A photograph of a car body on an assembly line. The car is silver and is being worked on by several yellow robotic arms. The background shows a factory setting with metal structures and lights.

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USMCA's Auto Rules as a Case Study

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William Alan Reinsch
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A Report of the CSIS SCHOLL CHAIR OF INTERNATIONAL BUSINESS

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CENTER FOR STRATEGIC &
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Executive Summary

In recent decades, supply chains have become more global while bilateral and regional free trade agreements (FTAs) have continued to grow in popularity. For free trade agreements to operate as intended— that is, to provide benefits to the member countries—it must be possible for goods to be identified as products of an FTA member and therefore be eligible for preferential treatment. Free trade agreements also are expected to encourage manufacturers outside the agreement’s boundaries to locate production facilities within the countries party to the agreement to take advantage of the preferential treatment for goods produced there. Rules of origin codified in trade agreements play a crucial role in shaping global supply chains by setting out rules to ascertain the origin of a good.

Rules of origin differ by product and by FTAs. Some rules are simple, for example, requiring that a certain percentage of a product’s content comes from within the FTA zone. That rules of origin often do not require that 100 percent of the product originates from within the FTA region is a recognition of the increasingly global nature of supply chains. Carefully crafted rules of origin can balance the needs of manufacturers to source content from around the world while incentivizing the sourcing of significant content from within an FTA area. Imbalanced rules of origin can cause negative economic impacts. Rules of origin that are too lax may allow companies outside of a free trade region to take advantage of preferences at the expense of countries within the region. Rules of origin that are overly strict may incentivize companies within the region to not comply with the rule because the cost of doing so is higher than the gains realized from preferential treatment. Clear, consistent, and balanced rules of origin are important for manufacturers because they provide a framework for establishing supply chains that are most competitive while remaining with the rules and realizing preferential trade benefits.

This paper will examine the North American automobile industry and rules of origin that govern it as a case study from which to draw broader conclusions about how rules of origin in regional trade agreements influence global supply chains. The North American automobile industry is highly competitive and complex. It is composed of domestic and foreign companies whose operations have been shaped by rules of origin in the North American Free Trade Agreement (NAFTA) for the past 25 years. The NAFTA replacement, the United States-Mexico-Canada Agreement (USMCA), overhauls automotive rules of origin. In doing so, the USMCA could require the modification of global supply chains laid out over the past 25 years. Those changes could result in unexpected and unwelcome costs for certain sections of the industry while generating opportunities for other sections.

The tighter USMCA rules require that a relatively high percentage of a vehicle's value come from North America and that a certain percent of a vehicle be built by workers earning at least \$16 an hour. The USMCA's layered automotive rules of origin will require established supply chains to shift to a less economically efficient and more managed layout. That could result in disadvantages for consumers, parts suppliers, and vehicle manufacturers. Vehicle prices could rise, or consumers could be offered fewer options. Manufacturers could require that suppliers of parts trim margins or be left behind, potentially resulting in layoffs. Added costs or lower sales will reduce spare capital in the automotive industry at a time when the North American industry faces plateauing sales in the United States and the need to invest heavily in groundbreaking new technologies related to electrification, automation, and connectivity. Increased costs and less capital for research and development may make automobiles produced in North America less globally competitive as well. Costs incurred by the new rules of origin, however, would be miniscule compared to costs created by potential Section 232 tariffs on automobile and parts, as the Trump administration has threatened.

There are, however, benefits from the new rules. New requirements to use North American steel and aluminum will be a boon to those industries. Parts suppliers and automobile manufacturers in the United States with spare capacity may find opportunities to increase production. Increased investment in the North American automotive supply chain is likely to increase over the long-term because of the new rules.

The evolution of the North American automotive rules of origin from NAFTA to the USMCA illustrates how policymakers seek to encourage investment in manufacturing and accomplish other goals in FTAs. The increased complexity of the USMCA's rules of origin relative to NAFTA's rules tracks the increased complexity of automotive supply chains in North America. How the USMCA's rules balance incentives and requirements to build in North America with the flexibility required to stay globally competitive remains to be seen as the impact of the rules will not become fully apparent for years.

Introduction

The purpose of a free trade agreement (FTA) is to boost trade and investment among the participating countries by lowering tariffs and laying out rules for economic activity. Challenges arise, however, in limiting the benefits of a given trade agreement to its participants. Merely reducing trade barriers among the FTA partners does not guarantee that only goods produced by the partners will receive preferential treatment. For example, an FTA member with the lowest external tariff for a particular product could import that product from outside the FTA region and export it within the region tariff-free, even if the product's ultimate national destination has a higher external tariff. This scheme undermines the intended benefits of an FTA and results in trade distortions. To prevent this scenario, trade negotiators include “preferential rules of origin” in trade agreements. These provide a means to determine where a good is from and a method to incentivize the use of local content in trade among FTA partners. If a product does not meet the rule of origin assigned to it in a trade agreement, it does not receive preferential treatment.

This paper will review the impact that rules of origin in FTAs have on supply chains. The rules of origin for the automotive sector in the United States-Mexico-Canada Agreement (USMCA) will serve as a case study. The findings of the report are based on a review of the literature, publicly available datasets, interviews with auto industry representatives and experts, and field research. The auto sector offers a unique but illustrative lens to view the impact that rules of origin have on supply chains. Indeed, the precursor to the USMCA and current framework for trade among Canada, Mexico, and the United States, the North American Free Trade Agreement (NAFTA), contains auto-specific rules of origin that helped shape the evolution of the auto sector supply chain in North America. Further, the complexity of an automobile and its supply chain makes it a good product for this case study. Vehicles are made of some 30,000 parts sourced from hundreds of suppliers pursuant to thousands of distinct contracts.¹ Auto supply chains are generally regionalized and then further localized.² Final assemblers, known in the industry as original equipment manufacturers (OEMs), strive to produce vehicles within or near the market of final

1. Chester Dawson and Mike Colias, “Trump Tariffs Pit Auto Companies Against Each Other,” *Wall Street Journal*, November 9, 2018, <https://www.wsj.com/articles/trump-tariffs-are-sourcing-longstanding-auto-industry-ties-1541782524>.

2. T.J. Sturgeon and J. Van Biesebroeck, “Global value chains in the automotive industry: an enhanced role for developing countries?,” *Int. J. Technological Learning, Innovation and Development* 4, Nos. 1/2/3 (2011): 181–205.

sale, which is usually a regional group of countries.³ OEMs produce some major parts themselves, such as engines and transmissions, which are, in turn, composed of parts often from other sources, and source other major parts from Tier 1 suppliers who buy other parts and components from Tier 2 suppliers that source inputs from Tier 3 suppliers and so forth. OEMs prefer to source or produce bulkier parts from production facilities near the relevant final assembly plant.⁴ There are exceptions to these principles, however.

Rules of origin are not perfect, and neither are the methods to determine domestic or originating content. In general, rules of origin often lead to sub-optimal economic outcomes because they inject political or geographical requirements into supply chain construction. In addition, they do not always achieve their intended objectives. They sometimes do not prevent content from outside the FTA region from receiving preferential treatment. Nor do they always result in more investment, production, and trade of a given product among FTA partners. Indeed, rules of origin that are too stringent may backfire and lead to supply chain disruptions with significant secondary effects throughout the chain, potentially resulting in price or variety downsides for consumers. In some cases, compliance with rules of origin comes at a cost higher than ignoring them and importing a product despite facing a non-preferential tariff rate, especially when components or products that do not meet the rule of origin are much cheaper than those that do. Entities driven by profit will abandon rules of origin if the cost of compliance exceeds the benefits of preferential tariff treatment. Firms that choose to ignore a rule of origin are left with no incentive to include local content in their product, resulting in an ineffective rule of origin. On the other hand, rules of origin that are too lax may have little to no impact on investment decisions. A balanced rule of origin can incentivize firms to make long-term supply chain decisions to locate operations within an FTA region to accrue preferential treatment, even if the location otherwise would not be the most economically optimal.⁵ Flexibility to locate production and sourcing based on a variety of factors, including labor costs, proximity to markets, and trade rules is necessary for consumers to experience lower prices and product choice, as well as for firms to garner a return on investment.

The automotive rules of origin negotiated in the USMCA are complex and will affect not only each OEM differently, but each vehicle model they produce. The rules of origin that automobiles and auto parts will have to meet to trade tariff-free within North America under USMCA rules are more stringent than NAFTA's automotive rules of origin. A labor content requirement based largely on employee wages further complicates the supply chain picture under the USMCA. That requirement effectively requires that more high-value auto components be built in the United States or Canada. Supply chains for certain models that already contain a high amount of North American content will require the least change to comply with the USMCA's automotive rules of origin. At the other end of the spectrum, vehicles that contain less North American content or manufacture high-value parts such as engines or transmissions in lower wage areas, including Mexico, will face a challenging choice: invest potentially more than \$1 billion to shift core components

3. United States Department of Commerce International Trade Administration, "2016 Top Markets Report Automotive Parts, April 2016, https://www.trade.gov/topmarkets/pdf/autoparts_Top_Markets_Report.pdf

4. KPMG, "Global Location Management in the Automotive Supplier Industry" 2005, <https://www.presseportal.ch/de/download/document/100004130-auto-relocation-survey.pdf>.

5. Jesse I. Goldman, "Determining Country of Origin: Logistical Challenges and Practical Strategies for Supply Chain Professionals," ICPA Asia-Pacific Conference Singapore, November 9–11, 2014.

of a vehicle's supply chain from Mexico to the United States or Canada or simply ignore the USMCA's rules of origin and pay the requisite most-favored nation tariff required to export a vehicle in the absence of preferential rules (2.5 percent for the United States). In cases between those two extremes, less drastic sourcing decisions will have to be made for certain vehicles to meet the USMCA's automotive rules of origin, or a strategy of ignoring the rules may be adopted.

In any case, the USMCA will bring about changes to North American automotive supply chains. The widespread adoption of just-in-time manufacturing in the automotive industry will amplify risks and impact of business disruption stemming from supply chain modifications. Adapting supply chains to the USMCA's automotive rules of origin will not be a painless task. The complexity of the automotive supply chain ensures that decisions made by single actors will send ripples throughout the entire industry. Capital intensity combined with long-planning cycles and variety of parts, components, vehicle platforms, and final products means that decisions to alter supply chains are not as simple as flipping a switch. In some cases, OEMs and their suppliers may end up making economically suboptimal decisions to comply with the new rules. The costs of those decisions will need to be accounted for at some point along the supply chain. They could be shouldered by OEMs and their suppliers, who would end up with less capital available to invest in new technologies necessary to stay competitive; the consumer, who could be forced to consider higher prices for automobiles or be presented with fewer vehicle or trim options; or a combination of both. That being said, costs added by the USMCA's automotive rules of origin would be much less than those generated by Section 232 tariffs on automobiles and auto parts that the Trump administration is considering.

Importantly, USMCA rules arrive at a time when the automotive industry is undergoing revolutionary changes. Stakeholders throughout the supply chain are investing significant amounts of capital in game-changing technologies related to vehicle electrification, automation, and connectivity. Partnerships among traditional competitors in the industry have been formed to develop technology that will be used in the vehicles of the future. Software will play an increasingly important role in vehicles, which will further shake up the industry. Meanwhile, automobile sales in the United States are plateauing, which may constrain capital to spend on research and development.

To gauge the potential impacts that could result from implementation of the USMCA's automotive rules of origin, this paper is divided into four parts. Part I reviews rules of origin methodologies and those contained in NAFTA. Part II presents a history of rules that have governed the North American automotive supply chain, as well as a brief overview of the North American automotive industry. The USMCA's automotive rules of origin are outlined in Part III. Potential scenarios for automotive supply chains shifts under the USMCA and their impacts are explored in Part IV.

Rules of origin are not the only factor in making supply chain decisions. For many companies, they are not a concern or constraint on operations. This has been the case throughout much of the automotive sector, which must cope with a variety of forces that exert pressure on different aspects of the supply chain, including capability and capacity to produce parts, the quality of parts, risk management, logistics and transportation costs associated with sourcing parts, the price of raw materials, environmental regulations,

labor availability, infrastructure costs, access to markets, and other trade actions, most notably tariffs.

Larger economic issues can trump rules of origin considerations. For example, a company expecting a downturn in demand may well choose not to invest anywhere, thus negating any relocation incentive that rules of origin might provide. Even in cases of increasing demand, larger issues like favorable tax and investment policies could have a greater influence on relocation decisions than rules of origin.

1 | Rules of Origin Methodologies and NAFTA

Rules of origin are used to determine the origin of a product for an FTA. The methodology used to calculate origin varies by government, product, and trade agreement. In the case of NAFTA and the USMCA, most products subject to rules of origin have a regional value content (RVC) threshold of 50 percent or higher. A product that has sufficient value derived from content produced in the trade region—in this case the United States, Canada, and Mexico—to meet the RVC threshold would receive preferential treatment under that agreement’s rules. Methodologies to calculate regional value content for the purposes of rules of origin are contained in trade agreements. Products that do not meet the RVC threshold are traded on most-favored nation terms.

Current Auto Rules under NAFTA (1994–Present)

Under NAFTA and USMCA rules, automobiles and parts are governed by separate specific rules of origin. A part that does not meet the specific rule assigned to it would not contribute to the overall RVC for the vehicle it is used in.

Under NAFTA’s rules of origin, an automobile must contain 62.5 percent regional value content using the net cost methodology for the car or truck to be imported into a member country duty-free. Auto parts must meet a 60 percent RVC using the net cost method to meet NAFTA’s rule of origin. The USMCA includes three methods to calculate RVC: net cost, build-down, and build-up.

Net Cost

Net cost determines RVC by dividing the difference of a good’s net cost and value of non-originating materials by its net cost. A good’s net cost is its total cost minus sales promotion, marketing, and after-sales service costs, royalties, shipping, and packing costs, and nonallowable interest costs that are included in the total cost. Net cost is a relatively simple way to calculate RVC because it considers a clear set of input costs.⁶

6. Bill Canis, M. Angeles Villarreal, and Vivian Jones, “NAFTA and Motor Vehicle Trade,” Congressional Research Service, July 28, 2017, <https://fas.org/sgp/crs/row/R44907.pdf>.

$$RVC = \frac{\text{Net Cost} - \text{Value of Nonoriginating Materials}}{\text{Net Cost}} \times 100$$

Build-Down

Build-down determines RVC by dividing the difference between a product's adjusted value and the value of non-originating materials by its adjusted value. Adjusted value is composed of all costs, profit, general expenses, parts and materials, labor, shipping, marketing, and packing.

$$RVC = \frac{\text{Adjusted Value} - \text{Value of Nonoriginating Materials}}{\text{Adjusted Value}} \times 100$$

Build-Up

Build-up determines RVC by dividing the value of originating materials by the adjusted value and multiplying that quotient by 100.

$$RVC = \frac{\text{Value of Originating Materials}}{\text{Adjusted Value}} \times 100$$

Tariff Shift and Tracing

In addition, NAFTA includes rules to determine if a good originated in the NAFTA region. A good that is entirely produced or obtained in the NAFTA region is deemed originating. For certain products, a shift in tariff classification within the NAFTA region or a shift in tariff classification plus meeting an RVC requirement may be sufficient to meet a particular rule of origin.

