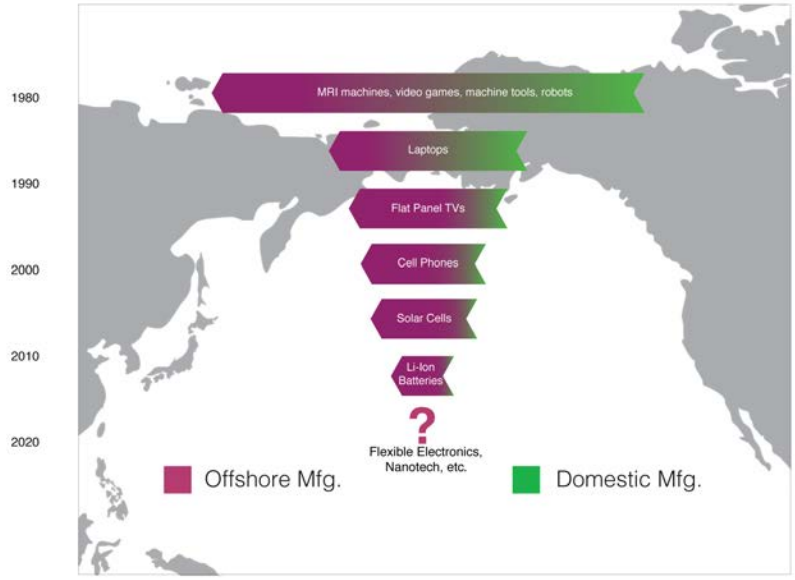
The United States is no longer where companies build new fabs. In 2011, of 27 high-volume fabs built worldwide, only one was in this country; 18 were in China and 4 in Taiwan. In 2018, 20 new fab projects had been announced in China, with total investment exceeding $10 billion.[14] Meanwhile, the total numberof fabs in the United States was projected to decline from 123 in 2007 to 95 by 2017. Predictably, as the industry has moved, the supply chain has gone with it. U.S. companies continue to have a majority of global market *sales* of semiconductors according to the Semiconductor Industry Association, but that share includes fabless companies, such as Nvidia and Qualcomm, that have designs manufactured in Asia by semiconductor foundries such as TSMC in Taiwan, the market leader.

The American justification for relying on Asian electronics manufacturers is that these are high-cost, low-margin links in the value chain; U.S. firms capture the bulk of profits. While true at the moment, at least for some companies, this same logic began the offshoring of consumer electronics that led to the loss of the entire industry. If U.S. companies are dependent on foreign producers, ultimately their ability to innovate and meet rapid product cycles is likely to be infringed. In fact, in 2018, shortages of electronic components—multilayered ceramic chip capacitors, resistors, semiconductors, graphics cards—are growing as new markets and applications create surges in demand that mostly Asian manufacturers are unable to meet.[15] As data capture and processing becomes pervasive in both products and processes, the United States will face ever-increasing dependence on foreign manufacturers across even more economic sectors. Figure 5 illustrates how **this process of shifting production of new technologies offshore not only continues but has accelerated.** By not manufacturing high-technology products, the nation loses the ability to innovate next-generation products, loses the opportunity to create manufacturing jobs and national wealth, and increases dependence on foreign sources for national security.

[14] Tseng, C., and Tracy, D. (2017). "Fab investment surge in China." *SEMI*. Retrieved from *http://www.semi.org/en/fabinvestment-surge-china-0*.

[15] McKeefry, H.L. (April 20, 2018). "Component shortages define first half of 2018 . . . and beyond." *EBN*. Retrieved from *https://www.ebnonline.com/author.asp?section_id=3219&doc_id=283376*.

FIGURE 5: Invent Here, Maufacture There - And Losing Faster
(Transition Time to Offshore Manufacturing)



Potential Impacts on Emerging Industries

An obvious source of concern is automobiles. Electronics are projected to comprise half the value of automobiles in 2030, as the sensors and processors needed for autonomous vehicles (AVs) multiply (Figure 6).[16] Software development and R&D for AVs has clearly been a priority for automakers. Toyota, for example, has recently opened a research center in Silicon Valley and started software companies in Japan and the United States.[17] Ford has a Smart Mobility unit that has acquired start-ups in software and cloud computing, and has started a new "Ford X" incubator. Ford is also An obvious source of concern is automobiles. increasing spending on electric vehicles, with Electronics are projected to comprise half the plans to launch 40 new battery and hybrid value of automobiles in 2030, as the sensors models by 2022. Several automakers have and processors needed for autonomous contracted with Nvidia (fabless), historically a leader in graphics processing units, for the processors needed for vehicle autonomy. Based on existing production capacity, the bulk of these electronic devices may be designed and engineered in this country, but most will be made in Asia. An exception is lidar supplier Velodyne, which opened a new factory in California in 2017 to manufacture its flagship lidar sensors.[18] Velodyne entered the lidar business in 2005 after participating in an autonomous vehicle competition by the Defense Advanced Research Projects Agency (DARPA). Its sensors are used in U.S. military vehicles.[19]

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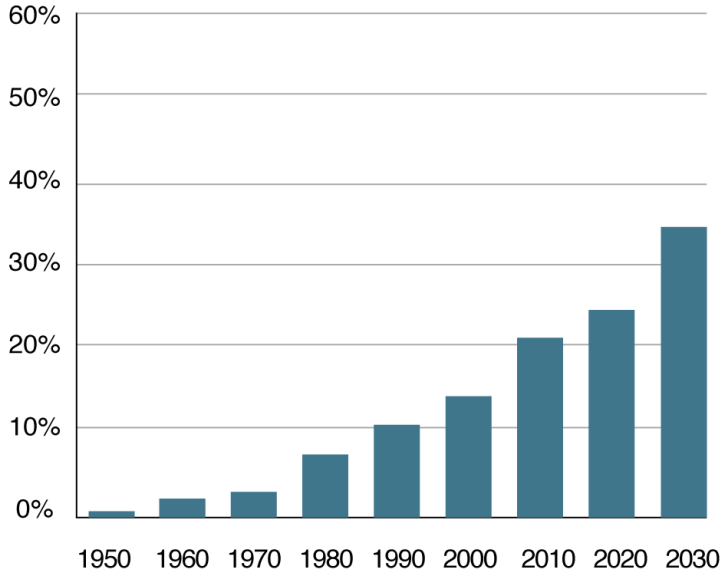
[16] "Automotive electronics cost as a percentage of total car cost worldwide from 1950 to 2030." *Statista* (2013). Retrieved from *https://www.statista.com/statistics/277931/automotive-electronics-cost-as-a-share-of-total-car-cost-worldwide/*.

[17] Buckland, K., and Sano, N. (2018, February 5). "Toyota's way changed the world's factories. now the retool." *Automotive News Canada.* Retrieved from *http://canada.autonews.com/article/20180205/CANADA01/302059902/toyotas-way-changed-the-worlds-factories.-now-the-retool.*

[18] Krok, A. (January 2, 2018). "Velodyne just made self-driving cars a bit less expensive." *Roadshow.* Retrieved from *https://www.cnet.com/roadshow/news/velodyne-just-made-self-driving-cars-a-bit-less-expensive-hopefully/*.

[19] Mozur, P., and Perlez, J. (April 7, 2017). "China tech investment flying under the radar, Pentagon warns." *The New York Times.* Retrieved from *https://www.nytimes.com/2017/04/07/business/china-defense-start-ups-pentagon-technology.html.*

FIGURE 6: Automotive Electronics Percentage of Total Vehicle Cost



The emergence of AVs and the shift to electric drivetrains will have additional impacts on U.S. manufacturing where the transportation sector comprises 15–20 percent of manufacturing employment. For instance, under the current North American Free Trade Agreement (NAFTA) 62.5 percent of the net cost of a vehicle must originate in North America. Current U.S. proposals call for 75 percent of electric or AV nine years. Experts are skeptical that nine years will be sufficient to build sufficient electronics production capacity to meet that mandate.[20]

A shift to electric vehicles may further complicate domestic content objectives. According to some estimates, electric drivetrains, including batteries, require 40 percent less manufacturing labor than mechanical drivetrains that require internal combustion engines, transmissions, exhausts, and cooling systems.[21] Different skills will be needed, while at the same time, production is likely to be consolidated into fewer factories. Without growth in domestic production of batteries, motors, magnets, electrical harnesses, and other electric vehicle components, imports will magnify the adverse impact on the domestic industry.

Production of all of these components and systems has grown rapidly in China because of the demand created by the government mandate to have 20 percent of vehicles sold by 2025 to use alternative fuel. Historically, the United States has used defense procurement to accelerate industrial development. Examples include aircraft, computers, semiconductors, robotics, and information networks. Leveraging defense procurement in emerging industries would promote early adoption, support pilot production, and help to re-establish the Industrial Commons needed for subsequent commercial-scale manufacturing.

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[20] Carey, N. (May 14, 2018). "NAFTA math may not add up to more U.S. auto jobs." Reuters. Retrieved from *https://www.reuters.com/article/us-trade-nafta-autos/nafta-math-may-not-add-up-to-more-u-s-auto-jobs-idUSKCN1IF0CP.*

[21] Frost, L., and Taylor, E. (September 11, 2017). "Carmakers face electric reality as combustion engine outlook dims." Reuters. Retrieved from *https://www.reuters.com/article/us-autoshow-frankfurt-electrics/carmakers-face-electric-reality-as-combustion-engine-outlook-dims-idUSKCN1BN00X.*

None of these issues in semiconductors and electronics are new, having reached the highest levels of government in the past. For instance, in 2005 the Defense Science Board (DSB) Task Force on High Performance Microchip Supply[22] outlined the potential consequences of "a profound restructuring" of the electronics industry caused by offshore outsourcing, the rise of increasingly competitive government-subsidized foreign producers, and substantial declines in federal support for basic R&D. The Department of Defense (DoD) did not adopt DSB's recommendations. In 2012, the Senate Armed Services Committee released the results of its investigation into electronic parts intended for weapons systems. **It found 1,800 cases of suspected counterfeit parts involving more than 1 million parts for use in the most important military systems; 84,000 suspect counterfeit electronic parts were supplied by one Chinese company.**[23] Additional concern was addressed by the Government Accountability Office (GAO) in 2015 in their review of trusted defense microelectronics. GAO found that access to leading-edge microelectronics faced challenges due to supply chain globalization, production costs, and market trends, and that future access and capabilities are uncertain.[24] Finally, a January 2017 report by the President's Council of Advisers on Science and Technology[25] emphasized the importance of a robust domestic semiconductor industry for both national security and overall national innovation. It also identified the threat posed by aggressive Chinese industrial policies in this industry and the need, therefore, for the U.S. industry to maintain its lead through R&D and continued innovation. Oddly, although the report noted that the share of global fabrication capacity in the United States fell to about 13 percent in 2015, compared to 30 percent in 1990, it did not recommend any steps to encourage locating new fabs here. Even the best design and engineering of microchips is at risk without assured access to manufacturing. A few more reports are not going to turn the tide.

U.S. manufacturing issues created by the loss of Industrial Commons are not limited to electronics. **Foundational manufacturing capabilities have been significantly reduced or lost entirely as production in multiple industries has moved abroad.** Another prime example is machine tools and other production equipment. The United States once had a large, diverse machine tool industry with thriving clusters in Cincinnati and elsewhere. Foreign competition intensified in the 1980s as producers from Germany, Japan, and S. Korea built U.S. market share. In 1982 imports were only 26 percent of domestic consumption, but reached 64 percent in 2002 and 63 percent in 2012 (Figure 7). Currently, only one U.S.-owned machine tool company, Haas, is among the top 15 in revenue. A combination of foreign companies building U.S. factories and changes in technology have reduced the import share to roughly 50 percent in recent years, but themanufacturing knowledge base embodied in the industry has yet to recover.[26]

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[22] Defense Science Board. (2005). *High performance microchip supply.* Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. Retrieved from *https://www.acq.osd.mil/dsb/reports/2000s/ADA435563.pdf.*

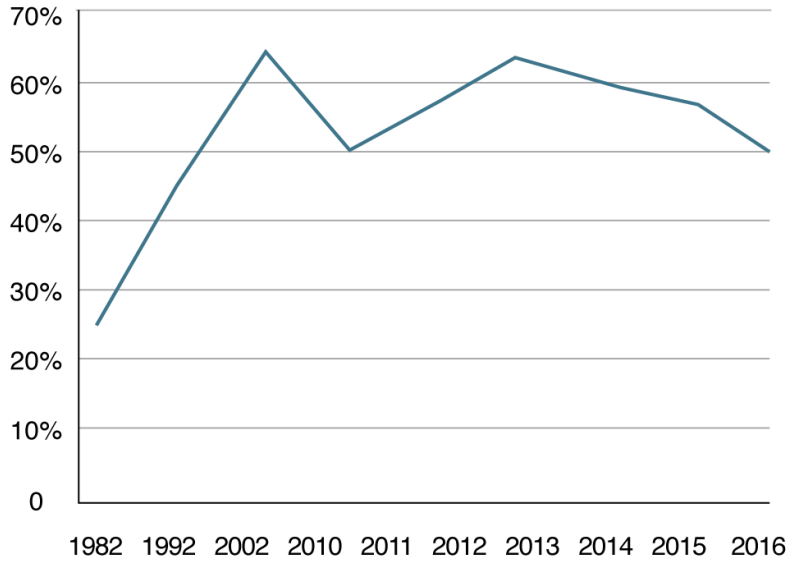
[23] Senate Armed Services Committee. (2012). Senate Armed Services Committee Releases Report on Counterfeit Electronic Parts. Retrieved from *https://www.armed-services.senate.gov/press-releases/senate-armed-services-committee-releases-report-on-counterfeit-electronic-parts.*

[24] U.S. Government Accountability Office. (2015). "Trusted Defense Microelectronics: Future Access and Capabilities Are Uncertain." Retrieved from *https://www.gao.gov/products/GAO-16-185T.*

[25] President's Council of Advisors on Science and Technology. (2017). *Ensuring Long-Term U.S. Leadership in Semiconductors.* Executive Office of the President. Retrieved from *https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_ensuring_long-term_us_leadership_in_semiconductors.pdf.*

[26] Unpublished data from The Association for Manufacturing Technology, based on census data.

FIGURE 7: Import Penetration in the U.S. Machine Tool Market



Another foundational manufacturing capability is tool and die making. In 2012, the Congressional Research Service stated that the U.S. tool and die industry is in a precarious state, largely due to offshoring. As major manufacturing industries have shifted production offshore, the tool and die industry endured a disproportionate loss of jobs and companies. Between 1998 and 2012 over a third of U.S. tool, die, and mold makers closed and employment halved. Even then, the average age of a skilled toolmaker was 52, presaging a skill shortage being felt today.[27] Metal additive manufacturing could have a significant impact in reversing the negative trends in the tool and die industry, a critical foundational capability that calls for a national strategy and significant investment.

Even industries in which the United States has had a global leadership position, such as medical devices and pharmaceuticals, are now dependent on Asian producers for many of their products. In pharmaceuticals, more than 80 percent of the active ingredients are imported, mostly from China and India. Generic drugs comprise more than 85 percent of the U.S. market, but only 10 percent are manufactured domestically.[28] Other medical supplies, including basics such as intravenous solutions, syringes, surgical masks, and respirators are imported and frequently in short supply.[29] In medical devices, China provides about 12 percent of total U.S. imports, including orthopedics, defibrillators, pacemakers, and magnetic resonance imaging scanners.[30]

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[27] Canis, B. (2012). "The tool and die industry: Contribution to U.S. manufacturing and federal policy considerations." Congressional Research Service. Retrieved from *http://www.ntma.org/uploads/general/Tool-and-Die-Industry.pdf.*

[28] Koons, C. (April 11, 2018). "Why we may lose generic drugs." *Bloomberg.* Retrieved from *https://www.bloomberg.com/news/articles/2018-04-11/are-drug-prices-too-low.*

[29] According to federal data, only 5 percent of the more than 230 million surgical masks and 30 percent of the more than 20 million respirators bought by American health care each year are made in the United States. McKenna, M. (2018). "Medicine's long, thin supply chain." *Wired.* Retrieved from *https://www.wired.com/story/medicines-long-thin-supply-chain/.*

[30] Kaplan, S., and Thomas, K. (April 6, 2018). "Why Trump's tariffs could raise the cost of a hip replacement." *The New York Times.* Retrieved from *https://www.nytimes.com/2018/04/06/health/trump-tariffs-china-devices-drugs.html.*

Despite multiple reports raising alarms for years, there is little evidence of improvement. The simple reason is profit maximization by the private sector and a lack of a comprehensive, long-term national strategy by the public sector. To a great extent, this lost Industrial Commons is a consequence of U.S. corporate strategy to maximize profits by inventing here and making there. Economic conditions and financial incentives made this an effective strategy, and the positive financial results have outweighed any doubts or concerns for long-term national security or economic health. U.S. government policy, reliant on the free market principles of comparative advantage, has largely been supportive of offshoring production, turning a blind eye to the negative impacts on defense production and the long-term detrimental effects on the nation's Industrial Commons. Now, the consequences of moving production capacity and know-how offshore has forced a new strategy among many U.S. manufacturers and an accepted norm among public officials: *invent there, manufacture there.* The negative and dangerous ramifications of this trend cannot be overstated.

Short Time Horizons and Shareholder Value *

Despite warnings about loss of manufacturing competitiveness going back to the 1980s, U.S. manufacturing has continued to shrink as a share of GDP, has had worsening trade balance in advanced technologies, and has become more dependent on foreign sources for critical inputs. The overwhelming conclusion is that market forces, specifically financial market forces, drive the managers of U.S. manufacturers to make decisions that have proven to be harmful to national interests. **These same forces are not evident in other advanced nations, such as Germany and Japan, that have maintained strong manufacturing sectors.**

Public corporations in the United States are frequently criticized for focusing on quarterly profits and changes to their stock price. This focus is partially driven by rapid turnover in stock ownership: **the average time investors hold a stock fell from eight years in the 1960s to only four months by 2012.** Further, senior management compensation typically combines salary and stock options, helping to drive decisions that will benefit shareholders. Ostensibly intended to maximize the value of the business for the owners of the business, using stock price as a proxy for business value drives short-term decisions. For manufacturers, over-emphasis on minimizing production costs results in offshoring of production and constant pressure on suppliers to lower costs; treating research as an expense to be avoided rather than a long-term investment reduces R&D spending; and using retained earnings (and tax windfalls) for stock buybacks rather than productive investments compromises long-term competitiveness.

This focus on shareholder value, now considered a cornerstone of American capitalism, is a relatively recent phenomenon, driven by policy changes in the 1980s. First, prior to 1982 antitrust standards restricted mergers, but antitrust guidelines were relaxed so that a large market share of a combined entity would not guarantee that a merger would be blocked. Second, the U.S. Supreme Court ruled in 1982 that state laws against hostile takeovers were unconstitutional because they limited interstate commerce. This change led to a rapid increase in hostile takeovers, from one in 1980 to more than 100 between 1984 and 1988. Third, tax reform in 1981 encouraged defined contribution retirement plans—termed 401(k) plans after the section in the legislation—which greatly increased the number of people owning stock, mostly through mutual funds. In 1982, mutual funds had $135 billion in assets; by 2017, assets totaled nearly $19 trillion. Mutual funds are now the largest owners of corporate stock, sometimes holding more than 10 percent of individual companies.

These changes caused and, over time, reinforced shareholder value as the primary touchstone for managers of public corporations. Yet, according to Gallup, only 52 percent of Americans own stock. **Foreign firms and U.S. private firms do not face the same pressure to maximize stock prices, and by many accounts, are more willing to make long-term investments and to consider the interests of all stakeholders when making management decisions.** The prevalence of so-called stakeholder capitalism in Germany, for example, is a significant reason that the German manufacturing sector remains more than 20 percent of its GDP.

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*More detail can be found in *The Vanishing Corporation* by Gerald Davis (2016) and *The Shareholder Value Myth: How Putting Shareholders First Harms Investors, Corporations, and the Public,* by Lynn Stout (2012).

"Large-scale innovation has become an engine for China's economic development." Matt Tsie, GM Executive Vice President and GM China President, May 2017 [31]

The weak state of the U.S. Industrial Commons has had detrimental impacts on the entire national innovation ecosystem. As more production of advanced technologies has moved abroad, more research and product development has moved with it due to the close ties between product and process technologies. Studies have shown that manufacturers are twice as productive at R&D when that work is collocated with a factory. Yet, U.S. manufacturers continue to outsource. Since2000, more than 70,000 manufacturing plants have closed or moved offshore, threatening the nation's innovation ecosystem. The ramifications can be seen not only in shifts in R&D spending by manufacturers, but also in the ability of U.S. innovators to make new products. **Because the nation is dependent on its ability to innovate, cracks in the system bode ill for long-term national prosperity as high-technology manufacturing is increasingly offshored.**

R&D Spending by Manufacturers

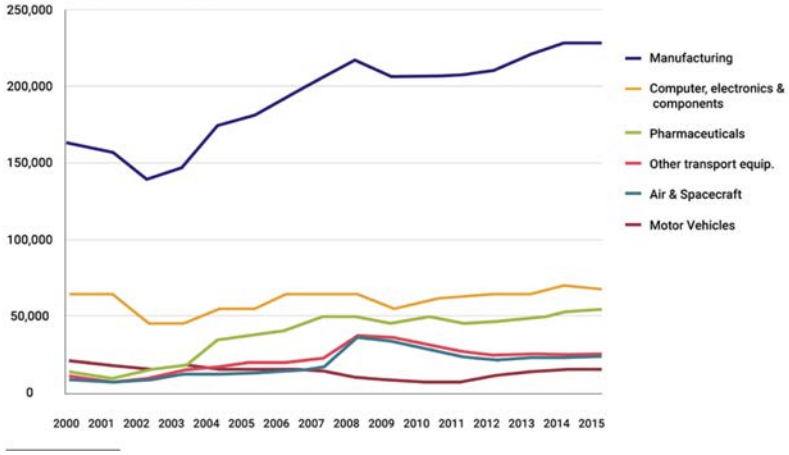
Recent years have witnessed a noticeable shift in R&D spending by U.S. manufacturers. Historically, manufacturing companies have been the largest corporate R&D spenders, driven by the need for new products, incorporating new technologies into existing products, and devising new, more efficient processes to make products. The share of R&D spending by manufacturers has been falling in the United States. In 1990 manufacturers spent more than 83 percent of total private sector R&D spending in the country; this fell to less than 60 percent in 2002 before recovering to 66 percent in 2015.[32] Most of the growth in recent years is attributable to the pharmaceutical industry, with other advanced manufacturing industries either declining or stagnating (Figure 8). **Perhaps more worrying, the focus of R&D spending, at least among publicly traded manufacturers, has steadily shifted toward development, especially incremental product development.** A 2007 study found that just 6 percent of companies published research in scientific journals, down nearly two-thirds since 1980. Largely due to pressure from investors, corporations spend less on basic science and have closed broad-based corporate research labs.[33]

[31] "GM China science lab key to future global developments." (May 23, 2017). *The Newswheel.* Retrieved from *http://thenewswheel.com/gm-china-science-lab-key-to-future-global-developments/.*

[32] "ANBERD: business enterprise R&D broken down by industry." (2017). *OECD.Stat.* Retrieved from *http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD_REV4.*

[33] Matthews, C. (December 21, 2015). "The death of American research and development." *Fortune.* Retrieved from *http://fortune.com/2015/12/21/death-american-research-and-development/.*

FIGURE 8: U.S. R & D Spending in Advanced Manufacturing Industries (Millions Constant 2010 $)



A number of factors have changed this dynamic in the United States. First, as more production moves offshore, the locus of both product and process development moves with it. There are a few exceptions, such as Apple, that maintain control of product design and the processes used by suppliers to make those designs, but in many cases, the expertise gained by producing builds the expertise needed for new product design and development. A 2009 survey of U.S. semiconductor producers concluded that process R&D requires proximity to manufacturing operations.[34] In the aerospace industry, the trend toward increased outsourcing of parts and systems is seen as diminishing the long-term prospects for U.S. business jet manufacturers. **Industry representatives recognize that many of the best ideas for manufacturing innovation come from the factory floor.**[35] **Experience demonstrates in multiple industries that proximity to manufacturing fuels innovations in both products and processes.**

A recent survey of 369 manufacturers reveals the main benefits of moving R&D to China (Figure 9).[36] Most of the top reasons are directly related to the strength of China's Industrial Commons.[35] **U.S. companies have been most aggressive in moving R&D to China in the last decade.** Figure 10 illustrates both the growth in foreign companies' R&D spending in China and the predominance of U.S. companies compared to other major countries.[35] Over 40 percent of all foreign R&D investments in China are by U.S. corporations.

[34] Dewey and LeBoeuf. (2009). *Maintaining America's competitive edge: Government policies affecting semiconductor industry R&D and manufacturing activity.* Semiconductor Industry Association. Retrieved from *https://www.semiconductors.org/document_library_and_resources/tax/maintaining_america_s_competitive_edge_government_policies_affecting_semiconductor_industry_r_d_and_manufacturing_activities/*.

[35] U.S. International Trade Commission. (2012). *Business jet aircraft industry: Structure and factors affecting competitiveness.* Retrieved from *https://www.usitc.gov/publications/332/pub4314.pdf.*

[36] "R&D and innovation spend increasingly moving to China." *Consultancy.UK.* (November 17, 2015). Retrieved from *https://www.consultancy.uk/news/2944/rd-and-innovation-spend-increasingly-moving-to-china.*

FIGURE 9: Factors driving manufacturing R&D to China

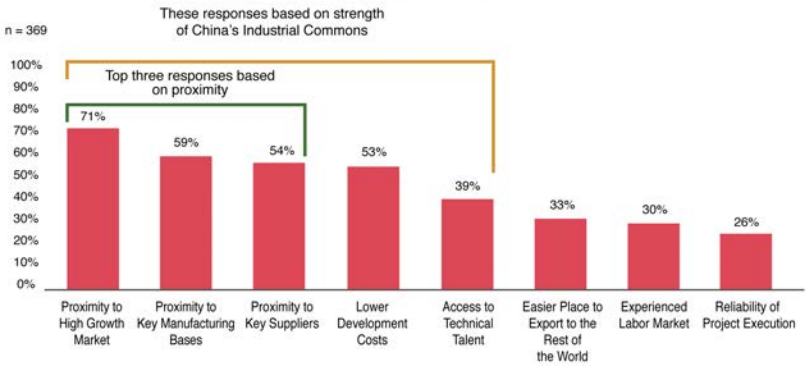
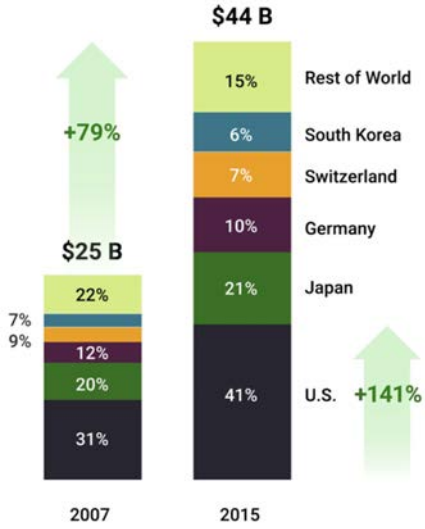


FIGURE 10: Foreign R&D Spending in China



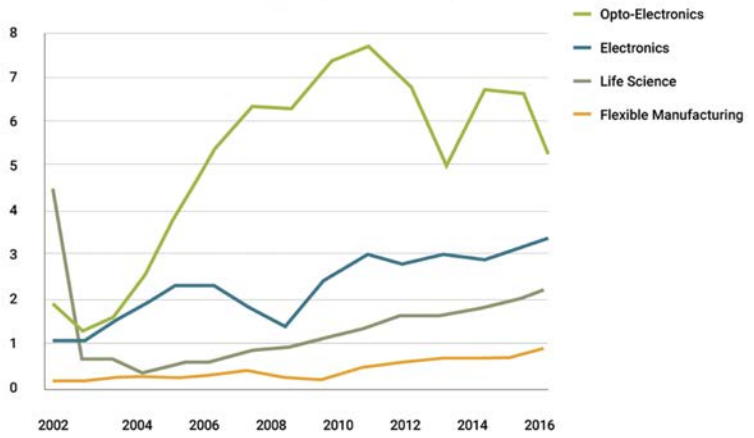
It is important to note that China has an explicit policy to attract foreign R&D centers with economic incentives and to recruit both expatriate Chinese and foreign scientists. The Thousand Talents program was launched in China in 2008 to attract academics to return to China. Using appeals to patriotism, financial incentives, and better career prospects, China has successfully attracted expatriate scientists with experience in defense research. So many scientists have been recruited back to China from Los Alamos National Laboratory that they have a moniker, "the Los Alamos club."[37]

A second factor reducing R&D investment by U.S. manufacturers is the growth of Chinese imports in advanced technology industries (Figure 11). Research in 2015

[37] Chen, S. (March 29, 2017). "America's hidden role in Chinese weapons research." *South China Morning Post.* Retrieved from *http://www.scmp.com/news/china/diplomacy-defence/article/2082738/americas-hidden-role-chinese-weapons-research.*

found that increases in import competition from China tend to reduce R&D and other forward-looking investments.[38]

FIGURE 11: Advanced Technology Imports from China ($ Billions)



Third, **management decisions to decentralize R&D, moving it to individual business units for the perceived advantage of being closer to the customer, often have the perverse effect of losing long-term strategic perspective.** Instead of providing long-term competitive advantage, R&D becomes just another cost center to be minimized.[39]

Finally, the availability of foreign research and engineering talent has grown substantially in recent years. **For some companies, moving R&D offshore is the high-skilled equivalent of moving production offshore for low-cost factory labor.** Controlling R&D costs is especially critical at a time when R&D productivity has fallen sharply. Between the 1960s and 2000s, research productivity fell by a factor of eight.[40] As more researchers are required for a given objective, and the number and quality of foreign researchers increases, cost-conscious American firms are likely to continue to raise research spending abroad.

Recent data, as well as corporate announcements, illustrate changes in manufacturing R&D. The largest R&D spenders among manufacturers in 2017 were in the computer/electronics, pharmaceutical, and automotive sectors. Intel, which spent nearly $13 billion on R&D, was the only computer/electronics firms on the list that actually manufactures in the United States. Others, such as Apple and Cisco, spending $10 billion and $6.3 billion respectively on R&D, use Asian contract manufacturers and have no domestic production.[41] All have significant research centers abroad.

A few examples of major U.S. firms conducting R&D offshore include:

- Applied Materials, the world's largest supplier of semiconductor manufacturing equipment, built its largest research laboratory in Xi'an, China because researchers need to be close to the factories using the equipment. Government in-

[38] Arora, A., Belenzon, S., and Patacconi, A. (2015). *Killing the Golden Goose? The Decline of Science in Corporate R&D.* NBER Working Paper 20902. Retrieved from *http://www.nber.org/papers/w20902.*

[39] Knott, A.M. (2017). "The real reasons companies are so focused on the short term." *Harvard Business Review.* Retrieved from *https://hbr.org/2017/12/the-real-reasons-companies-are-so-focused-on-the-short-term.*

[40] The trend crosses multiple industries. For example, the number of researchers needed to double chip density in accordance with Moore's law is 18 times the number needed in the 1970s. Bloom, N.A., Jones, C.I., Van Reenen, J., and Webb, M. (2017). *Are Ideas Getting Harder to Find?* Stanford Business School Working Paper No. 3592. Retrieved from *https://www.gsb.stanford.edu/faculty-research/working-papers/are-ideas-getting-harder-find.*

[41] *Bloomberg;* "Capital IQ." (2017). "Ranking of the 20 companies with the highest spending on research and development in 2017 (in billion U.S. dollars)." *Statista.* Retrieved from *https://www.statista.com/statistics/265645/ranking-of-the-20-companies-with-the-highest-spending-on-research-and-development/.*

centives to choose this location included a 75-year, discounted lease and 25 percent of operating costs paid for five years.[42]

- General Motors opened a large research center in Shanghai which serves as its center of global electric vehicle research because China is the world's largest market for electric vehicles. In 2017, China manufactured nearly 800,000 electric vehicles.[43]
- Intel has a large research center in Beijing for semiconductors and server networks because China is the biggest market for desktop computers and has the most Internet users.[44]
- Apple announced two new R&D centers, in Shanghai and Suzhou, in 2017, joining centers in Beijing and Shenzhen. Apple committed to spend over $500 million on research in China focused on working with local partners to develop new technologies. China is Apple's largest overseas market and home to almost all of its product manufacturing.[45]

Relative decline in R&D by U.S. manufacturers, along with a greater emphasis on development, means that incremental innovation is the primary focus to make current products better, lighter, faster, and cheaper—all of which are essential to remain globally competitive. The federal government, on the other hand, invests mostly in long-term basic research. **American corporations rarely leverage the results of federal research to transition nascent but promising technologies into successful commercial products.** In some cases, federal R&D funding supports technologies in which there is little if any domestic industrial production; advanced batteries are an example. Correcting this disconnect in the national innovation system is essential to long-term competitiveness. For both defense and commercial innovations, federal funding of university-performed R&D is becoming more critical to the national innovation system. Yet weaknesses in this part of the national innovation system negatively impact the national wealth that should be captured from this large investment in R&D.

BREAKDOWNS IN THE U.S. INNOVATION SYSTEM

The emerging shift in strategy by U.S. multinational manufacturers from "innovate here, manufacture there" to "innovate there, manufacture there" is creating challenges for the national innovation system that may not be fully recognized. Relative decline in domestic R&D spending by manufacturers puts more emphasis on government R&D to maintain the pace of innovation needed for future national competitiveness. Unfortunately, an innovation system that relies on government funding of university research is not well suited to maximizing commercialization of products. As central as university R&D is to the national innovation system, relatively little government funded university-performed R&D is converted to national wealth through the production and sale of new products and application of new processes and methods. Technology transfer from national research laboratories is also weak. The system is not even structured to ensure that R&D results create national competitive advantage. A national strategy to nurture and leverage promising ideas has never been implemented, relying instead on market forces. From a global perspective, most R&D results from American universities are readily available to be commercialized elsewhere, but when viewed from a national perspective, the fruits of R&D have not sufficiently driven improvements to national wealth and security. Invention without production has been a consistent pattern for multiple mass market technologies in recent decades. For the sake of long-term growth and security, these shortcomings must be corrected at once.

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[42] Bradsher, K. (March 17, 2010). "China drawing high-tech research from U.S." *The New York Times.* Retrieved from *https://www.nytimes.com/2010/03/18/business/global/18research.html.*

[43] Stanway, D. (March 20, 2018). "China electric car execs call for policy support, end to protectionism." Reuters. Retrieved from *https://www.reuters.com/article/us-china-autos-electric/china-electric-car-execs-call-for-policy-support-end-to-protectionism-idUSKBN1GW0O0.*

[44] Swanson, A., and Bradsher, K. (April 30, 2010). "China drawing H–T research from U.S." *The New York Times.* Retrieved from *https://www.nytimes.com/2018/04/30/us/politics/trump-china-researchers-espionage.html.*

[45] Gartenberg, C. (March 17, 2017). "Apple is opening two more R&D centers in China." *The Verge.* Retrieved from *https://www.theverge.com/2017/3/17/14960534/apple-research-centers-china-shanghai-suzhou.*

Figure 12 illustrates the "cycle of innovation" typical for manufactured products. Basic research in science and engineering is one source of a myriad of discoveries and inventions, some of which are suitable for new product introductions, some for incremental improvements to existing products, and, of course, some that contribute to basic scientific understanding. Another equally important source of new inventions is the necessity to meet the challenges that arise from manufacturing at scale. New process technologies, quality and inspection methods, control technologies, and new products emerge from the manufacturing experience, depicted by the arrow from Manufacturing to Discoveries and Inventions. For those discoveries and inventions that could become new products and technologies, additional research—translational research—is necessary to demonstrate proof-of-concept. Typically, a prototype is built that operates under constrained laboratory conditions with sufficient functionality to file for patent protection. If the proof-of-concept is promising, a more functional prototype is developed and the design is refined for factors such as manufacturability, safety, reliability, cost-effective recyclability, and user interface. Then the production process is engineered, tested and refined in pilot production, and if successful, scaled to full manufacture of a new product or technology. Within a manufacturing company, new product sales produce the profits to fund the basic research that maintains the cycle. Within a research entity based in an academic institution or a federal laboratory, other steps are involved to move the invention into an existing company or a start-up firm created to commercialize it. How this cycle of innovation applies to university R&D is where the leakages become obvious, illustrating the shortcomings in the system, as well as opportunities to fix it.

FIGURE 12: The Cycle of Innovation

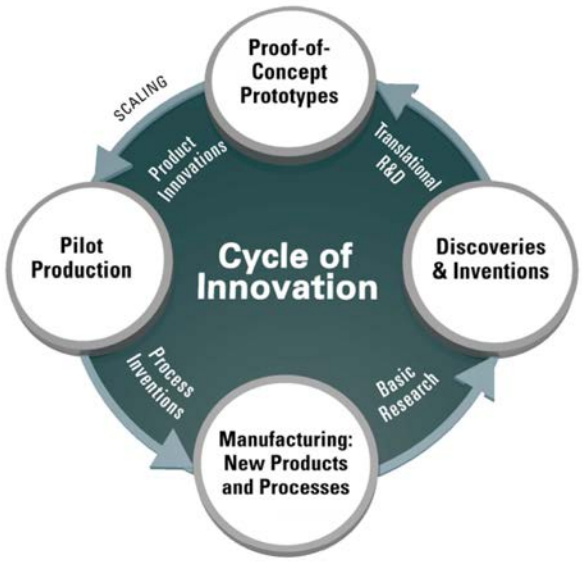
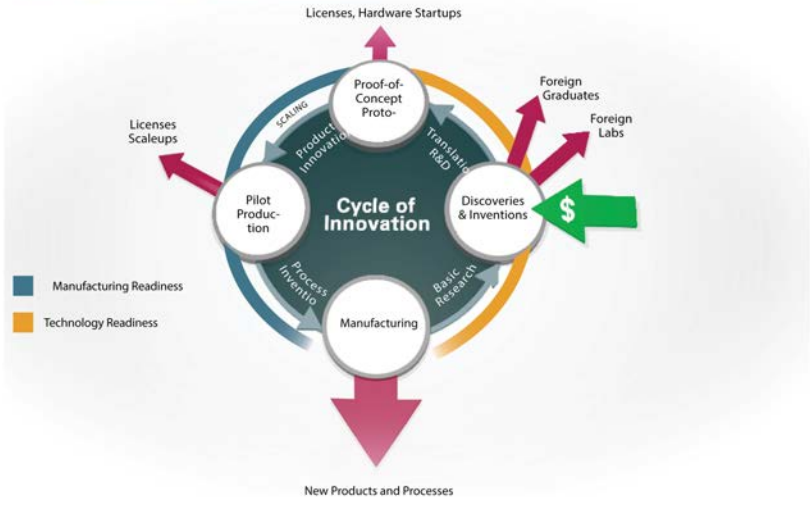


Figure 13 illustrates the same cycle of innovation, but highlights serious leakages in the U.S. innovation pipeline as it becomes more reliant on university R&D. The basic cycle is the same; however, at multiple steps along the way, either knowledge is lost, stagnates in the laboratory, or is commercialized abroad.

FIGURE 13: Gaps in the Cycle of Innovation



U.S. Federal funding is largely restricted to maturing Technology Readiness Levels (TRLs) but not Manufacturing Readiness Levels (MRLs)

First, opportunity for foreign competitors to take advantage of research outcomes is, at the moment, a fundamental part of the system. Academic research, especially in science and engineering (S&E), is dependent on foreign graduate students, predominantly from Asia.

In 1966, foreign students received 23 percent of S&E doctorates; in 2015, foreign students received 56 percent of engineering doctorates, 53 percent in mathematics and computer science, and 44 percent in physics.[46] These graduate students are the hands-on researchers in university laboratories and therefore are most intimately familiar with the work, have the knowledge needed to recreate the work, and are best prepared to help commercialize the results.

Nationality would not matter if these graduates remained in this country. International students are eligible to work in the United States for a year after graduating, a period called Optional Practical Training. Graduates in science, engineering, technology, and mathematics (STEM) can work for an additional two years. After that, they are subject to the same visa lottery system as other immigrants. Historically, work visas have allowed many to stay.[47] Many have argued that foreign S&E graduates should receive permanent resident status (green cards) along with their diplomas,[48] a reasonable argument considering that immigrants have accounted for roughly 25 percent of the recent innovation activity in the U.S. economy.[49]

The predominance of foreign students in S&E graduate programs, and the growing tendency to return to their home countries, is also tied to the loss of the Industrial Commons in the United States and the shift of manufacturing R&D abroad. According to the NSF, in 2015 the job market for S&E doctorate recipients was the lowest since 2000, 4–13 points below its most recent peak in 2006.[50] With poor job pros-

[46] National Science Foundation. (2018). *Science and Engineering Indicators 2018.* Retrieved from *https://www.nsf.gov/statistics/2018/nsb20181/.*

[47] The 2010 U.S. census found that 25 percent of the Bachelor's degree holders in STEM occupations are foreign-born, as were just under half of all Ph.D. holders.

[48] The Border Security, Economic Opportunity, and Immigration Modernization Act, S.744—113th Congress, proposed eliminating numerical limits on immigrants who had earned a doctorate degree or a graduate degree in science, technology, engineering, or mathematics with an employment offer.

[49] Kerr, W. (2007). 'The ethnic composition of U.S. inventors." Harvard Business School Working Paper 08–006. Retrieved from *https://www.hbs.edu/faculty/Pages/item.aspx?num=20233.*

[50] National Science Foundation. (2015). "What are the postgraduation trends? Science and Engineering Doctorates." Retrieved from *https://www.nsf.gov/statistics/2017/nsf17306/report/what-are-the-postgraduation-trends/job-marketscience-and-engineering.cfm.*

pects, U.S. students avoid graduate studies and foreign students return home even if they would prefer to stay.

However, foreign students are not the only source of leakage. In some cases, foreign institutions partner with American universities that are often encouraged to include foreign institutions in their research proposals. Engineering Research Centers (ERCs), funded by the NSF, have been an example, at least until recently. In other cases, foreign companies are members or participants in academic research centers. These firms may have significant presence, including manufacturing facilities, in the United States, and in some cases, may be essential participants for a center to access state of the art product and process technology. But they may also manufacture exclusively in their home countries, capturing the wealth generation and economic multiplier benefits at home. Nanotechnology, a national priority reflected in the creation of the National Nanotechnology Initiative in 2003, is a case in point.[51] The Japanese firm, Canon, established a U.S. affiliate, Canon Nanotechnologies, to partner with the NSF ERC for Nanomanufacturing Systems for Mobile Computing and Mobile Energy Technologies Display at the University of Texas. But Canon Nanotechnologies only conducts R&D; the nanotechnologies Canon licensed from the ERC are manufactured in Japan. Similar examples occur in other technologies such as displays, batteries, tissue engineering, and solar panels.

The process of funding academic research presents further opportunity for results to be captured by foreign companies. A typical faculty member receives funding from NSF and/or other federal agencies for an extended period of time to conduct basic research, often totaling several million dollars. Once a technology is proven to work even in a lab environment, the researcher will have difficulty maturing the technology further, for instance by testing prototypes in an operating environment, maturing manufacturing readiness or manufacturing at scale. After a few futile attempts to attract funding from the government or private sources, the researcher turns to (or is approached by) a foreign institute with money and facilities to establish a laboratory overseas. This happens quite regularly, with the loss of multiple promising technologies, all because the United States lacks strategy or a mechanism to fund nurturing and maturing of valuable results from the R&D that government funded in the first place.

Within the innovation cycle of university R&D, commercialization is dependent on licensing. However, interest in licensing depends on the research results demonstrating commercial feasibility through a proof-of-concept prototype, which requires translational research. **In many cases, funding for translational research is not readily available so many promising discoveries and inventions remain on the shelf or, at best, become side projects while the research team moves on to the next grant.** This lack of translational research funding is another weakness in this innovation cycle.

Assuming the invention is sufficiently proven to attract licensing interest, negotiating a license is often overly complex, time-consuming, and expensive. Although some universities have relatively simple licenses with simple fees and royalties designed for start-ups, established companies perceive the licensing process to be difficult and therefore avoid it. Consequently, to a great extent, university inventions are licensed to start-ups specifically created to commercialize the technology. The start-up culture continues to grow, encouraged by hugely successful examples of companies emerging from universities.[52] Between 1980 and 2014, nearly 5,000 companies were launched from university research.[53] By one estimate, 30 percent of the value of companies listed on the NASDAQ stems from university-based, federally funded research, primarily due to the value of the intellectual property generated by the research.[54] Yet, for manufacturing start-ups striving to commercialize hardware products, the challenges are significant, especially with a goal of building a manufacturing business in this country (*see* Investment Capital for Hardware Start-ups).

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[51] U.S. Government Publishing Office. (2003). 21st Century Nanotechnology Research and Development Act. Retrieved from *https://www.gpo.gov/fdsys/pkg/PLAW-108publ153/content-detail.html.*

[52] Google's initial public offering in 2003 returned over $330 million to Stanford University.

[53] Belz, A. (2016). "Trends in industry-university research relationships." *A Vision for the Future of Center-Based, Multidisciplinary Engineering Research.* Washington, DC: The National Academies Press. Retrieved from *https://www.nap.edu/catalog/23645/a-vision-for-the-future-of-center-based-multidisciplinary-engineering-research.*

[54] *Ibid.*

Even when hardware start-ups receive venture funding, it typically does not include the funds needed to scale production, the next step in the innovation cycle and another source of weakness. MIT's study, *Production in the Innovation Economy,* examined 150 production related hardware start-ups emerging from MIT research. The study found that these start-ups had access to sufficient skills and financing for R&D and initial product demonstration, but when the time came to scale production to commercial levels, the need for additional capital, production capabilities, and lead customers pushed many of these firms to move production abroad, usually to China.[55] Other studies have documented a slowdown in the formation of new manufacturing start-ups and continuing stagnation in their ability to scale production.[56]

China's network of suppliers, skills, and customers is strong, responsive, and easy to work with. Numerous American consultancies facilitate this process at every stage; Dragon Innovation in Boston and PCH International in San Francisco are examples. In many cases, Chinese investors provide the needed capital to make the move offshore, or to buy the U.S. startup outright. Often, these purchases provide access to advanced technologies that provide competitive advantage to the buyers that is then lost in this country.

Part of what makes Chinese production attractive is the willingness of Chinese investors to accept the risk and producers to access whatever manufacturing processes are necessary to produce the new technology, even developing new processes if needed. Except in specialized cases, for instance when a technology is defense related, neither universities nor hardware start-ups have sufficient funding to increase the manufacturability of new technologies, the Manufacturing Readiness Level (MRL). Fabricating a few prototypes is not the same as manufacturing at scale. Basic fabrication can often be demonstrated in the laboratory, but determining the detailed design attributes and the engineering architecture needed to scale to volume manufacturing requires additional research. **Raising the MRL from capability to produce in the laboratory (MRL 4) to capability to produce in a production representative environment with most of the specifications clearly defined (MRL 7) would be a boon to start-ups and other licensees and increase domestic alternatives to Chinese production.** It requires significant investment in creating pilot production facilities, which is typically too risky and expensive for venture capital investors; large multinational manufacturers tend to show interest only after higher TRLs and MRLs are achieved; and currently there is no federal S&T agency that funds the necessary translational research or invests in maturing MRLs.

Finally, the importance of the linkages between manufacturing and the research that leads to new discoveries and inventions must not be overlooked. The knowledge gained by manufacturing includes both knowledge about the production process and about the products being produced, both of which help to define questions to be tackled by research. This is the basis for the growing trend to locate research activities near the offshore factories reside, to be near the knowledge and the questions. By not manufacturing, the United States is losing ground in a range of industries-displays, energy storage, drones, solar cells, for example-that are important to national security and future commercial industries.

Investment Capital for Hardware Start-ups

The venture capital industry in the United States is the world's largest and most robust, well recognized for its critical role in the national innovation system. As important as it is, venture capital is rarely invested in manufacturing and, in fact, is ill-suited for hardware start-ups that need long-term, patient capital to ensure success.

Since 2002, both the number of deals and the amount invested by venture capital funds in manufacturing have averaged just 0.4 percent. The dollars invested exceeded 1 percent of the total (barely) only twice, in 2008 and 2009.[57] Figure 14 illustrates the distribution of venture capital investment by market sector in 2017.

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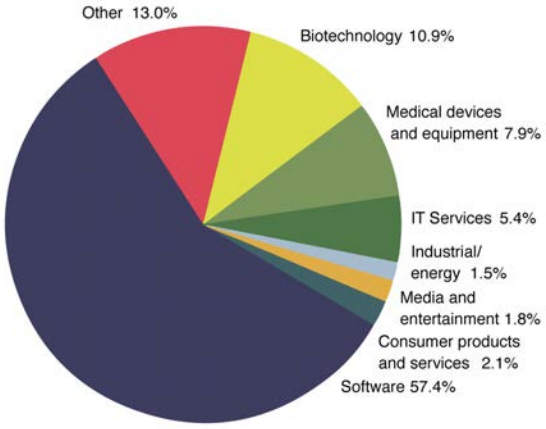
[55] Reynolds, E.B., Samel, H.M., and Lawrence, J. (2014). "Learning by building: Complementary assets and the migration of capabilities in U.S. innovative firms." In R.M. Locke and R.L. Wellhausen (eds.), *Production in the Innovation Economy.* Cambridge, MA: MIT Press.

[56] Bonvillian, W.B., and Singer, P.L. (2018). *Advanced Manufacturing: The New American Innovation Policies.* Cambridge, MA: MIT Press.

[57] Explore data at PWC, *https://www.pwc.com/us/en/industries/technology/moneytree/explorer.html#/%20type=history&category=&currentQ=Q1%202018&qRangeStart=Q1%202013&qRangeEnd=Q1%202018&chartType=bar*

FIGURE 14: U.S. Venture Capital Investments by Sector, 2017



The reasons so little venture capital is invested in manufacturing start-ups are simple: cascading risks and time. Compared to the most common alternatives in software and biotechnology, manufacturing new, unproven products confronts risks at multiple points. Will the product work as intended? Can it be manufactured profitably? Are needed suppliers available at the right cost and delivery time? Will customers buy it in sufficient quantities to justify the needed capital investment? Obviously, many of these challenges face software and biotechnology start-ups, but the investments required to rapidly scale software are much lower than hardware.[58] The operational costs to launch a software company declined by an estimated factor of 100 between 2000 and 2010. As a result, **private capital markets skewed strongly toward software: software attracts capital at a rate of roughly 7:1 compared to industrial opportunities, compared with roughly 2:1 twenty years ago.**[59]

Although venture capital has a history of funding favored industries in waves—the current wave favors artificial intelligence start-ups—a review of a few recent hardware start-ups helps to explain the relative lack of interest. According to CB Insights, the seven largest consumer hardware start-ups in recent years were Jawbone, NJoy, Juicero, Fuhu, Pebble, Zeebo, and hello. Between them, they raised nearly $1.5 billion. Four went bankrupt and three were purchased: Pebble sold to Fitbit; Fuhu, a tablet maker, sold to Mattel; and NJoy, an e-cigarette maker, was purchased by Homewood Capital.[60] At least in this consumer hardware industry segment, success has been far from assured.

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[58] Bonvillian and Singer describe why VCs are drawn to software and biotechnology in *"Innovation Orchards:" Helping Tech Start-Ups Scale,* from ITIF (2017), available at *https://itif.org/publications/2017/03/27/innovation-orchards-helping-tech-start-ups-scale.*

[59] Belz, A. (2016). "Trends in industry-university research relationships." *A Vision for the Future of Center-Based, Multidisciplinary Engineering Research.* Washington, DC: The National Academies Press. Retrieved from *https://www.nap.edu/catalog/23645/a-vision-for-the-future-of-center-based-multidisciplinary-engineering-research.*

[60] CB Insights. (2017). "The Top 9 Reasons Hardware Startups Fail." Retrieved from *https://www.cbinsights.com/research/report/hardware-startups-failure-success/.*

FIGURE 15: Foreign Participation in the U.S. Venture Capital Market, 2017

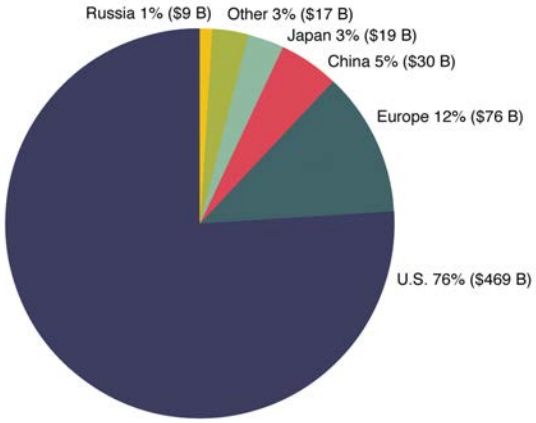
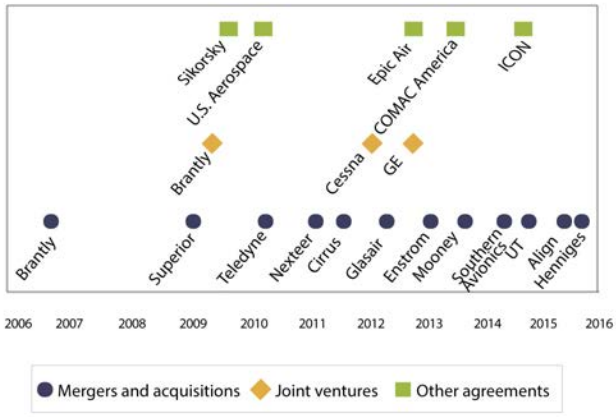


FIGURE 16: Chinese Investments in the U.S. Aerospace Industry



The U.S. venture capital market is also becoming more international, with foreign-based funds capturing a growing share of the market, reaching nearly 25 percent of the market. Figure 15 illustrates this foreign participation in 2017. Foreign investment in and purchases of U.S. start-ups has raised concerns in some sectors.[61] For example, Chinese investment in Neurala, a Boston-based artificial intelligence start-up with technology to make robots more perceptive, raised alarms in government circles, but Neurala had been unsuccessful raising government or private U.S. capital. Investments in other firms developing technologies with potential military applications, such as rocket engines, sensors for autonomous vehicles, and flexible electronics have also raised concerns among U.S. military officials.[62] The aerospace industry has been particularly attractive to Chinese investors with multiple deals

[61] Sprinkle, T. (2017) "Strings Attached." *Mechanical Engineering,* 139(05), 32–37. *http://doi.org/10.1115/1.2017-May-1.*

[62] Mozur, P. and Perlez, J. (2017, March 22). "China bets on sensitive U.S. start-ups, worrying the Pentagon." *The New York Times.* Retrieved from *https://www.nytimes.com/2017/03/22/technology/china-defense-start-ups.html.*

made in recent years (Figure 16).[63] At least partially to counter this weakness in the private venture capital market, state governments, universities, and non-profit organizations have established small angel and venture funds. Usually established as part of a state's economic development efforts, these funds have a mixed record of success, usually due to investment decisions based on political expediency rather than rigorous technological and market assessment. However, many have navigated sometimes conflicting objectives to achieve long-term success. Some of the larger public venture funds include Connecticut Innovations, Elevate Ventures (Indianapolis), Innovation Works (Pittsburgh), TMCx Innovations (Houston), TEDCO (Maryland), and Rev1 Ventures (Columbus, Ohio). These funds typically restrict funding to start-ups established in the local state or region, often as university spin-offs. Among the larger funds, they are more likely than private venture capitalists to invest in hardware, production-oriented start-ups, averaging roughly 20 percent of their portfolios.[64] Some examples include:

- The Oregon Nanoscience and Microtechnologies Institute leveraged Portland's historical strength in the semiconductor industry to create a new state-wide cluster, including gap funding (via two programs offering $75,000, then $250,000) to support nascent materials science ventures.
- The Georgia Research Alliance (GRA) has made more than $600 million in investments, providing funding to university spin-offs in phases, which can include equity investments by the GRA Venture Fund of more than $1 million.
- The Engine, started at MIT in 2016, provides affordable workspaces, access to specialized equipment, efficient business services, and patient capital to start-ups in biotechnology, robotics, manufacturing, medical devices, and energy.[65]
- SC Launch, a non-profit division of the South Carolina Research Authority, provides grants, loans, and direct investments to start-ups, along with mentoring and networking. Funding is provided through a combination of private donations and sales of state tax credits up to $6 million annually. Its portfolio includes 164 companies, roughly 40 percent of which are manufacturers.[66]

Incubators and accelerators, often with public funding support, are also an important part of the start-up landscape. Some, such as Greentown Labs in Boston, have targeted programs for hardware start-ups, working closely with the local MEP to find local manufacturers with production capabilities to partner with start-ups. Others have ties to local universities, especially engineering schools. Some include maker spaces, typically 3D printers but sometimes other CNC machine tools, that start-ups can use to perfect prototypes and address manufacturing issues. The support and infrastructure provided by incubators can help hardware start-ups make progress faster, but they still face issues in scaling production, which is often most easily done in China.

Corporate venture capital (CVC) funds are also becoming more common among large manufacturing companies. More than 1,000 CVCs were active in 2017 with the 10 most active being Google Ventures, Intel Capital, Salesforce Ventures, Qualcomm Ventures, GE Ventures, and Microsoft Ventures. Two Chinese funds, Legend Capital and Fosun RZ Capital, and two South Korean funds, K Cube Ventures and Samsung Ventures, round out the top 10.[67] Within specific sectors, such as autonomous vehicles, the CVC funds of large suppliers, including Bosch, Delphi, and Magna, have made investments and acquisitions in the full range of relevant technologies: radar, lidar, and optical sensors; artificial intelligence and data analysis software for autonomy; and connected vehicle cybersecurity.[68]

Even including the investments by public and corporate funds, hardware start-ups receive much less attention and less funding than firms in other sectors, especially relevant to the capital needed to scale production to commercial volumes. It is evident that, at least for hardware start-ups, the U.S. system of starting companies based on publicly funded research results, simply does not work. **Despite fund-**

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[63] Ohlandt, C., Morris, L., et. al. (2017). *Chinese Investment in U.S. Aviation.* Santa Monica, CA: RAND Corporation.

[64] Internal analysis conducted on data gathered from PitchBook, *https://pitchbook.com/*.

[65] Matheson, R. (October 26, 2016). "MIT launches new venture for world-changing entrepreneurs." *MIT News.* Retrieved from *https://news.mit.edu/mit-announces-the-engine-for-entrepreneurs-1026.*

[66] Interview with Jill Sorensen, Director of Entrepreneurial Programs for SCRA.

[67] CB Insights. (February 28, 2018). *The most active corporate VC firms globally.* Retrieved from *https://www.cbinsights.com/research/corporate-venture-capital-active-2014/*.

[68] *Ibid.*

raising innovations such as Kickstarter and other crowdfunding mechanisms, expecting hardware start-ups to raise seed, angel, and venture funding to perfect their product, and then raise more funds to fully commercialize the product with production in the United States is a tall order that few achieve.

Insufficient capital is available for hardware companies; in too many cases, needed production expertise and capacity are not obtainable because of the lost Industrial Commons; and inputs such as components, subassemblies, and test equipment are not available domestically. To build production capacity in the United States, the best option often is to sell to larger American manufacturers, but this option is only available if the start-up's product or technology meets a need of a larger firm. Many do not. Too frequently, the easiest option is to move production offshore, usually to China.

All of these breaks in the national innovation cycle mean that the United States is failing to capture all of the national wealth that should be created from what remains the world's largest national investment in R&D. In fact, U.S. R&D is benefiting the manufacturing sectors of competing nations. With a clear recognition of these leakages in the innovation cycle, targeted investments are necessary to fix the cycle, commensurate with the importance to future national security and economic prosperity.

TRANSFORMATIONAL MANUFACTURING TECHNOLOGIES

The emergence of new technologies is creating opportunities, perhaps even an imperative, to rebuild U.S. manufacturing competitiveness in advanced technologies. Cross-cutting technologies and advanced materials are impacting multiple industries in ways that advantage domestic production. At the same time, product and process technology shifts in specific advanced industries, including pharmaceuticals and semiconductors, are creating opportunities to leapfrog existing standard practice. Successful firms will be capable of rapidly adapting their physical and intellectual infrastructures to exploit changes in technology as manufacturing becomes faster and more responsive to changing global markets. With supportive government policies and appropriate investments, U.S. manufacturing can regain leadership, rebuild the Industrial Commons, capture all the benefits from the nation's R&D spending, and comprehensively meet national security requirements.

Smart Manufacturing

The broadest and most impactful transformative change affecting manufacturing is the application of powerful computing, networking, sensing, data analytics, machine learning, and artificial intelligence. Collectively known under various monikers—Smart Manufacturing, Industry 4.0, Industrial Internet of Things (IIOT)—**the digitalization of manufacturing is creating profound shifts in where and how production is done and participation in global value chains.** Combined with advanced materials, nanotechnology, sustainability, rapid product cycles, and other market forces, future manufacturing will be vastly different from the mass production, cost minimization strategies that have driven decisions for the past three decades. Smart manufacturing creates the opportunity to re-establish domestic production in advanced industries, providing competitive advantages from increased efficiency, security, rapid response to customer demand, and new product features incorporating sustainability and resource optimization. **Value will be derived from time to market, response to demand changes, inventory optimization, asset utilization, resources optimization, and quality improvement, rather than the simple cost minimization strategies that have driven offshore production.** The challenge for U.S. industry will be to deploy the relevant technologies quickly and effectively and to adapt business models to take advantage of these new capabilities.

Smart manufacturing encompasses a range of technologies implemented on the factory floor, in the communication networks between producers and consumers to integrate supply chains, and in all the logistics, financial, and management systems that pervade all levels of industrial production. A few of the critical technologies include:

Product development: Sophisticated computer-aided engineering tools, including optimization, design for manufacturing, material selection and certification, statis-

tical design of experiments, data analytics and virtual reality tools are increasingly used to design and develop new products to reduce product introduction failures, reduce product development costs and to meet custom market niches. Accelerating product development is the top priority, so far, for firms using 3D printing.[69] Incorporating smart technology features into products will also be important as connectivity, self awareness, and interactivity become expected by consumers.

Distributed manufacturing: Contract manufacturing using Asian contractors has become standard operating procedure in electronics and other industries, and machine shops used to make parts have always been a major part of supply chains. However, advances in production technologies, such as rapid injection molding, additive manufacturing and CNC milling (subtractive manufacturing) are expanding opportunities for local production of custom parts and final products. Companies such as Xometry, based in Maryland, ProtoLabs, based in Minnesota, and Fictiv in San Francisco offer on-demand manufacturing services based on digital part designs uploaded by customers.[70] Software Defined Manufacturing is an emerging cloud-based distributed manufacturing concept, supported by IBM and others, in which a part design is shared with a community of manufacturers who identify an optimal producer that can meet time and volume requirements.[71]

Integration of Operational Technology (OT) and Information Technology (IT): OT/IT integration is central to smart manufacturing. Multiple benefits include dramatic increases in capacity utilization, from a current average of roughly 60 to 85 percent and more. Sensors on production equipment (often retrofittable) tracking parameters such as temperature, vibration, and current load, combined with effective analysis of the resulting data, are enhancing predictive maintenance resulting in much higher machine uptime. For example, a Michigan manufacturer increased uptime 20 percent by applying sensors to monitor tool wear on the shop floor.[72] New business models are also emerging in which equipment providers use performance-based contracting to guarantee uptime, enabled because of the data generated by the sensor-laden equipment.