The NAFTA rule devised in the 1990s, however, also contains what is referred to as a "tracing list." The non-originating value of items on the list remains non-originating throughout the entire production of the final good and factors into the RVC of the final good, even if the item traced meets its specific RVC to count as originating. Items not on the list are deemed originating regardless of regional value content or any other factor that would determine origin. The NAFTA tracing list does not contain some parts found in modern cars, such as infotainment systems, and lists parts that are not in new cars, such as cassette decks.⁷ This has resulted in many modern vehicles meeting the NAFTA RVC despite containing parts that otherwise would put the vehicle's RVC below the NAFTA threshold. Some industry experts suggest that the tracing "loophole" allows vehicles to meet the NAFTA RVC with just 55 percent of its content having originated from the region.

7. "North American Free Trade Agreement," ratified December 8, 1993, Chapter 4, Annex 403.1, <https://www.nafta-sec-alena.org/Home/Texts-of-the-Agreement/North-American-Free-Trade-Agreement>.

2 | History of Rules and Overview of the North American Automotive Industry

U.S.-Canada Auto Pact (1965)

In the early 1960s, cross-border auto trade between the United States and Canada was limited to parts imported by Canadian subsidiaries of the Big Three automakers—General Motors, Ford, and Chrysler, which is now Fiat Chrysler Automobiles.⁸ These companies utilized an exemption in Canadian tariff law that allowed them to import duty-free parts that were not made in Canada to build the cars in Canadian factories.⁹ Otherwise, most cars and parts faced a 17.5 percent tariff upon import.¹⁰ Compared to their U.S. parent companies, automakers in Canada were inefficient and faced declining production and exports.¹¹ At the same time, Canadian imports of cars from the United Kingdom and Germany outpaced Canadian imports of cars from the United States.¹² As the Canadian balance of payments deficit continued to rise, the Canadian Royal Commission on the Automotive Industry issued a report with recommendations that would ultimately become the U.S.-Canada Auto Pact.¹³

The Auto Pact's aim was to create a combined market for cars that would be fueled by efficiencies generated by trade and large-scale production. Critical to a new U.S.-Canada supply chain was the advent of triple-decker rail cars to transport autos, which slashed transportation costs for automakers by 40 to 50 percent. This innovation eliminated the need to spread factories throughout Canada and the United States and allowed for centralized production.¹⁴ Ultimately, the Big Three automakers focused on expanding production in the Great Lakes region, including across the border in Ontario, Canada.

8. Jack L. Hervey, "Canadian - US auto pact - 13 years after," *Economic Perspectives* 4, no. 4 (July 1978): 19.

9. Kenneth P. Thomas, "Capital Mobility and Trade Policy: The Case of the Canada-US Auto Pact," *Review of International Political Economy* 4, no. 1 (1997): 129.

10. *Ibid.*, 129.

11. *Ibid.*, 131.

12. *Ibid.*, 130.

13. Karyne Charbonneau, Daniel de Munnik, and Laura Murphy, "Canada's Experience with Trade Policy," Bank of Canada, January 2018, <https://www.bankofcanada.ca/wp-content/uploads/2018/01/sdp2018-1.pdf>.

14. Thomas, "Capital Mobility and Trade Policy," 143.

To facilitate a cross-border supply chain, the Auto Pact eliminated tariffs on vehicles and parts produced by “designated” manufacturers that agreed to maintain the same ratio of Canadian vehicle production to sales as in 1964. The pact also required minimum production amounts of vehicles and parts in Canada and that those vehicles and parts contained a minimum of 50 percent U.S. or Canadian content to qualify for the tariff elimination.¹⁵ Only designated (effectively American multinational) auto manufacturers could take advantage of this exemption; even when European and Japanese companies built plants in North America in later years they were still not designated.¹⁶ Finally, manufacturers committed to increase investment in Canada by C\$260 million by 1968 (about \$1.5 billion in 2018).¹⁷

In the years following signing of the Auto Pact by President Lyndon B. Johnson and Canadian prime minister Lester B. Pearson in 1965, several significant changes occurred: Canadian manufacturers became more efficient, leading to an increase in the Canadian share of North American auto production;¹⁸ the price of cars in Canada fell more in line with prices in the United States, benefitting Canadian consumers; and automakers greatly changed how they manufactured cars, creating cross-border supply chains that significantly grew trade in both directions across the border.¹⁹ By 1968, Canadian auto imports had quadrupled and Canadian exports had grown by ten times, in part driven by the Auto Pact.²⁰ By the end of the decade, auto workers in Canada were earning the same wage and plants had become as productive as their U.S. counterparts.²¹ By 1980, the Auto Pact had directly created 100,000 jobs and more in related industries. The Canadian auto trade deficit with the United States disappeared and by 1970 Canada had a parts and vehicles trade surplus of \$2 billion²², though throughout the Auto Pact-era, Canada tended to run surpluses in vehicles and deficits in parts.²³

Canada-U.S. Free Trade Agreement (CUSFTA) (1989)

By 1986, political will was sufficient to begin negotiation of what would become the Canada-U.S. Free Trade Agreement (CUSFTA), signed on January 2, 1988.

Gradually by 1998, the CUSFTA eliminated all tariffs and non-tariff barriers on most goods except for a few hundred agricultural products such as sugar, dairy, poultry, peanuts, and cotton.²⁴ From 1989 to 2001, the overall average tariff on U.S. goods coming into Canada fell from 3 percent to almost zero and the overall average tariff on Canadian goods coming into the United States declined from 4.5 percent to 0.5 percent.²⁵

15. Canis, Villarreal, and Jones, “NAFTA and Motor Vehicle Trade,” 4.

16. Melvyn Fuss and Leonard Waverman, “The Canada-U.S. Auto Pact of 1965: An Experiment in Selective Trade Liberalization,” National Bureau of Economic Research, Working Paper No. 1953, June 1986, 2.

17. Charbonneau, de Munnik, and Murphy, “Canada’s Experience with Trade Policy,” 4.

18. Thomas, “Capital Mobility and Trade Policy,” 143.

19. Ibid.

20. Charbonneau, de Munnik, and Murphy, “Canada’s Experience with Trade Policy,” 4.

21. Ibid.

22. Michael Hart, “The Auto Pact: Forerunner of Free Trade (book excerpt),” December 1, 2002, <http://policyoptions.irpp.org/magazines/kyoto/the-auto-pact-forerunner-of-free-trade-book-excerpt/>.

23. David Crane, “Canada-US Auto Pact,” *The Canadian Encyclopedia*, February 6, 2006, last modified July 07, 2017, <https://www.thecanadianencyclopedia.ca/en/article/canada-us-automotive-products-agreement>.

24. John Romalis, “NAFTA’s and CUSFTA’s Impact on North American Trade,” *The Review of Economics and Statistics* 89, no. 3 (August 2007): 416-435, <https://doi.org/10.1162/rest.89.3.416>.

25. Roberto Cardarelli and M. Ayhan Kose, “Economic Integration, the Business Cycle, and Productivity in North

Two years after the CUSFTA was signed, Canada, the United States, and other Western countries fell victim to a recession. Canada's economic downturn was fueled in part by American companies closing their Canadian headquarters and factories, although primary causes of the recession are believed to be restrictive monetary policy, decline in consumer and business confidence because of the 1990 oil shock, and a decline in defense spending spurred by the Cold War de-escalating. The province of Ontario alone lost 200,000 manufacturing jobs, as Ontarian officials had predicted would happen before the agreement was signed. By 1991 the United States and Canada had grown out of the recession, although the U.S. economy picked up at a faster pace.

North American Free Trade Agreement (NAFTA) (1994)

Shortly after CUSFTA entered into force, discussions about a bilateral trade agreement between the United States and Mexico began under President George H.W. Bush. Mexico had liberalized its trade policy over the previous several decades. The Maquiladora program established in 1965 set the stage for North American manufacturing to drift towards Mexico.²⁶ That program allows duty-free imports of intermediate goods if a percentage of the final goods are exported. It established Mexico as an attractive manufacturing location where companies could take advantage of a nearby country in a similar time zone that has the benefits of lower costs and plentiful labor in addition to a duty reduction on inputs.

During the 1970s and 1980s, American automakers started moving manufacturing of labor-intensive parts like wiring and brakes to Mexico to utilize Mexico's competitive advantage of lower wages in proximity to the United States.²⁷ Although Mexico was liberalizing its trade policy, importing new cars from the United States and Canada was prohibited until 1989. Even then, tariffs of 20 percent or more were levied on imported cars and car parts.²⁸

Once Canada joined the U.S.-Mexico trade talks, the framework for the trilateral NAFTA emerged and negotiations were hurried to completion before President-elect Clinton took office in early 1993.

By 2008, NAFTA phased out all tariffs and most non-tariff barriers on goods traded between the three countries, except for some agricultural carve-outs for Canada and the United States. The agreement included rules on customs procedures, sanitation of agricultural products, investment, intellectual property, dispute settlement, and rules of origin, some of which were not present in CUSFTA.²⁹ Further, NAFTA included rules of origin for trade in automobiles and parts among the United States, Canada, and Mexico, superseding the U.S.-Canada Free Trade Agreement and the earlier Auto Pact. The Auto Pact would be eliminated officially in 2001 after the World Trade Organization found it in breach of global trade rules. The NAFTA rules of origin have shaped the evolution of the North American automotive supply chain over the past 25 years.

America," Banque du Canada, August 2010, <https://www.banqueducanada.ca/wp-content/uploads/2010/08/integration.pdf>.

26. Canis, Villarreal, and Jones, "NAFTA and Motor Vehicle Trade," 5.

27. Ibid.

28. Ibid.

29. "North American Free Trade Agreement," Office of the United States Trade Representative, accessed September 21, 2018, <https://ustr.gov/trade-agreements/free-trade-agreements/north-american-free-trade-agreement-nafta>.

The long-term macroeconomic results of the FTA have been less extreme than what both proponents and critics originally argued, with only modest job churn and economic gains in the United States,³⁰ although particular companies and sectors were more adversely affected. Measuring the agreement's impact is challenging given difficulties associated with isolating the effect of policy changes required by the agreement amid other variables. Even so, trade between the three countries has more than tripled since NAFTA came into force in 1994.^{31, 32} In 2017, total trade with Canada and Mexico was valued at \$1.1 trillion and accounted for nearly 30 percent of all U.S. trade.

NAFTA's Effect on Mexico

Since NAFTA and the integration of the North American auto supply chain, Mexico has seen significant growth in trade, investment, and international allure as a manufacturing and export hub. Through aggressive diplomacy, Mexico has acquired FTAs with 46 countries that account for 60 percent of global GDP and 47 percent of the world's new vehicle market.³³

As tariffs between the NAFTA parties were phased out between 1994 and 2008, investment grew in Mexico but skyrocketed after 2010. Lower labor costs, increased investment in education, and the multitude of trade agreements continue to drive further growth and investment, particularly to manufacture cars for export to non-North American markets, such as Europe. In 2017, Mexico produced about 20 percent of North American cars.³⁴ As investment in Mexico continues to rise, that percentage is sure to follow. Between 1993 and 2017, U.S. imports from Mexico rose from 228,500 cars to 1.24 million cars, an increase of 543 percent.³⁵ In 2017, Mexico produced more than 3.7 million cars and light trucks and exported 3.1 million of those vehicles, making Mexico the seventh largest producer of light vehicles.³⁶ Indeed, one of every nine light vehicles bought in the United States was produced in Mexico.³⁷ According to one estimate, OEMs have invested \$40 billion in Mexico over the past two years.³⁸ European and Japanese automakers have poured the most money into Mexico since 2009, accounting for almost 90 percent of additional light vehicle assembly plant investment there.³⁹ Nine out of the ten largest OEMs assemble vehicles in Mexico and more than 50 car and light truck

30. M. Angeles Villarreal and Ian F. Fergusson, "The North American Free Trade Agreement (NAFTA)," Congressional Research Service, May 24, 2017, <https://fas.org/spp/crs/row/R42965.pdf>.

31. Andrea Ford, "A Brief History of NAFTA," *TIME Magazine*, December 30, 2008, <http://content.time.com/time/nation/article/0,8599,1868997,00.html>.

32. Villarreal and Fergusson, "The North American Free Trade Agreement (NAFTA)," 15.

33. Bernard Swiecki and Debbie Maranger Menk, "The Growing Role of Mexico in the North American Automotive Industry," Center for Automotive Research, July 2016, <http://www.cargroup.org/wp-content/uploads/2017/02/The-Growing-Role-of-Mexico-in-the-North-American-Automotive-Industry-Trends-Drivers-and-Forecasts.pdf>.

34. Canis, Villarreal, and Jones, "NAFTA and Motor Vehicle Trade," 7.

35. U.S. Bureau of Economic Analysis, Mexican Auto Imports [MAUIA], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/MAUIA>, December 5, 2018.

36. Entrada Group, "Why Mexico Needs More Proven Auto Suppliers," 2018, <https://www.entradagroup.com/wp-content/uploads/2018/12/Entrada-Group-Auto-Suppliers-Whitepaper.pdf>.