Edge Computing: To take advantage of the computational power of cloud computing while avoiding its inherent latency, edge computing is emerging as a an effective means to process sensor data locally for real-time production control, then, when necessary, passing batch data to the cloud for in-depth analysis. Companies such as Saguna Networks specialize in edge computing. Other firms, such as Mocana [73] and Rubicon Labs [74] (both in San Francisco), specialize in secure communications from sensors and industrial control systems to the cloud to address cybersecurity issues.

Automation and robotics: Industrial robots are experiencing rapid advances in capabilities due to improved sensors, manipulators, control systems, connectivity, and processing power. Currently, three-quarters of industrial robots are used in just four industries: transportation equipment, machinery, computers and electronics, and electrical equipment, appliances, and components. Roughly 80 percent are used in five countries: China, Germany, Japan, South Korea, and the United States, with China significantly ahead. Use of industrial robots has grown nearly 20 percent in recent years, with most of that growth in Asia.[75] However, U.S. shipments of industrial robots reached a record high in 2017 and continued strong performance through early 2018.[76] One recent innovation is collaborative robots ("cobots"), easily reprogrammable robots that work alongside production staff without being enclosed in a safety cage. Rethink Robotics, headquartered in Boston, is a leading cobot manufacturer with easy-to-train, quickly deployable robots used in a wide range of appli-

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[69] Sculpteo. (2018). *The State of 3D Printing 2017.* Retrieved from *https://www.sculpteo.com/media/ebook/State_of_3DP_2018.pdf.*

[70] *https://www.xometry.com/; https://www.protolabs.com/; https://www.fictiv.com/.*

[71] Breitgand, D. (2014). "Collaborative manufacturing as a service in the cloud." *IBM Research.* Retrieved from *https://www.ibm.com/blogs/research/2014/12/collaborative-manufacturing-as-a-service-in-the-cloud/.*

[72] Hitch, J. (March 22, 2018). "Adopt or Die: AI Leaves Manufacturing No Choice." *Industry Week.* Retrieved from *http://www.industryweek.com/technology-and-iiot/adopt-or-die-ai-leaves-manufacturing-no-choice.*

[73] *https://www.mocana.com.*

[74] *https://www.rubiconlabs.io.*

[75] International Federation of Robotics. (2017). *World Robotics 2017 Industrial Robots.* Retrieved from *https://ifr.org/free-downloads/.*

[76] Robotic Industries Association. (February 26, 2018). "Robotics, vision and motion control industries set new growth records in 2017." *Robotics Online.* Retrieved from *https://www.robotics.org/content-detail.cfm/Industrial-Robotics-News/Robotics-Vision-and-Motion-Control-Industries-Set-New-Growth-Records-in-2017/content_id/7019.*

cations and industries including packaging, machining, and inspection. Relatively inexpensive, one manufacturer estimates that its robots pay for themselves in less than 200 days.[77]

Additive manufacturing: Also known as 3D printing, additive manufacturing is beginning to move from models and basic prototypes to production of parts with complex geometries. The additive manufacturing industry is making strides toward mass production applications, which will have broad impacts on tooling costs, materials, supply chains, and logistics. GE Aircraft Engines, for example, has used metal additive manufacturing to reduce part counts and build an engine that is 15 percent more fuel efficient. UTC Aerospace Systems is using metal additive manufacturing across a range of materials to reduce weight, part counts and lead times up to 80 percent.[78] Adidas has partnered with Carbon to mass produce 3D-printed custom shoes. General Motors is working with Autodesk to increase the number of production ready parts made with additive technology. For example, a 3D-printed stainless steel seat bracket is 40 percent lighter and 20 percent stronger than its predecessor, replacing eight components and multiple suppliers with just one.[79] A number of start-ups promise to increase the catalog of materials that can be used in additive manufacturing including a broader range of metals and carbon fiber composites.[80]

New business models are emerging, based on many of these technologies, that allow SMMs to access powerful tools such as modeling and simulation on a pay-per-use basis, lowering cost, simplifying access, and increasing flexibility. **The computational power of the cloud eliminates the need for specialized and expensive hardware and software, thereby lowering barriers to entry for SMMs.** Intelligent design tools are one emerging technology available through the cloud, in which the software detects design aspects that are not manufacturable and suggests alternate solutions or, in some cases, only creates designs that are easily manufacturable. Autodesk's Simulation 360 is one such example.

Other business models are also emerging that provide an opportunity to regain domestic production in the context of a changing manufacturing environment. For example, Manufacturing as a Service (MaaS) takes contract manufacturing steps further, relying on shared use of a networked manufacturing infrastructure. As more manufacturing infrastructure—everything from design software, production planning, and equipment—becomes networked, demand for more products of more variety can be met without owning any producing equipment. The results should be lower costs, greater machine utilization, more capacity, and more options for materials use, product features, and cost-effective low-volume custom production.

Disruptive technologies in individual industries are also creating opportunities for the United States to establish, or re-establish, strong positions. In some cases, these technologies are in industries with important national security implications, such as semiconductors and pharmaceuticals.

System-in-Package

Semiconductor packaging moved offshore in the 1980s because it was labor intensive. Now fully automated, emerging packaging technologies, System-in-Package (SiP), are creating an opportunity to restore domestic packaging operations, a big step in recapturing control of the advanced semiconductor value chain.

Currently Intel and GLOBALFOUNDRIES operate the most advanced semiconductor fabs in the United States; both ship completed silicon wafers to Asia for packaging. Continuing progress in reducing feature sizes, with the frontier now at 7 nanometers and below, integration of multiple functions as System-on-Chip (SoC), and three-dimensional integrated circuits are all defining the state of the art.[81] SiP

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[77] Universal Robots A/S. (July 20, 2017). "Universal robots saves 9 hours of production time at Glidewell Laboratories." *Robotics Online.* Retrieved from *https://www.robotics.org/content-detail.cfm/Industrial-Robotics-Case-Studies/Universal-Robots-Saves-9-Hours-of-Production-Time-at-Glidewell-Laboratories/content_id/6638.*

[78] Canaday, H. (May 14, 2018). "UTC aerospace working vigorously on additive metal parts." *MRO Network.* Retrieved from *http://www.mro-network.com/manufacturing-distribution/utc-aerospace-working-vigorously-additive-metal-parts.*

[79] Carey, N. (May 3, 2018). "GM bets on 3D printers for cheaper and lighter car parts." Reuters. Retrieved from *https://www.reuters.com/article/us-general-motors-parts/gm-bets-on-3d-printers-for-cheaper-and-lighter-car-partsidUSKBN1I408K.*

[80] CB Insights. (December 28, 2017). "Corporate investments drive a new wave of industrial 3D printing." Retrieved from *https://www.cbinsights.com/research/corporate-investment-industrial-3d-printing/.*

[81] Wessner, C., and Howell, T. (2018). *Partnering to Grow the New York Regional Nano-Cluster,* Washington, DC: Georgetown University.

is a complementary technology to SoC in which multiple silicon chips are placed in a single package and connected using wire bonds or solder bumps to reduce the overall system size. Firms such as Apple are using SiPs to mix multiple components—central processors, logic, analog, and memory—into a single package.[82]

Packaging started as a manual process, but is now largely automated. It continues to be located in Asia because of the experience base—the Industrial Commons for this activity—resides in the leading packaging firms that have refined processes since the 1980s. **The emergence of SiP and continued advances in the technology creates an opportunity to re-establish packaging capability in the United States as existing packaging facilities become obsolete.** With appropriate incentives, SiP operations could be built near U.S. existing fabs, which could then create advantages to establishing circuit board assembly plants nearby, too. By taking advantage of a discontinuous technology, SiP, much more of the semiconductor value chain could be rebuilt in this country with positive impacts on defense electronics and most other hardware sectors as digitalization becomes pervasive.

Continuous Manufacturing of Pharmaceuticals

Solid format pharmaceuticals are typically a batch production process. Combinations of active and inert ingredients are combined in carefully measured proportions, then fed into pill-forming or capsule-filling machines to prepare batches of final product. Many steps in this batch production process take time and create the possibility of mistakes. Multiple production lines increase the volume and variety of production, but also multiply the risk of quality defects. Plus, mixers, feeders, and other equipment must be cleaned between batches to avoid cross-product contamination. Batch production is relatively labor-intensive, which helps to explain why so much manufacturing, especially of generic drugs, is done in China and India.

Continuous manufacturing (CM) methods for powder-based pharmaceuticals eliminates batch processing for much faster, more reliable production through an uninterrupted process. CM can shorten production times, allows for more precise production control, and reduces the likelihood of errors and production breakdowns. The technology can be used for an entire production process or for specific operations within a larger process. The Center for Structured Organic Particulate Systems (C–SOPS) at Rutgers University, in partnership with other universities and industry, has been a leader in the development of CM technology.[83]

Congress recognized the potential offered by CM for drug production, enacting the "21st Century Cures Act" in 2016, which authorized grants to support continued development of CM. The Food and Drug Administration (FDA) encourages firms to adopt CM, provides technical assistance, and has issued guidance to industry wanting to implement CM and other technologies.[84] A growing number of manufacturers, including Lilly, Vertex, and Janssen Pharmaceutical Companies, are using CM. **As precision medicine and rapid response to patient needs become more important, CM can create competitive advantages for domestic production of pharmaceuticals and, in the future, other high-value chemicals.**

These are just a sample of the technologies already in use or emerging that will have profound effects on where, how, and how much manufacturing takes place. **The United States has an opportunity to take a leadership role, especially since many of these technologies rely on U.S. strengths in design, software, and networking. But capturing the competitive advantages requires broad-based dissemination and implementation of the enabling technologies.** Although there is strong evidence that implementation of smart technologies exceeds expectations for efficiency gains and return on investment, relatively few manufacturers have made serious inroads to implementation. Lack of knowledge, fear, skill availability, and focus on the daily pressures to meet production targets prevent SMEs from moving more rapidly.

Leadership in smart manufacturing should be considered a national priority and should be addressed with targeted programs and policies that will accelerate implementation. These would include mobilizing expertise; providing financial resources to buy technology; accelerating development of needed standards; and identifying a clear glide path for technology implementation appropriate for different firms in dif-

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[82] Shih, W. (2018). *Can an integrated semiconductor manufacturing capability be restored in the United States?* Unpublished manuscript. Harvard Business School, Cambridge, MA.

[83] *http://www.csops.org/*.

[84] FDA. (2017). *Advancement of emerging technology applications for pharmaceutical innovation and modernization, guidance for industry.* Retrieved from *https://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/UCM478821.pdf.*

ferent industries of different sizes. Federal, state, and local governments have a role, along with trade associations and other industry groups. Some are already making strong contributions. Automation Alley in the Detroit region is one example.[85]

Because smart manufacturing will eventually be pervasive and essential to both national economic strength and national defense, it is important that the enabling technologies be produced domestically, including not only design but also manufacturing. Sensors, controllers, networking, and the other hardware requirements for data analysis and machine intelligence are too important to rely on foreign sources. From a security perspective the same principles currently being applied to drones and telecommunications equipment from Chinese providers ZTE and Huawei should be applied to smart manufacturing. From a competitiveness perspective, these smart manufacturing technologies will evolve and the most effective way to ensure both continuous improvement and first mover advantages in technology implementation will be to manufacture the enabling electronics domestically.

U.S. manufacturing needs to get in front of the wave of change created by disruptive technologies. Markets are changing as consumers want instant gratification. Intelligent technology is pervading whole sectors: autonomous vehicles, drones, distributed energy and intelligent grids, and all areas of defense production, to name a few. The United States has been ahead in performing the research that creates the technologies that enables all of these changes, but has not maintained production capabilities to capture global markets, value added, and wealth creation. This failure has impacted the long-term health of the economy and national security. **By increasing the pipeline of new products, investing in the necessary manufacturing capabilities to make those new products, and incentivizing broad-based implementation of smart manufacturing technologies, the United States can recapture its manufacturing leadership.**

BOLD STRATEGY AND CRITICAL NEXT STEPS

U.S. manufacturing is on the cusp of a new era. In contrast to recent decades in which the focus has been on globalization, cost reduction, and lean production, the coming decades promise a much more responsive, flexible, and intelligent manufacturing sector. Advances in a myriad of technologies ranging from high-performance materials to ubiquitous sensors, from self-correcting robots to autonomous factories, will transform both products and processes. The United States is well-placed to take advantage of the opportunities created by these technological advances, building on strengths in research at world-class universities, software development, systems integration, creativity, and innovation. **But taking advantage and recapturing industrial leadership will require national recognition of the importance of manufacturing and a focus on building the industries of the future.**

Unlike many competing nations, the United States does not have a national manufacturing strategy. Countries such as Germany, South Korea, Japan, and China have manufacturing strategies with long-term R&D programs, investments in infrastructure, and national goals for specific industries. The details vary, but common themes include maintaining a strong industrial research infrastructure and vocational education system, and building sustained competitive advantage in important export industries. Public-private partnerships are usually important mechanisms. **Although the United States has many government programs, at both the state and federal levels, they are neither coordinated nor funded to translate basic research into U.S.-based manufacturing, do not include meaningful metrics, and tend to devolve to short-term problem solving rather than long-term strategy.** Most federal S&T agencies do not invest in manufacturing research to advance process technologies and innovations in manufacturing machines and equipment.

Instead, the U.S. approach relies on market-based decisions, which for most large manufacturers, have been based on cost reduction and quarterly earnings. Over time, the result of myriad decisions has resulted in a "hollowing out" of U.S. industry as production was moved offshore. U.S. manufacturers first moved to reduce labor costs, then to build production in growing foreign markets, and then to take

[85] *https://www.automationalley.com/*.

advantage of skills and supplier capabilities that are often in short supply here. The long-term negative ramifications of this shift of production abroad are now apparent, creating a number of "grand challenges" that must be addressed to restore U.S. manufacturing, especially in advanced technologies critical to national security and prosperity. These manufacturing grand challenges include:

1. Rebuild the Industrial Commons
The United States has lost fundamental production skill and capabilities—the Industrial Commons—in many industries and has lost entire industrial sectors, with noticeable impacts on the national innovation system and growing adverse effects on the defense industrial base.[86] Production can provide competitiveadvantages that are difficult to copy and have long-term sustainability. Maintaining domestic manufacturing capabilities is essential to retaining the know-how needed to produce next generation technologies, and to retaining critical defense production.

2. **Convert national R&D to national wealth and security**
Leading the world in R&D spending is not sufficient to ensure prosperity. Technologies invented here are being licensed, sold, or given away to manufacture overseas, which, in effect, is subsidizing R&D for other countries. The results of R&D must create new products, including defense critical technology products, that can be made in America at commercial scale to generate wealth, jobs, and exports.

3. Lead emerging industries
To ensure future economic strength and defense superiority, the United States must have a leadership position in emerging industries such as autonomous vehicles, robotics, metal-additive manufacturing, biomanufacturing, energy storage, advanced materials, and quantum computing, to name a few. Dependence on foreign suppliers, regardless of how much cheaper they may be, is creating defense vulnerabilities and long-term competitive disadvantages.

Bold steps are needed to ensure that these challenges are met quickly and vigorously. Market forces alone are unlikely to achieve the needed change. They have not so far. With sustained, strategic investments, the United States can regain fundamental manufacturing capabilities, ensure a return on federal investments in R&D, capitalize on technology changes broadly affecting manufacturing, establish leadership in new industries, and restore the broad-based supplier networks that are essential to economic and national security.

Restoring U.S. manufacturing leadership and, perhaps more importantly, restoring the nation's ability to capture wealth from the national innovation system with a robust manufacturing base, is a challenge to both the private and public sectors. Manufacturers, driven by short-term financial incentives, primarily focus on the current product development through incremental innovation while abandoning the long-term translational R&D needed to mature basic research results into a "next big thing."

Only government can overcome this market failure and enable the United States to remain globally competitive.

The nation must be aggressive in meeting the grand challenges and pursuing the opportunities created by rapid technological change, for the sake of wealth creation and national security. Rebuilding the Industrial Commons, performing the translational research necessary to fully commercialize basic research results, and incentivizing the widespread adoption of smart manufacturing and other advanced technologies are all areas in which the role of government is paramount. A few new programs will not suffice; they haven't in the past. Bold new initiatives with long-term commitment will make the difference.

Paramount for government is to make investments in manufacturing research, process technologies and innovation, and systems engineering. The impact will be:

- Wealth is created from public R&D;[87]
- Domestic industry, especially SMMs, implements advanced technologies faster than foreign competitors;

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[86] For recent examples, *see* Mehta, A. (May 22, 2018). "America's industrial base is at risk, and the military may feel the consequences." *Defense News.* Retrieved from *https://www.defensenews.com/pentagon/2018/05/22/americas-industrial-base-is-at-risk-and-the-military-may-feel-the-consequences/*.

[87] The goal is to advance both Technology Readiness Levels (TRLs) and Manufacturing Readiness Levels (MRLs).

- Defense production capabilities are maintained and foreign dependence minimized; and
- The skills and knowledge needed at all levels of industry and the national research enterprise are readily available.

Critical Next Steps

The United States needs a broad national conversation to identify the necessary steps to achieve these objectives. MForesight hosted a series of roundtables in early 2018 to begin this conversation, attended by diverse stakeholders from business, government, and academia. These discussions generated a number of promising ideas to address the grand challenges that were identified at the roundtables. A summary of actionable next steps that the nation needs to take to overcome the grand challenges follows.

Invest in Translational R&D and Manufacturing Innovation

Restoring the ability to generate wealth from the billions invested in R&D should be a national priority. The innovation cycle that converts R&D results—new inventions and discoveries—into successful commercial products is working well in software, but has multiple breakdowns for manufactured hardware. Funding for the translational research needed to develop operational prototypes, demonstrate manufacturability, and identify viable markets is frequently unavailable, so promising technologies languish in laboratories. Funding and expertise is needed to address the needs and ensure domestic production. This gap is so significant and the potential results so important that roundtable participants suggested creating **Translational Research Centers** (TRCs). TRCs would typically be independent non-profit corporations affiliated with a single or group of universities with strong industrial involvement. They would combine funding with expertise in product development, engineering, production, marketing, and other business functions needed to identify and nurture promising research results into commercial products and processes manufactured in this country. TRCs would provide skills that academic researchers usually do not have, help to lower the risk of commercialization and thereby attract private investment, and create a stronger pipeline from academic R&D to new products with positive impacts on national security and economic prosperity. Appendix A provides additional details on the TRC concept.

Mechanisms are also needed to ensure that needed advances in manufacturing technologies are developed and implemented domestically. **Advancing the Manufacturing Readiness Level** of a technology is often an essential step in reducing technical risk and attracting the private investment needed for full-scale manufacturing. In some cases, new manufacturing processes are necessary; in others, known processes can be used to demonstrate manufacturability, quality, and cost effectiveness. Several Manufacturing USA institutes are developing technologies for production of power electronics, functional fabrics, flexible electronics, and other critical technologies. Similar opportunities will continue to emerge from NSF-funded Engineering Research Centers, national laboratories, and even private companies working in areas such as autonomous vehicle sensors and control systems, advanced energy storage, and 5G equipment. In all cases, investments in applied engineering and manufacturing process research, coordinated with the translational research done at the TRCs would increase the likelihood of creating long-term competitive advantages that are difficult to copy.

One approach to advancing MRLs proposed by the roundtable participants would be to **establish additional Manufacturing USA institutes.** Existing Manufacturing USA institutes are mostly focused on specific technologies, such as flexible electronics, robotics, and bio-pharmaceuticals. **Additional institutes would be useful to rebuild foundational manufacturing know-how** while, at the same time, advancing capabilities in platform manufacturing technologies for multi-industry applications. Areas to be addressed would include metal forming, joining methods and technologies, laser processing, and process technologies for cost-effective low-volume manufacturing, to name a few. These institutes would focus on continuous improvement of widely used manufacturing processes, and work closely with domestic equipment makers to speed technology dissemination to commercial industry.

Another approach would be to **launch special competitions.** Competitions have proven to be an effective method for generating creative solutions to technical challenges. Competitions have been used by government agencies such as DARPA, nonprofits such as XPRIZE, and private manufacturers such as General Motors to generate creative ideas from a broad audience. The goal would be to engage researchers

to focus on manufacturing challenges in order to create and establish unique manufacturing capabilities that will provide U.S. producers with competitive advantages in multiple industries. One approach would be to assemble a group of experts who would identify a number of "moonshots"—important, long-term national objectives requiring advances in manufacturing technology and product innovation.

Encourage Pilot Production and Scale-up

To restore domestic production and overall leadership in emerging industries, America needs to invest in advancing manufacturing technologies, increasing pilot production, and scaling up to viable commercial volume. The necessary investment is largely the responsibility of the private sector, which means that national policies at all levels of government must remain conducive to profitable domestic production. Without addressing specific economic policies, which was beyond the scope of the roundtable discussions, participants did identify opportunities to take advantage of emerging technology developments to regain domestic production capacity. For example:

- Semiconductor packaging has long been done offshore, a legacy of the labor requirements of packaging processes. Packaging is now automated with little labor content. Furthermore, new technologies in which multiple chips are packaged together as System-in-Package (SiP) have created an opportunity to reestablish packaging in the United States. Government procurement from domestic sources would speed that development.
- Pharmaceutical production is on the verge of dramatic change with the emergence of continuous manufacturing methods for powder-based pharmaceuticals. The technology provides a mechanism to ensure cost-competitive domestic production of pharmaceuticals.[88]

In these and similar cases, government, especially defense, procurement contracts have proven to be an effective tool. Because it is important to create demand, not just supply, for advanced technologies manufactured in this country, the United States should **leverage government procurement** to create lead markets for new products and technologies. The federal government has a history of building strong national industries through a combination of R&D and procurement contracts. Aviation and the Internet are obvious examples. Government purchase orders are an effective tool for companies to raise needed capital, both investments and loans, to initiate pilot or scale production domestically. Assured markets of sufficient scale are essential to successful product launches and will incentivize private investment necessary to create needed manufacturing technologies and production facilities.

Although procurement contracts are an effective tool, they are not a universal solution. New mechanisms are needed to ensure that domestic resources are available to scale production here, rather than contracting manufacturing to Asian producers, especially for high-value, high-technology products. An opportunity exists to **form geographically dispersed manufacturing investment funds.** These funds could be organized as public-private partnerships, or build on existing state government funds, to ensure that hardware start-ups have a reliable source of investment capital and can scale production in this country. The lessons learned from existing state-level programs should be applied to ensure effective use of the resources.

Empower Small and Medium-Sized Manufacturers

Small and medium-sized manufacturers are the backbone of U.S. manufacturing.[89] SMMs are important anchors in their communities and critical to systems integrators. Most do not entertain offshoring strategies, yet increasingly compete with Asian producers. If U.S. manufacturing is to regain international competitiveness and take advantage of the opportunities presented by smart manufacturing technologies, SMMs will need to implement those technologies broadly and effectively. Roundtable participants recognized that multiple federal and state programs provide support of various types to SMMs, but they also suggested that more could be done to accelerate their adoption of smart manufacturing technologies, and to ensure that SMMs have access to technical skills and expertise they will need to be effective in the future. Suggestions to do that include:

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[88] Koons, C. (April 11, 2018). "Why we may lose generic drugs." *Bloomberg.* Retrieved from *https://www.bloomberg.com/news/articles/2018-04-11/are-drug-prices-too-low.*

[89] SMMs have 500 employees or less and comprise over 98% of U.S. manufacturing firms and over 89% of establishments. United States Census Bureau. (2018). *2015 SUSB Annual Data Tables by Establishment Industry.* Retrieved from *https://www.census.gov/data/tables/2015/econ/susb/2015-susb-annual.html.*

A. Provide loan guarantees and technical assistance to accelerate the pace of modernization of SMMs including capital equipment and implementation of smart manufacturing technologies. In partnership with states and existing federal programs, such as those at the Small Business Administration, this program would incentivize the purchase of domestically manufactured equipment and technologies to help rebuild the domestic machine tool industry, and to ensure that critical advanced manufacturing equipment and components are made and deployed domestically.[90]

B. Fund nation-wide educational and informational programs to ensure that SMMs are aware of government procurement opportunities, emerging domestic and export market opportunities, new technologies, and the capabilities of foreign competitors to facilitate better matching of domestic demand with domestic production. Working in collaboration with the Manufacturing Extension Partnership, such programs could accelerate the re-emergence of diverse, geographically distributed industrial ecosystems.

C. Create a program of industry fellowships to pay recent engineering and management retirees to work with the next generation of manufacturing start-ups, as well as business incubators and technology accelerators. Recent retirees are an underused resource, and in some cases, they are moving abroad to coach foreign competitors. A viable domestic alternative to capture such expertise before it is lost is essential to rebuilding the manufacturing knowledge base.

D. Develop simple technology licensing agreements to facilitate and encourage technology transfer and joint technology development between universities and industry, especially SMMs. Licensing technologies from universities can be overly complex and expensive, limiting the number of potential licensees. Useful models have been developed by some universities, which should be propagated nation-wide.

Grow Domestic Engineering and Technical Talent

Especially, though not exclusively, in academic R&D, the nation is dependent on foreign nationals in many scientific and engineering fields. In 2015, foreign students received 56 percent of engineering doctorates, 53 percent in mathematics and computer science, and 44 percent in physics.[91] Many factors affect domestic and foreign students' decisions to pursue graduate degrees, including available financial support, strength of the job market, and calculations of future earning power. The United States is fortunate to attract foreign students in large numbers, but would be remiss in continuing to depend on them, especially because foreign students are increasingly returning to their home countries upon graduation.

Other skills essential to restoring the nation's Industrial Commons and to effective implementation of smart manufacturing technologies require technical training, both broad-based and specialized. Accessing needed skills is frequently listed as the top challenge facing manufacturers in most industries today. Many community colleges have developed training programs targeting specific manufacturing skill requirements, often in concert with local manufacturers, but more needs to be done.

Because human resource issues are so complex, the roundtable participants did not attempt to suggest comprehensive solutions, but they did identify a few initiatives that could improve the current situation in engineering and technical talent. For instance, recognizing the current dependence on foreign students in many graduate programs in STEM fields, roundtable participants suggested steps to increase the supply of domestic graduate students. One way would be to significantly **increase the availability of graduate fellowships for qualified domestic students.** This simple, cost-effective step would help to limit inadvertent transfer of R&D results offshore, rebuild the supply of researchers available to domestic industry, and, importantly, increase the number of highly trained scientists and engineers who can work in defense industries.

Roundtable discussions also addressed the need for a strong pipeline of technical talent available to SMMs. To cope with a growing wave of retirees and a shortage of young people with appropriate skills, an increasing number of manufacturing companies are creating apprentice programs and working with local technical schools to create custom training programs, often with employment guaranteed to successful graduates. Yet potential students usually are not aware of them. A useful

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[90] Such a program could incentivize foreign manufacturing equipment companies to create or increase U.S. production capacity.

[91] National Science Foundation. (2018). *Science and Engineering Indicators 2018.* Retrieved from *https://www.nsf.gov/statistics/2018/nsb20181/*.

step would be to **create a national registry of apprenticeship and other industrial training programs** with the ability to match available programs with high school and college students and veterans seeking opportunities with SMMs, along with funding support for trainees. A national registry of such programs would better match student interest with employment opportunities and contribute to restoring the Industrial Commons.

To complement apprenticeship programs, roundtable participants also identified the need for a renewed national focus on **educating engineering technicians with emphasis on applied engineering skills.** A frequent complaint among manufacturers is that engineering graduates have insufficient practical skills to make an immediate contribution to factory operations, while still having significant salary expectations. Mobilizing the broad higher education community to educate more engineering technicians would meet a growing need and likely attract more students and veterans to applied engineering. This program could be a three-year polytechnic degree, could provide scholarships to pursue cooperative education programs at SMMs, could be a collaboration between trade schools and engineering colleges, or could be other creative paths that supplement a traditional undergraduate engineering curriculum.

IMPLEMENTATION STRATEGIES

All of these suggestions emerging from MForesight's roundtables address clearly defined components of the grand challenges facing U.S. manufacturing. Ideally, the United States will, at some point in the future, create a national manufacturing strategy as international competitor nations have done. These ideas should be part of such a strategy, ideally implemented in a coordinated way with a **single point of focus** to orchestrate the required funding streams and to maintain strategic program management.

Currently, multiple offices and agencies at both the federal and state levels of government, as well as a few private non-profit organizations and public-private partnerships, support technology development, but there is no single point of focus to provide national strategic direction, or to provide the cross-cutting focus on manufacturing and systems engineering needed to bridge the hardware innovation gap. **Manufacturing cuts across multiple disciplines and technologies so it is therefore all the more compelling to have a single focal point for engineering and manufacturing research and innovation.** The needed point of focus could take one of several possible forms—a publicly funded non-profit organization, a federal-state-industry partnership, or a federal office or agency. Its mission would be to fill the existing gaps in the national innovation cycle by providing funding for translational research to advance TRLs and MRLs, to help rebuild the Industrial Commons through strategic investments in workforce development, and to support hardware start-ups with investments, loans, expertise, and networking to encourage production scale-up this country.

Manufacturing *really* matters. Research and invention alone are not enough to ensure national prosperity. To reap the full rewards of rapid technological advances, the nation must be able to manufacture products. Because of a confluence of economic and technological forces, the United States now has an opportunity to rebuild its manufacturing base and restore its global competitiveness. **But another report won't help.** Bold steps commensurate with the scale and importance of the objectives are absolutely necessary. The roundtable participants proposed a few implementation options, including creating a national innovation initiative, establishing a national manufacturing innovation foundation, and establishing a manufacturing program within each of the federal S&T agencies. They fully expect policymakers to convene and make decisions on how best to implement the critical steps identified in the previous section. **A piecemeal approach, addressing one or two critical steps but not all, will not help.** Other nations are not standing still. The onus is on us.

Appendix A: Translational Research Centers

One of the ideas discussed in depth at MForesight's manufacturing roundtables is to create a number of Translational Research Centers (TRCs). These would be designed to address market failures, fill gaps in the innovation ecosystem, ensure su-

perior defense technology and capacity, and regain a vibrant, competitive industrial base.

Mission

Translational Research Centers will provide funding for product development to fill the gap between academic researchers with a potential hardware product or manufacturing process technology and domestic production. Employing professional engineers and managers experienced in new product introductions, the TRC will guide and fund research needed to translate laboratory results to testable beta prototypes and facilitate connections with domestic manufacturers to scale domestic production. Filling this gap will reduce the technical and market risk, attract private sector investment, retain and scale commercial production in the United States, and thereby multiply and accelerate the economic benefits from federal investments in academic research. TRCs serve as a means to translate promising technologies resulting from basic research conducted at affiliated universities into (hardware) products or processes for scaled production in the United States.

Background

- Federal R&D obligations in 2016 were $140 billion. Federal R&D spending at universities was nearly $40 billion. Of that, approximately $18 billion was spent on life sciences by NIH, and roughly $12 billion was spent on engineering research across all agencies. In 2016 alone, universities spent nearly $550 million on equipment for engineering research.[92]
- Almost no government funding is currently available for the translational research needed to create viable hardware prototypes or to scale production, leaving many discoveries and inventions languishing in the laboratory or, increasingly, commercialized outside the United States.
- Venture capitalists invest very little in hardware commercialization.
- A small federal investment in translational research would ensure greater domestic economic impact from R&D funding, dramatically increasing the return to federal R&D spending.

Existing Commercialization Process

- Commercializing results of university research is dependent on licensing, but results are rarely developed sufficiently to demonstrate the value to a potential licensee.
- University spin-off companies, start-ups established to commercialize university research, frequently lack rigorous product development skills and have difficulty raising sufficient capital to mature hardware technologies as well as to develop (or contract) needed manufacturing processes.
- Venture capitalists (VCs) limit investments in hardware start-ups because the risk profile is multifaceted and hardware overall is more risky, time-consuming, and expensive than software. VCs invest less than 5 percent in hardware start-ups. Some states and universities have created small VC funds for university start-ups, but even these favor information technology and healthcare startups.
- The result is that potentially promising research results do not receive additional effort to create commercial hardware products because funds are not available. The national wealth that could be created from research by introducing new products and technologies is foregone or captured by foreign competitors. Simply creating knowledge without a means to create national wealth from that knowledge is not sustainable.