37. Ibid.

38. Ibid.

39. Kristin Dziczek et al., "NAFTA Briefing: Trade benefits to the automotive industry and potential consequences of withdrawal from the agreement," Center for Automotive Research, January 2017, https://www.cargroup.org/wp-content/uploads/2017/01/nafta_briefing_january_2017_public_version-final.pdf.

models are built there.⁴⁰ Light vehicle manufacturers operate 20 production facilities in 12 states in Mexico to carry out a range of tasks that include final assembly, stamping, engine assembly, and more.⁴¹ Although Mexico has experienced stunning growth in automotive assembly, its domestic Tier 2 and Tier 3 supplier base is mired with gaps, which may stymie expansion in the industry if left unfilled or present enticing business opportunities for firms willing to fill gaps.⁴² According to one study, 70 percent of Tier 2 and 3 components used in Mexico are imported.⁴³

Mexico's growth picture is bright, but challenges remain that complicate foreign investment in manufacturing. These include concerns about governance, infrastructure, and utility costs. Corruption remains a problem, costing businesses 50 percent more in security and insurance expenses to defend their investments.⁴⁴ Utilities costs remain high compared to the United States or Canada. Overloaded natural gas and electricity infrastructure limits expanded manufacturing output and complicates Mexico's ability to attract investment. Aging infrastructure and theft plague Mexico's power grid, further driving up the price of utilities and forcing the country to import liquefied natural gas (LNG) from abroad.⁴⁵

Mexico also struggles with transportation infrastructure. For instance, moving goods in and out of Mexico takes twice as long as it does in the United States, and the cost of distribution is 40 percent higher.⁴⁶ Mexico's ports have difficulty keeping up with growing needs, and automakers are concerned that limited port capacity could bottleneck their exports.⁴⁷ Regardless, NAFTA has been a boon for Mexico's manufacturing industry, attracting tens of billions of dollars in investment and providing thousands of jobs for Mexican workers.⁴⁸

The State of the Auto Industry Supply Chain since NAFTA

NAFTA has shaped the auto supply chain in North America and led to significant interdependence within the region's automotive industry. According to one analysis, up to 80 to 90 percent of U.S. auto industry trade is intra-industry.⁴⁹ Automotive parts can cross NAFTA countries' borders up to eight times before incorporation into final assembly in the United States, Mexico, or Canada.⁵⁰ Generally, NAFTA has incubated deep, complex, and interconnected North American automotive supply chains. The connection between U.S. and Canadian plants is so tight that when the border was temporarily closed after the September 11, 2001 terror attacks, some U.S. auto plants had to shut down.⁵¹ Since 1994,

40. Ibid.

41. Ibid.

42. Original Equipment Suppliers Association, "OESA News 2019," 1st Quarter, Edition 1, <https://www.oesa.org/news/oesa-news-2019-1st-quarter-edition-1>.

43. Entrada Group, "Why Mexico Needs More Proven Auto Suppliers."

44. Swiecki and Menk, "The Growing Role of Mexico," 54.

45. Jorge Alvarez and Fabián Valencia, "Made in Mexico: Energy Reform and Manufacturing Growth," *Energy Economics* 55, March 2016: 253-265, <https://ssrn.com/abstract=2954101>.

46. Swiecki and Menk, "The Growing Role of Mexico," 5.

47. Ibid., 27.

48. Ibid., 35.

49. Dziczek et al., "NAFTA Briefing," citing Wilson, C. E., "Working Together: Economic Ties Between the United States and Mexico," (Washington, DC: Woodrow Wilson International Center for Scholars, 2011).

50. Ibid.

51. The Honourable Mark Eyking, "Priorities of Canadian Stakeholders Having an Interest in Bilateral and Trilat-

26 final assembly plants have come online in North America: 14 in the United States, 11 in Mexico, and one in Canada. Comparatively, from 1981 until NAFTA came into force, 25 new assembly plants were opened in the NAFTA region: 18 in the United States, 4 in Canada, and 3 in Mexico.⁵²

Assembly plants are only a fraction of the automotive supply chain, and assembly in North America does not by itself confer origin. The Original Equipment Suppliers Association estimates that in 1990 there were 30,000 firms in North America throughout the auto supply chain tiers, 10,000 in 2000, and 8,000 in 2004, indicating a level of consolidation.⁵³ This consolidation has continued with the emergence of what PwC coins “mega deals,” or mergers and acquisitions that exceed \$500 million. Between 2013 and 2016, the presence of these deals increased by 500 percent within the auto industry. The number of closed deals of any size in the industry also increased; in 2013, there were 186 closed deals whereas in 2015, there were 203.⁵⁴

In examining the automotive supply chain in the context of NAFTA, questions about North American content, as well as U.S., Canadian, and Mexican content, arise. These questions are particularly important when examining the intersection of supply chains and rules of origin. Determining where content value originates is extremely complicated given the complexity of an automobile and the complexity of the North American automotive supply chain. A number of vehicles are assembled in the NAFTA region but do not meet the NAFTA RVC threshold of 62.5 percent, while other vehicles are built outside the region and imported, paying the United States’ 2.5 percent most favored nation (MFN) tariff on vehicles. All determinations of a motor vehicle’s domestic content are approximations. One common metric is the American Automobile Labeling Act (AALA), although it does leave room for inaccuracies. The AALA requires that automakers provide information on U.S. and Canadian parts content, the country of assembly for the final automobile, and the country of origin for a vehicle’s engine and transmission. However, AALA data combines U.S. and Canadian content into a single number and allows automakers to round up parts that are 70 percent U.S./Canadian to 100 percent U.S./Canadian. The American University Kogod School of Business seeks to improve on the AALA database through its own Made in America Auto Index.⁵⁵ The Kogod index accounts for profit margin and location of headquarters, the location of final assembly, the location of research and development for a vehicle, the cost of inventory, capital, and other expenses that correlate with location of assembly, location of engine production, location of transmission production, and origin of body, chassis, and electrical component in a vehicle, which is a function of a vehicle’s AALA score.

eral Trade in North America, Between Canada, the United States, and Mexico,” Report of the Standing Committee on International Trade, December 2017, <http://www.ourcommons.ca/Content/Committee/421/CIIT/Reports/RP9326406/ciitp08/ciitp08-e.pdf>.

52. Alliance of Automobile Manufacturers, “The Auto Story,” April 4, 2018, <https://autoalliance.org/wp-content/uploads/2018/04/The-Auto-Story-Facts-Figures-and-Opinions-Driving-Policy.pdf>

53. U.S. Department of Commerce International Trade Administration, “The American Automotive Industry Supply Chain – In the Throes of a Rattling Revolution,” 2009, <https://www.trade.gov/td/otm/assets/auto/supply-chain2009.pdf>.

54. Dietmar Ostermann, Doug Harvey, Jan Hesse, and Shan Haque, *Consolidation in the global automotive supply industry, 2016 report* (Strategy& PwC, 2016), <https://www.strategyand.pwc.com/media/file/Consolidation-in-the-global-automotive-supply-industry.pdf>.

55. Frank DuBois, “Made in America Auto Index,” American University Kogod School of Business, <https://www.american.edu/kogod/research/autoindex/>.

Vehicles Listed Under the American Automobile Labeling Act

Manufacturers	Makes	Carlines	Percent Content US/ Canada	Percent Content Other Countries		Final Assembly Countries		Sources of Vehicle's Engine/Motor		Sources of Vehicle's Transmission(s)	
BMW AG	BMW	X3	25%	35% G		US		A		G	
Ford Motor Company	Ford	F150	65%	15% M		US		US (2.7 DOHC, 3.0DSL, 3.3 TIVCT, 5.0 DOHC)	M(3.5 GTDI)	US	
Ford Motor Company	Ford	Fiesta	10%	70% M		M		1.6L (BR)	1.6 T/C (UK)	M, BR	UK
General Motors LLC	Chevrolet	Silverado	46%	44% M		US		US		US	
Honda Motor Co., Ltd.	Honda	CR-V 2WD	65%			US		US		US	
Kia Motors	Kia	Rio	2%	49% K	47% M	M		M		M	K
Mazda Motor Corporation	Mazda	Mazda2	5%	70% M	20% J	M		J		J	
Nissan North America, Inc	Nissan	Rogue AWD	20%	35% J	20% K	US		US		M	
Subaru	Subaru	Outback	45%	40% J		US		J		J	
Toyota	Toyota	Camry	55%	30% J		US	J	US	J	US	J
Toyota	Toyota	Prius V	0%	100% J		J		J		J	
Volkswagen	Volkswagen	Golf	9%	44% M		M		M (1.8L)		AR (M5)	JP (A6)

Source: United States Department of Transportation National Highway Traffic Safety Administration, Part 538 American Automobile Labeling Act Reports, 2018, <https://www.nhtsa.gov/document/2018-aala-listed-alphabetically>.

Regardless of the dataset used, U.S. automakers, the Big Three, generally produce vehicles with more U.S. and Canadian content than foreign brands, regardless of where final assembly occurs. U.S. companies produce 20 of the top 25 vehicles on the Kogod scale, and 38 of the top 50 vehicles. Big Three models assembled in Mexico and Canada also have higher U.S. content than some foreign models assembled in the United States.

According to the Motor & Equipment Manufacturers Association (MEMA), components supplied by parts producers contribute roughly 77 percent of a vehicle's value. A study by the Center for Automotive Research (CAR) found that parts and materials make up roughly 71 percent of a vehicle's value while assembly accounts for the other 29 percent, which includes profit margin, research and development, labor costs, and other expenses.⁵⁶ Further broken down, the CAR study found that a vehicle's engine can make up about 20 percent of the parts and material content value; the transmission, 10 percent of a vehicle's value; the body, 9 percent; interior, 13 percent; chassis, 9 percent; and electronics and other components, 39 percent. Industry experts and representatives

56. Debbie Maranger Menk, Yen Chen, and Joshua Cregger, "Methodology for Creating a Matrix to Assess the Domestic Content of a Vehicle by Make and Model," Center for Automotive Research, February 2012, <https://www.cargroup.org/wp-content/uploads/2017/02/AAPC-Domestic-Content-Final.pdf>.

estimate that a vehicle's engine, transmission, body, chassis, axle, suspension, and steering components make up at least 50 percent of its content value. In electric vehicles, the battery pack can account for roughly 25 to 30 percent of a vehicle's content value. The USMCA's automotive rules of origin could influence where relatively high-value parts such as engines, transmissions, and other core parts will be produced in North America. Production of higher-value parts may gravitate towards the United States and Canada, away from Mexico, in part because of the new labor value rules in the agreement.

OEMs generally localize production of bulkier, core components such as engines and transmissions, and, more recently, battery production and assembly, close to the final assembly locations to cut down on transportation costs and potential for damage to key parts in transit. There are, however, some exceptions to this trend in North America. For example, Mercedes-Benz operates a final assembly plant in Tuscaloosa, Alabama that moves more than 280,000 SUVs off its assembly line each year, but it imports engines and transmission for those vehicles from its facilities in Germany.⁵⁷, ⁵⁸ Those vehicles still have relatively high U.S. and Canadian content, around 60 percent according to AALA statistics, whereas roughly 30 percent of the value of Mercedes-Benz SUV's built in Alabama originates in Germany. Notably, a number of Mercedes-Benz models, along with many other models offered by luxury brands such as Porsche, Jaguar, Bentley, Lexus, and Audi, assemble vehicles and source parts from outside North America and have virtually no North American content.

In some cases, assembling a vehicle in North America does not equate to high NAFTA content. Volkswagen, another German brand, either assembles vehicles for the North American market in Chattanooga, Tennessee, or Puebla, Mexico, with engines sourced from its plants in Germany, Mexico, or Hungary and transmissions sourced from Germany, Argentina, or Japan. The North American content of Volkswagen vehicles ranges from 57 percent for the discontinued 2018 Beetle to just 30 percent for some 2018 Passats assembled in Chattanooga, per AALA data. The BMW X series is another example of U.S. assembly not ensuring robust NAFTA content. The X3, X4, X5, and X6 are put together in Spartanburg, South Carolina, one of its most productive assembly plants in the world by vehicle output. The plant pumps out around 1,400 vehicles a day and works with 300 U.S. suppliers, more than 40 of which are located in South Carolina.⁵⁹ It produced more than 370,000 vehicles in 2017 and more than 400,000 in 2016.⁶⁰ Still, BMW imports engines and transmissions for those automobiles from Germany, which results in a North American value content of between 25 and 35 percent for the X series. In another deviation from the general supply chain trend of "build it where you sell it," BMW exports the majority of its X series vehicles produced at the Spartanburg plant—nearly 275,000 in 2017.⁶¹ BMW has a dedicated battery assembly facility at the Spartanburg operation for the

57. Mercedes-Benz, "Product Locations Mercedes-Benz Cars," December 31, 2017, https://facts.daimler.com/fileadmin/user_upload/cars/downloads/MBC_Production_locations_PDF_VIEW.pdf.

58. U.S. Department of Transportation National Highway Traffic Safety Administration, "Part 583 American Automobile Labeling Act Reports," 2018, https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/2018_aala_percent_09102018.pdf.

59. "Production Overview," BMW Group, <https://www.bmwusfactory.com/manufacturing/production-overview/>.

60. BMW Group, *Annual Report 2017* (Munich, Germany: BMW Group, 2018), https://www.bmwgroup.com/content/dam/bmw-group-websites/bmwgroup_com/ir/downloads/en/2018/Gesch%C3%A4ftsbericht/BMW-GB17_en_Finanzbericht_ONLINE.pdf.

61. "BMW Manufacturing Continues as Largest U.S. Automotive Exporter," BMW Group, February 13, 2018,

BMW X5 xDrive40e iPerformance vehicle and the planned all-electric X3 slated for 2020 but has only recently begun to publicly float the idea of building an additional U.S. facility for engine and transmission production.^{62,63} Locating battery facilities near final assembly facilities can be economically advantageous. Lithium-ion batteries for vehicles are heavy and hazardous to move, which makes their transport costly.⁶⁴

Both foreign nameplates and the Big Three have established core part production and vehicle assembly in Mexico, largely to take advantage of lower labor costs there. In general, vehicles assembled in Mexico have lower U.S. and Canadian content than vehicles assembled in the United States or Canada. On the other hand, vehicles assembled in Canada generally have higher U.S. content than Canadian content, which means that any supply chain shifts would likely impact U.S. auto companies and suppliers at least as much as Canadian companies.⁶⁵ Nearly half of the value of Canadian vehicle exports to the United States and a quarter of the value of parts exports are generated by intermediate inputs imported from the United States.⁶⁶

Some analysts claim that a larger assembly base in Mexico will increase the competitiveness of the entire North American supply chain required to serve those plants. Auto suppliers in the United States benefit from additional final assembly capacity throughout North America given the likelihood that new assembly facilities will make use of existing auto suppliers in the United States if capacity exists to serve them.⁶⁷ No data proves this better than the fact that U.S. content in vehicles imported from Mexico stood at 5 percent before NAFTA, whereas a 2014 study determined that amount to be closer to 40 percent.⁶⁸ One estimate places the value of U.S. parts per car produced in Mexico at \$5,500. Meanwhile Mexico supplies on average \$3,800 in parts per car produced in the United States.⁶⁹

Although NAFTA allowed some U.S. firms to rationalize shifting supply chains and relocating some production to Mexico, it also opened and fostered a new and growing Mexican market for U.S.-brand vehicles and auto parts built either in Mexico or the United

https://www.bmwusfactory.com/bmw_articles/bmw-manufacturing-continues-as-largest-u-s-automotive-exporter/.

62. Anna B. Mitchell, "BMW electric vehicles hit 100,000 mark," *Greenville News*, December 19, 2017, <https://www.greenvilleonline.com/story/money/2017/12/19/bmw-electric-vehicles-hit-100-000-mark/964060001/>.

63. Anna B. Mitchell, "BMW considers building second U.S. plant for engines, transmission," *Greenville News*, November 28, 2018, <https://www.greenvilleonline.com/story/money/2018/11/28/bmw-considers-building-second-u-s-plant-engines-transmissions/2138579002/>.

64. Chris Dougher, "Breaking Down the Lithium-Ion Cell Manufacturing Supply Chain in the U.S. to Identify Key Barriers to Growth," April 23, 2018, <https://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/16600/US%20Lithium%20Ion%20Cell%20Manufacturing%20Supply%20Chain.pdf?sequence=1>; Wolfgang Kerler, "Germany's Car Industry Can't Build Its Own Battery Cells," *The Verge*, August 15, 2018, <https://www.theverge.com/2018/8/15/17685634/germany-car-industry-battery-cells>.

65. Canadian Parliament Standing Committee on International Trade, "Priorities of Canadian Stakeholders Having an Interest in Bilateral and Trilateral Trade in North America, Between Canada, United States, and Mexico," Evidence, Meeting Number 065, 1st Session, 42nd Parliament, May 4, 2017, <https://www.ourcommons.ca/DocumentViewer/en/42-1/CIIT/meeting-65/evidence#Int-9502944>.

66. Nathan Janzen, "Potential U.S. auto import tariffs: the view from Canada," Royal Bank of Canada, June 26, 2018, http://www.rbc.com/economics/economic-reports/pdf/other-reports/USautotariffs_June2018.pdf.

67. Dziczek et al., "NAFTA Briefing."

68. Wharton School of the University of Pennsylvania, "NAFTA, 20 Years Later: Do Benefits Outweigh Costs?" February 19, 2014, <http://knowledge.wharton.upenn.edu/article/nafta-20-years-later-benefits-outweigh-costs/#>.

69. Mexican Ministry of Economy, "Mexico's Auto Industry 23 Years Since NAFTA and Beyond," July 2017, <https://www.cargroup.org/wp-content/uploads/2017/08/Sandoval.pdf>.

States. Mexico is the second-largest destination for U.S. auto parts, trailing only Canada. In 2017, the United States shipped nearly \$16 billion worth of auto parts to Mexico and more than \$17 billion to Canada. The United States imported \$22 billion worth of auto parts from Mexico in 2017, roughly twice as much as it imported from Mexico in 2010. China was the second largest supplier of auto parts to the United States in 2017, with imports valuing nearly \$9.5 billion, also double what China exported to the United States in 2010. Canada was the third-largest supplier of auto parts to the United States, shipping more than \$8.5 billion worth of parts in 2017. Canadian auto parts exports to the United States have not seen significant growth since 2010. That vehicle and parts production has grown throughout North America since NAFTA's entry into force despite Mexico attracting a growing share of the automobile supply chain, indicates that investments in the industry are not zero-sum but instead can foster growth throughout the automotive industry in North America.

Mexico's production of less complicated parts that are relatively labor intensive has grown under NAFTA because of lower wages than those found in the U.S. and Canadian auto industries. Still, the United States remains a premier final assembly and parts production location, not just in the North America but globally. The market size of the United States, its relatively large skilled labor force, open markets, economic and rule of law stability, and access to cutting edge innovation ensures that it will remain an attractive location to manufacture vehicles and core parts to serve the market. NAFTA, in essence, allowed the United States, Canada, and Mexico to fuse comparative advantages in the auto industry to create a single, globally competitive automobile market.

The tightly integrated automotive supply chain in North America nurtured by NAFTA has resulted in North America becoming an automobile production powerhouse. The region produced roughly 17.2 million vehicles—including cars, light, medium, and heavy trucks—in 2018. The United States accounted for nearly two-thirds of that production, with a vehicle output of 11.3 million that year. Canada produced 2 million vehicles and Mexico produced 3.9 million vehicles in 2018. Capacity utilization in the region was 94 percent in 2017 for light vehicle production.⁷⁰ Mexico and Canada clocked in essentially full capacity utilization for light-vehicle production whereas the United States operated at 93 percent capacity.

NAFTA also has led North America to become a significant export base for vehicles built in the region to be sold around the world. The United States exported 2 million passenger vehicles and light trucks in 2017 and 130,000 heavy and medium duty trucks. More than half of those exports went to Canada and Mexico, however, European Union member countries and China each received more than a quarter-million U.S.-built vehicles, and Gulf Cooperation Council members received more than 100,000 vehicles.

Mexico and Canada depend on the U.S. market as a destination for their automobile exports and rely on U.S. suppliers for parts to produce their vehicles.⁷¹ In 2018, Mexico exported 2.5 million vehicles to the United States. Its second-highest export destination, Canada, received just 250,000 vehicles, whereas its third-highest export destination,

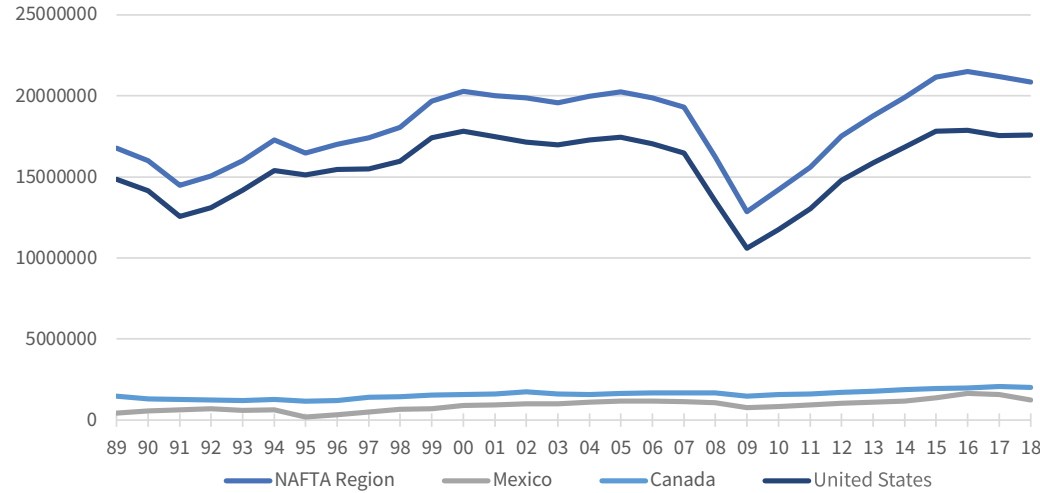
70. Haig Stoddard, "Global and U.S. Automotive Outlook 2018–2019," Wards Auto Intelligence, Presented to the 25th Annual Automotive Outlook Symposium Federal Reserve Bank of Chicago.

71. Ibid.

Germany, received 150,000 units. Brazil received 78,000 vehicles from Mexico and Colombia received 52,000 in 2018. Italy received 43,000 that year. In 2016, GM exported 540,000 vehicles from Mexico, Nissan exported 500,000, Fiat-Chrysler exported 443,000, Ford exported 377,000, and Volkswagen exported 334,000.⁷² Still, that Mexico's NAFTA partners absorb more than 80 percent of Mexico's auto exports and roughly three-quarters of Mexico's auto production undercuts the idea that auto companies choose to locate assembly facilities in Mexico to take advantage of Mexico's network of FTAs. Canada exports more than 90 percent of the 2.3 million vehicles it produces and almost 60 percent of the auto parts it produces.⁷³ Canada receives roughly 900,000 vehicles from the United States. Canada's vehicle exports to Mexico are negligible.

With a rosy production and export picture, new auto sales in the United States appear to have peaked in 2016 with roughly 17.9 million vehicles sold after seven years of growth. Several factors contributed to a decline in U.S. sales in 2018, including rising interest rates and consumers holding on to their vehicles for longer.⁷⁴ Ridesharing also may pose a long-term challenge to the auto industry. Mexico saw auto sales decline in 2018 for the second year in a row whereas sales in Canada declined from a record high in 2017.^{75, 76} Declining sales and increased production prices combined with new rules in the USMCA come as automakers and suppliers prepare for and invest in a revolution in the automobile industry, the core pillars of which are automation, connectivity, electrification, and shareability.

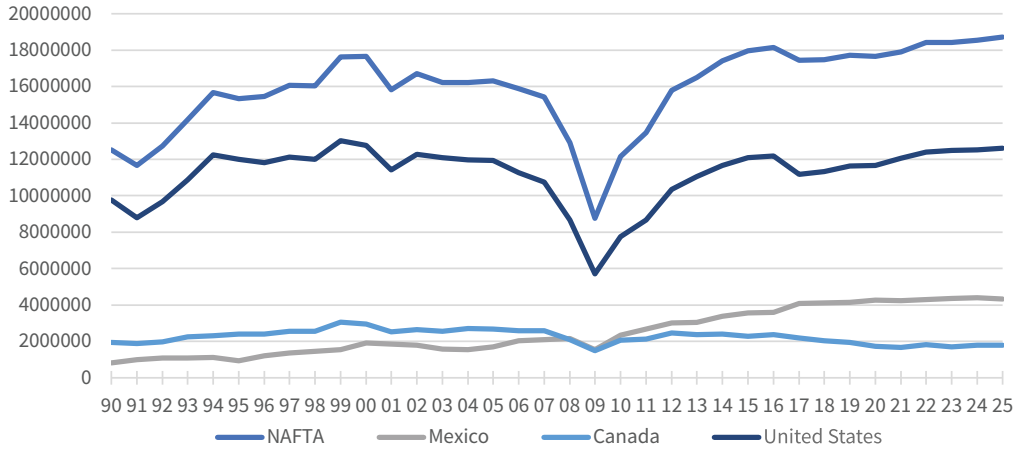
NAFTA Region Vehicles Sales, By Unit



Source: Ward's Automotive Group/Haver Analytics

72. Mexican Ministry of Economy, "Mexico's Auto Industry 23 Years Since NAFTA and Beyond."
 73. Government of Canada, "Canadian automotive industry," January 10, 2019, <https://www.ic.gc.ca/eic/site/au-to-auto.nsf/eng/home>.
 74. Neal E. Boudette, "Car Sales End a 7-Year Upswing, With More Challenges Ahead," *New York Times*, January 3, 2018, <https://www.nytimes.com/2018/01/03/business/auto-sales.html>.
 75. *Mexico News Daily*, "Light vehicle sales down 7% in 2018; Nissan continues to lead in market share," January 9, 2019, <https://mexiconewsdaily.com/news/light-vehicle-sales-down-7-in-2018/>.
 76. Scotiabank, *Global Auto Sales Decline in 2018* (Scotiabank Economics, 2019), https://www.scotiabank.com/content/dam/scotiabank/sub-brands/scotiabank-economics/english/documents/global-auto-report/GAR_2019-01-30.pdf.

NAFTA Vehicles Production, By Unit



Source: Ward's Automotive Group/Haver Analytics
 Note: Updated February 2018, data through prior months are actual. All other data are Ward's forecasts.

3 | USMCA Automotive Rules of Origin

The Car and its Parts

The USMCA, if implemented, will contain the most stringent automotive rules of any trade agreement. The original NAFTA required that vehicles meet a 62.5 percent RVC, which at the time of its negotiation was the tightest rule of origin in an FTA. The USMCA contains three rules, all of which must be met to qualify for preferential treatment: an overall vehicle RVC, different RVC thresholds for certain parts, and a labor value content rule. The USMCA contains a 75 percent RVC for light vehicles and light trucks and a 70 percent RCV threshold for heavy trucks. The light vehicle rule of origin comes with a three-year transition period and automakers have the option to apply for a two-year extension for roughly 10 percent of its pre-USMCA auto production if the automaker can provide a plan that would allow those vehicles to meet USMCA requirements within five years of the agreement's entry into force. Heavy trucks and associated principal and complementary parts have been afforded a seven-year phase-in. The staging of the rules of origin cannot begin before January 1, 2020 or end before January 1, 2023.

Regional Value Content Table: Finished Passenger Vehicles and Light Trucks

Effective Year	Regional Value Content Requirement (Net Cost Method)
2020 ⁷⁷	66 percent
2021 ⁷⁸	69 percent
2022 ⁷⁹	72 percent
2023 ⁸⁰	75 percent

The USMCA also includes tighter rules of origin for “core parts,” which must meet a 75 percent RVC threshold over a three-year transition to be considered originating. Those core parts include engines, chassis, axles, gearboxes (transmissions), shocks, steering boxes, and advanced batteries for electric cars. Core components make up nearly 50

77. January 1, 2020 or the date the agreement enters into force, whichever is later.

78. January 1, 2021 or one year after the date the agreement enters into force, whichever is later.

79. January 1, 2022 or two years after the date the agreement enters into force, whichever is later.

80. January 1, 2023 or three years after the date the agreement enters into force, whichever is later.

percent of a vehicle’s total value and require high-skilled workers to manufacture.⁸¹ To meet the USMCA’s rules of origin, vehicles must meet the overall regional value content threshold, as well as the regional value content thresholds for three other categories: core parts, complementary parts, and principle parts. In addition to those requirements, vehicles also must meet a labor value content threshold.

Regional Value Content Table

Core Parts for Use in a Passenger Vehicle or Light Truck

Effective Year	Regional Value Content (Net Cost Method)	Regional Value Content (Transaction Value Method) ⁸²
2020	66 percent	76 percent
2021	69 percent	79 percent
2022	72 percent	82 percent
2023	75 percent	85 percent

“Super-Core” Parts and Components for Passenger Vehicles and Light Trucks⁸³

Category	Components
Engine	Heads, blocks, crankshafts, crankcases, pistons, rods, head subassembly
Transmission	Transmission cases, torque converters, torque converter housings, gears and gear blanks, clutches, valve body assembly
Body and Chassis	Major body panels, secondary panels, structural panels, frames
Axle	Axle shafts, axle housings, axle hubs, carriers, differentials,
Suspensions System	Shock absorbers, struts, control arms, sway bars, knuckles, coil springs, leaf springs,
Steering System	Steering columns, steering gears/racks, control units
Advanced Battery	Cells, modules/arrays, assembled packs

USMCA Article 4.B Table A.2

“Principal parts”—less complicated parts such as tires, glass, pumps and compressors, air conditioning modules, bearings and bearing housings, electric motors used as a primary source of propulsion, electrical variable transmission, electromagnets, starter motors and generators, bumpers, safety belts, brakes, road wheels, radiators, mufflers, airbags, seats, and parts of seats—will face a RVC requirement of 62.5 percent when the USMCA enters into force. The RVC threshold for those parts will rise 2.5 percent every year for three years, maxing out at 70 percent.

81. Michael Fries et al., “An Overview of Costs for Vehicle Components, Fuels, Greenhouse Gas Emissions and Total Cost of Ownership Update 2017,” Institute of Automotive Technology, 2017.

82. Can only be used if the rule includes a transaction value method.

83. For the purposes of RVC calculations, super-core parts are considered to be on part if a Party opts to average RVC across a model line or class of motor vehicle over a fiscal year or any quarter or month, per USMCA Article 4.5.2 in the Appendix on Provisions Related to the Product-Specific Rules of Origin for Automotive Goods.