Translational Research Centers

- TRCs would fill a gap in the current innovation ecosystem by funding translational research and facilitating scale-up needed to spur commercialization of the most promising results from academic R&D. TRCs would fund experienced product development teams working with start-ups to develop commercially viable hardware prototypes, perform validation testing to demonstrate the value proposition, and work with U.S. manufacturers, typically small and medium-sized manufacturers, to identify a path to full-scale production in the United States.

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[92] National Science Foundation. (2018). *Science and Engineering Indicators 2018.* Retrieved from *https://www.nsf.gov/statistics/2018/nsb20181/*.

- TRCs would work with a single university or multiple regional universities to identify promising hardware technologies emerging from research results.
- TRCs could take multiple possible legal forms. Although TRCs are affiliated with universities, they should be independent from universities, although they could be part of university research corporations. Most likely, they would be independent non-profit corporations. Each TRC would establish relationships with affiliated universities to allow sharing of license fees and royalties from successful products and/or processes.
- Regardless of legal form, the overhead rate on federal funds would be limited to a maximum of 15 percent.
- The TRC would employ professional engineering and management staff to serve as systems engineers, project managers, market researchers, and private sector liaisons. Experienced product development teams would apply rigorous processes to specify, design, build and test hardware products/processes in the context of anticipated use cases to ensure timely results and high levels of domestic commercialization.
- Any technologies funded through TRCs would be subject to simplified licensing agreements to encourage licensing by SMMs. Licensing of resulting products must be restricted to U.S. production facilities only.
- Commercial production or use of resulting process technologies would be strictly limited to the United States to increase domestic manufacturing output and exports.

Funding

- An initial pilot program would fund 10 TRCs around the country, selected based on competitive proposals.
- Each TRC would be funded at up to $10 million annually, for an initial 3-year award. The amount of funding provided would be commensurate with the associated universities' federal research funding, up to 3 percent of basic research funds.
- Continued or increased funding would depend on performance as determined by an assessment scorecard.

Assessment Scorecard

The intent of this initiative is to mature promising results from the basic research conducted at affiliated universities. TRCs, in collaboration with their affiliated universities, are at liberty to choose the technology projects to be pursued. The results reported in the scorecard will be used to assess the effectiveness of the affiliated university in transitioning promising research into domestically scalable products/processes in the marketplace. Each TRC will be scored based on a series of leading and lagging metrics indicative of positive impact on the U.S. economy. Metrics would include:

- Number of private-sector jobs created (maximum score = 20)
- Amount of private-sector investment (does not include state or federal funds or university funds; does not include "commitments") (maximum score = 20)
- Number of start-ups successfully scaling profitable production (maximum score = 10)
- Number of U.S.-based SMMs engaged in the production, technology transfer, and/or development process (maximum score = 10)
- Number of technologies exceeding Technology Readiness Levels (TRL) 6 and Manufacturing Readiness Level (MRL) 5, according to standard TRL and MRL assessments used by the Department of Defense (maximum score = 10)

Continued funding would be based on the annual score achieved:

- Award amount may be increased with a score above 55.
- Continued funding for 2 years after the initial 3 year award requires a score above 40.
- Funding would terminate at the end of the fifth year if the score is below 45.
- Funding would be extended at the end of the fifth year for an additional 3 years if the score is at least 55.

- The TRC scorecard will be used in the evaluation of all future proposals submitted by the participating universities.

Proposal Evaluation Criteria

The initial ten TRCs should be selected based on a Request for Proposals. Multiple legal structures, formal relationships with universities, industry and technology foci, non-federal funding sources and partnerships, and other characteristics should be encouraged to maximize the lessons from the pilot program, though the same assessment scorecard must be used for all TRCs. The initial ten TRCs should focus on universities, though subsequent centers could work with other recipients of federal R&D funding such as non-profit research institutions and national laboratories. Achieving the desired impact—real, measurable economic benefit to the United States—will be the ultimate determinant of success. Proposal evaluation criteria should be based on the likelihood that proposers can achieve that goal.

Appendix B: Roundtable Participants

Boston, MA (January 18, 2018)

1. Dean Bartles, Director of the John Olson Advanced Manufacturing Center—University of New Hampshire
2. Bill Bonvillian, Lecturer—MIT
3. Sam Feller, Founder—Awkward Engineer
4. John Hart, Associate Professor—MIT
5. Christian Hoepfner, Executive Director—Fraunhofer USA Center for Sustainable Energy Systems CSE
6. Micaelah Morrill, Director of the Manufacturing Initiative and Acting Executive Director—Greentown Labs
7. Ira Moskowitz, Director of Advanced Manufacturing Programs—Massachusetts Technology Collaborative
8. Venky Narayanamurti, Benjamin Peirce Professor of Technology and Public Policy at the Harvard School of Engineering and Applied Sciences—Harvard University
9. Dave Rapaport, Head of Research and Collaboration Management US—Siemens Corporate Technology
10. Liz Reynolds, Executive Director MIT Industrial Performance Center
11. Peter Russo, Director of Growth and Innovation—MassMEP
12. Matt Sweitzer, Manufacturing Fellow—Greentown Labs
13. Jim Watkins, Professor of Polymer Science and Engineering—University of Massachusetts, Amherst and Director—Center for Hierarchical Manufacturing
14. Johanna Wolfson, Principal—PRIME Impact Fund

Washington, DC (January 22, 2018)

1. Rob Atkinson, President—Information Technology and Innovation Foundation
2. Norman Augustine, CEO (Ret.)—Lockheed Martin & Former Under Secretary of the Army
3. Kurt Bettenhausen, Senior Vice President—Siemens Corporate Technology USA
4. Robyn Boerstling, Vice President, Infrastructure, Innovation and Human Resources Policy—National Association of Manufacturers
5. Walter Copan, Under Secretary of Commerce for Standards and Technology and NIST Director—NIST
6. Ron Hira, Professor of Public Policy—Howard University & Research Associate—Economic Policy Institute
7. Paul Kern, Senior Counselor—Cohen Group
8. Mark Mills, Senior Fellow—Manhattan Institute
9. Shirish Pareek, CEO—Hydraulex Global

10. Willy Shih, Robert and Jane Cizik Professor of Management Practice in Business Administration—Harvard Business School
11. Jeff Wilcox, Vice President for Engineering and Program Operations—Lockheed Martin
12. Chad Moutray, Chief Economist—National Association of Manufacturers
13. Andrew Bicos, ASME Legislative Fellow—Office of U.S. Congressman Reed
14. Pramod Khargonekar, Vice Chancellor for Research and Distinguished Professor of Electrical Engineering and Computer Science—University of California, Irvine
15. Mike Russo, Director and Corporate Lead of U.S. Government Affairs—GLOBALFOUNDRIES

Austin, TX (February 23, 2018)

1. Joe Beaman, Professor and Earnest F. Gloyna Regents Chair in Engineering—University of Texas at Austin
2. Roger Bonnecaze, William and Bettye Nowlin Chair in Chemical Engineering and Co-Director of NASCENT—University of Texas at Austin
3. Larry Dunn, Assistant Director of Industry and Innovation Programs at NASCENT—University of Texas at Austin
4. Brian Korgel, Professor, Edward S. Hyman Endowed Chair in Engineering—University of Texas at Austin and Director of Industry/University Cooperative Research Center on Next Generation Photovoltaics
5. Dwayne LaBrake, President and Chief Executive Officer—Canon Nanotechnologies
6. Ed Latson, Executive Director—ARMA—Austin Regional Manufacturers Association
7. Ken Pfeiffer, Vice President of Engineering—Superconductor Technologies Inc.
8. Bill Rafferty, Manager of Process Improvement Engineering—Southwest Research Institute and South Central Regional Director—Texas Manufacturing Assistance Center (TMAC)
9. John Randall, President—Zyvex Labs, Dallas
10. S.V. Sreenivasan, Professor and Co-Director of the NASCENT Center—University of Texas at Austin
11. Krishna Srinivasan, Founding General Partner—LiveOak Ventures
12. Bill Stueve, President—Atonometrics
13. Sarah Holloway, District Field Director—Office of Congressman Michael T. McCaul (TX–10)

San Jose, CA (March 8, 2018)

1. Bob Brakeman, Independent Consultant
2. Megan Brewster, Vice President of Advanced Manufacturing—Launch Forth
3. Glenn Daehn, Fontana Professor of Materials Science Engineering and Director for Manufacturing, Institute for Materials Research—The Ohio State University
4. Cyril Ebersweiler, General Partner, SOSV and Managing Director, HAX
5. Mauricio Futran, Vice President, Process Science and Advanced Analytics—Johnson & Johnson
6. Jim Myrick, Entrepreneur in Residence—Flextronics
7. Shirish Pareek, CEO—Hydraulex Global
8. David Parrillo, Global Research and Development Director for DowDuPont Packaging and Specialty Plastics—The Dow Chemical Company
9. Sean Randolph, Senior Director—Bay Area Council Economic Institute
10. Greg Reichow, Partner—Eclipse Ventures
11. Mike Russo, Director and Corporate Lead of U.S. Government Affairs—GLOBALFOUNDRIES

12. Randy Schiestl, Vice President, R&D, Global Technology and Services—Boston Scientific Corporation
13. Diego Tamburini, Principal Industry Lead for Azure Manufacturing—Microsoft
14. Malcolm Thompson, Executive Director—NextFlex
15. David Vasko, Director of Advanced Technology—Rockwell Automation
16. David Wahl, Senior Vice President and General Manager—Jabil

Raleigh, NC (March 14, 2018)

1. Paul Cohen, Woolard Distinguished Professor, Fitts Department of Industrial and Systems Engineering—North Carolina State University
2. Steve Ellis, CEO—Automated Solutions
3. John Hardin, Executive Director—North Carolina Board of Science, Technology and Innovation
4. Nick Justice, Executive Director—PowerAmerica Institute
5. Russell King, Foscue Distinguished Professor and Co-Director of the Center for Additive Manufacturing and Logistics—North Carolina State University
6. John Loyack, Vice President of Global Business Services—Economic Development Partnership of North Carolina
7. Mike Mazzola, Director of the Energy Production and Infrastructure Center—University of North Carolina at Charlotte
8. Steve McManus, Innovation Manager—RTI
9. Phil Mintz, Executive Director—NC State Industry Expansion Solutions and Director—North Carolina MEP
10. Zack Oliver, Economist—RTI
11. Scott Smith, Professor and Department Chair, Mechanical Engineering and Engineering Science—University of North Carolina at Charlotte
12. Binil Starly, Associate Professor, Industrial and Systems Engineering—North Carolina State University
13. Bob Wilhelm, Vice Chancellor for Research and Economic Development—University of North Carolina at Charlotte
14. Fiona Baxter, Associate Executive Director—NC State Industry Expansion Solutions

Indianapolis, IN (March 21, 2018)

1. Keith Belton, Director of the Manufacturing Policy Initiative—Indiana University Bloomington
2. Andrew Berger, Senior Vice President of Governmental Affairs—Indiana Manufacturers Association
3. Matt Conrad, Executive Director, Indiana Automotive Council—Conexus Indiana
4. Claudia Cummings, Vice President, Strategic Development—Conexus Indiana
5. Jennifer Hagan-Dier, Manufacturing Extension Partnership Director, Center for Industrial Services—University of Tennessee
6. Ned Hill, Professor of Public Administration and City and Regional Planning—The Ohio State University
7. Steve Jones, Professor of Finance, Kelly School of Business—IUPUI
8. Razi Nalim, Associate Dean for Research, School of Engineering and Technology—IUPUI
9. Clayton Nicholas, Industry Research Development Specialist, School of Engineering and Technology—IUPUI
10. Ray Niehaus, Managing Director of Innovation and Technology—Mid-America Science Park
11. Dave Roberts, Chief Innovation Officer—Indiana Economic Development Corporation

12. Dave Snow, Director—Indiana MEP
13. Stan Woszczynski, Vice President, Chief Manufacturing Officer—Cummins, Inc.
14. James Ruble, Advanced Composites Outreach Consultant, Center for Industrial Services—University of Tennessee
15. Tim Frazier, Executive Director of Advanced Engineering—Cummins, Inc., Dearborn, MI (March 29, 2018)

Dearborn, MI (March 29, 2018)

1. Carla Bailo, President and CEO—Center for Automotive Research
2. Timothy Bartik, Senior Economist—Upjohn Institute
3. Mike Coast, President—Michigan Manufacturing Technology Center
4. Chris Conrardy, Executive Director—LIFT and Chief Technology Officer and Vice President for Strategic Initiatives—EWI
5. Chuck Hadden, President and CEO, Michigan Manufacturers Association
6. Fred Keller, Founder and Chair, Cascade Engineering
7. Tom Kelly, Executive Director and CEO, Automation Alley
8. Jeff Krause, Executive Director and CEO, SME
9. Andrew McColm, Managing Director, Venture Creation—Spartan Innovations
10. Mark Montone, Director of Sales and Marketing North America—Lacks Trim Systems LLC
11. David Ollila, President and Chief Innovation Officer—Skypoint Ventures
12. Kirk Roys, Director of Global Technical Services—Steelcase
13. Ryan Sekol, Senior Researcher, Manufacturing Systems Research—General Motors Global Research and Development
14. Kelly Sexton, Associate Vice President for Research—Technology Transfer and Innovation Partnerships—University of Michigan
15. Dan Slane, Owner—The Slane Company
16. Alan Taub, Chief Technical Officer—LIFT

Other Contributors

1. Christie Wong-Barrett, CEO, MacArthur Corp.
2. Glenn Daehn, Mars G. Fontana Prof. of Metallurgical Engineering, The Ohio State University
3. Khershed Cooper, Program Director, Nanomanufacturing, National Science Foundation
4. Charles L. Cooney, Robert T. Haslam (1911) Professor of Chemical Engineering, Emeritus, and Faculty Director, Emeritus, Deshpande Center for Technological Innovation, MIT
5. Lawrence D. Burns, Vice President (retired), R&D, General Motors
6. Pat McGibbon, Vice President, Association for Manufacturing Technology
7. Kirsten Rieth, Senior Innovation Advisor, RTI
8. Madhav Acharya, Technology-to-Market Advisor, ARPA–E
9. Charles Zukoski. Provost, University at Buffalo
10. Sue Babinec, Senior Commercialization Advisor, ARPA–E, Dept. of Energy

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NATIONAL EMPLOYMENT LAW PROJECT (NELP)

Manufacturing Low Pay: Declining Wages in the Jobs That Built America's Middle Class

Catherine Ruckelshaus and Sarah Leberstein

November 2014

Executive Summary

Americans perceive manufacturing jobs as "good jobs."

> Nine out of ten Americans believe that a strong manufacturing base is very important to our country's standard of living, according to a poll conducted by the consulting firm Deloitte for the Manufacturing Institute. When asked what type of facility they would support to bring jobs to their community, a manufacturing plant was at the top of the list.

Manufacturing wages now rank in the bottom half of all jobs in the United States.

> While in the past, manufacturing workers earned a wage significantly higher than the U.S. average, by 2013 the average factory worker made 7.7 percent below the median wage for all occupations.

The perception that manufacturing jobs are highly paid disguises how many workers are stuck at the bottom.

> Today, more than 600,000 manufacturing workers make just $9.60 per hour or less. More than 1.5 million manufacturing workers—one out of every four—make $11.91 or less.

Manufacturing wages are not even keeping up with inflation.

> Real wages for manufacturing workers declined by 4.4 percent from 2003 to 2013—almost three times faster than for workers as a whole.

In the largest segment of the manufacturing base—automotive—wages have declined even faster.

> Real wages for auto parts workers, who now account for three of every four autoworker jobs, fell by nearly 14 percent from 2003 to 2013—three times faster than for manufacturing as a whole, and nine times faster than the decline for all occupations.
> The growth in the number of auto parts jobs is cause for concern, because the typical parts worker makes one-third less than the typical auto assembly worker, and puts downward pressure on the higher assembly wages.

There has been a resurgence in the number of auto industry jobs since the economic crisis peaked in 2009.

> The auto industry has added nearly 350,000 jobs and invested $38 billion in U.S. facilities since 2009, which indicates a long-term commitment to building vehicles here. As long as vehicles are assembled in the United States, the economic benefits of a just-in-time manufacturing base ensures that jobs at many parts suppliers are also likely to remain in the country, even if wages rise.

New jobs created in the auto sector are worse than the ones we lost.

> In 5 of the 10 "Auto Alley" states—Michigan, Indiana, Ohio, South Carolina, and Tennessee—new hires at auto parts plants are paid roughly one-quarter less than the other auto parts workers in the state.
> In 6 of the 10 Auto Alley states—Alabama, Mississippi, Indiana, Ohio, Michigan, and Illinois—auto parts workers saw real monthly earnings decline between 2001 and 2013. Alabama saw the steepest decline—24 percent—over that period.

Heavy reliance on temporary workers hides even bigger declines in manufacturing wages.

> About 14 percent of auto parts workers are employed by staffing agencies today. Wages for these workers are lower than for direct-hire parts workers and are *not* included in the official industry-specific wage data cited above.
> Estimates based on U.S. Census Bureau data, however, indicate that auto parts workers placed by staffing agencies make, on average, 29 percent less than those employed directly by auto parts manufacturers.

Introduction

Politicians, economists, and other promoters tout increased investment by manufacturers, the benefits of direct and "value added" industry cluster jobs flowing from

manufacturing plants, and the overall economic boost that manufacturing jobs bring to local economies. This narrative creates a sometimes-intense competition among states for manufacturers in the form of subsidies and tax breaks for the perceived benefits. And while the manufacturing sector has been resurging in the last few years, growing by 4.3 percent between 2010 and 2012, the jobs that are returning are not the ones that were lost: wages are lower, the jobs are increasingly temporary, and the promised benefits have yet to be realized.

This report will trace some of the drivers of this anemic rebound in manufacturing and its largest sector, auto manufacturing. "Onshoring" of jobs by manufacturers is on the rise in the United States; jobs are rebounding here due to a combination of a wage convergence between domestic and international jobs and aggressive supports from U.S. states. At the same time, the decline in relative wages in the manufacturing sector is striking: in the last decades, wages in the sector have fallen behind private-sector pay, so that wages for production workers in manufacturing are now more than 4.0 percent less than the private-sector average, and they continue to decline.

While the manufacturing sector has grown in recent years, wages are lower, the jobs are increasingly temporary, and promised benefits have yet to be realized.

Auto manufacturing trends track those of manufacturing overall; the sector is enjoying a rebound in jobs since the auto crisis, but the replacement jobs pay substantially lower wages. While part of the reason for lower average auto wages is due to the relative increase in workers in parts plants that pay less than the assembly plants, the replacement jobs are also increasingly placed via staffing and temporary agencies that pay lower wages. The report uses state data from the "Auto Alley" states—Alabama, Georgia, Illinois, Indiana, Kentucky, Michigan, Mississippi, Ohio, South Carolina, and Tennessee—to provide more refined information regarding lower earnings and wages in auto jobs.

Workers profoundly feel these shifts. Phillip Hicks explained to *The Washington Post* that his only option for a job at a Toyota plant in Georgetown, Kentucky was through the staffing agency Manpower, Inc. Manpower assured Hicks that he would be able to switch to Toyota payroll after a year or two, promising a doubling of his salary from $12.60 to $24.20 an hour and gaining benefits.[1] But after four years, Hicks was still waiting for a permanent employee position, unable to afford health benefits for his family or take more than three days off per year without risking his job, because of a punitive leave policy that only applied to "temps."[2]

If these wage trends continue, manufacturing and auto jobs will not deliver on the promise of creating livable jobs with positive economic revivals in communities and for families.

1. Communities are racing to create "good jobs in manufacturing"

Government policymakers and state and local economic development agencies see manufacturing jobs as important to economic growth because they create a ripple effect, generating additional jobs in other manufacturers that supply a plant, as well as in restaurants and retail, transportation and logistics, and white-collar professional services that support the plant. Manufacturing jobs are thus highly sought after by our federal and state policymakers, lauded as "advanced industries" that generate investments, create a high number of direct and indirect jobs, enhance worker skills, and generate additional economic activity in related industries.[3]

In addition, the general public perceives that manufacturing jobs can uplift the economy by delivering good jobs and generating additional employment in related

[1] Jonathan Weisman, "Permanent Job Proves an Elusive Dream," *Washington Post,* October 11, 2004, 1–2, *http://www.washingtonpost.com/wp-dyn/articles/A22773-2004Oct10.html.*

[2] *Id.*

[3] *See* Economic Development Partnership of Alabama, *Alabama Industry Profile: Automotive Industry,* 2007, *https://aama.memberclicks.net/assets/docs/auto_profile.pdf;* Georgia Power Community and Economic Development, *Automotive Manufacturing in Georgia,* 2014; Ohio Department of Development, *The Ohio Motor Vehicle Industry,* February 2011; Darla Moore School of Business, *The Economic Impact of South Carolina's Automotive Cluster* (Columbia, South Carolina: University of South Carolina, January 2011); Brookings Advanced Industries Series, *Drive! Moving Tennessee's Automotive Sector Up the Value Chain* (Washington, DC: Brookings Institution Metropolitan Policy Program, 2013).

support industries. Recent poll results show that respondents think that manufacturing is the most important job sector, in terms of strengthening the economy.[4] During election seasons in particular, many public-office-seekers resolve to create and promote manufacturing jobs, scheduling photo-ops in front of manufacturing plants with workers and business owners. And our public policymakers promote manufacturers as saviors for still-struggling local economies, luring them with subsidies and state welcome mats.[5]

Recent poll results show that respondents think that manufacturing is the most important job sector, in terms of strengthening the economy.

Thanks to global market forces and aggressive courting and subsidies by the federal government and states, some manufacturing jobs are rebounding, but the quality of too many of the returning jobs is low and fails to live up to workers' and the overall public's expectations.

The perceived importance of manufacturing jobs leads to state competition and generous subsidies. States and towns compete fiercely to lure manufacturing plants with generous subsidies that strain public budgets. These large public subsidies are premised, and largely supported locally, on the expectation that companies will create good manufacturing jobs that boost the local economy, both through jobs at the plant itself as well as those that arise in the network of suppliers that serve it and beyond. Yet, subsidies that taxpayers were asked to support have not always delivered the good jobs that employers promised and the states expected.

Subsidies that taxpayers were asked to support have not always delivered the good jobs that employers promised and states expected.

Subsidy programs have included a broad array of supports, including corporate income tax credits (for job creation, capital investment, research and development), cash grants, low-cost or forgivable loans, enterprise zones, reimbursement for workers' training expenses, and other types of company-specific state assistance.[6] Companies may also receive property tax abatements, whose cost is borne by local taxpayers and comes at the potential expense of other goods and services.[7] But many subsidy programs come with few meaningful conditions: many require little if any job creation; fewer than half provide any kind of wage standard for the workers in subsidized companies; and fewer than a quarter require any level of health coverage.[8] Moreover, subsidy programs aimed at creating new jobs tend to attach wage and benefits standards only to full-time, permanent positions, and have not consistently applied those standards to part-time and temporary workers or contractors within the subsidized company.[9]

Dozens of large manufacturing companies have come to expect states to undertake worker-training responsibilities in exchange for creating jobs, even when the companies have the financial capabilities to train workers themselves.[10] If the training is too narrowly focused on a low-wage temporary job, the state's investment may have no lasting benefit to workers, who are not any more prepared to get a better-paying and higher-skilled job.[11]

The costs to local and state budgets are staggering. Notable deals have included the following:

- A nearly $1.3-billion package to Nissan to build a Canton, Mississippi plant in 2001, including a controversial 25-year state tax rebate for jobs that, in many cases, start at just $12 per hour;

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[4] *See* Deloitte Manufacturing Institute, *Leadership Wanted: U.S. Public Opinions on Manufacturing* (2012 Annual Index), 9; George Heaton et al., *Manufacturing Issues in the 2012 United States Presidential Campaign* (Technology Policy International, June 30, 2012); Toplines polling data commissioned by the Alliance for American Manufacturing (Steelworkers), *http://americanmanufacturing.org/*.

[5] *See id.,* note 1.

[6] Philip Mattera, et al., *Money for Something: Job Creation and Job Quality Standards in State Economic Development Subsidy Programs* (Washington, DC: Good Jobs First, December 2011), *http://www.goodjobsfirst.org/sites/default/files/docs/pdf/moneyforsomething.pdf.*

[7] *Id.*

[8] *Id.*

[9] *Id.* at 19.

[10] Motoko Rich, "Private Sector Gets Job Skills; Public Gets Bill," *New York Times,* January 7, 2012, at *http://www.nytimes.com/2012/01/08/business/states-pay-to-train-workers-to-companies-benefit.html?pagewanted=all.*

[11] *Id.*

- A $1-billion subsidy package for ThyssenKrupp to build a steel plant in Mobile, Alabama;[12]
- A 2007 package deal for Alcoa worth $5.6 billion, giving a 30-year discounted electricity deal for an aluminum plant;
- A $3.2-billion deal in tax breaks and other subsidies for Boeing's aircraft manufacturing facilities in 2003;[13] and
- A 2006 deal with Kia Motors brokered by Georgia Governor Sonny Perdue, worth $410 million and estimated to cost about $160,000 for each of the projected direct jobs at the plant.[14]

Taxpayers may find that they have been essentially asked to subsidize a large company whose promise of good jobs never materializes.

These generous packages may not ultimately make a difference, however, in a manufacturer's decision about whether and where to locate new plants. States have provided generous subsidies to foreign auto companies that, research suggests, would have begun operations in the United States regardless of the supports, in order to strengthen their market share and counteract the effects of import controls.[15] By the 1990s, foreign auto-makers were expanding their operations in the United States, especially in southern "right to work" states, to take advantage of what had now become relatively cheap U.S. labor and to avoid rising shipping costs.[16] Companies also may accept subsidies even as they choose sites for their proximity to markets, as Toyota did in 2003 when it chose to locate a new assembly plant in San Antonio, passing up more generous subsidies to build in other locations because of the new site's access to the large Texas market for pick-up trucks to be built at the plant.[17] Taxpayers may find that they have essentially been asked to subsidize a large company whose promise of good jobs never materializes.

2. "Onshoring" has sparked a resurgence of U.S. manufacturing

Manufacturing in the U.S. is on the rebound. Between 2010 and 2012, the sector grew by 4.3 percent.[18] While the share of employment in manufacturing has shrunk rapidly in the decades since the Second World War, falling from over 40 percent of private non-farm employment in 1945 to just over 10 percent in 2013, there is a core of manufacturing work (including auto and computers) that is bouncing back and is likely to remain in the United States. Foreign and domestic manufacturers are making major investments in the U.S. market, including BMW's Spartanburg, South Carolina plant, which is in the midst of a $900 million expansion.[19] From a trough of 11.5 million jobs in 2010, manufacturing jobs grew to just over 12 million in 2013.[20] Five million workers work in the United States for foreign firms, and one-third of them work in manufacturing jobs.[21]

Chinese, Japanese, and U.S. manufacturers are establishing plants in the South in particular, where labor standards are weaker.

Onshoring by manufacturers is one cause of the domestic resurgence of manufacturing jobs; they are rebounding here because wages are lower than they used to be.[22] Chinese, Japanese, and U.S. manufacturers are establishing plants in the

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[12] "Alabama's Largest Incentives Packages in Last 20 Years," *Business Alabama, http://www.businessalabama.com/Incentives.pdf* (based on data from Good Jobs First).

[13] Philip Mattera, Kasia Tarczynska, and Greg LeRoy, *Megadeals: The Largest Economic Development Subsidy Packages Ever Awarded by State and Local Governments in the United States* (Washington, DC: Good Jobs First, June 2013), *http://www.goodjobsfirst.org/sites/default/files/docs/pdf/megadeals_report.pdf.*

[14] "Case Study of Foreign Auto Assembly Plants," Good Jobs First, accessed October 20, 2014, *http://www.goodjobsfirst.org/corporate-subsidy-watch/foreign-auto-plants.*

[15] *Id.*

[16] *Id.*

[17] *Id.*

[18] David Wessel and James Hagerty, "Remade in the USA: Flat Wages Help Fuel Rebound in Manufacturing," *The Wall Street Journal,* May 29, 2012.

[19] "BMW Manufacturing News Center." *BMW US Factory BMW Expands Export Operation From South Carolina Comments.* N.p., n.d., Web. November 10, 2014.

[20] Calculations by the authors (Bureau of Labor Statistics).

[21] James Fallows, "Made in America, Again," *The Atlantic,* October 2014, 22–23.

[22] According to the Boston Consulting Group, companies find the United States attractive because of its low labor costs relative to Europe and Japan. Brad Plumer, "Is U.S. Manufacturing Making a Comeback—or Is It Just Hype?," *Washington Post Wonkblog,* May 1, 2013.

South in particular, where labor standards are weaker.[23] The Boston Consulting Group's 2012 survey found that 37 percent of the nation's largest manufacturers are considering bringing some production back to the United States from China.[24] The wage differential between Chinese and U.S. workers is projected to shrink to $7 an hour by 2015, down from $17 an hour in 2006.[25] Many manufacturers have returned to the United States due to their just-in-time production cycles, the increasing costs of shipping and moving heavier and bulkier component parts like auto interiors, proximity to demand and to energy sources or natural resources, and the existence of innovation and R&D capacities.

A few examples:

- General Electric moved its electric water heater production from Mexico to Louisville, Kentucky, and hired workers at $13 an hour.[26]
- Lenovo, the Beijing computer maker, opened a manufacturing plant in Whitsett, North Carolina in 2013,[27] due to rising wages in China and the ability to offset rising logistics and transportation costs by relocating to the United States near a large customer base.
- Ford, GM, and Caterpillar also moved some operations back to the United States for similar reasons.[28]
- Ikea opened a furniture factory in Danville, Virginia in 2008.
- Airbus is building a new factory in Mobile, Alabama.[29]

Production and labor costs are no longer that different between international and U.S.-based facilities. There has been a "wage convergence" across U.S. locations,[30] and international wages have risen while transportation and supply-chain costs have gone up.[31] The gap in wages across states is narrowing: the median wage in Georgia, now the lowest among the "Auto Alley" states, is just 19.8 percent lower than the median in Michigan, the highest wage on the list. While this gap is not trivial and could be due to differences in composition of jobs, it may not be enough to compel a firm to move a facility for savings of this magnitude.

While the number of returning jobs is not yet making a dent in the six million manufacturing jobs lost between 2000 and 2009, according to the Bureau of Labor Statistics, the returning jobs bring hope to local economies.[32]

3. Manufacturing wages are in decline

The decline in relative wages in the manufacturing sector is striking. In most of the post-war period, manufacturing paid somewhat higher wages than other industries. But this is no longer the case.

As will be shown below, these reported average wages are artificially high due to a failure of government data to account for the lower wages in staffing and temporary agency—placed jobs in manufacturing. Most of the jobs gained since 2009 have been non-union, a key wage impact for these jobs.[33] Note that the decline in average wages in the sector corresponds with the resumption of its growth—the United States lost manufacturing jobs for decades, accelerating between 2000 and 2009. When manufacturers began growing again, the jobs they added have tended to pay less.

If recent trends continue for the next decade, hourly wages for production workers in manufacturing will be almost 9.0 percent less than for the private sector as a whole.

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[23] *Id.*

[24] *Id.; Id.;* "BMW Manufacturing News Center." *BMW US Factory BMW Expands Export Operation From South Carolina Comments.* N.p., n.d., Web. November 10, 2014.

[25] Plumer, "Is U.S. Manufacturing Making a Comeback?"

[26] Wessel and Hagerty, "Remade in the USA."

[27] Plumer, "Is U.S. Manufacturing Making a Comeback?"

[28] *Id.* GM is moving the Cadillac SRX, the brand's best seller, to Spring Hill, TN. "Cadillac SRX Production Moving to TN, Next-Gen Equinox Going to Mexico," *AutoBlog,* accessed November 5, 2014, *http://www.autoblog.com/2014/08/29/cadillac-srx-spring-hill-chevy-equinox-mexico/.*

[29] *Id.*

[30] Calculations by the authors (Occupational Employment Statistics mean and median wages by state).