The USMCA contains a final category of “complementary parts,” which includes smaller parts— pipes, catalytic converters, valves, taps and cocks, electric motors and universal AC/DC motors not exceeding 37.5 watts, DC motors and generators with output more than 750 watts, lead-acid and nickel batteries, distributors and ignition coils, electrical lighting, windshield wipers and defrosters, sound recording and reproducing devices, electrical switches, insulating wiring sets, headlamps, electronic instruments, and measurement equipment. Those parts will be subject to a 62 percent RVC when the USMCA enters into force, with a 1 percent increase over each of three years, capping at 65 percent.

The USMCA also does away with NAFTA’s tracing scheme as well as the concept of “deemed originating.” This will have implications throughout the supply chain, which will be discussed later in this paper.

Labor Value Content

The USMCA introduces a phased-in labor value content (LVC) requirement, that requires 40–45 percent of the content of an automobile be made by workers earning at least \$16 per hour. The 40–45 percent range is dependent on the type of vehicle; passenger vehicles require 40 percent, whereas pickup trucks require 45 percent.⁸⁴ The labor value content rule has three divisions: high-wage material and manufacturing expenditures, high-wage technology expenditures, and high-wage assembly expenditures.

The wage rules effectively require that a greater share of the high-value parts comprising an automobile must come from the United States and Canada rather than Mexico. The intended effect of the LVC is to reorient towards the United States and Canada investment in parts production that make up a significant portion of a vehicle’s overall value. Lower wages are part of Mexico’s comparative advantage in the auto industry, driving investment and causing a shift in supply chains over the last decade. The average hourly earnings for a motor vehicle and parts manufacturing worker in the United States was \$22.78 in 2018. Motor vehicle manufacturing workers received average hourly earnings of \$29.76, body and trailer workers earned \$19.15 per hour, and parts manufacturing workers earned \$20.88 per hour.⁸⁵ In Mexico, the average wage for an auto assembly worker was \$7.34 per hour and just \$3.41 per hour for an auto parts worker in 2017.⁸⁶ It will be difficult for automakers to meet both the RVC and LVC if production of core parts, including engines, transmissions, and assembly of advanced batteries for battery electric vehicles takes place in Mexico. Automakers with a substantial portion of their production occurring in Mexico will have to decide how to react to the changing rules. Some could relocate production or assembly to the United States or Canada whereas others may choose to pay the United States MFN tariff and potentially move even more of their production to Mexico to make up for the increased cost.

84. Ivet Rodríguez, “USMCA ‘a delicate balance,’” *Automotive News*, October 8, 2018, <http://www.autonews.com/article/20181008/GLOBAL/181009774/usmca-mexico-trade-u.s>.

85. U.S. Bureau of Labor Statistics, Average hourly earnings of production and nonsupervisory employees, motor vehicles, not seasonally adjusted [CEU3133610008], Raw Data, https://data.bls.gov/timeseries/CEU3133610008?amp%253bdata_tool=XGtable&output_view=data&include_graphs=true, December 7, 2018.

86. Center for Automotive Research, “NAFTA Briefing.”

Labor Value Content Table
Passenger Vehicles

Effective Year	Material & Manufacturing Expenditures ⁸⁷	Technology Expenditures ⁸⁸	Assembly Expenditures ⁸⁹	Total Labor Value Content
2020 ⁹⁰	15 percent	10 percent	5 percent	30 percent
2021 ⁹¹	18 percent	10 percent	5 percent	33 percent
2022 ⁹²	21 percent	10 percent	5 percent	36 percent
2023 ⁹³	25 percent	10 percent	5 percent	40 percent

Labor Value Content Table
Light and Heavy Trucks

Effective Year	Material & Manufacturing Expenditures	Technology Expenditures	Assembly Expenditures	Total Labor Value Content
2020 ⁹⁴	30 percent	10 percent	5 percent	45 percent

High-wage material and manufacturing expenditures equate to the annual purchase value of parts and materials produced in a North America production facility with wages of at least \$16 an hour.

High-wage material and manufacturing expenditures are calculated as the annual purchase value of purchased parts produced in a facility and labor costs in a vehicle assembly facility located in North America with a production wage rate that is at least \$16/hour as a percentage of the net cost of the vehicle or the total vehicle plant assembly Annual Purchase Value, including vehicle assembly labor costs.

The production wage rate is the average hourly base wage rate, not including benefits, of employees directly involved in the production of the part or component used to calculate the labor value content, and it does not include salaries of management, research and development, engineering, or other workers who are not involved in the direct production of parts or in the operation of production lines.

High-wage technology expenditures, which may compose up to 10 percent of the labor value content, include expenditures on research and development or information technology as a percentage of total annual vehicle producer expenditures on production wages in North America. Research and development expenditures include prototype development, design, engineering, testing, or certifying operations. Information

87. Purchased parts or materials produced in a North American plant or facility and any labor costs of employees directly involved in production (not management or other workers) with a wage rate of at least \$16/hour.

88. Expenditures in North America on wages for R&D or IT, including software development, technology integration, vehicle communications, and IT support operations.

89. An engine, transmission, or advanced battery assembly plant with an average production wage of at least \$16/hour. Eligible engine or transmission assembly plants must have a production capacity of at least 100,000 units. Eligible advanced battery assembly plants must have a production capacity of at least 25,000 units.

90. January 1, 2020 or the date the agreement enters into force, whichever is later.

91. January 1, 2021 or one year after the date the agreement enters into force, whichever is later.

92. January 1, 2022 or two years after the date the agreement enters into force, whichever is later.

93. January 1, 2023 or three years after the date the agreement enters into force, whichever is later.

94. January 1, 2020 or the date the agreement enters into force, whichever is later.

technology expenditures include expenditures on software development, technology integration, vehicle communications, and information technology support operations.

High-wage assembly expenditures can contribute no more than 5 percent to the total labor value content requirement if a vehicle producer has an engine assembly, transmission assembly, or advanced battery assembly plant, or long-term contracts with such a plant, in North America with an average production wage rate of at least \$16 an hour. To qualify towards a passenger vehicle or light truck labor value content threshold, a high-wage assembly or transmission assembly plant must have a production capacity of at least 100,000 originating engines or transmissions and an advanced battery plant must have the production capacity of at least 25,000 originating assembled battery packs. For heavy trucks to receive the credit, a high-wage engine, transmission, or battery assembly plant must have a production capacity of at least 20,000 of the respective parts.

North American Steel and Aluminum Requirement

The USMCA introduces a new rule requiring that 70 percent of the total steel and aluminum used in an automobile must be sourced from North American suppliers.⁹⁵ Unlike many of the other rule changes in the USMCA, the steel and aluminum requirement has no phase-in period. On the day the agreement goes into effect, automakers will have to abide by the new rule. Currently, there is no rule in NAFTA regarding metal origin, although most automobile manufacturers located in the United States and Canada will have little to no trouble meeting the new USMCA requirements. The percentage of steel and aluminum from North America that automakers use is proprietary information. According to an estimate by the American Automotive Policy Council, the average cost of steel used in a car built in the United States based on publicly available data is \$1,100 and the average cost of aluminum is \$430 per vehicle.⁹⁶

The USMCA's elimination of tariff shift rules enabling stamped parts to be deemed originating is another change. Under NAFTA, an auto part stamped in North America would contribute full value to the final vehicle regardless of where the steel that was stamped was produced. This has led to auto companies, mostly foreign brands with production in Mexico, relying on stamped parts that use steel produced from outside the NAFTA region, industry representatives and experts said. With tariff shift rules for stamped parts unavailable under the USMCA, parts stamped with foreign steel would likely no longer qualify as NAFTA parts because the value added through stamping would not increase a part's regional value content to USMCA threshold.

Quotas for Exemptions from Section 232 Tariffs

The United States also negotiated side letters with Canada and Mexico to create quotas for exemption from Section 232 national security tariffs on passenger vehicles and parts,

95. United States-Mexico-Canada Agreement (USMCA), Article 4-B.6, <https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement/agreement-between>.

96. American Automotive Policy Council, "AAPC Responses to ITC Questions from Nov. 15 Hearing," Investigation Number 105-003, December 20, 2018.

if those tariffs are implemented. Mexico appears to have been awarded a larger parts exemption because of the amount of parts from Mexico that U.S. OEMs import.^{97,98}

Side Letters Exemption Table

Country	Passenger Vehicle Exemption ⁹⁹	2017 Passenger Vehicle Imports ¹⁰⁰	Parts Exemption	2017 Part Imports
Canada	2.6 million	1.86 million	\$32.4 billion	\$15.8 billion
Mexico	2.6 million	1.73 million	\$108 billion	\$53.1 billion

Further, there is a provision negotiated solely between the United States and Mexico that allows 1.6 million vehicles that do not meet USMCA requirements but do meet the NAFTA rules of origin to be imported at the current tariff (2.5 percent for passenger cars and 25 percent for pickup trucks) if the United States raises its MFN tariff rates. Mexican officials have said that 32 percent—or 780,000 vehicles—do not meet USMCA requirements, leaving significant space before the cap is hit.¹⁰¹ This provision and the side letters that lay out quotas beyond current U.S. import volumes should alleviate some uncertainty and other downsides from potentially forthcoming U.S. tariffs on automobiles and parts but would not completely blunt the negative impacts. The side letters appear to be an attempt to curb the economic downsides stemming from tariffs on automobile and parts imports by leaving space for supply chains that stretch across Canada, the United States, and Mexico to remain partially intact. Absent the side letters, parts and vehicles from Canadian and Mexican automobile and parts suppliers could face prohibitive tariffs relative to the United States' MFN tariffs for not meeting the USMCA's rules of origin.

97. United States-Mexico-Canada Agreement (USMCA), Side Letter 14, <https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement/agreement-between>.

98. United States-Mexico-Canada Agreement (USMCA), Side Letter 3, <https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement/agreement-between>.

99. All imported light trucks are excluded from Section 232 tariffs as per side letters #3 and #14.

100. Sean McLain and William Boston, "Nafta Rewrite Is Mixed Blessing for Foreign Car Makers," *Wall Street Journal*, October 1, 2018, <https://www.wsj.com/articles/nafta-rewrite-is-mixed-blessing-for-foreign-car-makers-1538403059>.

101. "Meet the New NAFTA," Center for Automotive Research, October 16, 2018, <https://www.cargroup.org/meet-the-new-nafta/>.

4 | Automotive Supply Chains Under USMCA

The North American Supply Chain in Terms of Compliance

According to the Center for Automotive Research (CAR), most vehicles assembled in the United States and Canada currently meet the new USMCA auto rules of origin or are “close” to doing so. A more recent analysis from CAR estimates that 47 vehicle models produced and sold in North America do not comply with the new rules of origin.¹⁰² Out of those 47 models, 20 are assembled in the United States and the other 27 are assembled in Canada or Mexico. Of the 27 models assembled outside the United States, 24 meet NAFTA requirements but would not comply with the USMCA’s rules of origin. Those non-conforming vehicles fail to meet multiple USMCA requirements and are unlikely to be brought into compliance, CAR claims. It is more likely that sales of those models end in the United States or production of them halts in North America than they are brought into compliance, CAR found. Indeed, announcements that 12 of the 24 models will no longer be produced in North America or sold in the United States have already been made, per CAR. Meanwhile, analysts and government officials estimate that about 70 percent of Mexican vehicle production already meets the new rules. Mexico’s Secretary of Economy during the USMCA negotiations, Ildefonso Guajardo, claimed that 70 percent of Mexico’s automotive exports will comply with the new rules of origin when they come into force.¹⁰³ The estimates of CAR, Guajardo, and industry representatives and experts largely track with information in the AALA database and Kogod Index. Notably, vehicles that are produced in the United States for sale in the United States do not have to meet any trade rules. U.S. automakers sell more than 80 percent of their production to consumers in the United States, which means that vehicles and parts producers in Mexico will feel the most pressure from USMCA rules.

The Big Three—Ford, General Motors, and Fiat-Chrysler—are best positioned to comply with the USMCA’s auto rules of origin, particularly their vehicles produced in the United

102. Michael Schultz, Kristin Dzikczek, Yen Chen, Bernard Swiecki, “U.S. Consumer & Economic Impacts of U.S. Automotive Trade Policies,” Center for Automotive Research, February 2019, <https://www.cargroup.org/wp-content/uploads/2019/02/US-Consumer-Economic-Impacts-of-US-Automotive-Trade-Policies-.pdf>.

103. Sharay Angulo, “Most Mexican auto exports can meet new NAFTA rules, says minister,” Reuters, August 27, 2018, <https://www.reuters.com/article/us-trade-nafta-mexico-autos/most-mexican-auto-exports-can-meet-new-nafta-rules-says-minister-idUSKCN1LC2HC>.

States.¹⁰⁴ This is because of their longevity in the United States compared to more recent foreign-brand entrants. Along with the U.S. Big Three, Honda and Toyota are relatively well positioned to deal with the new rules of origin. As the American Automotive Policy Council put it in comments submitted to the U.S. International Trade Commission (USITC), "The longstanding American manufacturers (e.g., AAPC member companies) will as a whole have an easier time meeting the new more rigorous USMCA's auto rule of origin requirements. The most recent foreign investors in the United States (e.g., Volvo Cars, Hyundai Motors, BMW) will have a more difficult time meeting the requirements and the foreign investors that have been assembling in North America for several decades would tend to fall somewhere in-between the two."¹⁰⁵

Ford's move to phase out sedans in the U.S. market will ease compliance concerns stemming from the assembly of the Fiesta and Fusion in Mexico. GM assembles its flagship pickup trucks, the Chevrolet Sierra and Silverado, in the United States but sources about 44 percent of its content from Mexico, per AALA. As with Ford, GM has announced a shift away from sedans for the U.S. market and has recently closed two assembly and two propulsion plants in the United States as part of an overall restructuring of the company's footprint for the future.¹⁰⁶ It also has announced that it will increase investment in electric vehicles. Fiat-Chrysler assembles multiple Ram pickup models in Saltillo Mexico and produces the Jeep Compass in Toluca Mexico. Per the Kogod Auto Index, the Compass contains 69 percent Mexican content and only 17 percent U.S. and Canadian content. The Ram pickups come in around a 25 percent Mexican content to 60 percent U.S. and Canadian content split.

In general, vehicles produced in Mexico tend to have higher Mexican content and include core parts assembled in Mexico. Out of the ten highest selling vehicles assembled in Mexico produced by the Big Three, only the Dodge Ram has more than 50 percent U.S. and Canadian content.

U.S. sales for Big Three vehicles produced in Mexico:

Big Three Vehicles Assembled in Mexico	2018 annual sales
Ford Fusion	173,600
Jeep Compass	171,167
Chevrolet Cruze	142,617
GMC Terrain	114,314
Dodge Journey	94,096
Ford Fiesta	51,730
Lincoln MKZ	19,852

OEMs that have had a presence in North America for a relatively long period of time, such as the Big Three, Honda, and Toyota, also are best positioned to meet the steel and

104. Daniel Alanis et al., "Preparing for North America's New Auto Trade Rules," Boston Consulting Group, November 1, 2018, <https://www.bcg.com/publications/2018/preparing-north-america-new-auto-trade-rules.aspx>.

105. American Automotive Policy Council, "AAPC Responses to ITC Questions from Nov. 15 Hearing."

106. General Motors, "General Motors Accelerates Transformation," November 26, 2018, <https://investor.gm.com/news-releases/news-release-details/general-motors-accelerates-transformation>

aluminum requirements. Relatively new “transplants” with assembly operations in Mexico such as Kia, Mazda, and Volkswagen generally use less North American steel and therefore may have to alter their sourcing when the new rules come into force.

How Stakeholders Have Reacted to the USMCA’s Rules of Origin

USITC held hearings in 2018 to explore the likely impact of the USMCA on the U.S. economy and industry sectors that included the automotive, steel, and aluminum industries.

AUTOMOTIVE INDUSTRY STAKEHOLDERS

The Big Three believe that the USMCA’s rules of origin are manageable and will bolster investment in North America, in particular in the United States, over the long term—even with increased administrative and compliance costs. Foreign automakers are less bullish on the new rules, although they do not believe they will inflict major damage on their presence in North America. Parts suppliers also have voiced strong concerns about the impact the new rules will have on the nearly 900,000 workers in that section of the industry.

However, foreign and domestic automakers agree that the new rules will come with increased costs because of administrative tasks to analyze supply chain options to meet the rules as well as costs associated with changing existing supply chains to less efficient ones to comply with the USMCA. The industry has asked for longer phase-ins to better adapt to the new rules. Stakeholders have voiced concerns about jobs training and the ability to fill new positions as the sector becomes more tech-focused and more U.S. content is required in vehicles.

The American Automotive Policy Council (AAPC), which represents the Big Three, states that the new rule-of-origin “strikes the right balance by discouraging free riders who might use the USMCA as a conduit for outsourcing, while allowing those who have been invested in the region to enjoy the agreement’s free-trade benefits.”¹⁰⁷ For U.S. automakers, the USMCA is an effective strategy to avoid offshoring for departments that are yet to start (such as R&D) and increase investment in the United States in the long run. Though the USMCA in isolation is workable with no immediate impact to the industry, benefits gleaned from the USMCA would be neutralized by 232 tariffs on steel, aluminum, or automobiles.

The American International Automobile Dealers Association (AIADA), which represents international nameplate automobile dealers, is most concerned about USMCA’s impact on the affordability of cars. They believe that the USMCA’s “onerous new origin requirements, possible 232 tariffs, and crippling uncertainty” will increase auto prices.¹⁰⁸ Customers will be priced out of the entire automotive industry because as the price of new cars go up, demand—and subsequently prices—of used cars also will increase. Especially in such a price-sensitive market, the increased cost of cars borne by the consumer could lead to fewer car purchases and ultimately lost jobs. The AIADA also testified that “there’s a shortage of technicians to work”¹⁰⁹ in dealership positions that are increasingly technology-based.

107. Matt Blunt, Testimony Given to the U.S. International Trade Commission, “2018 United States International Trade Committee in the Matter of: United States-Mexico-Canada Agreement: Likely Impact on the U.S. Economy and on Specific Industry Sectors,” Investigation no TPA-105-003, November 15, 2018.

108. Cody Lusk, *ibid.*

109. *Ibid.*

The Alliance of Automotive Manufacturers (AAM), which represents the 12 largest car manufacturers, has concerns about the complexity of the rules of origin regulations, which will lead to increased administrative and compliance costs. They asked for more reliability from lawmakers and warned that adding these extra layers of compliance will divert resources away from R&D for the automation and electrification of vehicles and increase the price for consumers without adding any additional value to the car. They voiced apprehension about the caps on auto and auto part imports within side letters to Mexico and Canada as well as noting that up to 700,000 car manufacturing jobs will be lost if Section 232 tariffs on automobiles are implemented.¹¹⁰

The Association of Global Automakers (AGA), which represents international automobile manufacturers, is greatly concerned about the new rules of origin regulations, as they “will introduce unnecessary complexity, require costly changes to supply chains and potentially redundant investments.”¹¹¹ Inefficiencies will arise as compliance will be prioritized over innovation. They stressed the need for more certainty in the industry, asking for a longer sunset clause for the agreement as the proposed renewal cycle is shorter than the lifespan of developing a new car. The AGA testified that the future success of the auto industry rests on redesigning job training to fill the continually vacant “high-tech, high-skilled, highly-paid” jobs in auto manufacturing.¹¹²

The Motor & Equipment Manufacturers Association (MEMA), which represents parts suppliers, focused on the time needed to adjust to these regulations. The R&D needed to comply with new requirements will take an estimated five to seven years and will be at the expense of hiring and discretionary budgets. “The current state of play on trade has placed [the] industry in turmoil” as uncertainty is bred by various trade disputes and potential tariffs.¹¹³ MEMA also was the most vocal about workforce concerns; current efforts to provide apprenticeship programs for training are not effectively bridging the skills gap. As car manufacturing jobs are increasingly high-skilled positions, “if we don’t have that workforce, we’re not going to be able to reshore jobs.”¹¹⁴

The Auto Care Association (ACA), which represents businesses in the aftermarket industry, predicts that USMCA guidelines will bolster North American reshoring and investment for auto part manufacturers. There are concerns, however, about whether small and medium-sized businesses will be able to bear the burden of the costs of compliance. The new rules of origin force manufacturers to create new production facilities, alter supply chain structures, and reassess their methods of production. Uncertainty is increasing to the point where any more regulatory changes “could stifle investment in production entirely.”¹¹⁵ Auto care jobs are becoming roles to diagnose and repair computers within cars. Labor thus is a limiting factor to growth in auto care; jobs that the USMCA generates in the United States are only as good as the number of qualified individuals that can fill those positions.

110. Jennifer Thomas, *ibid.*

111. John Bozzella, *ibid.*

112. *ibid.*

113. Ann Wilson, *ibid.*

114. *Ibid.*

115. William Hanvey, *ibid.*

The Canadian Vehicle Manufacturers' Association (CVMA), which represents Ford, GM, and Fiat-Chrysler in Canada, has concerns regarding Canadian auto manufacturing competitiveness after the USMCA is enacted. The more interconnected the economies of the United States, Mexico, and Canada become, the more outside competition Canadian manufacturers face. Because of extra heating costs required to overcome Canada's colder climate and a carbon tax going into effect in April 2019, they will need to innovate to lower operating costs to remain competitive.¹¹⁶

STEEL AND ALUMINUM STAKEHOLDERS

The United States steel industry is upbeat on the auto provisions in the USMCA. The industry believes the rules will increase demand for U.S. steel in the automobile industry and stem the use of Chinese and other foreign steel in automobile manufacturing. The steel industry has supported disciplines on state-owned enterprises in the USMCA and rules that encourage increased coordination between customs authorities. The Aluminum Association also is in favor of proposed USMCA regulations because their supply chain relies on the open market between Canada, Mexico, and the United States. Their opinions diverge on 232 tariffs; both steel associations believe that the tariffs are a productive move to prevent further Chinese captivity of the steel market whereas the Aluminum Association projects the tariffs will hinder the growth of the aluminum industry.

The American Iron and Steel Institute (AISI), which represents the North American steel industry, responded positively to the USMCA's work to reduce China's role in North American steel markets. It applauded the elimination of the NAFTA tracing system that made it possible for non-originating materials to be classified as originating and the strengthened rules of origin and regional value content restrictions that incentivize use of North American steel. It believes that the inclusion of currency manipulation and state-owned enterprises in the USMCA should act as modernizing precedents for future trade agreements. It testified that 232 tariffs would "not allow Canada or Mexico to become a funnel for . . . transshipped product from outside the region."¹¹⁷

The Steel Manufacturers Association (SMA), which represents the electric arc furnace steel industry, is pleased with the USMCA's modernized approach to trade. It "strongly [believes] that these modifications will bolster the competitiveness of . . . North American steel producers,"¹¹⁸ especially lauding the shift away from a loophole-filled tracing system. The policies strengthen the fight against Chinese state-driven steel growth through its provisions on state owned enterprises, stronger rules of origin, and enhanced cross-boundary coordination. Steel prices have moderated in such a way that suggests that "a lot of the claims about job loss or facility closures appear to be overstated."¹¹⁹ It believes that the United States needs 232 tariffs because it helps prevent China's global excess capacity of steel from reaching the United States.

116. Keith Nuthall, "USMCA No Panacea for Canadian Automakers," *Wards Auto*, January 18, 2019, <https://www.wardsauto.com/industry/usmca-no-panacea-canadian-automakers>.

117. Kevin Dempsey, Testimony Given to the U.S. International Trade Commission, "2018 United States International Trade Committee in the Matter of: United States-Mexico-Canada Agreement: Likely Impact on the U.S. Economy and on Specific Industry Sectors," Investigation no TPA-105-003, November 16, 2018.

118. Philip Bell, *ibid.*

119. *Ibid.*

The Aluminum Association, which represents the aluminum production, fabrication, and recycling industries, and their suppliers, believes USMCA provisions for increased cross-boundary cooperation and information sharing will significantly benefit the aluminum industry. This is because their “ability to continue to grow and support record demand . . . is directly tied to a strong and integrated North American aluminum market.”¹²⁰ Nevertheless, the association does not predict an unprecedented spike in demand for North American aluminum as cars already are trending toward aluminum, leading to a constant increase in demand for the industry. Demand is outpacing U.S. supply of aluminum, “limiting access for U.S. aluminum producers to reach suppliers and customers [that] will hamper continued growth and investment for our industry here at home.”¹²¹

120. Heidi Brock, *ibid.*

121. *Ibid.*

5 | What Changes Could Occur

Expectations and Limitations

General Expectations versus Likely Limitations

The Trump administration negotiated the automotive rules of origin in the USMCA to meet a fundamental goal: increased automobile and parts production in the United States. The labor value requirement, combined with new regional value content thresholds for core parts and tighter origin rules for steel and aluminum and parts, aim to incentivize parts production and automobile assembly in the United States. The administration intends for the USMCA to shore up the U.S. automobile industry by requiring more production in the United States for automobiles to qualify for preferential tariff treatment in Mexico and Canada. The administration expects that transition periods in the USMCA will provide OEMs and suppliers enough time to adapt their supply chains to the new rules. The administration also sought to strike a balance between encouraging the automobile industry to invest and manufacture in the United States while still remaining competitive globally. Whether the allowed transition periods for the various rules are adequate remains to be seen. What is certain, however, is that even the smoothest, fastest transition entails short-term costs that add to the industry's burden. Adding to the complexity is the ongoing current transition in the industry toward electric vehicles and the likely future transition to autonomous vehicles.

Several factors, however, may limit the benefits expected by the Trump administration. Changes to the automotive rules of origin in North America will cause disruptions throughout the industry that will vary by company, vehicle model, and part. Regardless of the level of physical change necessary to comply with the new rules or origin, nearly every player in the industry, regardless of make, model, or part, will be hit with front-loaded administrative expenses required to set up new monitoring systems to ensure compliance with the new rules. How those costs will be distributed throughout the supply chain is to be determined. Smaller companies, such as low tier or niche parts suppliers, with less spare capital on hand are likely to have the hardest time coping with monitoring compliance and the associated costs, in large part because of the absence of supply chain or customs experts on staff.

Additional U.S. steel and aluminum are likely to be used in vehicles produced in the NAFTA region—mostly vehicles assembled in Mexico or by foreign firms with less history in the

United States—because of the combination of the 70 percent steel and aluminum regional value content and the elimination of some tariff shifts related to stamping steel conferring NAFTA origin. The removal of a tracing list also could shift the sourcing of more modern components left off the NAFTA list. The labor value content rule combined with the higher regional value content rule for core parts could spur long-term investment in production capacity in the United States and Canada while likely raising production costs. Shifts in parts and vehicle production come with a variety of costs, including administrative, construction (for new facilities), labor, and those stemming from quality testing and other requirements. Quality and safety testing for parts from new suppliers can take up to seven years, which could leave OEMs in a difficult spot in terms of compliance with the new rules. Those costs can lead to a variety of downsides depending on where they are accounted for. Vehicle prices could increase or remain in line with projections but contain fewer features. Powerful OEMs may demand that suppliers sell parts at a lower price or risk being cut out of business, which could have negative job repercussions across the supplier industry that employs more than 800,000 workers in the United States. In the long-term, the new rules of origin will likely attract investment in the United States for vehicle production to serve the North American market, but the global competitiveness of vehicles produced in the region may suffer from the strict USMCA requirements. Changes to the North American automotive supply chain also could result in workforce adjustments. The auto industry alone employs more than 2 million U.S. workers, whereas the steel and aluminum industries employ roughly 300,000 workers in the United States. Counting indirect jobs, the automotive industry supports more than 7 million workers.¹²²

Sector	Direct number of U.S. jobs
Automotive assembly	242,200 ¹²³
Dealers	1,296,000 ¹²⁴
Vehicle parts manufacturers	600,900 ¹²⁵
Steelmakers	143,700 ¹²⁶
Aluminum	162,000 ¹²⁷

Tracing, Tariff Shift, and Steel and Aluminum

The expectation that the USMCA will result in more North American steel and aluminum in vehicles produced in the region is likely to be borne out. The elimination of the tracing regime and the concept of “deemed originating” itself will require changes to automotive supply chains as well as additional compliance costs for the industry. The tracing “loophole” has resulted in some vehicles containing only 55 percent RVC, according to industry officials and experts interviewed for the project. High-tech items that were not envisioned to be in vehicles when NAFTA was negotiated but are now commonplace, such

122. Alliance of Automobile Manufacturers, <https://autoalliance.org/economy/>.

123. Bureau of Labor Statistics, “Automotive Industry: Employment, Earnings, and Hours” Employment – Not Seasonally Adjusted, Motor Vehicles Manufacturing, Dec. 2018, <https://www.bls.gov/iag/tgs/iagauto.htm>.

124. Ibid., Employment – Not Seasonally Adjusted, Retail Trade, Automobile dealers, Dec. 2018.

125. Ibid.

126. American Iron and Steel Institute, “Profile 2018,” <https://www.steel.org/-/media/doc/steel/reports/2018-aisi-profile-book.ashx?la=en&hash=99F688718B7AC33BA38E9FAEFC20E08823EFC2B4>.