[31] Brookings Institute, *Drive!,* at v, 24.

[32] Id.

[33] Plumer, "Is U.S. Manufacturing Making a Comeback?"

The existence of some high-wage manufacturing workers disguises just how many manufacturing workers there are at the bottom of the economy. Table 1, below, shows hourly wage cutoff points for each percentile (10, 25, median, 75, 90).

Table 1. Manufacturing Production Wages by Percentile, 2013

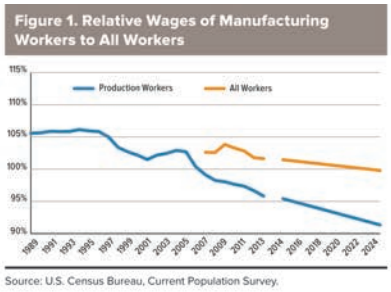
Total Employment in Occupation	Mean Wage	Wage at 10th Percentile	Wage at 25th Percentile	Median Wage	Wage at 75th Percentile	Wage at 90th Percentile
6,163,470	$17.11	$9.60	$11.91	$15.66	$20.76	$27.17

Source: Bureau of Labor Statistics, Occupational Employment Statistics, data for NAICS Sector 31–33, All Production Occupations (51–0000), May 2013, available at *http://www.bls.gov/oes/*.

Returning jobs are simply not paying as much as those that were lost in the recession. Some examples:

- General Electric is producing electric water heaters in Louisville, Kentucky, where workers are making $13 an hour.
- Remington Outdoor Co.—the gun manufacturer—is hiring production workers for its new Alabama manufacturing facility at $11.50 an hour. The project is eventually expected to employ 2,000 people.[34]
- Texas Power Systems, which supplies engines to the Caterpillar plant in Seguin, Texas, hires workers through a staffing agency for $10.50 an hour. Workers get a raise to $10.75 if they are hired on as direct employees.[35]
- A Vaughan-Basset Furniture plant in Galax, Virginia pays its recent hires $9 an hour.[36]

Manufacturing wages have fallen behind the rest of the private sector. The longest view we have on wages is the Census Bureau's Current Population Survey (CPS), which relies on household surveys to track wage data over many years. As shown in Figures 1 and 2, from 1976 to 2006, the median wage for manufacturing workers was higher than for private-sector workers as a whole. That changed in 2007, and has continued to decline since.[37]



Other data sources, such as the Bureau of Labor Statistics' Occupational Employment Statistics (OES), allow us to look more closely at both industry ("manufacturing" or "motor vehicle assembly") and occupation ("all production workers"). The OES data, which collects data from businesses rather than individual workers, shows the median wage for manufacturing workers is 7.7 percent lower than for all workers (public and private sector).[38] When manufacturing workers are compared to all goods-producing workers (which includes other blue-collar production occupations such as construction, logging, and mining), we can see the median wage for

[34] "How to Apply for a Production Job at New $110M Remington Gun Plant in Huntsville," *Al.com, http://www.al.com/business/index.ssf/2014/06/remington_huntsville_jobs_guns.html.*

[35] Sanford Nowlin, "Caterpillar Supplier Eyes More Hiring, Ading Third Production Line," *San Antonio Business Journal,* October 28, 2011, *http://www.bizjournals.com/sanantonio/print-edition/2011/10/28/caterpillar-supplier-eyes-more-hiring.html?page=all.*

[36] *Id.*

[37] U.S. Census Bureau, Current Population Survey.

[38] U.S. Bureau of Labor Statistics, Occupational Employment Statistics, NAICS Sectors 31–33, All Production Occupations (SOC Code 51–000) compared to All Private and Public Sector Workers (SOC Code 00–0000).

manufacturing is 3.6 percent below the average for the goods-producing sector as a whole.[39]

In 2007, the wage gap reported in the CPS data was fairly modest—$19.57 per hour for all private-sector workers, compared with $19.40 an hour for manufacturing workers. (Note that the CPS data include a somewhat broader group of occupations than the BLS data, so median wages tend to be higher than they would be for production workers alone.) But by 2013, the gap had widened considerably, to 85 cents an hour. If these recent trends continue for the next decade, hourly wages for manufacturing workers will be almost 9.0 percent less than for the private sector as a whole. See Figure 1, above.

In previous decades, the path of wages in manufacturing generally followed the pattern of employment. As Figure 2 above shows, in the late 1940s and early 1950s, the average hourly wage for production workers in the manufacturing sector was close to 10 percent higher than the average for the private sector as a whole. The gap peaked in 1985, with wages for manufacturing workers 7.6 percent higher than the average for the private sector as a whole. Manufacturing wages then began to fall relative to the private sector as a whole, dropping below the private-sector average in 2007 and continuing to edge downward in subsequent years. (Note: The sharp drop shown in 1964 is associated with a break in the series; it does not reflect anything that happened in the economy in that year.)

This downward trajectory of manufacturing wages relative to all private-sector employment cannot be overlooked. If the wage trends continue, manufacturing jobs will not deliver on the promise of creating livable jobs with positive economic revivals in communities and families.

Table 2. Changes in Real Wages, All Manufacturing Workers, 2003–2013

Year	Total Employment in Occupation	Mean Wage	Wage at 10th Percentile	Wage at 25th Percentile	Median Wage	Wage at 75th Percentile	Wage at 90th Percentile
2003	7,456,360	$18.04	$10.15	$12.57	$16.38	$22.11	$29.38
2013	6,163,470	$17.11	$9.60	$11.91	$15.66	$20.76	$27.17
Change		**−5.2%**	**−5.4%**	**−5.3%**	**−4.4%**	**−4.7%**	**−6.1%**

Source: Calculations by the authors. (Bureau of Labor Statistics, Occupational Employment Statistics, data for NAICS Sector 31–33, All Production Occupations (51–0000), May 2003 and May 2013, available at *http://www.bls.gov/oes/*.)

Manufacturing wages are not even keeping up with inflation. Wages in manufacturing are not keeping up with inflation.[40] As shown in Table 2, the median wage for all manufacturing workers in the United States is $15.66 per hour. In real terms, however, since 2003, the inflation-adjusted median hourly wage for manufacturing workers has declined by nearly $1.00 an hour, from $16.38 to $15.66 (in 2013 dollars). That amounts to a drop of over 4 percent. For a manufacturing worker who works 40 hours a week, 52 weeks per year, that translates to a drop in income of about $2,000 a year.

The public assumes that manufacturing jobs are highly paid, but the reality is that millions of manufacturing workers are at the bottom of the wage scale.

Looking closer, the data reveal that there have been similar declines in real wages across all income categories.

The hidden reality of low-wage manufacturing workers. When people say they support bringing manufacturing jobs to their community, they are probably thinking of those positions at the higher end of the wage scale. Fortunately, there are still some of those high-wage manufacturing jobs left. They disguise the fact that millions of manufacturing workers are at the bottom of the wage spectrum, however.

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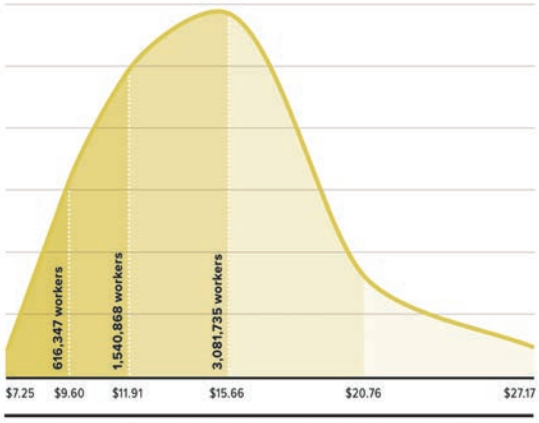
[39] U.S. Bureau of Labor Statistics, Economic News Release, "Table B–3: Average Hourly and Weekly Earnings of All Employees on Private Nonfarm Payrolls by Industry Sector, Seasonally Adjusted," available at *http://www.bls.gov/news.release/empsit.t19.htm.* Based on OES Establishment data. Note that these medians include all occupation codes, not just production occupations, so that median wages are significantly higher.

[40] Wessel and Hagerty, "Remade in the USA."

The Bureau of Labor Statistics' Occupational Employment Statistics (OES) data report wages by percentiles, which provides more detail about what is happening to workers than what is apparent through the reported averages. The 10th percentile, for example, means that 10 percent of workers make at or below that wage rate. The 25th percentile means one-quarter of workers make at or below that wage rate, and so on. The OES data reports that in 2013, there were approximately 6.2 million production workers in manufacturing. More than 600,000 of those workers make just $9.60 or less, and more than 1.5 million of those workers make $11.91 or less.[41] See Figure 3, below.

Figure 3. Distribution of Hourly Wages for Manufacturing (Production) Workers



Source: Bureau of Labor Statistics, Occupational Employment Statistics, data for NAICS Sector 31-33, All Production Occupations (51-0000), May 2013, available at http://www.bls.gov/oes/.

4. Case Study: The changing nature of automotive work

Motor vehicle manufacturing and supply is a significant sector in our economy, and is the largest manufacturing sector.[42] Employment in the auto sector has followed the same general downward path as manufacturing as a whole, although the sector's jobs have rebounded since 2009. At the start of the 1950s, autoworkers accounted for more than 2.0 percent of private-sector employment. This share has dropped to just 0.7 percent in the last decade. But, auto has added over 340,000 jobs since the 2009 fallout, according to the U.S. Treasury, making it one of the few sectors in this recovery that is relatively healthy.[43] By taking a closer look at this group of manufacturing workers—especially workers in the parts sector, who tend to be paid less—we can gain some insight into some of the factors that are driving down wages across the manufacturing sector.

Thus, the definition of what an auto job is has changed over the years, with significant consequences for the wages of workers in this sector. In addition to the drop in its share of total employment, there has also been a substantial change in the employment mix in the sector, changing the way the industry operates and altering

[41] Bureau of Labor Statistics, Occupational Employment Statistics, NAICS Code 31–33 (Manufacturing), Production Occupations (Occupation Code 51–0000), available at *http://www.bls.gov/oes/,* accessed October 2014.

[42] Thomas Klier and James Rubenstein, *Who Really Made Your Car? Restructuring and Geographic Change in the Auto Industry* (Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2008).

[43] U.S. Department of the Treasury, "TARP Programs: Auto Industry," last modified October 14, 2014, *http://www.treasury.gov/initiatives/financial-stability/TARP-Programs/automotive-programs/Pages/default.aspx.*

the quality of the average job. Throughout the 1960s, when wages were at their peak, the share of autoworkers employed in auto assembly plants had been close to 50 percent, when wages were at their peak in the industry. It began to decline slightly in the early 1970s, but was still almost 46 percent in the mid-1980s.

Today, 72% of autoworkers are employed in the auto parts sector, where wages are much lower. Parts suppliers increasingly rely on staffing firms for labor.

Between 1980 and 1990, the mix shifted dramatically. In 1980, 49 percent of autoworkers were in the supplier sector, and by 1990, it had climbed to 69 percent. Growth in the supplier or parts sector since 1990 has been comparatively marginal. In 2013, according to Current Employment Survey data, there were 147,400 auto assembly production workers and 384,500 production workers employed by auto parts suppliers. In other words, today 72 percent of autoworkers—nearly three out of every four—are in the parts sector. That number is significant because, according to data from the Bureau of Labor Statistics, the median wage for workers in the auto parts sector is one-third less (36 percent) than for a worker in a final vehicle assembly plant.[44] Further, auto suppliers—like many other manufacturers—are increasingly turning to staffing and temp firms to supply their labor. The industry has been a multi-tiered one for decades, and the sometimes-elaborate supply chain matrix has grown more complex in recent years. Auto suppliers have begun to outsource their labor supply to staffing and temporary firms, as described below, creating yet another level of contracted work in the industry and lowering wages even further. As shown below, the reported median wage in auto parts manufacturing is around $15 an hour, but this is inflated because of some still relatively higher-paying jobs in union shops or higher-skilled positions in the industry, and because jobs placed by staffing or temporary firms that pay less are measured separately.

The U.S. auto industry is seeing an impressive rebound. As the economy collapsed and auto production in the United States bottomed out in 2009, every automaker—foreign and domestic—scaled back production and laid off workers.[45] Since then, U.S. auto production has rebounded, from a low of 5.7 million vehicles in 2009 to 11.1 million vehicles in 2013.[46] This rebound is reflected both in the number of jobs in the U.S. auto industry and the amount of investment that automakers have made in their U.S. production plants. Foreign and domestic companies have added 350,000 new jobs at their U.S. auto assembly and parts plants since the auto crisis in 2009. They have made $38 billion in capital investment since 2009.[47] This suggests a commitment by U.S. and foreign producers to keep jobs in the United States.

New jobs and more investment are good news. Major investments in U.S. factories makes it more likely that these jobs will stay in the United States, and as long as automakers are assembling cars here, there are economic incentives for them to maintain a significant network of parts plants here as well, given the demands of just-in-time production, high shipping costs for certain types of parts, and the desire to reduce or eliminate the costs of warehousing and inventory of parts. While the manufacturing of certain automotive components—such as airbags, wiring harnesses, seatbelts, and audio systems—have largely moved outside of the United States, there are economic incentives for many other parts to be produced domesti-

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[44] Bureau of Labor Statistics, Occupational Employment Statistics.

[45] Drew Speier, "Toyota Layoffs Shock Workers," WFIE News-14 (Evansville, IN), available at *http://www.14news.com/story/6435509/toyota-layoffs-shock-workers,* accessed November 10, 2014; Jeffrey Collins, "Layoffs Ahead for S.C. Temp Workers at BMW," *Charlotte Observer,* October 18, 2008, available at *http://www.charlotteobserver.com/2008/10/18/261224_layoffs-ahead-for-sc-temp-workers.html#.VGEgfTTF9yw,* accessed November 10, 2014; Ralph Kisiel, "Honda Axes Factory Temps as Output Falls," *Automotive News,* March 9, 2009, available at *http://www.autonews.com/article/20090309/OEM01/303099843/honda-axes-factory-temps-as-output-falls,* November 10, 2014; "Mercedes Layoffs Not Sign of Healing Economy," *Tuscaloosa News,* September 17, 2009, available at *http://www.tuscaloosanews.com/article/20090917/NEWS/909169969,* accessed November 10, 2014; Ian Rowley, "After Huge Loss, Nissan Plans More Layoffs," *Bloomberg Business Week,* February 9, 2009, available at *http://www.businessweek.com/globalbiz/content/feb2009/gb2009029_103868.htm,* accessed November 10, 2014; Michael Harley, "Hyundai to Slow Production of Santa Fe, Sonata," *Autoblog.com,* October 19, 2008, available at *http://www.autoblog.com/2008/10/19/hyundai-to-slow-production-of-santa-fe-sonata/,* accessed November 10, 2014.

[46] Calculations by the authors ("United States Vehicle Production by Manufacturer," WardsAuto, available at *www.WardsAuto.com,* accessed October 26, 2014).

[47] *State of the U.S. Automotive Industry: Investment, Innovation, Jobs, and America's Economic Competitiveness* (Washington, DC: American Automotive Policy Council, June 2014), *http://www.americanautocouncil.org/sites/default/files/State_Of_The_US_Automotive_Industry_2014.pdf.*

cally, near the assembly plants they supply. These include parts of the car that are too heavy or bulky to ship, as well as parts built essentially to order in just-in-time plants where inventory is measured in hours, not days or weeks.

But the quality of automotive jobs is declining. Historically, average pay in the auto industry far outpaced other private-sector jobs. In the 1950s and 1960s, the industry-wide average wage was roughly 30 percent higher than the average for the private sector as a whole. It then rose relative to the private-sector average in the 1970s, peaking in the mid-1980s at more than 150 percent of the average private-sector wage.

But by many measures—because of the declines in the relative pay in the parts sector and also the decline in the share of workers employed in auto assembly plants—average pay for autoworkers is now comparable to pay in the rest of the private sector.

As Table 3 below shows, between 2003 and 2013, the real (inflation-adjusted) wage for auto parts workers fell by 13.7 percent. Auto parts workers toward the top of the pay scale—the "good manufacturing jobs" that communities work so hard to retract and retain—saw the most dramatic decline. The wage at the 75th percentile—presumably, the most skilled and experienced employees—plummeted by 29 percent. In auto assembly, real wages fell by 21 percent during that same period.

Table 3. Changes in Real Wages, Motor Vehicle Parts Manufacturing Workers, 2003–2013

Year	Wage at 10th Percentile	Wage at 25th Percentile	Median Wage	Wage at 75th Percentile	Wage at 90th Percentile
2003	$11.61	$14.26	$18.35	$28.41	$36.54
2013	$10.38	$12.63	$15.83	$20.17	$27.13
Change	**−10.6%**	**−11.4%**	**−13.7%**	**−29.0%**	**−25.8%**

Source: Calculations by the authors. (Bureau of Labor Statistics, Occupational Employment Statistics, data for NAICS Code 3363, All Production Occupations (51–0000), May 2003 and May 2013, available at *http://www.bls.gov/oes/*.)

The median wage for auto parts workers is $15.83 an hour, still 17 cents an hour above the median for all manufacturing workers. One out of ten auto parts workers makes less than $10.38 an hour, and approximately one out of every four makes less than $12.63—just slightly above the average for all manufacturing workers.

As Table 4 shows, median wages for autoworkers are falling significantly faster than for manufacturing workers as a whole. Median wages for auto parts workers, for example, fell three times faster than wages for manufacturing workers as a whole, and nine times faster than the average for all occupations. Motor vehicle manufacturing fell nearly five times faster than the average for all manufacturing workers.[48] Because auto companies factor in labor costs when they decide whether to do work in-house or contract with a supplier, lower wages in the supplier sector can drag down wages at the final assembly plants as well.

Table 4. Comparison of Real Wages, 2003–2013, Manufacturing Occupations vs. All Occupations

Year	All Occupations	All Manufacturing	Motor Vehicle Manufacturing	Parts Manufacturing
2003	$17.13	$16.38	$31.45	$18.35
2004	$17.06	$16.16	$31.09	$18.26
2005	$16.88	$15.90	$28.38	$17.74

[48] Bureau of Labor Statistics, Occupational Employment Statistics, including data for All Occupations (SOC Code 00–000) and production workers (SOC Code 51–000) for all manufacturing workers (NAICS 31–33), Motor Vehicle Manufacturing (NAICS 3361), and Motor Vehicle Parts Manufacturing (NAICS 3363), *http://www.bls.gov/oes/,* accessed October 2014.

Table 4. Comparison of Real Wages, 2003–2013, Manufacturing Occupations vs. All Occupations—Continued

Year	All Occupations	All Manufacturing	Motor Vehicle Manufacturing	Parts Manufacturing
2006	$16.88	$15.76	$28.37	$17.43
2007	$16.97	$15.73	$29.09	$16.99
2008	$16.85	$15.65	$29.37	$16.49
2009	$17.32	$16.10	$29.62	$16.74
2010	$17.38	$16.10	$27.93	$16.69
2011	$17.16	$15.88	$26.11	$16.53
2012	$16.95	$15.74	$25.21	$16.14
2013	$16.87	$15.66	$24.83	$15.83
% Change	**−1.52%**	**−4.40%**	**−21.05%**	**−13.73%**

Source: Calculations by the authors. (Bureau of Labor Statistics, Occupational Employment Statistics, All Production Occupations (51–0000) for NAICS Sector 31–33 and NAICS Codes 3361 and 3363, and All Occupations (00–0000), May 2003 and May 2013, available at *http://www.bls.gov/oes/*.)

The auto jobs being created are worse than the ones lost. The wage trends in the automotive sector track the trends in overall manufacturing: the replacement jobs following the auto crisis and recession are not on a par with those that were lost.

Alabama: Auto Jobs on the Rise, But Paychecks Decline

Alabama refers to itself as the "center of the Southeast's auto industry,"[49] and with good reason. Before 1997, when Mercedes opened the first auto assembly plant in the state, the Alabama automotive industry was nearly non-existent. Then, Honda opened a plant in Alabama in 2001, followed by Hyundai in 2005.[50] Kia built its plant in West Point, Georgia, on the Alabama border, in 2010.[51] Toyota has also made engines in Huntsville, Alabama, since 2003.[52] Today, there are 12,800 workers employed at auto assembly plants in the state, and another 20,700 at parts suppliers.

Since 2001, the number of auto parts workers in Alabama has grown by 64 percent. But while the number of auto jobs in Alabama has been on the rise, paychecks have been on the decline. From 2001 to 2013, real (inflation-adjusted) monthly earnings for Alabama auto parts workers have declined by 42 percent-more than any other major auto-producing state. The average Alabama auto parts worker took home $1,593 less in 2013 than he or she did in 2001.[53]

What may be contributing to these falling wages, even as the Alabama auto industry thrives? There are several likely factors:[54]

- New hires are taking home about $600 less per month than the typical auto parts worker in the state—17 percent below the statewide average. The signifi-

[49] Economic Development Partnership of Alabama, Alabama Department of Commerce, "Alabama Automotive Industry Profile," 2, accessed October 11, 2014, *http://www.madeinalabama.com/assets/2013/01/automotive-industry-profile.pdf.*

[50] "Automotive Hub of the South," Amazing Alabama, Alabama Power Corp., accessed October 11, 2014, *http://www.amazingalabama.com/key-industry-targets-automotive.html.*

[51] Kia Motor Manufacturing Georgia, "Our History," accessed October 11, 2014, *http://www.kmmgusa.com/about-kmmg/our-history.*

[52] "Toyota Marks Milestone 3-Millionth Alabama-Made Engine," (Alabama Department of Commerce, February 18, 2014) *http://www.madeinalabama.com/2014/02/milestone-3-millionth-alabama-made-engine/*.

[53] U.S. Census Bureau, Quarterly Workforce Indicators, NAICS Code 3363 (Motor Vehicle Parts Manufacturing), available at *http://ledextract.ces.census.gov/*. Calculations by the authors.

[54] U.S. Census Bureau, Quarterly Workforce Indicators, NAICS Code 3363 (Motor Vehicle Parts Manufacturing), available at *http://ledextract.ces.census.gov/*. Calculations by the authors.

cant number of new hires in Alabama—both in terms of new auto parts jobs coming to the state, and the significant turnover in existing jobs-contribute to pulling down the average wage for autoworkers overall.

- In the period from 2001 to 2013, the number of young auto parts workers (aged 19 to 34) nearly tripled—a growth rate twice as fast as the Alabama auto parts industry as a whole.
- Young workers tend to make less than older workers. In Alabama, the monthly incomes of auto parts workers under 22 are two-thirds of the state average wage for that sector. Workers aged 22 to 24 make three-quarters of the average.
- Meanwhile, older workers have seen their wages go backwards. Alabama auto parts workers 45 and older saw real wages decline by 50 percent or more from 2001 and 2013. Workers aged 35 to 44 saw real wages shrink by one-third over that same period.

In addition to the evidence cited above, state-level data on the auto industry taken from the Census Bureau's Quarterly Workforce Indicators—which measures quarterly earnings, not hourly wages—can shed some additional light on trends affecting workers. Auto manufacturing is concentrated in a relatively small number of states, known as the "Auto Alley"—mainly Michigan, Ohio, Indiana, Illinois, Kentucky, Tennessee, Mississippi, South Carolina, Alabama, and Georgia.

Median wages for autoworkers are falling significantly faster than for manufacturing workers as a whole.

For auto parts workers, just one state—Mississippi—has new hires collecting monthly earnings similar to the statewide average for parts workers. In every other state, new-hire wages are dramatically lower. See Table 5. In 5 of the 10 states, monthly incomes for new hires are around one-quarter less than the state average.

Table 5. Monthly Earnings, Motor Vehicle Parts Manufacturing Workers, New Hires vs. All Workers

State	% Difference for New Hires
Michigan	−28%
Indiana	−27%
Ohio	−25%
South Carolina	−24%
Tennessee	−23%
Kentucky	−18%
Alabama	−17%
Illinois	−16%
Georgia	−7%
Mississippi	1%

Source: Calculations by the authors (U.S. Census Bureau, Longitudinal Employer-Household Dynamics, Quarterly Workforce Indicators, 2013, NAICS Code 3363, available at *http://lehd.ces.census.gov/*.)

Real monthly earnings are declining for all autoworkers, not just new hires. In a majority of Auto Alley states, parts workers have seen real (inflation-adjusted) monthly earnings decline from 2001 to 2013. See Table 6, bottom right. Kentucky and Georgia—the two states with the lowest monthly earnings in 2001—saw increases, along with South Carolina. In Alabama, which saw the largest decline in monthly earnings at 24 percent, a worker's monthly paycheck was $1,200 less in 2013 than in 2001.

Table 6. Change In Monthly Earnings, 2001–2013, Motor Vehicle Parts Manufacturing Workers

State	% Difference in Monthly Earnings, 2003–2013
Alabama	−24.0%
Mississippi	−13.6%
Indiana	−12.1%
Ohio	−9.4%
Michigan	−3.3%
Illinois	−1.6%
Georgia	3.8%
Kentucky	7.9%
Tennessee	8.0%
South Carolina	13.3%

Source: Calculations by the authors. (U.S. Census Bureau, Longitudinal Employer-Household Dynamics, Quarterly Workforce Indicators, 2001 and 2013, NAICS Code 3363, available at *http://lehd.ces.census.gov/*.)

5. Heavy reliance on staffing agencies obscures much deeper problems in manufacturing

Often lost in the official numbers on employment fluctuations and wage trends is a closely related but not well-tracked trend that has reshaped manufacturing jobs over the past two decades: domestic outsourcing. Workers looking for a manufacturing job, and especially one in an auto plant today, increasingly find that the only open positions are placed by staffing agencies that pay lower wages and provide fewer benefits as compared with direct hires, and that offer limited opportunities to secure a permanent-employee position. Government data fail to include staffing agency workers in the official counts for manufacturing workers and fail to factor their wages into industry averages, however, making it difficult to track this trend with precision. Yet existing data sources offer ample evidence of this dramatic trend in manufacturing and the extent to which it has degraded jobs; these sources are substantiated by anecdotal evidence from workers and from the many towns where manufacturing plants have blossomed with the support of generous subsidies but have failed to provide family-supporting jobs.

Manufacturing firms are increasingly turning to staffing and temporary agencies to hire their workers. In the two decades from 1989 to 2009, two emergent labor market trends reshaped the nature of manufacturing jobs.[55] First, manufacturers looked to the staffing services industry to source their production workers, creating a shift in the types of jobs that staffing companies placed: that is, increasingly "blue collar" and other manual labor, rather than the office-based clerical jobs that defined the staffing industry in earlier years. The number of staffing agency workers assigned to manufacturing grew by about one million from 1989 to 2000, from about 419,000 workers to almost 1.4 million, and data suggests that this trend continues.[56] In 1990, 42 percent of staffing agency jobs were office and administrative support work, while only 28 percent were blue-collar positions.[57] This balance had reversed by 2006, with blue-collar workers accounting for 44 percent of staffing

[55] Matthew Dey, Susan N. Houseman, and Anne E. Polivka, *Manufacturers' Outsourcing to Staffing Services,* 65 Indus. and Lab. Rel. Rev. 533 (Ithaca, NY: Cornell University ILR School, June 2012), *http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=2126&context=ilrreview.*

[56] *Id.* at 548–49.

[57] *Id.* at 543.

agency jobs.[58] Industrial and factory staffing now form the single largest source of revenue for the staffing industry.[59]

Second, manufacturing employers began to rely more heavily on staffing services to fill core production and low-skilled manual occupations as opposed to only for peripheral functions, such as janitorial.[60] In 1989, less than 1 percent of all production workers were employed by staffing agencies, but by 2000, that fraction had risen to 6.1 percent.[61] This upward trend was mirrored in other manual occupations: 6.4 percent of all helpers, laborers, and hand material movers in 1989 were employed by staffing agencies, rising to 15.6 percent by 2000.[62] In 1989, there were approximately 43 direct-hire workers for every one staffing agency worker in manufacturing, but by 2000, researchers estimate that this ratio had dropped to 12 to 1.[63] And data suggest that the trend has continued, with the staffing agency sector adding 9.2 percent, or 1.3 million workers, to direct-hire manufacturing in 2006, the last year this data is available, as compared with 2.3 percent in 1989 and 8.2 percent in 2000. Staffing agencies made an even more dramatic addition to low-skilled manual occupations in 2006, where for every 100 low-skilled manual laborers directly hired by manufacturing employers, there were another 35 low-skilled manual laborers hired by staffing agencies.[64]

Outsourcing dramatically affects job-growth and wage-level numbers. Taking into account the rise of outsourcing dramatically alters measures of manufacturing employment and of labor productivity.[65] While measured manufacturing employment declined by 4.1 percent from 1989 to 2000, if staffing agency workers (who usually work alongside and under the same supervision as direct-hire employees) were counted, manufacturing employment would have actually risen by 1.3 percent.[66] Factoring in manufacturers' use of staffing agency workers does not erase the long declines in manufacturing employment since 2000, but it does show that an increasing share of manufacturing work is being done by staffing agency workers.[67]

For instance, the growth of outsourcing and the related decline in wages is apparent in the NAICS data on the occupation of Team Assemblers—essentially, assembly line workers—which represents the largest category of production workers in manufacturing. Since 2002, the number of temporary Team Assemblers across all industries has grown from 57,520 (5.0 percent of all team assemblers) in 2002, to 176,590 (16.7 percent) in 2013.[68] Over the same time period, the total number of Team Assemblers, across all industries, shrunk 7.1 percent.[69] See Figure 4. This means temporary workers are playing an increasing part of a continuously shrinking manufacturing pie.[70]

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[58] *Id.*

[59] Rebecca Smith and Claire McKenna, *Temped Out: How the Domestic Outsourcing of Blue-Collar Jobs Hurts America's Workers* (New York, NY: National Employment Law Project and National Staffing Workers Alliance, 2014), 4, *http://www.nelp.org/page/-/Reports/Temped-Out.pdf?nocdn=1,* citing Jeremy Edwards, IBISWorld Industry Report 56132, Office Staffing and Temp Agencies in the U.S. (2014).

[60] Dey, *Manufacturers' Outsourcing* at 534.

[61] *Id.* at 547.

[62] *Id.* at 547–48.

[63] *Id.* at 549.

[64] *Id.* at 557.

[65] *Id.* at 534.

[66] *Id.* at 557.

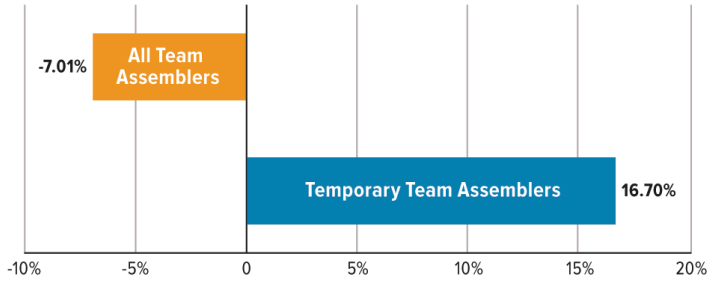
[67] *Id.*

[68] Unpublished Census Bureau data, on file with authors.

[69] *Id.*

[70] Bureau of Labor Statistics, Occupational Employment Statistics data sets. Retrieved on June 23, 2014 from *http://www.bls.gov/oes/tables.htm.*

Figure 4. Team Assemblers, Change in Employment, 2002–2013



Source: Unpublished Census Bureau data, on file with the authors.

Unpublished Census Bureau data suggests this economy-wide distribution of temporary Team Assemblers is mimicked within the auto parts sector. The Quarterly Survey of Plant Capacity records, but does not publish, the number of staffing agency workers assigned to manufacturing. For the first two quarters of 2014, this data show that auto parts manufacturers used staffing agencies to supply 13.5 to 14.5 percent of their workforce.[71] Assuming that the currently reported 318,020[72] auto parts production workers only represent 85.5 percent of workers on the shop floor, an additional 53,933 staffing agency workers (and 17,623 agency-employed Team Assemblers) are unaccounted for in official industry figures. This is significant, because the median wage of Team Assemblers working through staffing agencies is 29 percent lower than Team Assemblers directly hired in the auto parts industry.[73]

The growth of agency-employed production workers and their below-industry-standard wages may help explain in part the fall in auto parts production wages over the past decade. Between 2003 and 2013, real (inflation-adjusted) wages for Team Assemblers in the auto parts industry fell $1.47 an hour (9.2 percent), while real wages for all auto part production workers fell $2.77 an hour (15 percent). The degradation we see in the industry therefore looks closely connected to the increased outsourcing of jobs to temporary staffing agencies. See Table 7, below.

Table 7. Team Assembler Wages by Industry

Industry	Mean Wage	Wage at 10th Percentile	Wage at 25th Percentile	Median Wage	Wage at 75th Percentile	Wage at 90th Percentile
Auto Parts	$15.56	$10.21	$12.17	$14.54	$17.72	$23.14
Temp Agencies	$11.36	$8.12	$8.87	$10.33	$12.67	$16.79

Source: Bureau of Labor Statistics, Occupational Employment Statistics, data for NAICS Codes 3363 and 5631, Team Assemblers (51–2092), May 2013, available at *http://www.bls.gov/oes/*.

Anecdotal reports show that more auto plants are hiring via staffing and temporary agencies, with poorer working conditions. Numerous press stories profile workers with few options as the factories in their towns replaced the employees laid off during the recession with staffing agency workers, and as foreign auto manufacturers that established plants in the South starting in the 1990s are relying heavily on staffing agencies to provide labor. Some companies abruptly converted

[71] U.S. Census Bureau (2014), Quarterly Survey of Plant Capacity, unpublished data.
[72] Bureau of Labor Statistics (May, 2013), *Occupational Employment Statistics,* retrieved October 22, 2014 from *http://www.bls.gov/oes/tables.htm.*
[73] *Id.*

their existing employees to "temporary" employment. Employees at A&E Services, a small auto parts manufacturer in Chicago, for example, learned that their firm would "no longer hold general labor employees on its payroll" and that they would have to agree to work through a temporary staffing agency if they wanted to keep their jobs.[74]

Workers feel these shifts deeply. In addition to the Philip Hicks story mentioned above in the introduction, Betty McCray found herself in a similar situation when she took a job at a Nissan Auto plant in Smyrna, Tennessee, preparing parts for the assembly line.[75] Although she works alongside permanent Nissan employees, as a staffing agency worker, she is paid less, gets no personal days, and has to bring in a doctor's note in order to get a sick day.[76]

The growth of the fiercely competitive auto parts supply sector and its heavy use of outsourcing can also have serious implications for workers' health and safety. Under intense pressure by auto companies to maximize output while constraining labor costs, suppliers and their contractors may choose to ignore safety precautions in an attempt to cut the bottom line.[77] Workers hired for temporary agency positions are unlikely to speak up and are much less likely to be able to seek support in a union, which have historically monitored safety conditions at the major auto company plants that are their base.[78] This dynamic, combined with lax occupational safety and health standards and enforcement, and the prevalence of dangerous chemicals in auto seating and other parts supply, has proven hazardous for workers, who have developed sinus infections, chronic coughs, bronchitis, shortness of breath and asthma.[79]

Conclusion

Jobs in manufacturing and auto, important growth-generating industries, are not as good as they once were. New hires in auto earn less than $10 an hour. What will these jobs look like in 10 years if these trends continue? The ramifications for the workers, the communities that are hosting these jobs, and the U.S. economy are far-reaching, and include increasing inequality as middle-class jobs do not return, drains on taxpayers as local and federal subsidies fail to alter manufacturers' behavior and fail to deliver quality jobs, and a lack of accountability for businesses that seek only to enhance profits at the expense of working families and local communities.

The promise of manufacturing and auto, its largest component industry, is not lost, however. The government can resurrect the collection of credible data on temporary and staffing jobs again to better understand the impact those structures have on jobs and communities, and public entities providing subsidies should track results and hold recipients of hard-earned taxpayer dollars to account for the quality of the jobs created. This information will allow policymakers, manufacturers and the public to invest in good jobs that will sustain our communities for the decades to come.

Questions Submitted for the Record to Josh Nassar

Questions Submitted by Hon. Ron Wyden

Question. During the hearing, you noted the range of policies that affect companies' decisions to manufacture in the United States, as well as U.S. competitiveness with respect to key technologies such as electric vehicles. Sales of electric vehicles are expected to continue to grow at a rapid pace, with one Bloomberg report projecting that by 2040, 55 percent of new car sales globally will be electric and 33 percent of cars on the road will be powered by batteries.

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[74] Weisman, "Permanent Job Proves an Elusive Dream," 1–2.
[75] Sarah Jaffe, "Forever Temp?", *In These Times,* January 6, 2014, *http://inthesetimes.com/article/15972/permatemps_in_manufacturing.*
[76] *Id.*
[77] Seth Freed Wessler, "What's Making These Selma, Alabama Auto Parts Workers So Sick", NBC News, In Plain Sight, July 14, 2014, *http://www.nbcnews.com/feature/in-plain-sight/whats-making-these-selma-alabama-auto-parts-workers-so-sick-n150136.*
[78] *Id.* at 4.
[79] *Id.*

With respect to tariffs, how might a targeted tariff affect U.S. competitiveness in producing electric vehicles?

Answer. Today, most of the production footprint for tomorrow's advance automotive technology is being developed overseas. If this trend continues, as the United States migrates from internal combustion engines to electric vehicles (EVs), the roughly 95,000 U.S. jobs in engine and transmission manufacturing will not be backfilled with EV component manufacturing jobs.

Lithium-ion batteries are the most valuable component in EVs. With the growth of demand from EVs, global lithium-ion battery production capacity is expected to grow by 73 percent between 2017 and 2021 [1] and lithium-ion batteries could become a $40 billion market by 2025. This has sparked a race to develop the production capacity to meet growing battery demand and it is this race that will determine the geography of much of the EV value chain. The United States is currently falling behind its Asian and European counterparts.

Chinese and EU governments are directly supporting this fledgling industry, with the EU recently announcing billions of euros in co-funding for lithium-ion battery factories.[2] It is projected that by 2021, 56 percent of battery manufacturing capacity will be located in China and another 19 percent will be in Europe. The United States will only have 14 percent of global battery production capacity and this production will be highly dependent on the success of one plant, the Tesla-Panasonic Gigafactory in Nevada.[3] Three of the five top battery companies will be based in China, along with LG Chem in South Korea and Tesla-Panasonic in the United States.[4]

The EV value chain is not just battery mega-factories—it is an entire supply chain of associated battery and EV components that will determine which countries will benefit from the shift to EVs. To take just one example, battery separators are a component that prevents short-circuits by creating a barrier between the anode and cathode materials in a lithium-ion battery. The battery separator market is projected to be worth $2.7 billion by 2025, its growth driven by EV battery demand.[5] Nearly all the global manufacturing capacity for battery separators is in China, Japan, and South Korea.[6]

Additionally, EVs and autonomous vehicles (AVs) of the future will be heavily reliant on semiconductors. It is estimated that an EV/AV will have over a thousand dollars' worth of semiconductors. This increase in semiconductor usage comes at a time when U.S. semiconductor manufacturing has been in decline. The total number of U.S. fabs has decreased from 123 in 2007 to 95 today,[7] while the industry employs 100,000 less production workers than it did at the turn of the century.[8] Currently, U.S. manufacturers account for only 13 percent of the global semiconductor supply. This is because the United States is no longer attracting new fabs. In 2011, of 27 high-volume fabs built worldwide, only one was in the United States; 18 were in China and 4 in Taiwan. In 2018, 20 new fab projects had been announced in China, with total investment exceeding $10 billion.[9]

Foreign governments have shown that properly crafted tariffs and industrial policies can encourage domestic electric vehicle and component R&D and manufacturing.

In particular, taking into consideration overall value, associated R&D, and national security interests, the United States should consider targeted tariffs on the following:

- Lithium-ion batteries;
- Electric motors;
- E-axles;
- Battery safety and thermal control systems;

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[1] *https://about.bnef.com/electric-vehicle-outlook/#toc-download.*
[2] *https://www.ft.com/content/097ff758-cec3-11e8-a9f2-7574db66bcd5.*
[3] *https://www.ft.com/video/0bdc9c56-021a-4f02-b508-e26a0170b903.*
[4] *https://www.ft.com/video/0bdc9c56-021a-4f02-b508-e26a0170b903,* 0:40.
[5] *https://ec.europa.eu/jrc/sites/jrcsh/files/jrc105010_161214_li-ion_battery_value_chain_jrc 105010.pdf,* p. 21.
[6] *https://data.bloomberglp.com/bnef/sites/14/2017/07/BNEF-Lithium-ion-battery-costs-and-market.pdf,* page 6
[7] *http://mforesight.org/download/7817/.*
[8] BLS, Quarterly Census of Employment and Wages (QCEW) for NAICS 334413, *http://www.bls.gov/cew/.*
[9] *http://mforesight.org/download/7817/.*

- Semiconductors;
- Lidar; and
- Automotive CPUs.

Anchoring this manufacturing footprint and know-how in the U.S. will pay dividends into the future, offering export opportunities and maintaining the United States' technological competitive edge. However, we recognize tariffs alone may not create the needed investment. Any tariff should be coupled with an industrial policy that supports R&D and encourages the fledgling EV/AV market, through direct investment, government procurement, regulation and incentives. If the EV manufacturing footprint takes root outside the United States, it will be extremely difficult for the United States to recapture that work in the future. To date, no major manufacturing sector that has been offshored has ever been reshored to the United States. The capital intensity and long manufacturing lead times in auto, makes the possibility of reshoring the EV market once it has left, all the less likely.

Question. How do other administration policies, including tax policies and policies with respect to fuel economy standards, affect the U.S. industry and U.S. manufacturing of automotive goods such as electric vehicles?

Answer. Under the Tax Cuts and Jobs Act (TCJA) (Pub. L. 115–97), the new, official corporate tax rate is 21 percent.[10] But U.S. multinational corporations pay at most only half that rate on their offshore profits as they do on their earnings here at home, since they can deduct half of their offshore profits from taxation. The new law also gives U.S. corporations an annual deduction on their offshore profits worth 10 percent of their offshore tangible assets, such as factories. For example, a company with $100 million worth of tangible offshore assets pays no U.S. taxes on the first $10 million of foreign profits they report. Many companies will likely end up paying no U.S. taxes on foreign earned profits. This law created new incentives for U.S. corporations to move real investments offshore, along with the manufacturing jobs that go with them. These incentives will become greater over time.

TCJA also repealed the Domestic Production Activities Deduction. This deduction was a tax incentive for keeping manufacturing jobs in the United States. Its repeal further encourages offshoring. The more investments they offshore, the less they pay in taxes. Companies also received a massive tax break in the form of a repatriation holiday. In 2004, companies primarily used increased revenue for stock buybacks after Congress allowed a one-time tax holiday for repatriated foreign earnings.

History is repeating itself. Once again, companies are taking billions in windfall profits and putting them toward dividends or buying back their own stocks, which benefits shareholders. America's biggest companies are not generally using their tax cuts on creating new jobs, but instead are using them for stock buybacks. Some of the biggest stock buyback announcements so far in 2018 include: Apple—$100 billion; Cisco—$25 billion; Wells Fargo—$22.6 billion; Pepsi—$15 billion; AbbVie—$10 billion; Amgen—$10 billion; Google parent Alphabet—$8.6 billion; Visa—$7.5 billion; and eBay—$6 billion.[11] According for Americans for Tax Fairness, the total amount of stock buybacks authorized by companies since TCJA was enacted is over $786 billion.

Companies who benefit from tax breaks to build and maintain factories face practically no consequences for pocketing savings and closing shop in the United States. We need claw back provisions in the law to stop this long-standing abuse of tax payer funds.

The tax code is full of perverse incentives for outsourcing. For example, the cost of moving personnel and components of a company to a new location qualifies for a tax deduction. Congress should address the misguided policies enacted under TCJA and prior laws to encourage U.S. companies to maintain and create auto manufacturing jobs in the United States. The Bring Jobs Home Act sponsored by Senator Stabenow would only keep this deduction in place for U.S. companies that bring jobs and business activity back home, while this tax benefit would be eliminated for companies that ship jobs overseas. Companies should not be able to deduct costs for closing factories. That is totally unacceptable. The Bring Jobs Home Act should be passed into law.

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[10] *https://www.cbpp.org/research/federal-tax/new-tax-law-is-fundamentally-flawed-and-will-require-basic-restructuring.*

[11] *http://time.com/money/5267940/companies-spending-trump-tax-cuts-stock-buybacks/.*

Manufacturing workers and domestic manufacturing face serious headwinds. The causes are many from bad trade deals that lower wages and destroy good paying U.S. jobs, perverse tax provisions that incentivize businesses to move jobs overseas, and employers who do not recognize workers' right to collectively bargain. Extensive damage has already been done and workers are paying the price for policy failures and neglect by our elected leaders over many decades.

To be clear, Corporate Average Fuel Economy standards (CAFE) and Greenhouse Gas (GHG) standards are not the problem. Nevertheless, the National Highway Traffic Safety Administration (NHTSA) and the Environmental Protection Agency (EPA) are proposing to amend existing CAFE and GHG emissions standards for passenger cars and light trucks and establish new standards, covering model years 2021 through 2026. The UAW does not support the preferred alternative in the SAFE Vehicles Proposed Rule, which would freeze emissions standards at Model Year 2020 because freezing emissions standards is bad for the U.S. economy, the domestic auto industry, our members, and the communities that rely on union manufacturing jobs. It would set back efforts to address air pollution and climate change crisis. We cannot afford to ignore this global crisis that threatens our shared future.

We are also concerned that proposed rule threatens to disrupt the "One National Program," creating uncertainty for the industry and discouraging investment. It also risks allowing the U.S. auto industry to fall behind on advanced vehicle technology and sustainable innovation, just as other nations are promoting increased efficiency and lower emissions.

As we know, fuel efficiency is the auto industry's future. From electric vehicles to full-sized pickups, fuel efficiency is improving across the industry, including in vehicles made by UAW members. We support the development of Electric Vehicles and are concerned that a significant portion will not be built in the United States. As referenced earlier, most of the production footprint of tomorrow's advance automotive technology is overseas and the sales of electric vehicles are expected to continue to grow at a rapid pace.

Countries around the globe continue to promote greater efficiency and lower emissions. The greener vehicles of the future are going to be made somewhere and other countries are preparing for these new technologies. If we ignore these realities, we could see the U.S. auto industry fall behind on advanced technology, hurting the American economy and American workers. The final regulations must incentivize continuing investment in and production of advanced technology components and vehicles in the United States.

Question. In your testimony you noted that wages in the U.S. automotive industry have fallen even though productivity has substantially improved.

In your view, why have wages in the U.S. auto industry not kept pace with greater productivity?

Answer. A variety of factors have contributed to wage stagnation in the U.S. auto industry even though worker productivity has increased substantially throughout the decades. Bad trade deals, inadequate investment in worker training and education, and weak labor laws have all contributed to wage stagnation in the U.S. auto industry.

The United States lost 5 million manufacturing jobs between 2000 and 2014. Per the Economic Policy Institute's (EPI) Manufacturing Job Loss: Trade, Not Productivity, Is the Culprit,[12] trade and recession were primarily responsible for the decline in employment, with technological advances and other factors also playing a part. Between 2000 and 2007, 3.6 million jobs were lost to trade deficits, mostly in manufacturing. The Bureau of Labor Statistics data supports EPI's argument. Wages have fallen even though productivity has substantially improved. Labor unit costs fell between 2000 and 2014 from 121.8 to 94.9 for auto assembly and parts from roughly 121 to 86. Productivity increased dramatically over the same period.

Wages have fallen even though productivity has substantially improved. The average factory worker makes less than the median wage for all occupations. Real wages in manufacturing fell between 2003 and 2013 at a faster rate than for workers overall.[13] According to the Bureau of Labor Statistics, one fourth of manufacturing jobs

[12] *https://www.epi.org/publication/manufacturing-job-loss-trade-not-productivity-is-the-culprit/*.

[13] "Ruckelshaus, Catherine, and Leberstein, Sarah, "Manufacturing Low Pay: Declining Wages in the Jobs that Built America's Middle Class," November 2014.

make less than $13.07 per hour.[14] U.S. autoworkers wages have been suppressed and bad trade agreements have contributed to this troubling reality.

The United States imported $187 billion in car parts in 2014 (Mexico's imports constitute the largest share). Imported parts amounted to $12,135 of foreign content for every light vehicle built in America. As the flood intensified, wages declined and jobs moved to Mexico. Adjusted for inflation, car part production workers' average hourly wages declined by 23 percent in the past decade. Between 2000 and 2014, employment in U.S. parts suppliers declined 36 percent.

Of course, workers are also consumers so the economic impact of lower wages and lost jobs impacts businesses and lowers tax revenue for schools and other public services. NAFTA, like other flawed trade deals, has had a lasting negative impact.

Poor labor standards in foreign nations have a real economic impact on the United States as companies relocate to take advantage of workers who lack basic rights and are underpaid. Workers in Mexico are often put in harm's way for exercising their most basic rights. Most make less than $3 an hour (not including benefits) despite booming profits and record growth for the industry. Manufacturers in the United States routinely threaten to move operations overseas.

Question. What is the impact of temporary or contract positions in the auto industry on wages?

Answer. The growing use of temp work drives down wages, benefits and job security in the auto industry and undermines good, middle class jobs.

The number of workers in temporary or contract positions are on the rise in various industries including automotive. As auto-industry contract work is shifting from administrative to blue-collar jobs, employing perma-temps, defined as the use of temps for extended periods of time with no path to full-time employment, is becoming all too common. Jobs in transportation and material moving and production now account for 42 percent of the temp industry. Furthermore, perma-temps earn 22 percent less than private-sector workers and work with little to no benefits.[15] The median worker in the staffing industry earns $12.40 an hour, compared to an hourly wage of $15.84 by all private sector workers, regardless of industry.[16]

For example, Nissan North America has a history of relying on long term temps and has engaged in anti-union campaign to prevent workers' right to collectively bargain in many U.S. plants. Of Nissan's 45 production facilities in the Americas, Europe, Asia, Australia, and Africa, only three are non-union, and all three are located in the United States (Smyrna, TN; Decherd, TN; Canton, MS).

Nissan's Canton, Mississippi assembly plant opened in May 2003, aided by $1.3 billion in subsidies from Mississippi's State and local taxpayers over the term of the subsidy program. By 2016 the Canton plant was producing over 360,000 vehicles with an estimated production and maintenance workforce, of 5,300—approximately 80 percent of whom were African-American. Of these, 3,700 were direct Nissan employees and an estimated 1,600 workers were supplied by the Kelly and Minact temporary employment agencies. These temporary employees received lower pay and benefits compared to regular employees. A year after production began, workers contacted the United Auto Workers for help in establishing collective bargaining representation. Nissan fiercely engaged in anti-union activities including one on one meetings with workers, threatening termination for union activities, and threatening plant closures if employees chose the union as their representative. Nissan is hardly the only company utilizing long term temps.

It is important to emphasize that it is very difficult for temporary workers to join a union. Since they are not full-time employees and are hired through staffing agencies, it is unclear who they are bargaining with. At the same time, full time workers feel vulnerable to the notion that they could be replaced by temporary workers. The National Labor Relations Board ("NLRB") expanded its definition of "joint employer" in 2015 to include companies that share some direct or indirect control over other companies' employees. Anti-worker forces are working to weaken this standard and eliminate employer liability for businesses in staffing, franchise, and other contractual relationships.

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[14] *https://www.bls.gov/iag/tgs/iag31-33.htm.*

[15] Smith, Rebecca, and McKenna, Claire, "Temped Out: How Domestic Outsourcing of Blue Collar Jobs Harms America's Workers," National Employment Law Project, September 2, 2014.

[16] *Ibid.*

Question. What policies would you propose to increase wages and improve working conditions for U.S. autoworkers?

Answer. Congress must strengthen U.S. labor law and insist on stronger enforcement of current law.

The right to collectively bargain strengthens the economic security of workers. On average, a worker covered by a union contract earns 13.2 percent more in wages than a peer with similar education, occupation, and experience in a nonunionized workplace in the same sector.[17] Unionized workers are more likely to have healthcare benefits, access to paid leave, employer provided pension plans and safer working conditions compared to their non-union counterparts. Over the last several decades, wages have stagnated, and union membership has declined, largely as a result of employers using unfair labor practices, refusing to negotiate contracts, pushing mandatory arbitration and imposing non-compete clauses that restrict the ability of nearly 1 in 5 workers to change jobs. Strengthening our labor laws and increasing penalties against employers who do not recognize worker's legal right to have a voice on the job will strengthen the middle class and reduce income inequality. There are several labor bills pending in Congress that would improve our labor laws and protect the rights of working families, including the Workers' Freedom to Negotiate Act, the WAGE Act, Workplace Democracy Act, Public Service Freedom to Negotiate Act, and the Public Safety Employer-Employee Cooperation Act. Congress should pass these and other pro worker bills. We need to increase remedies against employers who violate workers' rights and create a mandatory mediation and arbitration process to ensure corporations and newly formed unions reach a first contract.

As noted above, Nissan is hardly the only bad actor on worker's rights. Volkswagen (VW) has refused to recognize workers right to collectively bargain even though workers voted in support of union representation. On December 4, 2015, skilled-trades employees at Volkswagen's plant in Chattanooga, Tennessee vote overwhelmingly—71 percent—to designate UAW Local 42 as their bargaining representative. The NLRB certified the results of the election. However, to this day, VW refuses to come to the bargaining table with workers. VW is not alone. In far too many circumstances, employees' rights to bargain collectively are violated even after the union wins the NLRB election. The NLRA's intent is to facilitate the creation of a first contract which determines wages, hours, and employment conditions. Employers, however, often impede the creation of a contract through delay tactics and unwillingness to bargain in good faith.

Delay tactics and surface bargaining are illegal under the NLRA, but the law lacks meaningful deterrents to force employers to bargain in good faith with their employees. As a result, in 52 percent of organizing campaigns, workers lack a collective bargaining agreement a full year after demonstrating majority support for union representation.[18] Even 2 years after an election, 37 percent of newly formed unions still had no labor agreement.[19] According to a study by MIT, under the current law 44 percent of workers who form a new union never reach a first contract.[20]

Furthermore, we do not have clear and transparent data on the number of temporary workers in the auto industry. At least thirty percent of workers in auto industry are temporary workers and it could be as high as fifty percent. It is important that we get accurate data on the number of temp workers employed in the auto industry and take steps to hold employers accountable and strengthen labor protections and wages for workers. Congress should mandate better reporting of the use of temps and require that government contracts disclose such information. Furthermore, efforts to undo the Obama-era NLRB decision expanding joint employer liability for businesses in staffing, franchise, and other contractual relationships should be opposed.

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[17] Economic Policy Institute. "How Today's Union's Help Working People." *https://www.epi.org/publication/how-todays-unions-help-working-people-giving-workers-the-power-to-improve-their-jobs-and-unrig-the-economy/*.

[18] Bronfenbrenner, Kate, "Fact Sheet: NO HOLDS BARRED The Intensification of Employer Opposition to Organizing," *Economic Policy Institute,* May 20, 2009, *available at: http://www.epi.org/page/-/pdf/bp235-fact-sheet.pdf.*

[19] *Ibid.*

[20] Ferguson, John-Paul, "The Eyes of the Needles: A Sequential Model of Union Organizing Drives, 1999–2004," *Industrial and Labor Relations Review,* Vol. 62, No. 1, Cornell University, October 2008, *available at: http://republicans.edlabor.house.gov/UploadedFiles/4.30.10_ferguson.pdf.*

As we renegotiate NAFTA, we need to make sure Mexico fixes its labor laws and ends protection contracts prior to entering into any new agreement. Mexico has made false promises in the past; it is important that they make and implement the changes so workers can join real unions. We also need stronger enforcement mechanisms that impose economic penalties on companies for worker rights abuses. Dispute settlement has failed workers for decades and we fear it will continue to do so.

In March 2017, Congress blocked an Obama-era regulation that required employers to maintain accurate records of workplace injuries and illnesses for 5 years or face financial penalties. Now the requirement to avoid penalties is only 6 months. This policy hampers the U.S. Occupational Safety and Health Administration's (OSHA) efforts to properly gauge health and safety conditions at worksites across the country. Due to this rollback, OSHA will only be able to issue citations during the 6-month period following a record-keeping violation. The revised lookback period does not give investigators enough time to identify willful or recurring problems and it also gives employers license to employers to keep fraudulent records and to violate the law with impunity. To improve the working conditions and protect the health and safety of auto workers, Congress should reinstate the 5-year lookback period and increase penalties for companies that violate the law.

QUESTIONS SUBMITTED BY HON. ROB PORTMAN

Question. At the hearing, it appears there was a general consensus about the value of making autos in the United States.

Please describe what you believe is the best approach to improve vehicle and part production in America? What policies should be instituted, reformed, or discontinued in order to achieve this goal?

Answer. Advancing policies that strengthen the middle class, create good-paying jobs providing benefits and retirement security in the United States, and reduce income inequality will improve vehicle and part production in America. A holistic approach would go a long way towards meeting these objectives. Equitable tax policies, robust worker training programs, and enhanced labor rights are needed to strengthen our domestic auto industry.

For instance, there is an ongoing skills labor shortage in the automotive industry. Over the next decade nearly 3½ million manufacturing jobs will likely need to be filled. The skills gap is expected to result in 2 million of those jobs going unfilled. According to research carried out by the Automotive Industry Action Group in collaboration with Deloitte,[21] more than half of OEMs and suppliers believe they will face a high level of difficulty in hiring workers who possess the skills and talent to fill these jobs.

One way to improve vehicle and part production in America is to invest in apprenticeship programs and employment and training opportunities to that ensure that workers have the necessary skills to be hired for high wage, high skill occupations in the auto manufacturing industry and that employers have a readily available pool of workers to hire from.

Some of the policies that should be instituted include:

- Incentivizing companies to invest apprenticeship programs.
- Community colleges should reinstitute technical courses that are needed by students enrolled in apprenticeship programs to fulfill related technical instruction (RTI) requirements. An infusion of resources should be devoted to community colleges to redevelop course materials and establish the curriculum necessary to educate newer generations of apprenticeships.
- Increase affordability and access to community colleges.
- Provide middle school and high school students with information on vocational training and increase access to career and technical education. Better-informed school guidance counselors who can help steer students toward careers in machinery, robotics, information technology and other emerging fields are also key.
- More effective public outreach by employers to target unemployed or underemployed workers who might have been displaced by automation or who have given up looking for work.

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[21] *http://www.themanufacturinginstitute.org/~/media/827DBC76533942679A15EF7067A704CD.ashx.*

A program that should be continued but has come under attack is the Advanced Technology Vehicles Manufacturing (ATVM) for domestic manufacturing and the U.S. auto industry.

The ATVM program provides direct interest-bearing loans to automakers and parts suppliers to construct new U.S. factories or retrofit existing factories to produce vehicles and parts that increase fuel efficiency. Ford Motor Company received a $5.9 billion loan during the height of the auto crisis.

The Department of Energy (DOE) administers the program and they have not issued a new loan in many years. This is a missed opportunity. ATVM should be strengthened to support auto manufacturing and increase our competitiveness for the 21st-century global economy.

Congress should reverse the misguided policies under the Tax Cuts and Jobs Act (TCJA). Unfair and unequitable tax policies have the dual effect of incentivizing companies to ship jobs overseas and eroding domestic auto manufacturing jobs. Simultaneously, billionaires and multinational companies receive enormous tax breaks while working families fall further behind. Increasing deficits and decreasing revenues puts pressure on critical safety net programs such as housing, health care, nutrition and education—all programs that working families, seniors, and children depend on.

Question. Last week witnesses offered a variety of viewpoints about the way the United States should conduct its trade policy. They used terms like "free trade" and "integrated approach" to describe the preferred approach for U.S. trade policy.

What does your preferred approach to U.S. trade policy look like? Do you believe there are ever situations in which tariffs should be levied? If so, what are those situations? Are there other public policies that should interface with trade policy, and what are they?

Answer. The UAW believes U.S. trade policy should work in tandem with a broader domestic industrial policy. We advocate for an industrial policy which invests in American workers and communities, and positions the United States to be a leader in manufacturing and innovation. Trade agreements must support this cause by leveling the playing field and requiring fair trade. Trade agreements must result in stronger wages for workers, worker and environmental protections for all countries involved, and strong and effective enforcement mechanisms.

This may require targeted and nuanced tariffs or quotas, because not all trade imbalances are created equal. Countries that suppress workers and wages will need different policy prescriptions than countries that practice currency manipulation or forced technology transfers. Further, we recognize not all trade imbalances have the same impact. For example, Canada's $16.7 billion finished automobile deficit is nearly offset by our $14.7 billion surplus in automotive bodies and parts.

Even if the United States does find the right balance, decades of disinvestment and offshoring of U.S. jobs by multinational corporations has weakened our economic security as a Nation and has inflicted great harm on American workers and communities. Massive job losses have had ripple effects through our communities—idling able-bodied workers, tearing apart families and communities, and diminishing tax revenues.

This production shift has begun to unravel America's global technological advantage. For decades, Federal and State governments, universities and research institutions, and private companies in the U.S. supported cutting edge research and development, with the shared understanding that technologies developed in American labs would drive the economy and provide good jobs to American workers. This successful partnership is under attack and our public and private sectors must work together in a proactive fashion if we are going to remain a global technological leader.

Any effort to reset America's trade policy must be accompanied by a strong industrial policy focused on education, workforce development, research and development, support for advanced manufacturing and technologies, building a 21st-century infrastructure, and creating penalties for companies that turn their back on American workers. A properly crafted industrial policy will create new industries, as well as re-shore old ones. This will improve living standards, reduce poverty, mitigate our environmental impact, and vastly improve Americans' quality of life.

To ensure American workers and companies are ready to compete will require:

- *Workers' voice on the job*—Advanced manufacturing will require a highly skilled workforce. To optimize their utility, these workers need a voice on the job. This will ensure the United States will have a well-trained, well-paid, stable workforce ready to face tomorrow's challenges. To this end, the United States must reform its labor laws to make it easier for workers to join unions. Recent decisions by anti-worker judges and NLRB stand to further weaken our middle class and harm auto workers.
- *Quality education*—An educated citizenry is not only paramount to a functioning democracy, but is an engine of growth in the economy. Education is a public good that pays back dividends in quality of life, civic engagement and productivity. The United States needs to reinvest in the American worker:
  - *Investing in K–12 education*—Decades of disinvestment in public education has hobbled these institutions. Buildings are outdated, teachers are underpaid, classrooms are packed, and curriculum has been cut. This systematic attack on public education, has left us ill-prepared for the work of tomorrow, which will require additional skills and creative thinking. Public schools need reinvestment, to again make sure that all students have access to rigorous academics, the arts and vocational training.
  - *Worker training*—Advanced manufacturing is going to require a skilled workforce. The skilled trades and German manufacturing sector have shown that investing in workers through course work and on the job training leads to highly skilled workers, who can produce high-valued products at high wages. The Federal Government should do much more to incentivize joint union/employer apprenticeships to retrain todays manufacturing workers for the jobs of tomorrow.
  - *Student loan debt relief*—The looming costs of a college education present huge challenges. Over the past 10 years, the average price for tuition and fees at 4-year private colleges and universities has jumped to $35,830 a year, up more than $7,000, according to statistics from the College Board.[22] Student loan debt is now the second highest consumer debt category, behind only mortgage debt, and higher than both credit cards and auto loans. The Federal Government should pass student loan debt relief programs that focus on keeping student loan interest rates low, refinancing of Federal student loans and getting rid of taxes on student loan forgiveness.
- *Stimulate demand for next generation products.*
  - *Leveraging government procurements* to create lead markets for new products and technologies. Government purchase orders are an effective tool for companies to raise needed capital, both investments and loans, to initiate pilot or scale production domestically.
  - *Using regulation and incentives* to create domestic market.
- *Provide loan guarantees and technical assistance to help manufacturers retain and onshore work.* This can modernize our plants with either new capital equipment and/or implementing smart manufacturing technologies. In partnership with states and existing Federal programs, this program would incentivize the purchase of domestically manufactured equipment and technologies to help rebuild the domestic machine tool industry, and to ensure that critical advanced manufacturing equipment and components are made and deployed domestically.
- *Funding research and development to spread wealth throughout the economy*—From the Internet to autonomous vehicles, government-supported research has spurred major technological leaps in our society. The government should continue to invest in the development of new cutting-edge products. The fruits of this research should be spread throughout the economy—from new exciting products, to well-paying jobs. To this end the government should recoup more of its research costs through royalties on products that become a commercial success. These monies would be used to reinvest in America's universities and publicly supported labs, allowing researchers in these institutions to earn wages and benefits. Finally, new products born from this research should be manufactured in the United States.
- *Infrastructure investment to create an economy that works for everyone*—The United States is in desperate need of infrastructure investment. This does not just mean repairing old roads, but updating our water systems, electrical grid, mass transit, high-speed Internet, roads, bridges, and high-speed rail. These improvements will put millions of Americans to work in good-paying jobs, re-

[22] *https://trends.collegeboard.org/college-pricing/figures-tables/tuition-fees-room-board-over-time.*

duce our environmental impact, improve Americans' health and quality of life, as well as make the United States an attractive place to invest. When used strategically, infrastructure projects can not only improve society, but also eliminate the social and economic costs of unemployment.