127. Aluminum Association, “Jobs & Economy,” <https://www.steel.org/-/media/doc/steel/reports/2018-aisi-profile-book.ashx?la=en&hash=99F688718B7AC33BA38E9FAEFC20E08823EFC2B4>.

as touchscreens, sensors, LiDAR, certain semiconductors and processors, and rearview cameras, were not on the NAFTA tracing list and were therefore “deemed originating” when imported from outside the NAFTA region for use in NAFTA vehicles.

Generally, automakers are pleased that the onerous paperwork associated with the NAFTA tracing requirements will be in the past. The USMCA will no longer require a specific NAFTA form to track parts but will allow company invoices and receipts, which will cut compliance burden and costs throughout the supply chain. But the elimination of tracing does not come without costs. The elimination of the “deemed originating” concept may encourage OEMs to source more components from within the NAFTA region and could encourage suppliers to invest in assembly facilities in North America as well. However, OEMs may choose to continue to import low-cost parts that do not contribute much to the overall value of a vehicle. Changes to logistics and unit costs likely would come with the decision by OEMs and suppliers to shift supply chains or production of parts to the NAFTA region as a result of the revamped tracing requirements.

The loss of “deemed originating” status for certain parts will require supply chain revisions. This could cut down on logistic costs associated with the new rules, but the elimination of a tracing list also means that the origin of all components will have to be tracked throughout the supply chain. Industry experts raised concerns that smaller suppliers may not have the technical capacity to track where certain components or parts originated or may not have the expertise on staff to optimize their own supply chains to meet the new USMCA rules. Such compliance issues could result in largely unseen but serious financial stress on smaller suppliers.

Changes to the tariff shift rule for stamped parts will force a choice for foreign-brand automakers in Mexico that have historically relied on imported steel: find a way to source steel from the NAFTA region or miss the mark on the requirement that 70 percent of the value of a vehicle’s steel is made in the NAFTA region. Importing steel from the United States carries heavy logistics burdens that would be exacerbated by sourcing from Canada. The U.S. steel industry is operating at about 80 percent capacity.¹²⁸ The industry is confident that it can meet additional market demand, citing construction of new mills and reactivation of decommissioned mills.¹²⁹ The industry also believes that the new steel requirement in the auto rules of origin will increase steel production in the United States. Total U.S. steel production capacity is around 2.4 million tons per week. Experts within the steel industry do not predict a swell in the price of steel because of new rules of origin regulations, citing the dynamic and responsive nature of the price mechanism for steel.¹³⁰

Core Component Production, Final Assembly, and Labor Value Requirement

The Trump administration expects that the USMCA’s labor value content rules combined with the core component RVC requirements may encourage major auto companies—OEMs

128. <https://www.steel.org/industry-data>

129. Dempsey, “2018 United States International Trade Committee In the Matter of: United States-Mexico-Canada Agreement: Likely Impact on the U.S. Economy and on Specific Industry Sectors.”

130. Ibid.

and Tier 1 companies that produce core parts—to shift additional core part production to the United States. It is nearly impossible for an automaker that sources its core components from Mexico to meet the labor value rule because of lower wages there. Although complex and costly in terms of labor, capital, and time, moving production of core components to the United States could directly create jobs at those facilities and also could encourage suppliers throughout a chain to localize production near core parts facilities to optimize costs. If the USMCA and other factors compel core part production to take place in the United States, it could bring additional vehicle assembly and principal part and complementary part production.

Through the wage requirement, the administration aims to assuage concerns that auto industry jobs will leave the United States for Mexico because of that country's relatively low wages. The labor value requirement hamstring's Mexico's automotive industry unless it manages to pay its workers \$16 an hour, well above the current average wages in the industry there. The intention of the wage rule is to encourage Mexico to raise wages for its auto workers or risk losing business, while not requiring companies in the United States and Canada to undertake massive changes. It is unlikely that the labor value content rule alone will result in Mexican auto industry wages increasing to \$16 an hour. The average hourly wage for an auto assembly worker in Mexico is under \$7.50 an hour and the average hourly wage for an auto parts worker is under \$3.50 an hour.¹³¹ Multiple factors keep those wages relatively low, including barriers to collective bargaining in labor law and a relatively low national minimum wage. Indeed, the wage gap between the United States and Mexico has grown since 1994.¹³² The USMCA does contain labor rules aimed at enhancing workers' rights in Mexico, although critics have questioned the enforceability of those provisions.

Aside from wages, the weight, size, fragility, and hazards that come with transportation of certain core parts make it optimal from a logistics and financial perspective to establish production near a final vehicle assembly plant. Localized production of bulky and model-specific parts also ensures timely delivery to the final assembly location. The advantages of a localized supply chain fade as those factors decline.¹³³

Historically, automotive production and employment tends to cluster regionally—in the United States Midwest and Ontario, the U.S. Southeast, or Central and Northern Mexico. Sometimes clusters specialize in specific parts of the business, including design, final assembly, or manufacture of parts that have some commonality.

Automakers setting up new final assembly plants in new locations have pressured their existing suppliers to move production with them.¹³⁴ Despite globalization, the automotive supply chain has remained relatively centralized in terms of major Tier 1 suppliers and OEMS and regionalized in terms of production. This is driven by the need to keep costs

131. Ibid., Center for Automotive Research, "NAFTA Briefing."

132. El Colegio De Mexico, "El Futuro Del Trabajo Automotriz En Mexico," March 2017, https://trades.colmex.mx/assets/docs/Apuntes_para_la_equidad_1.pdf.

133. Timothy Sturgeon, Johannes Van Biesebroeck, and Gary Gereffi, "Value chains, networks and clusters: reframing the global automotive industry," *Journal of Economic Geography* 8 (2008): 297-321, https://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/11587/JEG%20autos%20article_Sturgeon%2C%20van%20Biesebroeck%20%26%20Gereffi_May%202008.pdf?sequence=4.

134. Ibid.

down while producing parts and vehicles at a large scale while maintaining a system of just-in-time manufacturing that requires local content to meet preferential trade rules.¹³⁵

Limitations exist, however. Shifting production across Mexico's northern border may not equate to additional employment opportunities in the United States and Canada. Automation and the lack of qualified workers, for example, will cap the amount of job gains from additional production in the United States and Canada. The ability for some OEMs and suppliers to expand capacity by adding additional product and vehicle lines at existing plants also may limit new investment and employment. Neither parts or vehicle production in the United States is at capacity, and the lack of skilled talent and its mobility are some of the largest impediments to job and capacity growth in the United States.¹³⁶ Those factors would suggest that remaining hooked into globally competitive supply chains offers the U.S. auto industry the best chance at remaining globally competitive.¹³⁷

Powertrains also may represent a challenge in dealing with the transition to new rules of origin. OEMs design powertrains to suit multiple platforms and engineer and design them with a 10-year lifespan in mind. As with platforms, new technology is driving OEMs to redesign powertrains at an increased pace, raising already expensive design and engineering costs.

More broadly, each vehicle part and component require testing, validation, and certification before it can be introduced into a supply chain. Any shift in a supply chain to comply with the new rules of origin will come with added costs and delays associated with those requirements. Auto industry representatives and insiders have expressed alarm that the short transition periods afforded by the USMCA may not provide companies enough time to adapt existing and planned products to the new rules while keeping associated price increases in check and ensuring consumers are afforded the model and technology options to which they are accustomed.

Still, constructing a new engine, transmission, chassis or advanced battery plant is a relatively big decision for a company and is not driven solely by rules of origin. It is capital- and labor-intensive not only in terms of construction but planning and engineering the facility and then operating it once complete. Auto sales appear to have peaked in the United States for the time being, which may limit capital on hand for companies to make such an investment. Further, the shortage in qualified labor to operate assembly or parts plants is a systemic issue in the auto industry and an additional challenge for companies considering new production capacity in the United States. New facilities must fill demand for parts or vehicles, which appears to be tapering off. Additional siting variables include the cost of labor and material in the region under consideration for investment, economic incentives and disincentives to invest there, environmental and other regulations, the price of energy, and more. Numerous factors go into decisions regarding whether to site a plant at a certain location well beyond rules of origin.

Assuming the USMCA drives a shift in the automotive supply chain to the United States, it likely would impose costs for many stakeholders, although the phase-in periods could

135. Ibid.

136. Ann Wilson, "MEMA post hearing."

137. Ibid.

alleviate some, but not all, pain. To meet the new rule of origin, contracts between suppliers or OEMs and suppliers may have to be broken or rewritten. Supply chain experts would have to consider how to meet the new rules and if supplier capacity exists to do so. Quality and safety checks would be required for new supply chain relationships to become fully operational. OEMs, Tier 1, and Tier 2 suppliers will have to cooperate more closely to map out USMCA compliant supply chains. Information about materials, labor, overhead, engineering, research and development, and even labor cost data on a plant and product basis will have to be shared.¹³⁸ Each of those burdens would create new compliance costs throughout the supply chain distinct from the cost of materials, parts, or labor that also may fluctuate with shifts in sourcing and assembly.

The Impacts of The Changes

There is general agreement regarding the overall impact the USMCA will have on the automotive industry. The new rules of origin are expected to marginally increase costs throughout the automotive supply chain. The rules also may lock in an environment in which U.S. automakers and parts suppliers capture a larger share of the North American auto market but are somewhat less globally competitive. Additional administrative costs and shifting supply chains to a less optimal position to meet the USMCA's rules of origin could affect multiple parts of the automotive industry. Indeed, NAFTA's rules of origin compliance costs already can amount to up to 7 percent of the value of a finished good.¹³⁹ Multiple outcomes may arise from added costs from the new rules of origin depending on which parts of the supply chain shoulder them. Still, costs from the new rules of origin would be close to insignificant compared to costs that could be incurred by Section 232 tariffs on automobiles and parts that the Trump administration is considering. In the long-term, many industry representatives and experts believe the new rules will encourage investment in manufacturing, assembly, and research and development in the United States while somewhat degrading the overall competitive position of U.S. automakers in markets abroad.

OEMs and Consumers

OEMs have some flexibility in determining how to handle increased costs because of their financial size and position relative to suppliers that rely on vehicle production and demand to operate and grow. In a bid to maintain pre-USMCA automobile prices and sales, OEMs could deal with cost increases by offering consumers fewer models to choose from to cut down on operational costs. OEMs also could offer fewer features in vehicles to save on the net cost of each automobile. Additionally, OEMs could attempt to renegotiate contracts with suppliers to procure parts at a lower cost. Those options would negatively impact suppliers, consumers, and the OEMs position in terms of global competition. Fewer vehicle or content options would mean less choice for consumers, which could harm an OEM's brand or reputation. Fewer models and "de-contenting" vehicles would decrease demand for parts. De-contenting vehicles also would turn off consumers who expect

138. Alanis et al., "Preparing for North America's New Auto Trade Rules."

139. Stephen Tapp, "Understanding Rules of Origin: A Critical Review of the Literature, Finance Canada Working Paper," June 2007; Céline Carrère and Jaime de Melo, "Are Different Rules of Origin Equally Costly? Estimates from NAFTA," CEPR Discussion Paper No. 4437, 2004.

vehicle prices to remain stable year over year but include more content. OEMs could choose to directly shoulder the added costs by increasing vehicle prices. That path would likely decrease vehicle purchases, harming OEMs and suppliers alike.

In some cases, the transition period for the rules of origin will be shorter than the life cycle and investment horizons for certain vehicle lines, platforms, and parts. The increasing pace of technological advances and additions to automobiles has led to a reduced vehicle platform lifecycle in recent decades. As customers demand that more new technology be available in automobiles at a faster pace, OEMs more quickly cycle through platforms. In the 1980s, platforms lasted about 8.6 years before being replaced or retired. Vehicle platforms now have an average lifespan of 6.7 years.¹⁴⁰ For OEMs that are planning to rollout new platforms in the next five years, shifting auto rules of origin could require an entire rethink of the platform. Engineering and design costs associated with developing a new vehicle platform are high and must be returned via sales. Increases in those costs, plus added compliance costs, combined with shorter lifecycles for platforms could drive OEMs toward fewer platform offerings. According to the U.S. International Trade Administration, “most U.S. suppliers are ill-situated to withstand major disruptions to their sales and the impact upon suppliers when an automaker sharply curtails operations can be severe. It takes many months and significant resources to win business from vehicle assemblers or from the major ‘Tier 1’ suppliers.”¹⁴¹

Suppliers

Faced with increased costs, suppliers could be pressured by OEMs to renegotiate contracts or be left behind. Shrinking margins from sales to OEMs along with additional compliance costs associated with the rules of origin will put suppliers, particularly smaller companies with less capacity to review and reorient supply chains, under serious strain.¹⁴² Layoffs could occur, or entire companies could go out of business, industry experts have feared. Consolidation in the supplier industry spread costs and lower margins but would not entirely obviate the negative impacts from cost increases.

Suppliers in the United States with spare capacity, however, could benefit. Those firms could be well situated to meet increased demand for parts from increases in core part production in the United States. Additionally, a number of industry experts and representatives predict that the USMCA’s rules of origin will result in increased investment in the U.S. automotive industry over time, which should provide a boost to the parts suppliers down the chain. Additional assembly plants could bring more facilities to produce engines, transmissions, batteries, and other core parts. That in turn could shore up parts producers at lower tiers of the supply chain. However, loss of exports because of a decrease in competitiveness could offset those gains.

140. Center for Automotive Research, “Automotive Product Development Cycles and the Need for Balance with the Regulatory Environment,” September 20, 2017, <https://www.cargroup.org/automotive-product-development-cycles-and-the-need-for-balance-with-the-regulatory-environment/>.

141. U.S. Department of Commerce, International Trade Administration, Office of Transportation and Machinery, “On the Road: U.S. Automotive Parts Industry Annual Assessment,” 2011, <https://www.trade.gov/td/otm/assets/auto/2011Parts.pdf>.