- *Taxes*—Fair and equitable tax policies play an important role in strengthening auto manufacturing jobs and incentives companies to keep jobs in the United States instead of moving them abroad. The UAW believes that we need to stop enacting budgetary and tax policies that favor the wealthy over working families and create dangerous incentives for companies to lower wages and move jobs overseas. For example, the Tax Cuts and Jobs Act (TCJA) (Pub. L. 115–97) gave massive tax breaks to corporations and billionaires, encouraged companies to outsource U.S. jobs, and weakened the Affordable Care Act by eliminating the individual mandate tax penalty. Only 4.4 percent of workers have been promised wage increases or one-time bonuses related to TCJA, and a mere 116 of 5.9 million employers have announced new investments related to the tax cuts.[23] The money has instead gone to shareholders and CEOs via stock buybacks. According to Americans for Tax Fairness, Since the tax cuts were passed, more than 400 corporations have announced stock buybacks of $750 billion—106 times more than what corporations have promised workers in pay hikes. Buybacks mostly benefit the wealthy, who own most corporate stock.

Harley-Davidson is a prime textbook case of how the tax law is being used in the real world to disadvantage U.S. workers. Following the big tax-rate cut, Harley-Davidson closed a Kansas City plant costing 800 local jobs, rewarded shareholders with $700 billion in stock buybacks, and opened a new facility in Thailand. This pattern will repeat itself time and time again unless these harmful anti-worker incentives are changed by Congress and the President.

The corporate tax code reforms are permanent and will lead to well over $1.5 trillion in lost revenue over 10 years. In contrast, tax cuts for working families will expire within a decade, leading to tens of millions of lower and middle-income families paying more in taxes. In fact, millions of middle-class and working-poor Americans will pay more in taxes long before the expiration of those tax cuts because of the elimination of deductions working families have relied upon to keep more of their money.

TCJA also dismantles an essential component of the Affordable Care Act by eliminating penalties in 2019 for people that decide to not buy health insurance despite having the means to afford it. With fewer healthy people in the exchanges, rates will rise and be less sustainable. The Blue Cross Blue Shield Association forecasts premiums increasing by an average of roughly 13 percent annually. According to Blue Cross/Blue Shield, this provision will result in 13 million more people being uninsured. Other analysis predicts even higher premium increases. Per the Tax Policy Center, the average tax cut for the top 1 percent of taxpayers is $51,000, whereas the bottom 20 percent averages $60. That 10-percent premium increase alone will wipe-out a $60 tax cut. To make matters worse, America's 10 biggest prescription-drug corporations are among the biggest winners from the TCJA, yet they are not offering pricing relief to millions who cannot afford essential prescription drugs.

TCJA is also projected to add $1.9 trillion to the deficit over the next decade, endangering critical safety net programs and essential investments for our future. The law jeopardizes funding for Medicare, Medicaid, Social Security, education, infrastructure, and food and rental assistance that working people and retirees depend on. In fact, the tax cuts for the top 1 percent alone cost more than providing food stamps to vulnerable populations. According to estimates from the Institute on Taxation and Economic Policy, the richest 1 percent of households, those with incomes higher than $607,090, stand to receive a total tax cut of more than $84 billion in 2019 alone. To put this number in perspective, in 2019, the total cost of nutrition assistance benefits paid through the Supplemental Nutrition Assistance Program (SNAP) is expected to be $58 billion which will help 39 million individuals access food benefits.

A range of fair and equitable tax policies could be implemented to strengthen the economic security of workers and encourage companies to maintain and create good, manufacturing auto jobs in the United States. We need to eliminate tax breaks and subsidies that allow some corporations to pay very limited amounts of taxes, or avoid paying taxes altogether, while encouraging multinational corporations to shift

[23] *https://americansfortaxfairness.org/trump-gop-tax-cuts-not-improving-economy/*.

profits and jobs offshore. Corporations' share of Federal taxes has declined dramatically over the years; therefore, any corporate tax reform should require the corporate sector to contribute more in Federal income-tax revenue than it does now, not less. We also need to reform our tax code, so it raises adequate revenues to meet critical needs in a fiscally responsible manner. This requires that wealthy Americans—the richest 2 percent—and corporations pay their fair share of taxes.

- ATVM—referenced in question 1.

Question. At its root, any section 232 investigation requires a national security basis. I am cognizant that you may not consider yourself a national security expert, but you are an auto expert.

Do you believe there is any national security basis—whether limited or broad in scope—for import restrictions on autos and auto parts? If so, describe that national security basis.

Answer. We need a more comprehensive trade policy to ensure that we have the industry capacity to not only produce enough for projected national defense requirements, but to also ensure that the U.S. is maintaining the skills and technological advancements as well as its ability to bolster the economy by maintaining competition with foreign markets on specific domestic industries.

As the 232 statute recognizes, economic stability is needed to have strong national security.

Section 232 investigations consider:

- Domestic production needed for projected national defense requirements;
- Domestic industry's capacity to meet those requirements;
- Related human and material resources;
- The importation of goods in terms of their quantities and use;
- The close relation of national economic welfare to U.S. national security;
- Loss of skills or investment, substantial unemployment, and decrease in government revenue; and
- The impact of foreign competition on specific domestic industries and the impact of displacement of any domestic products by excessive imports.

Based on the results of the investigation, targeted measures to boost domestic manufacturing and strengthen our economic and national security for this and future generations may be needed.

PREPARED STATEMENT OF RICK SCHOSTEK, EXECUTIVE VICE PRESIDENT, HONDA NORTH AMERICA, INCORPORATED

Chairman Hatch, Ranking Member Wyden, and members of the committee, thank you for the opportunity to testify today before the Senate Finance Committee. My name is Rick Schostek, an executive vice president of Honda North America. Based on the more than 3 decades in which I have worked directly with all five of Honda's U.S. auto plants, located in Ohio, Alabama, and Indiana, I am here today with a very personal perspective on the impact of tariffs on automobile manufacturing in the United States.

While I am here on behalf of Honda, I share the concerns about the potential impact of 232 auto tariffs with all sectors of the auto industry, including domestic and international automakers, suppliers, dealers and the aftermarket service and repair industry. The automotive industry is thriving as evidenced by our record-years of production, sales, and exports of U.S.-produced vehicles. The industry is not seeking protection, and certainly not seeking additional tariffs, which will harm manufacturing in the U.S., our workers and, most importantly, U.S. consumers.

Mr. Chairman, next year will mark two key milestones in our history in the United States—the 60th anniversary of Honda's business in America and the 40th anniversary of the first product we built in America. What's important is not these anniversaries, but what they represent, which is our pioneering vision to establish production operations in America and the U.S. policy environment that encouraged such investment.

Until 1982, when we began building the Honda Accord in Ohio, every vehicle we sold in the U.S. was built in Japan. Since then, we've produced more than 25 million vehicles in America, including 1.2 million vehicles last year alone—that is 1.5 times more vehicles than we produced in Japan. Last year, of the 1.65 million vehi-

cles we sold in the U.S., 66 percent were made in our U.S. plants, 20 percent came from Canada, 7 percent from Mexico, 4 percent from England, and 3 percent from Japan.

This remarkable transformation is guided by a simple and long-held Honda commitment to build our products close to the customer. This approach led Honda to begin production in Ohio in 1979—the first Japanese automaker to build products in America. That said, what made it possible to manufacture those products here were national policies that welcomed our investment, and State and local governments that have supported it as Honda has continued to expand our investment in America—now totaling over $20 billion.

In 1987, the year I joined Honda, we began a far-reaching plan that led to a second auto plant, a new R&D center to develop products here, a focused effort to increase parts purchases in America and to export vehicles from America to overseas markets. Step by step, we have continued to expand our operations based on this strategy, to the point where we now have a workforce of 31,000 Americans—72 percent working in manufacturing roles. Last year, we purchased more than $41 billion in parts, supplies, and services from more than 12,000 U.S. companies in 32 States. And our U.S.-made products were exported to 89 countries.

The beneficiaries of this investment are American workers, American consumers, American communities, and the American economy.

Honda also produces engines, transmissions, and other high-value components in the U.S. that go into our automobiles. In our plants in Ohio and Alabama, we build engines starting with the aluminum ingot used to make the engine block. At other Honda plants in Georgia and Ohio, we build high-tech transmissions using very precise and advanced technologies. We also have begun to assemble the hybrid battery and electric motor in two of our Ohio plants as we invest to make electrified vehicles right here in America. Moreover, we have entered into a joint venture with General Motors to manufacture advanced fuel cell stacks in Michigan.

Beyond manufacturing, our U.S. associates are engaged in research and development, actually creating all-new vehicles from scratch here in America. The latest example is our all-new 2019 Acura RDX, introduced this summer, that was designed in our Acura Design Studio in Los Angeles, CA and engineered by our U.S. R&D team in Raymond, OH, adjacent to our East Liberty Plant where the RDX is built. This is just the latest example of our robust U.S. R&D presence, which has developed over 30 car and light truck models.

Our 40-year history of building products in America means Honda is well beyond so-called assembly operations. From concept to design, development to production and everything in between, we are creating and building our products here in the United States.

Although this hearing is focused on the impact of tariffs on the auto industry, it is relevant to mention that in addition to automobiles, we manufacture and develop power equipment as well as jet engines and the HondaJet in North Carolina; ATVs and Side-by-Side vehicles in South Carolina. Some of these products are also being affected by U.S. trade actions and the corresponding retaliation.

But even with this deep commitment to produce products close to our customers, local production has to make business sense. There must be available land, infrastructure and suppliers to support the operation of a factory on a daily basis. And the U.S. has been a great place to develop and build our vehicles and many other products.

Needless to say, the most important requirement is a qualified, competent and energetic workforce. And we certainly have that, and Honda has invested in local schools, 2-year colleges, and universities to address our growing need for a 21st-century manufacturing workforce.

However, there are two other critical factors I would like to highlight today. These are (1) stability and (2) maintaining a welcoming business environment that supports manufacturing.

Let me take these one at a time, starting with stability. Today's cars and trucks contain literally thousands of individual parts. The process of developing a new vehicle takes up to 6 years, and just to put that in perspective, that's the same length of time as the term of office for a United States Senator.

Why does this matter? Components for these vehicles are carefully designed to meet the needs of our customers and government regulations for things like safety

and fuel economy, a process that takes several years, working in close collaboration with our suppliers. The labor and material content of each component is also carefully managed to maximize performance while minimizing cost to ensure that the ultimate price of the vehicle will meet the needs of our customers.

This is where unanticipated disruptions like new taxes in the form of tariffs come in. These taxes represent an unplanned addition to the cost and process of building a vehicle that wasn't factored into the business plans of manufacturers and suppliers that began years earlier. Thus, these added costs will either be passed on to our customers or borne by manufacturers, which then diverts money intended for other critical purposes, including investment in future technologies, or capital improvements to our operations that secure jobs, provide compensation for our workforce, and fulfill our social responsibility to the community.

Moreover, once a vehicle has been introduced, manufacturers cannot readily change suppliers to mitigate the added cost of tariffs, since business agreements with suppliers generally cover several years of production. Further, it takes time for a manufacturer to qualify a part from an alternative supplier as well as ascertain their ability to supply that part in the quantity and schedule required.

The key point is that tariffs, no matter how short-lived, are enormously disruptive to the stability of a business and reduce the value business can provide to customers and contribute to society.

The second factor is the importance of a business environment that welcomes manufacturing through various measures. Most States and localities welcome new business because they value the investment, employment and growth opportunities that manufacturing brings to their communities. Moreover, we have had confidence to build products in the United States. The U.S. also has long worked to ensure access to a global marketplace that provides the ability to procure components and materials of the highest quality and at competitive prices. This environment is critical to the continued success of our operations.

Our country has long been an advocate for open markets and reduced barriers to trade because it makes globally competitive production feasible on these shores, ensures the introduction of the world's most advanced technologies and brings the best, reasonably priced products to our Nation's consumers.

Nearly 60 years ago, it was this environment that motivated our founder, Soichiro Honda, to choose the U.S. as the first market for his company to establish an overseas subsidiary. As of today, 10 international auto companies have joined the traditional Detroit companies and are producing vehicles in the U.S., thus creating a robust U.S. auto manufacturing industry that produced nearly 11 million vehicles last year; international automakers' production is almost half of that.

Equally important, are the exports of cars and trucks made in the U.S. Honda started exporting vehicles from America in 1987. In fact, 30 years ago, we began exporting Accords made in Ohio back to Japan. Senator Wyden, you may remember this. On March 7, 1988, as a young Representative, you were at the Port of Portland in Oregon, where the first shipment of Accord Coupes was loaded onto a ship bound for customers in Japan. Our business touches so many aspects of American commerce.

In the ensuing years, Honda has exported more than 1 million vehicles overseas from 13 U.S. ports, ranging from Seattle out west to Miami and Baltimore on the east coast. With more than 95 percent of the world's consumers outside the U.S., export markets are a critical component to the growth of manufacturing and to the U.S. economy. And automakers producing in the U.S., including Honda, exported nearly 2 million vehicles last year.

However, America is now experiencing a fundamental change in the philosophy of open markets. Already, the tax on materials and components coming into our country is bringing an array of unanticipated harmful effects that would only be magnified by tariffs on automobiles and auto parts. For example, more than 90 percent of the steel used to produce our vehicles here is sourced in America. So, while we're paying relatively little in the way of tariffs on steel, the price of domestic steel has increased as a result of the tariff, saddling us with hundreds of millions of dollars in new, unplanned cost.

The Commerce Department is currently investigating whether imports of autos and auto parts are a threat to national security, potentially subjecting the products to additional tariffs. Few things would be more disruptive to American manufacturing than the additional tariffs of as high as 25 percent that have been proposed.

Our vehicles built in America tend to have relatively high U.S. content. In fact, we had four vehicles in the top ten of the "2018 American Made Index"[1] created by *Cars.com*. Nevertheless, the reality is that every vehicle built in this country—regardless of manufacturer—is produced using both domestic and globally sourced parts. So, even for a vehicle built in a U.S. factory, the cost to manufacture will increase as a direct result of these tariffs, and the increases could be substantial. As already mentioned, of the vehicles we sell in the U.S., 20 percent are built in Canada and 7 percent in Mexico. These vehicles have significant U.S. content. Treating them as foreign products with a 25-percent tariff will have an enormous impact on vehicle prices and sales, and thereby have a direct impact on the operations of U.S. suppliers and their employees.

These affected jobs are not just in States with auto plants but wherever there are parts makers, auto dealers and service outlets, and other businesses that serve the industry. In other words, tariffs impact every State in America. Moreover, the tariff has been estimated to increase the price of a new vehicle in the range of $1,400 to $7,000 per vehicle.[2] As the price of a new vehicle grows beyond the reach of more Americans, the price of used vehicles will rise, as will the cost of service parts. These tariffs will ripple across all aspects of the auto industry and the broader economy.

Mr. Chairman, over the past 19 months, the auto industry has been confronted with significant challenges associated with the new direction in trade policy. Already, the steel and aluminum tariffs have increased the cost of manufacturing across all sectors of the American economy. And NAFTA, which has been the foundation of making North America a manufacturing titan, is being renegotiated. While the agreement needs modernizing, it has been successful in spurring investment and manufacturing in the U.S.; production by international automakers increased by 3 million vehicles since the agreement took effect.

Now we face the addition of new auto and auto parts tariffs. Coupled with pending changes to NAFTA, the cumulative impact would be unprecedented, especially at a time when automobile sales in the U.S. have begun to plateau and the auto industry is facing fundamental changes that require investment in a number of new technologies.

Adding a further economic challenge in the form of a new tax on automobiles and auto parts will only threaten the great jobs that currently exist for tens of thousands of Americans and increase the cost of vehicles for millions of U.S. consumers. To be certain, barriers to trade should be removed everywhere, but imposing tariffs *here* will put American workers, American consumers, American communities, and the American economy at risk. For this reason, Honda has joined every automaker doing business in the U.S. in opposing new tariffs on automobiles and auto parts.

Mr. Chairman, thank you for the opportunity to testify, and I am happy to take your questions.

PREPARED STATEMENT OF HON. RON WYDEN,
A U.S. SENATOR FROM OREGON

The President has made it a practice to get up in front of cameras, tout new trade deals, and reap splashy headlines, but those announcements are consistently hollow and the results underwhelming.

I'll start with this week's announcement about the U.S.-Korea Trade Agreement. The administration touts it as a massive overhaul of a trade deal that they claim had previously cost hundreds of thousands of American jobs. But if you search for the significant changes—concrete wins that will deliver red, white, and blue jobs on the scale the President talks about—you're going to come to the conclusion that there's no "there" there.

A recent *Bloomberg News* article summed it up clearly: "Trade analysts say changes to the South Korea agreement were largely cosmetic. . . ." There's no evidence that the renegotiation will actually result in an increase in the number of American-made cars sold in South Korea. In at least one case, the changes aren't even cosmetic—they're nonexistent. Earlier this year, the White House even went

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[1] *https://www.cars.com/articles/carscom-2018-american-made-index-whats-the-most-american-car-1420700348632/*.
[2] *https://piie.com/system/files/documents/pb18-16.pdf*.

on record announcing a deal with Korea on currency manipulation, but it's nowhere to be found in the final text or anywhere else.

So when it comes to South Korea, the Trump administration over-hyped and under-delivered. That's the administration's entire record on trade in microcosm.

In recent months, the President has threatened to impose sweeping tariffs on automobiles. Now, if the administration comes up with a coherent strategy that would result in more high-paying jobs here at home and greater access for American-made cars in markets overseas, I sure want to know about. But where things currently stand, it looks like this could just be more haphazard bluster.

Furthermore, the President's threats to impose auto tariffs are already doing harm here at home—stifling investment, likely costing jobs in the long run, and raising costs for American consumers. In one case, Ford announced that it decided not to sell a particular model of car in the U.S. because of the looming threat of tariffs. So that's the start of Americans having fewer choices when they're visiting showrooms.

The President believes he has the authority to impose auto tariffs because the Congress gave it to him. So I want to put the administration on notice. Under the Constitution, it's the Congress that's in charge of trade and tariffs. In the absence of real strategy and tangible wins on trade, perhaps it's time for the Congress to think about reclaiming that authority.

I want to thank our witnesses for being here today. This is an important opportunity for the Finance Committee to draw a distinction between two different approaches to trade and autos. The approach I'd prefer is one based on concrete, well-planned strategies that will create auto manufacturing jobs and deliver for American workers. But in my view, what the administration is delivering now is more chaos. Its trade policy dictated by early-morning tweets and bluster, and it may end up costing jobs and doing more harm than good.

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AND

HERE FOR AMERICA

These comments are submitted in connection with the above-captioned hearing on behalf of the Association of Global Automakers[1] (Global Automakers) and the Here for America companies.[2]

To begin, we greatly appreciate the Committee's focus on tariffs and their impact on the U.S. automotive industry. The U.S. auto industry supports the jobs of 10 million Americans, is a critical part of the United States economy, and is directly impacted by tariffs already in place as well as those contemplated by the Department of Commerce's ongoing 232 investigation of auto and auto parts trade.

While the Committee has already heard directly from Rick Schostek, Executive Vice President of Honda North America, Inc., one of our member companies, and other witnesses, this statement seeks to amplify and expand on remarks made by these witnesses during the September 26 hearing.

As many members of this Committee are aware, the U.S. automotive industry has changed dramatically during the past 50 years. Today, the U.S. auto industry comprises fourteen companies that build cars and trucks in the United States. A fifteenth is scheduled to begin production in 2021. Thirteen of these fifteen automobile manufacturers are headquartered outside of the U.S., and all support a value chain of U.S. businesses across the country conducting research and development, manufacture of vehicle components such as engines and transmissions, vehicle assembly, sales, service, logistics and aftermarket products and services.

In our view trade has strengthened, not weakened, the U.S. automotive sector. Foreign competition and investment have in fact resulted in more U.S. producers and greater competition, benefiting U.S. consumers and strengthening the U.S. industry overall. Imports of vehicles and parts have been an important element contributing to this success. These imports bolster the economic health of the U.S. industry, not threaten it.

Impact of Tariffs on U.S. Auto Industry Today

The U.S. automobile industry today faces tremendous uncertainly due to the risk of high import tariffs. Steep tariffs recently placed on steel and aluminum, imposed pursuant to an investigation into whether imports of these metals are a threat to U.S. national security under section 232 of the Trade Expansion Act of 1962 are already rippling through the automotive supply chain. The costs of these goods, in-

[1] The Association of Global Automakers represents the U.S. operations of international motor vehicle manufacturers, original equipment suppliers, and other automotive-related trade associations. For more information, visit *www.globalautomakers.org*.

[2] Here for America is an initiative of the Association of Global Automakers to increase public awareness about the importance of international automakers to American job creation, economic growth, technological innovation and strong communities. Visit *www.hereforamerica.com*.

cluding steel and aluminum produced in the U.S., increased across the board.[3, 4] The price of steel has gone up almost 50 percent since tariffs were announced and the 50-percent price increase is more than twice the amount of the tariffs that were imposed.

Rising input costs directly impact the cos,, of production for U.S. automakers. Toyota, which sources 90% of the steel for its U.S.-based facilities from American mills, stated,

> The (U.S.) Administration's decision to impose substantial steel and aluminum tariffs will adversely impact automakers, the automotive supplier community and consumers.[5]

Ironically, the steel tariffs have created an opening for foreign producers. *Bloomberg* reported on July 5th that: "So successful have tariffs been in pushing up American steel that foreign metal is becoming more appealing."

Additionally, the U.S. Department of Commerce is conducting a similar investigation into whether imports of autos and auto parts are a threat to our nation's security. This broad authority to impose tariffs in the name of national security was granted to the President of the United States by Congress. Unlike other authorities to impose tariffs to respond to unfair trading practices or to provide temporary protection to a struggling industry facing import competition, this "232" authority is so broad, and the impacts of tariffs imposed under it are so widespread and of such indeterminate length, that we believe Congress must ask whether this authority is being used for the purposes intended.

In our view, there is no support for the proposition that imports of cars, trucks, SUVs and auto parts threaten the national security of the United States. No automaker or auto parts supplier has requested protection under our trade laws. Auto sales, production and exports are in fact at or near all-time highs.

The Department of Commerce so far has been unable to outline any theory explaining how the commercial production of cars and trucks is connected to U.S. national security. Simply running a sectoral trade imbalance, which the Secretary suggested as a rationale during a recent appearance before Congress, seems insufficient because it does not distinguish the U.S. automobile industry from other industries where this is also the case. In response to the Department's call for public comments on the 232 tariffs, only three substantive statements, out of more than 2,300 comments of all types, were filed supporting tariffs or other restrictions on auto or auto parts imports, and that support was often tepid at best.

Several studies indicate that passenger vehicle prices would rise very significantly, with an estimated increase of over $6,000 on a $30,000 vehicle as a representative example.[6] Because tariffs are effectively taxes on American consumers, this action would have a devastating impact on American households. As noted by Chairman Hatch on June 20th, automobiles are the second biggest purchase most American families make, many require a car to get to their jobs, and roughly 10 percent of the median U.S. household income of $59,000 would be erased by additional $6,000 price increase.[7]

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[3] *https://www.reuters.com/article/us-usa-trade-steel/u-s-commerce-dept-probing-steel-profiteering-after-tariffs-idUSKBN1JG22W.*

[4] *https://www.wsj.com/articles/steel-aluminum-prices-rise-on-u-s-tariffs-1527792759.*

[5] *https://www.reuters.com/article/usa-trade-toyota/toyota-says-u-s-tariffs-on-steel-aluminum-will-substantially-raise-production-costs-idUST9N1N004M.*

[6] *See* "Policy Brief: An Accident Waiting to Happen? The Estimated Impacts of Tariffs on Motor Vehicles and Parts," Trade Partnership Worldwide, LLC/The Trade Partnership," May 29, 2018, *http://tradepartnership.com/reports/an-accident-waiting-to-happen-the-estimated-impacts-of-tariffs-on-motor-vehicles-and-parts/* (concluding that the price of an imported $30,000 car would rise by $6,400); "Trump's Car Tax Would Boost Average New Car and Truck Prices by $1,262 to $5,809," National Taxpayers Union Foundation, May 30, 2018, *https://www.ntu.org/foundation/detail/trumps-car-tax-would-boost-average-new-car-and-truck-prices-by-1262-to-5809* (concluding that the average price of imported cars would increase by $4,205 per vehicle and the average price of U.S.-assembled vehicles by an average of at least $1,262 per vehicle, and that duties on imported pickup trucks would increase by $5,089 per vehicle). We recognize that the recently concluded United States-Mexico-Canada Agreement (replacing the NAFTA) includes side-letters that exclude a certain number of vehicles produced in the North American region from 232 tariffs. This agreement has not yet been implemented however, and it seems prudent to use data that reflect the broad impact of 232 tariffs until such time as circumstances change.

[7] Opening statement of Chairman Orrin Hatch, hearing on "Current and Proposed Tariff Actions Administered by the Department of Commerce," United States Senate Committee on Finance, June 20, 2018, *https://www.finance.senate.gov/imo/media/doc/6.20.18%20Hatch%20Opening%20Statement%20at%20Hearing%20on%20232%20Trade%20Actions.pdf.*

And Americans would lose their jobs. The cost to U.S. employment from the import duties alone would be 195,000 jobs, with U.S. auto and auto parts industries shedding 1.9 percent of their labor force, according to the Peterson Institute for International Economics.[8] Both imports and exports would be reduced, according to the study, with U.S. production falling 1.5 percent. These job losses would increase significantly in the very likely event that our trading partners were to impose the same tariffs on U.S. exports of these goods. In that scenario, U.S. production would fall 4 percent, and 624,000 Americans would lose their jobs. The impact on exports would exceed that on imports.

These losses would be a severe blow to the automotive sector, including automakers, parts suppliers, and dealerships throughout the country. To the extent this Section 232 investigation is premised on the proposition that the economic health of the sector can be equated with U.S. national security, any duties imposed as a result of this investigation would achieve the directly opposite effect of its stated purpose. And by damaging the sector and driving up the prices of one of the most significant purchases most U.S. consumers make, the duties would have much broader effects on the U.S. economy, wiping out many if not all of the economic benefits of last year's tax cuts.[9]

Investments by International Automakers Have Strengthened the U.S. Automobile Industry

International automakers have together invested $75 billion in the United States and directly employ 130,000 Americans at nearly 500 facilities. Together, these companies create jobs for 1.29 million Americans including people employed in design, research and development, manufacturing, sales, finance, and dealership operations as well as other businesses. International automakers produced nearly half of all cars, SUVs, vans and light trucks made in America last year and accounted for nearly half of vehicle exports in 2016, exporting 17 percent of that production to 140 countries and territories.

The investment of international automakers in America has been substantial and translates into real benefits for communities. In Ohio, Honda operates five manufacturing facilities and accounts for 54% of the vehicles made in the state.[10] In Missouri, international automakers last year invested $742 million and generated over 28,000 jobs.[11] We estimate that without their contributions, Missouri's unemployment rate would be 4.4% rather than 3.5%, which is where the rate stands today.[12]

In Georgia, Kia has invested $1.6 billion in their first U.S. manufacturing facility located in West Point. They directly employ 2,700 people at the facility and indirectly support another 14,000 jobs through their regional suppliers.[13] A similar story can be told in South Carolina, where BMW opened its Greer facility in 1994. Since then, BMW has invested $9.3 billion in the Upstate region and directly employs 10,000 people. In addition, Volvo Cars recently began production of their S60 model in their $1.1 billion North American facility located in Ridgeville, South Carolina. These are just a few examples. In 2017 alone, international automakers announced plans to invest of $10.2 billion in their U.S. facilities. And in the longer view, between 2009–2017, automakers invested over $87 billion in the United States accounting for 73% of all investments made in North America during that time.[14]

These investments underscore the health and vitality of the automobile industry in America. They were made because these companies are committed to the U.S. market and because the United States is a highly competitive place to build cars. The decades-long U.S. commitment to open trade and investment policies is a bedrock that allowed competition to flourish. That commitment also allowed the U.S. auto-

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[8] "Trump's Proposed Auto Tariffs Would Throw U.S. Automakers and Workers Under the Bus," Peterson Institute for International Economics, May 31, 2018, *https://piie.com/blogs/trade-investment-policy-watch/trumps-proposed-auto-tariffs-would-throw-us-automakers-and#_ftn1.*

[9] The Tax Foundation has concluded that the duties would be equivalent to a $73 billion tax increase, offsetting half the benefits of the tax cuts for lower-income Americans. *See* "Automobile Tariffs Would Offset Half the TCJA Gains for Low-income Households," The Tax Foundation, June 4, 2018, *https://taxfoundation.org/automobile-tariffs-2018/?utm_source=Corporate&utm_campaign=599962eac5-EMAIL_CAMPAIGN_2018_06_04_07_52_COPY_01&utm_medium=email&utm_term=0_94e6588ff2-599962eac5-429121933&mc_cid=599962eac5&mc_eid=6afd4735f6.*

[10] *https://www.globalautomakers.org/State_Datasheets/2018GA_HFA_OH.pdf.*

[11] *https://www.globalautomakers.org/State_Datasheets/2018GA_HFA_MO.pdf.*

[12] *https://www.globalautomakers.org/State_Datasheets/2018GA_HFA_MO.pdf.*

[13] *https://www.kmmgusa.com/about-kmmg/our-company/.*

[14] *https://www.cargroup.org/car-book-of-deals-2017-annual-review/.*

mobile industry and its workers to grow their U.S. production for both American consumers and to customers abroad. Last year alone, international automakers exported 950,000 vehicles from the U.S. to 130 countries and territories across the globe.[15] Exports of U.S.-built cars and trucks worldwide have more than doubled since 1993, when NAFTA became effective, increasing from 978,155 vehicles to 1.981 million vehicles. The value of these same exports has nearly quadrupled, rising from $14.3 billion in 1993 to more than $57 billion in 2017.

Conclusion

When America does trade the right way, by tearing down those barriers and expanding access to more markets around the world, we create jobs, promote innovation, and build the foundation for sustainable prosperity. When America does trade the wrong way, with unnecessary and unwanted restrictions and intervention, we see increased costs and prices, depressed demand, and limited consumer choice. Beyond that, tariffs discourage new investment in the United States, and threatens opportunity. We hope that Congress will continue to be vigilant in its oversight role to ensure that the U.S. automobile industry continues to thrive in the years ahead.

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Statement Submitted by Brian Cohn, President

Chairman Hatch and Members of the Committee, Multi Parts Supply USA (Multi Parts) is a family-owned company that sells into the automotive aftermarket. Multi Parts supplies both to manufacturers and national packagers, which in turn sell to major aftermarket retailers and regional warehouse distributors.

You will find a full list of Multi Parts imports impacted by the List 1 and List 3 tariffs at the end of this document. These products include such items as brake parts, fuel pumps and regulators, timing components, and water pumps. Multi Parts' products are not glamorous, but they are *essential* to American consumers. Multi Parts' products are used by everyday people that need an affordable option to keep their cars on the road, running safely and reliably—whether they choose to fix their own vehicles or have them serviced at independent repair shops. Not only do we help U.S. consumers extend the life of one of their most valuable assets, we help make that vehicle an economically viable option for second, third, and even fourth owners.

To serve the U.S. market, Multi Parts maintains two purpose-built facilities in China and the United States. The two facilities work hand in hand: the facility in Florida performs research and development and product qualification, while the wholly-owned facility in China assembles, tests custom packages, and ships the products to the United States for distribution. These two facilities are both essential to allow Multi Parts to service the aftermarket needs of its customers.

Each of the factors the USTR has stated it is considering supports excluding the types of products imported by Multi Parts:

- First, Multi Parts has never seen any Chinese pressure to share its intellectual property or been forced to enter into any joint ventures. The replacement automotive parts sold by Multi Parts are simply not the high-tech goods China has identified in its "Made in China 2025" plan. However, it has taken Multi Parts many years and, what is for us, a tremendous amount of investment to develop and qualify the thousands upon thousands of unique products we must supply to cover the myriad combinations of vehicle makes, models, years and options in each product category we supply. For example, we do not sell "a" brake hose assembly; we have developed thousands of different assemblies, each with a different combination of end fittings and brackets to fit everything from a 1962 Ford Falcon to a 2016 Toyota Corolla. Attempting to duplicate this meticulously built supply chain to produce this kind of broad-range, low-volume production at the level of quality required for safety critical applications would be exceedingly difficult if not impossible.

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[15] *https://www.globalautomakers.org/economic-impact/national-impact.*

- Second, the tariffs on Multi Parts imports would cause disproportionate economic harm to U.S. interests. Multi Parts partners with numerous manufacturers and distributors, which will also suffer from the onerous 25 percent tariffs proposed on Multi Parts imports from China.
- Third, the tariffs would most certainly harm small and medium-sized businesses—Multi Parts being a prime example. Multi Parts is a family company that considers every individual team member as part of that family. Multi Parts is very proud of the business it has created and most especially of the good-paying jobs with full benefits which it provides in areas such as engineering, marketing, sales, and management. These tariffs put all those jobs at risk.
- Finally, the burden of the Section 301 tariffs on Multi Parts' products will be passed on to the ultimate vehicle owners. For low- and middle-income consumers, stretching out the value of their automobiles is vital and high-priced dealership parts and services are simply not an option. The replacement and aftermarket parts sold by Multi Parts are a safety-net for these consumers, helping them prolong the life of the car that allows them to get to work, run their errands, drop off their children and live the treasured American life of mobility. The Section 301 tariffs on our aftermarket products threaten every single American's ability to keep his or her car running safely and reliably.

The impact of these tariffs on Multi Parts, and on our customers, would be catastrophic. We at Multi Parts ARE sympathetic to the goals of the USTR in seeking to remedy any Chinese intellectual property abuses. But Multi Parts and its customers—as well as the ordinary Americans who rely on these products—are just innocent bystanders in this international trade war with China. So, we had asked the USTR to seek to minimize the collateral damage on a family-owned company like Multi Parts and the low- and middle-income customers who rely on us to provide reliable, safe, and economical aftermarket parts for their automobiles. Unfortunately, none of the tariff lines listed below were removed from the announced tariffs and, barring approval of exemption requests or action by congress, we will face the full and onerous impact of these tariffs.

As promised above, here is the list of Multi Parts imports impacted by the Lists 1 and 3 tariffs:

Section 301 Lists 1 & 3 Products of Concern	HTSUS Code 8 Digit
Gas Cap Tether	4007.00.00
Charge Air Cooler/Intercooler Boots/PCV Hoses/Turbo Hose Kits	4009.31.00
Brake Hose Assembly	4009.32.00
Fuel Pump Lock Ring	4016.93.10
Diesel Particulate Filter	6909.12.00
Diesel Particulate Filter	6909.19.50
Cam Phaser Gears	8409.91.50
Brake Wheel Cylinder/Clutch Slave Cylinder	8412.21.00
Fuel Pump Module; Water Pumps	8413.30.90
Brake Master Cylinder, Clutch Master Cylinder, Hydraulic Clutch Cylinder Assembly	8413.50.00
Fuel Pump Strainer/Filter	8421.23.00
Diesel Emission Fluid Heater	8421.99.00
Variable Valve Timing Solenoid	8481.20.00
Fuel Limit Vent Valves/Diesel After Treatment Injectors; Diesel Fuel Regulators/Gasoline Fuel Pressure Regulators/EGR Valves	8481.80.90

Section 301 Lists 1 & 3 Products of Concern	HTSUS Code 8 Digit
HID Ballasts	8504.10.00
HID Ballasts	8512.20.20
Interior Bulbs	8512.20.20
Brake Hose Assembly	8708.30.50
Knuckle Assemblies	8708.80.65
Clutch Actuating Components	8708.93.75
Hydraulic Timing Tensioner	8708.99.81

NATIONAL ASSOCIATION OF FOREIGN-TRADE ZONES (NAFTZ)
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202–331–1950

October 10, 2018

U.S. Senate
Committee on Finance
Dirksen Senate Office Building
Washington, DC 20510–6200

Re: Senate Finance Committee hearing on "Impact of Tariffs on the U.S. Automotive Industry" (September 26, 2018)

The National Association of Foreign-Trade Zones (NAFTZ) submits the following comments to the U.S. Senate Committee on Finance for inclusion in the record for the committee's hearing on September 26, 2018 to consider the impact of tariffs on the U.S. automotive sector.

1. Background

NAFTZ is the voice of the U.S. Foreign-Trade Zones (FTZ) Program and its stakeholders—communities, companies, and service providers in the United States that use and rely on the FTZ program. The program was established by Congress in 1934 to help "level the playing field" for U.S.-based companies facing competition from firms in foreign countries exporting to the United States. Manufacturing, distribution, intermodal activities and re-exports may be conducted in FTZs that could otherwise take place abroad and reduce U.S. participation in global commerce.

Since manufacturing was first allowed in FTZs by an amendment to the Foreign-Trade Zones Act in 1950, the program has been a critical tool for promoting tariff policy that benefits manufacturing in the United States, which constantly competes with overseas production. FTZ participation helps U.S.-based firms improve their global competitiveness, maintain U.S.-based activity and jobs, encourage production closer to end-user markets, and boost exports through lower effective-duty rates and special customs-entry procedures that improve cash flow and production efficiency.

As a result, the FTZ program provides valuable incentives that help U.S. communities recruit and/or retain companies to manufacture/operate in their locations, and ultimately, remain in the United States, rather than moving to a foreign country.

As intended by the FTZ Act, American communities receive the principal benefits of the FTZ program, which include three pillars of economic development:

- **Business Retention:** The FTZ program grants communities the opportunity to help their local companies to lower operational costs, remain competitive in their particular industry, and continue operations in the United States.
- **Business Recruitment:** The FTZ program is an effective foreign-direct investment tool that communities use to recruit foreign companies interested in establishing a physical presence in the United States and thereby contributing to the U.S. economy.

- **Increased Regional Employment:** Operating in an FTZ environment affords companies the opportunity to remain competitive, expand operations, and, most importantly, hire highly-skilled American workers.

The FTZ Act achieves its economic development objectives through the cost reduction mechanisms offered through the FTZ program, which include:

- **Duty Deferral**—Companies using FTZs may delay payment of customs duties until goods move out of the zone and enter U.S. commerce.
- **Duty Elimination**—Companies using FTZs may export goods from a zone to a foreign country without paying U.S. duties, thereby simplifying the company's cash flow management.[1]
- **Duty Reduction**—Companies approved for production in an FTZ may pay duty at either the rate applied to the foreign inputs used in production or the rate for the finished product ("inverted tariff"), thereby reducing U.S. duty to the level automatically enjoyed by foreign manufacturers. U.S. customs policy should not discourage U.S.-based manufacturing, which the U.S. FTZ program helps avoid by ensuring production is not lost to overseas competitors due to U.S. duties. These manufacturing benefits have resulted in numerous investments in U.S. facilities and creation of American jobs in automobile and parts production for more than four decades.

Congress provided all these FTZ benefits to bolster the global competitiveness of U.S.-based operations. FTZs account for a significant portion of total U.S. trade. In 2016, the last year for which complete data are available, exports from facilities operating under FTZ procedures totaled $76 billion, or 5.2 percent of all U.S. goods exported. Imports into FTZs totaled $225.3 billion, or 10.2 percent of total goods imported into the United States. Over 420,000 American workers are employed at FTZ operations in all fifty states and Puerto Rico, accounting for nearly 4 percent of manufacturing employment in the United States.[2]

2. General Comments

While many industries (including electronics, pharmaceuticals, petroleum, chemicals, machinery, ships/boats, and food/beverages) use the U.S. FTZ program, the automobile and auto parts industries are among the largest and most important users and are a major FTZ manufacturing and export success story. FTZs have been instrumental in creating and preserving many thousands of American manufacturing jobs in these industries and reviving state and local economies throughout the United States.

A good example is BMW, which manufactures automobiles in a foreign-trade zone in Spartanburg, South Carolina (FTZ 38). Before the arrival of BMW, the Greenville/Spartanburg economy was largely dependent on the textile industry—hard hit by years of plant closures and job losses. Spartanburg was able to leverage the FTZ program to persuade BMW to invest $3.7 billion to construct the largest final-assembly auto plant in the world employing 9,000 South Carolinians. Based on the overwhelming success of this operation, the company announced in June 2017 a plan to invest an additional $600 million in this plant, which will add another 1,000 jobs, and boost production up to 450,000 vehicles a year. BMW is also one of this country's largest exporters of U.S.-made automobiles. BMW and the auto-parts suppliers it has drawn into FTZ 38 have been instrumental in turning Upcountry South Carolina from another decaying textile community into a modem manufacturing and exporting powerhouse and a region that understands through direct experience the importance of global supply and value chains, foreign direct investment, and open markets to the U.S. economy and jobs.

We have seen similar manufacturing success stories in the automotive sector play out in U.S. FTZs across the country—with Honda in Cincinnati, Ohio (FTZ 46); Hyundai in Montgomery Alabama (FTZ 222); Mercedes-Benz in Birmingham, Alabama (FTZ 98); Nissan in Smyrna, Tennessee (FTZ 78) and Canton, Mississippi (FTZ 158); Subaru in Indianapolis, Indiana (FTZ 72); Tesla in San Jose, California (FTZ 18); Toyota in Georgetown, Kentucky (FTZ 29), Huntsville, Alabama (FTZ 83), and Charlestown, West Virginia (FTZ 229); and Volkswagen in Chattanooga, Tennessee (FTZ 134). In these examples, we repeatedly see a direct correlation between

[1] The sole exception to this benefit is exports of manufactured goods from a U.S. FTZ to NAFTA partner countries (Canada and Mexico), which, as NAFTZ has pointed out, is an unfair restriction and should be removed.

[2] BLS statistics for total U.S. manufacturing employment, *https://data.bls.gov/timeseries/CES3000000001.*

a manufacturer's announced expansion of its zone operations, the subsequent grant of expanded production authority in the zone, and increased production and employment. This has ancillary benefits as finished production is shipped for export out of ports like Jacksonville, New York/New Jersey, Charleston, and Baltimore. Without the FTZ program, much of this production and economic activity would have stayed in or relocated to other countries.

3. Tariffs and the U.S. Automotive Sector

U.S. tariff policy has been a key reason why the FTZ program is of such importance to the U.S. automotive sector. Automobile manufacturers in the United States face a classic inverted tariff situation where the 2.5 percent duty on the final product (automobiles) is lower than the average 5 percent duty on the inputs (auto parts). The FTZ program is specifically designed to address this situation through the duty-reduction benefit described above. Without this benefit, imports, subject to the lower duty on the finished automobile, would have a distinct tariff advantage over U.S. auto production, which is assessed the higher duty on imported parts.

However, the tariff picture is very different with respect to the application to products manufactured in a U.S. FTZ, including autos and auto parts, for additional tariffs imposed under a trade remedy, including antidumping/countervailing duties, Sections 201 and 301 of the Trade Act of 1974, and Section 232 of the Trade Expansion Act of 1962. To safeguard the FTZ Program's consistency with U.S. trade law and policy, Congress developed a built-in legal and regulatory mechanism to ensure that FTZ manufacturers are subject to the same obligations and treatment as U.S. manufacturers outside a zone with respect to additional duties or quotas imposed under a trade remedy. One of the most important of these safeguards is the requirement that certain imported inputs subject to a trade-remedy action be admitted into a zone in what is called "Privileged Foreign (PF) status." PF status is the legal mechanism to ensure trade remedies duties are assessed and collected on subject imported inputs at the time a final product manufactured from those components in an FTZ in the United States is withdrawn from a zone and entered into U.S. commerce.

Thus, FTZ automotive manufacturers, like the U.S. automotive sector as a whole, have been impacted by the various trade-remedies actions imposed this year by the Administration—Section 232 on steel and aluminum duties under Section 232 of the Trade Expansion Act of 1962; Section 301 of the Trade Act of 1974 on imports from China; and the potential imposition of Section 232 duties on vehicles and parts. However, FTZ automotive manufacturers are also being impacted in some unique ways solely by virtue of having their manufacturing operations inside, rather than outside a zone.

a. Section 232 Duties on Steel and Aluminum

Like the U.S. automobile industry as a whole, the Section 232 tariffs on steel and aluminum have substantially raised the price of a key input in automobile production and thus the overall production costs for FTZ automobile manufacturers. These costs are not borne by competing producers in foreign countries. The result is to diminish the global competitiveness of U.S. made vehicles vis-à-vis imported automobiles, a situation the U.S. FTZ program was specifically designed to mitigate.

b. Section 301 Duties on Imports From China

The expanding number of products from China subject to duties under Section 301 has created a unique problem for FTZ manufacturers, including those in the automotive sector, regarding how those duties are being applied to FTZ-manufactured products.

Final products manufactured and substantially transformed in a U.S. FTZ are legally products of the United States, just as if they had been produced in a U.S. factory outside a zone. As such, they should not be considered or treated as foreign products imported into the United States for purposes of applying trade remedies. While U.S. manufacturers outside a zone typically make entry and pay applicable duties on their imported inputs upon arrival at a U.S. port, the FTZ program allows U.S. manufacturers inside a zone to delay making entry and paying duty on those imported inputs until the final product is withdrawn from a zone for U.S. consumption and to not pay Customs duties on exports.

However, to obtain statistical data on imported inputs used in zone manufacturing, the U.S. Census Bureau guidance directs FTZ manufacturers to report on Customs-entry documentation the country of origin of the foreign-status inputs with the greatest aggregate value in a zone-manufactured product. This guidance inadvert-

ently results in a U.S.-origin, zone-manufactured product potentially being erroneously treated as foreign origin on entry documentation for purposes of application of trade remedies.

Specifically, if a product made in a U.S. FTZ falls under the HTS classification of a product subject to the trade remedy *and* the inputs with the greatest aggregate value are from a country subject to the trade remedy, the trade-remedy duties will be applied to the FTZ-manufactured, U.S.-origin product against the value of all the incorporated foreign-status inputs at the time of Customs entry, including inputs from countries other than China.

Therefore, while a U.S. manufacturer outside a zone pays trade-remedy duties only on imported inputs that are subject products from a subject country, a U.S. FTZ manufacturer is penalized by having the trade remedy-duties also assessed on the entire value of all foreign-status inputs in the zone-manufactured product, *resulting in the effective assessment of the trade-remedy duties on imported inputs that are not themselves specifically subject to the trade remedy.*

To prevent this erroneous treatment in the Section 232 actions on steel and aluminum, CBP, as the enforcement agency acting under policy direction from the Administration, and the Commerce Department asked the White House to include Proclamation language exempting from Section 232 tariffs any product manufactured and substantially transformed in a U.S. FTZ (comprising NPF status input value only), while also clarifying that all imported inputs specifically subject to the Section 232 action be safeguarded by requiring admission to the zone in PF status and retaining that status even if used to manufacture a different, substantially-transformed product in an FTZ. President Trump agreed to the requested language and signed the proclamation. As a result, the Section 232 duties are being correctly and appropriately applied to U.S. FTZ manufacturers in accordance with trade policy.

We have been informed that CBP's reported request to USTR for similar language in the Section 301 actions was rejected for unknown reasons. As a result, CBP finds itself with conflicting directives on the application of trade remedy duties to FTZ-manufactured products in the Section 232 actions as compared to the Section 301 actions. CBP has indicated to the NAFTZ that it cannot act on its own to resolve this discrepancy absent clarification from the Administration through USTR.

Unfortunately, inaction by USTR to resolve this problem has resulted in a significant disincentive to use the FTZ program as Section 301 duties are effectively being assessed on foreign-status inputs that are neither Chinese origin nor on the Section 301 list of subject products. These duties are not being assessed on products manufactured in the U.S. outside a zone.[3]

As a result, zone manufactures are faced with the following dilemma: (1) incur millions of dollars in erroneously and inappropriately applied additional duties under Section 201 and 301 on products that are not subject to those trade actions; (2) incur millions of dollars in additional duties and costs by abandoning the FTZ Program and the Commerce Department's grant of inverted tariff benefits that help manufacturers keep production in the United States and eliminate incentives to import the finished product from foreign countries, or (3) move production to a foreign country, import the finished product into the U.S., and forego the value-added activities, inputs, and economic benefits associated with U.S.-based manufacturing in an FTZ.

c. Section 232 Duties on Motor Vehicles and Parts

At its core, the focus of Section 232 as a trade restrictive measure is on national security, meaning production for defense and defense readiness. Restricting imports of motor vehicles, auto parts or any other product is an extremely serious step that requires an imminent "threat" to national security. The plain wording of Section 232 demonstrated that Congress did not intend or authorize the President to use this provision to impose trade restrictions based on economic considerations not related to national security.

Therefore, it would seem that an affirmative national-security determination in this investigation on imports of automobiles or auto parts can only rest on a finding that (1) the autos and parts industries each face an imminent crisis so profound as to imperil their continued existence and ability to supply vehicles or parts to the U.S.

[3] Although not impacting the automotive sector, a similar problem exists with respect to duties imposed earlier this year on washing machines/parts and solar cells/panels under Section 201 of the Trade Act of 1974.

military; and (2) the United States faces an imminent national-security threat, including the risk of a trade embargo, that would necessitate ensuring domestic demand could be satisfied solely by the U.S. auto and auto-parts industries without any imports. We believe there is no credible evidence to support either conclusion.

Just looking at General Motors, the company remains the largest producer of automobiles manufactured in the United States, with a market share in 2017 of 17.6 percent and revenue of $146 billion. GM recently experienced one of the largest stock surges in its history based on its pioneering work in electric cars and artificial intelligence for autonomous vehicles. Over the past six years, its stock price has more than doubled from $19 a share to nearly $44 a share. These are hardly the signs of a company in dire peril. Like all industries, the automobile sector has faced a variety of challenges over the past 50 years, including from imports. But evidence shows it has emerged more globally-competitive with record sales and profits as the U.S. economy has recovered from the 2008 financial crisis.

There are several other troubling aspects to possible imposition of Section 232 duties on imported vehicles and parts. Imposing stringent market access restrictions in the name of national security against foreign exports and investment in the automotive sector would mean significant government market intervention in and control of the industry, with the government artificially inflating prices for vehicles and parts through hidden taxes on consumers. The result leaves the government, rather than the market, in the position of dictating to American consumers what they will be allowed to buy, in what quantity, and at what price. As we know from basic supply-and-demand economics, we can expect significantly higher costs to U.S. consumers for finished automobiles as a result.[4] Higher auto prices could erase any tax savings American families gained from last year's tax bill and depress the U.S. auto market.

This situation also allows the government, rather than market forces, to pick winners and losers among U.S. companies and industries. With the automotive sector part of a global supply and value chain, trade measures hitting inputs (*i.e.,* auto parts) in addition to finished vehicles will significantly increase the cost of manufacturing automobiles in the United States. This could cripple the ability of the U.S.-based auto industry, including the many companies using FTZs, to remain globally competitive vis-à-vis foreign manufacturers unburdened by these additional expenses, create strong disincentives to manufacture in the United States, and significantly reduce sales of U.S.-made automobiles in important export markets. The number of jobs lost in other industries as a direct consequence of these tariffs has been calculated at 250,000 resulting in a net loss of 158,000 American jobs when accounting for estimated employment gains in the auto and parts sectors. These figures do not include those jobs adversely impacted by expected retaliation by other countries against American products.[5]

The Administration's unprecedented and expansive interpretation of its national-security authority under Section 232 for purposes other than those Congress and WTO member countries intended, will have two other very negative consequences. First, it sets an alarming precedent by effectively ceding to the President unfettered authority to impose tariffs and other trade restrictions on any product, against any country, in any amount, at any time, and for an indefinite period, free from Congressional authority and oversight or scrutiny by the U.S. courts and the World Trade Organization, merely by citing the words "national security." This was not Congress' intention when it passed Section 232 as part of the Trade Expansion Act of 1962, turns Section 232 into the exception that swallowed the rule, and exposes the U.S. government to legal challenge in the courts and the WTO that it runs a considerable risk of losing.

The prospect of these disturbing consequences raises a more profound concern—that unconstrained use of Section 232 would inflict serious and potentially lethal damage to the rules-based global trading system the United States created and built over the past 75 years and which has been instrumental in fostering economic cooperation and prosperity around the world.

Specifically, such action undermines the principles of non-discrimination, national treatment, and bound tariffs, which are pillars of the global-trading system; invites

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[4] A recent study by the Trade Partnership estimated the cost of foreign vehicles would rise from an average of $30,000 to $36,400 per vehicle—a 21-percent increase. Dr. Joseph Francois, Laura Baughman, et al., "An Accident Waiting to Happen? The Estimated Impacts of Tariffs on Motor Vehicles and Parts," The Trade Partnership (May 29, 2018), p. 2.

[5] *Id.*

retaliation against U.S. exports; provides a precedent and road-map for other countries to impose unwarranted market-access restrictions against U.S. goods and services in the name of "national security"; and risks a return to the law of the jungle in trade relations that existed during passage of the infamous Smoot-Hawley tariffs before World War II and the needless damage they inflicted on the U.S. and global economies.

To be successful and globally competitive in the 21st-century economy, our companies need and rely on a coherent and predictable set of international rules. Therefore, we have urged the Department of Commerce and the White House to consider these points carefully before taking any further action under Section 232. We cannot endorse, nor can our country afford, wanton, reckless, or arbitrary use of Section 232 for reasons unrelated to genuine national security concerns and threats.

In conclusion, we do not believe there is a justifiable national-security basis to impose any trade measures under Section 232 on imported motor vehicles and parts.

Respectfully submitted,

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The National Pork Producers Council (NPPC) is a national association representing a federation of 42 state producer organizations and the federal and global interests of the U.S. pork industry. The U.S. pork sector is a major value-added enterprise in the agricultural economy and a significant contributor to the overall U.S. economy.

Recognizing that the purpose of this hearing is to examine the impact of tariffs on the automotive industry, NPPC wishes to draw attention to the fact that Section 232 national security tariffs on autos and auto parts, if implemented, likely would result in retaliation by affected trading partners. The estimates of the trade affected by Section 232 tariffs are mind boggling. Retaliation of such magnitude would be extremely harmful to many sectors of the U.S. economy and, in particular, would be financially catastrophic for America's 60,000 pork producers, who have the dubious distinction of already being on three retaliation lists.

For the reasons cited below, we wish to express our continued opposition to the tariffs that have been imposed to date and to any new tariffs that may be under consideration, whether by the United States or by our trading partners.

The United States over the past 10 years, on average, has been the No. 1 exporter of pork in the world, and it is the world's lowest cost producer. In any given year, the U.S. pork industry ships pork and pork products to more than 100 nations. Those exports contribute significantly to the bottom line of all U.S. pork producers, adding more than $53 to the value of each hog marketed in 2017, when $6.5 billion of U.S. pork was exported.

That export value is 11.3 times greater than it was in 1993, the year before the NAFTA went into force and when the United States began aggressively opening foreign markets through bilateral and regional trade agreements. The export growth in the U.S. pork industry can be attributed almost entirely to the market access benefits achieved in those trade agreements. We now export more pork to the 20 countries with which the United States has free trade agreements than to all other nations combined.

The USDA's Economic Research Service calculates that every $1 billion in additional U.S. agricultural exports generates 8,010 new jobs across our economy. However, for livestock exports the job multiplier is calculated at 11,812 jobs per billion dollars. Measured in these terms, U.S. pork exports since the United States began negotiating free trade agreements are estimated to have generated at least 76,000 additional U.S. jobs.

In short, our industry has benefited enormously from reduced foreign tariffs. And, not surprisingly, we lose badly when tariffs are imposed or hiked on our exports.

In the past 10 months, our industry has been subjected to the following new barriers.

U.S. Section 232 (National Security) Tariffs on Steel and Aluminum

China retaliated against U.S. pork on April 2 with a 25-percent tariff on top of existing tariffs. Prior to this retaliation, China had been the third largest export market for U.S. pork. We exported $1.1 billion of pork and pork products to China in 2017. The 25-percent duty is having a devastating impact on U.S. pork exports and gives competing countries an enormous price advantage over our products. To compound the harm, the tariff was subsequently increased to 50 percent, as described below.

Mexico retaliated against U.S. pork on June 5 with a 10-percent tariff and increased that retaliation to 20 percent on July 5. Mexico is our largest volume export market. Our industry has worked very hard over the years to expand this market. These tariffs are causing severe financial pain to our industry, hurting sales in Mexico, and have placed a critical market we have worked diligently to develop at serious risk.

Japan, our top value export market, also has been hit by U.S. Section 232 tariffs. To date, Japan has refrained from retaliation. A new U.S. tariff on Japanese automobiles would likely deal a devastating blow to pork and other U.S. farm exports.

U.S. Section 301 (Unfair Trade Practices on Intellectual Property) Tariffs on Goods From China

In response to U.S. tariffs on $34 billion in Chinese products, on July 6, China retaliated against an equivalent value of U.S. exports. U.S. pork was hit with an additional 25-percent tariff, on top of the 25-percent tariff imposed on April 2 under Section 232. This, combined with China's normal MFN tariff, has resulted in an overall tax of 70 percent for some pork categories. The cumulative effect of these actions has moved the United States from being the most price competitive supplier of pork to China to the least price-competitive among all countries. Our exports to China are plummeting.

U.S. Section 232 (National Security) Tariffs on Automobiles

The Trump administration has proposed applying tariffs on imported automobiles for the purpose of protecting national security, and the Department of Commerce has already sought public comment on that suggestion. Tariffs on autos would potentially affect imports from Japan, Canada, Mexico, South Korea and at least four current members of the European Union—Germany, Italy, Sweden and the United Kingdom—not to mention other EU members that supply parts to those countries. All of these are customers for U.S. pork. Japan, Mexico, Canada and South Korea are four of our top five markets. (China is No. 3.) As in the case of Japan, mentioned previously, the imposition of a tariff on automobiles on the basis of national security concerns would no doubt provoke retaliation against U.S. pork and farm exports by most, if not all, of those countries.

Finally, it is important to stress that the impact of tariffs has an adverse effect on farmers and ranchers, as well as on all American consumers, by raising prices and costs of production. For farmers, this means prices will go up directly or indirectly (for example by the increased cost of steel to domestic manufacturers) on inputs such as tractors, machinery, animal health drugs and other inputs. For many farmers and ranchers, this will prove too much to cope with on top of the impact from lost export sales.

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October 8, 2018

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Chairman Hatch and Members of the Committee, Sea Link International is headquartered in Largo, Florida. Sea Link specializes in Automotive Lighting research, development and component part manufacturing. Core competency includes,

Plastic Injection Molding, AL/Mg Die Casting, Thixo-molding, Stamping, painting, metallization and assembly. Sea Link currently employs 42 direct employees in Florida, Michigan and California. These U.S. jobs are upper-level engineering, project management, logistics, warehousing, accounting and sales positions with an average annual income of $100,000/year or more.

Sea Link imports various products from its two, wholly-owned manufacturing facilities located in the Shanghai area. Sea Link employs multiple expatriates in its two Chinese facilities. The facilities from which Sea Link imports its products are not run or owned by the Chinese Government or related interests. The products imported by Sea Link are not implicated in the "Made in China 2025" initiative.

While the products Sea Link manufactures in and imports from China are possibly available from U.S. or third-countries, to abandon its Chinese operations would create an economic hardship that might ultimately lead to operational failure and closure of Sea Link's U.S. operations. Sea Link has invested large sums of money in its Chinese facilities, with financial assistance from U.S. financial institutions.

To locate sources of the products Sea Link imports from China today, or to move its current manufacturing operations out of China, would be very cumbersome and expensive, if not impossible given the OEM Automotive Industries regulatory and quality requirements. The level of capital investment and increased costs necessary to make those changes would cause Sea Link to be unable to compete in the current marketplace. With the national unemployment rate in the U.S. at roughly 3.9%, the volume of the labor force that would be necessary to handle this manufacturing is virtually unavailable, and those available are not willing to enter this level of employment. Factories in the U.S. are running at about 80% of the labor force needed to operate efficiently. Another area of concern is that the capability to manufacture and maintain the tooling necessary to produce the products Sea Links imports is not available in the U.S. to the same degree and capacity as in China. These factors would strain the ability of Sea Link to meet the Quality, Cost and Delivery demands of its customers, to the point of jeopardizing its U.S. operations altogether.

Sea Link imports products impacted by both the List 1 and List 3 tariffs. These products include such items as Industrial Valves, Bulb Shields, Heat Shields, Heat Sinks, Brackets, Reflectors, Fog Lamps and other types of Signal Lighting. Each of the factors the USTR has stated it is considering supports excluding the types of products imported by Sea Link:

- Sea Link has not received any pressure from the Chinese Government or other related entities to share its intellectual property or been forced to enter into any joint ventures. The OEM and other parts imported by Sea Link are not the type of products that China has identified in its "Made in China 2025" initiative. Sea Link has invested many years and a large amount of capital to produce the myriad of products necessary for the many categories of Industrial and automobile platforms in which its products are used. As mentioned above, attempting to duplicate this intricate supply chain to produce these products at the level of quality its customers require would be very cumbersome and expensive, if not impossible.
- The tariffs on the products that Sea Link imports would cause disproportionate economic harm to U.S. interests. Sea Link and its customers, including many suppliers of parts to various OEMs, will all suffer economic harm from the tariffs proposed on the products in List 1 and List 3 that Sea Link imports from China.
- The tariffs will harm many small and medium-sized businesses like Sea Link. Again, as mentioned above, most of the jobs provided by Sea Link are mid- to upper-level positions with full benefits which we provide in areas such as engineering, project management, logistical, and warehousing services. These tariffs put all those jobs at risk.
- These Section 301 tariffs place a burden on the products Sea Link imports that will need to be absorbed or passed on to the ultimate consumer. If company's like Sea Link are unable to absorb the increased costs, and our customers—including the end-user consumers—are unwilling to pay the higher prices, the economic impact will be disastrous to the individuals we employ (both in the US and the expatriates in China), the communities in which they live and work, all the way up through the US economy as a whole.

Sea Link is sympathetic to the goals of the USTR in seeking a remedy for Chinese abuses regarding U.S. intellectual property. However, the collateral damage inflicted

by these tariffs is just too high of a price to pay in this international trade war with China. We hope that a more measured approach in remedies imposed is within our reach going forward.

Seth Weisberg
Vice President—N.A. Operations
Sea Link International, Inc.

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