142. Ibid.

Global Competition and the Vehicle of the Future

In all likelihood the majority of vehicles built in the United States will be sold in the United States; however, costs associated with the new rules of origin could harm their ability to compete outside North America. Harm to OEMs' and suppliers' bottom lines could cut into research and development at time when the auto industry is on the cusp of revolutionary change.¹⁴³ Automation, connectivity, and electrification will make up the core features of vehicles of the future. Building smarter and greener automobiles will require massive investments in a range of technologies. For example, between 2015 and 2017, Ford and GM increased research and development expenditures by about 20 percent.¹⁴⁴ Ford has promised shareholders that 90 percent of vehicles will be connected by 2020,¹⁴⁵ whereas GM is developing a plan for an all-electric future.¹⁴⁶ Bosch, a leading global auto parts supplier, plans to invest billions in driver-assistance and automation systems, as well as electric powertrains and batteries.¹⁴⁷ Bosch's investment in the systems that will underlie the vehicle of the future is just one example of suppliers investing in their own innovative research and development. Research and development driven by suppliers carries upsides because of their ability to test products and prove their effectiveness to OEMs.¹⁴⁸

The inclusion of advanced batteries as a core part combined with the high labor costs associated with them indicates that the Trump administration intends to incentivize production of those parts in North America, and the United States in particular. The rules of origin for advanced batteries have a longer five-year transition but come as China pours money into its own electric vehicle and advanced battery production.¹⁴⁹ Beijing intends for its advanced battery industry to dominate globally as part of its state-driven Made in China 2025 policy. The Trump administration has labeled China a strategic "competitor." The USMCA offers only a partial response to China's desire to command global advanced battery production. China commands a complete lithium-ion battery supply chain and it is boosting production capacity.¹⁵⁰ One estimate sees China's lithium-ion battery production capacity rising from 134.5 gigawatt hours (GWh) in 2018 to 631 GWh in 2028.¹⁵¹ By comparison, North America's capacity is expected to rise from just 20.9 GWh in 2018 to 148 GWh in 2028. China boasts seven of the top ten lithium-ion megafactories by production capacity. The sole U.S. factory in the top ten, Tesla's Gigafactory 1, ties China's

143. Roland Berger, "Global Automotive Supplier Study 2018," December 2017.

144. Statista, "Ford's engineering, research, and development expenditures from FY 2016 to FY 2018 (in billion U.S. dollars)," Raw Data, 2019, <https://www.statista.com/statistics/260867/fords-research-development-expenditures/>; Statista, "GM's research and development expenditures from FY 2015 to FY 2018 (in US dollars)," Raw Data, 2019, <https://www.statista.com/statistics/260866/research-and-development-expenditures-of-general-motors/>.

145. Ford Motor Company, 2017 Annual Report (Dearborn, MI: Ford Motor Company, 2018), https://s22.q4cdn.com/857684434/files/doc_financials/2017/annual/Final-Annual-Report-2017.pdf.

146. Alex Davies, "General Motors Is Going All Electric," *Wired*, October 2, 2017, <https://www.wired.com/story/general-motors-electric-cars-plan-gm/>.

147. Jim Irwin, "Bosch Tackles Automation, Mobility, AI in 2018," *Wards Auto*, <https://www.wardsauto.com/industry/bosch-tackles-automation-mobility-ai-2018>.

148. Ann Wilson, "MEMA post hearing."

149. Scott Kennedy, "China's Risky Drive into New-Energy Vehicles," Center for Strategic and International Studies, November 2018, https://csis-prod.s3.amazonaws.com/s3fs-public/publication/181127_Kennedy_NEV_WEB_v3.pdf.

150. *Ibid.*

151. Jeff Desjardins, "Battery Megafactory Forecast: 400% Increase in Capacity to 1 TWh by 2028," *Visual Capitalist*, October 19, 2018, <https://www.visualcapitalist.com/battery-megafactory-forecast-1-twh-capacity-2028/>.

Contemporary Amperex Technology Co. Ltd.'s factory for top projected capacity by 2023. Catching up with China in the advanced battery space will require the United States to deploy a broad strategy that encourages research and development, investment in new capacity, and production of and demand for electric vehicles.

OEMs and large suppliers, as well as non-traditional players such as Google, Apple, and Uber, are leading the charge in developing new technologies that will connect vehicles, assist or eliminate the need for drivers, and cleanly power drivetrains. The USMCA may nudge OEMs and major suppliers to locate research and development of these technologies or even advanced battery production in the United States. The costs associated with meeting the new rules of origin, however, will cut into resources that could otherwise be spent on advanced vehicle research and development.

Overall, the costs stemming from the USMCA's rules of origin will put additional pressure on the U.S. auto industry to keep up with technological advances abroad. More expensive vehicles relative to those built in Europe or Asia will harm the global competitiveness of U.S. vehicles. As the Center for Automotive Research states:

If more money is needed for one part of a plan, it must be made up somewhere else . . . Evaluations are made to determine whether the costs of all of the proposed vehicle features can be contained within the limit imposed by profit and investment targets. If costs exceed this limit, management must make trade-offs about which features to include and which to drop . . . On the other hand, as once-new features become commonplace, they become a 'given'—a matter of customer expectation for which there is no incremental willingness to pay.¹⁵²

Fewer offerings from U.S. companies, whether in parts, vehicle content, or vehicle models will harm the standing of U.S.-built vehicles at home and abroad. Finally, slower advances in automation, connectivity, and electrification because of increased costs associated with the USMCA also will harm the global competitiveness of U.S. automakers in the short and long run as vehicles built in Europe and Asia could gain an important first-mover advantage in technology for new generation vehicles and in the production of the vehicles themselves.

Ignore USMCA's Rules of Origin

In some cases, the costs of meeting the new automotive rules of origin may exceed the cost of paying the 2.5 percent tariff the United States levies on automobiles. In those instances, firms, driven by economic motivations, may abandon attempts to comply with the USMCA's rules of origin. Doing so would incentivize firms to establish the most economically efficient supply chains, which could lead to lower North American and U.S. content than prescribed even by the current NAFTA rules of origin. In that case, the USMCA's rules of origin would backfire, lowering automotive production in the United States and encouraging companies to source components from outside the United States or NAFTA region entirely. At the time of this writing, manufacturers had not indicated that they would follow this course.

152. Kim Hill, Morgan Edwards, Steven Szakaly, "How Automakers Plan Their Products, A Primer for Policy-makers on Automotive Industry Business Planning," Center for Automotive Research, July 2007, <http://www.cargroup.org/wp-content/uploads/2017/02/HOW-AUTOMAKERS-PLAN-THEIR-PRODUCTS.pdf>.

Other Factors

Rules of origin do not by themselves determine how firms construct supply chains. Industry officials and experts cited a slew of factors that impact how sourcing and investment decisions are made. Decisions over where to source parts take into account a variety of factors. Additionally, considerations about the quality of parts, reliability of the supplier to deliver just-in-time, the volume of production, and the supplying firms' own ability to manage for risks and other unforeseen circumstances all play into sourcing decisions. Regarding investing in a new assembly facility, factors that must be considered include unused capacity, capital, the availability of skilled labor, incentives offered by the jurisdiction in question, environmental and fuel efficiency regulations, ease and cost of purchasing inputs, quality and reliability of suppliers in the area under consideration, growth forecast for the region, labor costs, and ability to export abroad.

The most influential factors cited by industry representatives are the Section 232 tariffs on steel and aluminum, the absence of skilled labor in certain areas, and the lack of mobility for workers who are skilled enough to fill currently open jobs or those that would crop up because of increased investment in the United States. U.S. tariffs on steel and aluminum are a significant cause of consternation for the entire auto industry, and at the time of writing this report, they remain in place on Canada, Mexico, and most of the world, with only a few exceptions.¹⁵³ Steel prices in the United States hit a ten-year peak in July 2018 following the imposition of tariffs in March that year but by early 2019 had fallen to pre-tariff levels. That decline may be driven by investments in additional production capacity in the United States, which steel companies have said they will continue despite falling prices.¹⁵⁴ Ford CEO Jim Hackett said in late 2018 that the tariffs were predicted to cost his company \$1 billion despite most of its steel and aluminum being of U.S. origin.¹⁵⁵ That prediction was driven by U.S. steel being more expensive than foreign steel, a result of the Trump administration's Section 232 tariffs on steel and aluminum. The head of the American Automotive Policy Council, which represents the Big Three Detroit automakers, told a government panel in 2018 that high U.S. steel and aluminum costs stemming from the tariffs causes vehicles produced in the United States to cost roughly \$400 more than it does to build them abroad with non-U.S. steel and aluminum. Steel and aluminum tariffs also may drive parts production from the United States to Canada and Mexico. Higher steel and aluminum prices in the United States may make U.S. parts less competitive compared to those produced abroad with cheaper foreign steel and aluminum. Once those raw materials have been transformed into parts, those parts could be exported to the United States without the additional steel or aluminum duties. That outcome would see the steel and aluminum tariffs backfire and harm the auto industry as well as domestic metal producers.

153. David Lawder, "U.S. automakers plead with Trump administration to end steel, aluminum tariffs," Reuters, November 15, 2018, <https://globalnews.ca/news/4666655/automakers-trump-end-steel-aluminum-tariffs/>

154. Bob Tita, "Steelmakers Find Strength to Expand Under Tariffs," *Wall Street Journal*, February 7, 2019, <https://www.wsj.com/articles/steelmakers-find-strength-to-expand-under-tariffs-11549544400>.

155. Jim Hackett and David Westin, "Ford CEO Says Metal Tariffs Cost \$1 Billion in Profits," Bloomberg TV, Bloomberg Daybreak: Americas, September 26, 2018 <https://www.bloomberg.com/news/videos/2018-09-26/ford-ceo-says-metals-tariffs-took-about-1-billion-from-profits-video>.

Extraneous Factors

Sometimes one policy can get in the way of another, forcing the unanticipated development of new supply chains. For example, the potential for the Trump administration to impose a hefty tariff on automobiles and automobile parts under Section 232 of the Trade Expansion Act of 1962 is a serious concern in the automotive industry and would drastically change its landscape. Increased tariffs on automobiles and parts entering the United States also would dramatically change the stakes of not meeting the USMCA's automotive rules of origin. Hiking automotive tariffs likely would incentivize investment in the U.S. automotive industry, bringing with it jobs and increased capacity over the long term, but the short-term negative impacts from tariffs would be significant. The tariffs would likely increase, sometimes prohibitively, the cost of certain imported parts and vehicles. The inability to source competitively priced parts from abroad could jeopardize the ability of domestic manufacturers to meet demand.¹⁵⁶ Tariffs also would raise domestic automobile prices because of inflated import prices. As a result, consumers would have to pay more for less, with many likely to be priced out of the market altogether. Automakers in the United States would become less globally competitive and would face massive trade retaliation, along with other parts of the U.S. economy. The magnitude of retaliation against the United States would have serious negative repercussions throughout the economy. The parts industry also would suffer because of decreased demand and increased prices within the United States and NAFTA region, in addition to facing significant tariffs abroad.

From the Specific to the General

Rules of origin are both a necessary element of an integrated regional market and a deterrent to enhanced market integration. In other words, without rules of origin, an effective FTA is impossible to maintain because benefits cannot be effectively limited to FTA members. However, if the rules are not artfully constructed, they can play a negative role either by forcing the construction of less efficient supply chains inside the free trade area, thereby reducing industry global competitiveness, or by encouraging manufacturers to ignore the rules of origin altogether and pay normal MFN duties because the compliance costs otherwise would be higher than the tariffs.

In complex and layered industries with tight profit margins, such as the automotive industry, even small changes to rules of origin can lead to seismic shifts. A mere handful of modifications in sourcing or production can set off a cascade of other changes in long-established supply chains. A firm's lack of knowledge about rules of origin or lack of expertise to ensure compliance can lead to unintended costs either through noncompliance or additional administrative expenses to ensure compliance. A more complicated rule of origin is expected to generate larger administrative compliance costs that, for inexperienced firms and their partners, may go unseen until compliance is enforced. In that regard, larger, multinational firms in general are better equipped to examine and adapt to new rules of origin, whereas smaller firms will face upfront costs

156. Ann Wilson, Comments submitted to the Department of Commerce regarding the Section 232 Investigation of Automobiles and Automotive Parts Imports, Docket No. DOC-2018-0002, June 29, 2018, https://www.mema.org/sites/default/files/resource/MEMA-Comments-re-Sec232-Investigation-Autos-AutoParts_FINAL_June-29-2018.pdf.

related to analysis of the rule and administrative tasks in adapting to them. Those unequal costs could cause smaller firms to unwittingly be out of compliance with the new rules or forced into financial belt tightening that otherwise would not occur.¹⁵⁷

The likelihood of administrative costs and unintended consequences from rules of origin will rise as supply chains across a range of industries become more complex. The trend could be magnified if countries strike bilateral and regional trade agreements and do not align rules between overlapping deals. In the case of automobiles, the three major regional hubs of production—North America, Asia, and Europe—all house a range of overlapping trade agreements and are in the process of negotiating additional deals. Lack of alignment or cumulation among deals could result in exceedingly complicated compliance schemes to ensure that supply chains meet multiple rules of origin. Again, those administrative costs would disproportionately burden smaller firms.

Our analysis of NAFTA/USMCA's rules of origin illustrates these problems. If carefully crafted, rules of origin to determine preferential trading arrangements can incentivize production within a free trade region. Rules of origin that are too lax or riddled with loopholes will do little to encourage entire supply chains to operate within a given free trade zone, whereas overly complex rules of origin can encourage firms to abandon them altogether.¹⁵⁸ Indeed, a 2011 WTO report observed that only 16 percent of global merchandise trade, excluding trade within the European Union, qualified for preferential tariff rates, complex rules of origin being a contributing factor.¹⁵⁹ A 2007–2008 survey of firms in East Asia and Latin America by the Asian Development Bank and Inter-American Development Bank found that costs to comply with rules of origin were a deterrent to using them to qualify for trade preferences, particularly when preference benefits were low or the cost of compliance exceeded gains from those benefits.¹⁶⁰

The value of a transaction and the experience of a firm also determine whether to use a rule of origin.¹⁶¹ For example, in the case of utilizing NAFTA preferences, when most-favored nation tariffs are relatively low, a relatively larger share of imports enters the United States without meeting the rules of origin.¹⁶² Restrictive rules of origin may encourage firms to swap a non-member country supplier for a less economically optimal supplier within the free trade region, which can increase costs and may harm demand and overall trade and consumption of the intermediate and final good.¹⁶³

Analysis of the USMCA's automotive rules of origin is particularly timely because, as supply chains become more complex and regional or plurilateral trade agreements proliferate, innovative rules of origin are likely to appear as well. The automotive rules in the USMCA show how such rules can be used creatively to shape supply chains. Rules

157. Caroline Freund, "Streamlining Rules of Origin in NAFTA," Peterson Institute for International Economics, Policy Brief, June 2017, <https://piie.com/system/files/documents/pb17-25.pdf>.

158. Goldman, "Determining Country of Origin: Logistical Challenges and Practical Strategies for Supply Chain Professionals."

159. World Trade Organization, "World Trade Report 2011, The WTO and preferential trade agreements: From co-existence to coherence," 44, https://www.wto.org/english/res_e/booksp_e/anrep_e/world_trade_report11_e.pdf.

160. *Ibid.*, 10.

161. *Ibid.*, 72.

162. Freund, "Streamlining Rules of Origin in NAFTA."

163. *Ibid.*, 9.

regarding labor value content and research and development in the USMCA go beyond traditional rules of origin and aim to address wages, intellectual property development, and innovation, and we are certain to see more of them.

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