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Trade Briefing:

Consumer Impact of Potential U.S. Section 232 Tariffs and Quotas on Imported Automobiles & Automotive Parts

Michael Schultz

Kristin Dziczek

Bernard Swiecki

Yen Chen

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3005 Boardwalk, Suite 200
Ann Arbor, MI 48108
www.cargroup.org

CAR's mission is to conduct independent research and analysis to educate, inform and advise stakeholders, policymakers, and the general public on critical issues facing the automotive industry, and the industry's impact on the U.S. economy and society.

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Executive Summary & Conclusions

If the Trump Administration chooses to implement tariffs or quotas on U.S. imports of automobiles and automotive parts, the Center for Automotive Research (CAR) estimates that consumers will see the price of all new vehicles rise by $455 to $6,875 depending on the level of tariff or quota, where the vehicle was assembled, and whether the policy provides exemptions for automotive trade with Canada and Mexico. Higher new car prices will drive some consumers into the used vehicle market where prices will also be higher due to heightened demand and constricted supply – producers cannot make more used vehicles. Higher automotive parts prices are also likely to drive up the price of vehicle maintenance and repair, so even holding on to an existing vehicle will become more expensive. Manufacturers that import vehicles to the U.S. market may choose to no longer offer specific models – which is especially likely for small cars that are offered at lower price points to consumers who cannot afford increased vehicle prices due to tariffs.

U.S. automotive and automotive parts manufacturers would not benefit from tariff or quota protection since all vehicles produced in the United States rely on imported content and a substantial share of U.S.-produced automotive parts and components are exported for assembly in vehicles built in other countries. Over 70 percent of 2017 U.S. auto parts exports were to Canada and Mexico (U.S. International Trade Administration, 2017), so including these two trading partners in the trade action would be particularly harmful to U.S. automotive parts producers. CAR estimates that automotive demand will fall by between 493,600 to 2 million vehicles as a result of the implementation of tariffs or quotas. Declining demand is associated with employment losses ranging from over 82,000 to nearly 750,000 jobs and a $6.4 billion to $62.2 billion decline in U.S. Gross Domestic Product (GDP).

New vehicle dealerships would also be substantially affected. The United States' 17,000 new vehicle dealerships provide significant contributions to the U.S. economy. Collectively, these businesses employ more than 1.1 million people, with average annual pay exceeding $57,000 (National Automobile Dealers Association, 2017). CAR analysis indicates that this industry, and the employment and wages it provides, will be severely harmed by the introduction of restrictions on automotive imports. CAR estimates that new vehicle dealership employment declines would range from 28,800 to 117,500 and total dealer revenues could decline between $16.3 billion and $66.5 billion as a result of automobile and automotive parts tariffs and quotas.

Overview of Tariff and Quota Scenarios and Analytical Approach

The U.S. Department of Commerce, under President Trump's direction, is investigating whether there are national security concerns related to the import of automobiles and automotive parts to the United States. The investigation is under the auspices of Section 232 of the Trade Expansion Act of 1962, as amended (hereafter, Section 232). Although the final form of potential Section 232 automotive and automotive parts trade restrictions is not yet known, CAR constructed and evaluated six possible scenarios to assess the impact of the trade changes on consumer prices, vehicle sales levels, U.S. dealership employment, total U.S. employment, and U.S. GDP:

1. 25 percent across-the-board tariffs on all automobile and automotive parts imports:
    a. From all trading partners
    b. From all trading partners with an exemption for imports from Canada and Mexico
2. 10 percent across-the-board tariffs on all automobile and automotive parts imports:
    a. From all trading partners
    b. From all trading partners with an exemption for imports from Canada and Mexico

3. A quota instead of tariffs—set at 80 percent of the 2017 automobile import volume (units) and 80 percent of the 2017 value of automotive parts imports:
    a. Applied to all imports
    b. Exempting imports from Canada and Mexico

In all scenarios, CAR's analysis reflects the full pass-through of trade restriction costs into consumer prices.

Several features of CAR's analysis result in conservative estimates that *understate* the harms which will be caused to the U.S. economy should tariffs or quotas be imposed on automobile and/or automotive parts imports:

- CAR's simulation model is unrestricted with regards to the potential expansion of U.S. production of automobiles and automotive parts, which allows a significant portion of the harm caused by trade restrictions to be offset by expanded domestic production. However, currently about half of all open production capacity in the United States is available due to the consumer shift away from passenger cars. Unless consumers switch away from imported automobiles of all body styles and segments specifically towards U.S.-assembled passenger cars, domestic production cannot readily increase. Converting an under-utilized factory to a new product typically takes a year or more, and establishing a new assembly plant requires, on average, two years from the start of construction to the beginning of production (Center for Automotive Research, 2018).
- CAR's tariff impact estimates assume that automotive parts cross the border into the United States only once. The reality is that automotive parts cross back and forth between Canada, Mexico, and the United States repeatedly – any imposed tariffs would be applied multiple times and the effect amplified throughout the supply chain.
- Increases in the costs of new automobiles and automotive parts will impact the used vehicle market, and automotive repair and maintenance services. These effects are not captured in CAR's model.
- CAR did not evaluate the welfare losses that consumers will experience as the variety of vehicle models available in the U.S. market declines in response to higher import costs.
- Likewise, impacts on U.S. production of vehicles for export markets is not evaluated; instead, as imports of complete vehicles decline, U.S. production for export markets is modeled as output that is re-directed towards the U.S. market.
- Feedback effects, such as lost economies of scale, and thus further increases in cost per unit that directly result from the imposition of trade restrictions, are also excluded from CAR's analysis.
- CAR's analysis does not incorporate any form of retaliatory actions, nor the income losses to U.S. citizens which would result, and further lower demand for automotive products.

Overview of Analytical Results

Under the four tariff scenarios, the average consumer price of a vehicle sold in the United States is estimated to go up by $980 (10 percent tariff with exemptions for Canada and Mexico) to $4,400 (25 percent tariff applied to all imports). For vehicles that are both sold and manufactured in the United States, the range of the consumer price increases due to tariffs is smaller – $455 to $2,270 additional per vehicle—as the tariff only applies to the imported automotive parts content. U.S. consumers who wish to purchase imported vehicles would see the most substantial price increases – from $1,345 to $6,875 additional per vehicle. If the United States were to impose a quota (80 percent of 2017

automobile import units and automotive parts import dollar value), consumers would see price increases ranging from $760 to $6,610 per vehicle.

CAR estimates that across all six scenarios, total U.S. employment losses range from just over 82,000 to nearly 750,000, and GDP losses range from $6.4 to $62.2 billion.

The direct impacts on new automobile dealers range from 29,000 lost jobs under a 10 percent tariff which exempts Canada and Mexico, to almost 118,000 job losses when a 25 percent tariff is applied to all imports. These impacts correspond to revenue losses which range from $16.3 billion to $66.5 billion. For the average dealership, revenues fall by $1 million under the 10 percent tariff, with Canada and Mexico exempted, to $4 million should a 25 percent tariff be enacted covering all automobile and automotive parts imports. Employment losses range from 2 jobs (2.5 percent) to 7 jobs (10.3 percent), for the average new automobile dealership.

Some dealerships will experience significantly greater harm than the average, depending on which products they carry. Note that these negative effects do not fall evenly across company or vehicle brands. Certain vehicles assembled in the United States have relatively low North American and U.S. content, while some models assembled outside the United States have relatively high U.S. content. Nearly every brand offers vehicle models with at least average levels of U.S. content, and likewise, offers models with low U.S. content levels. On average, automobiles assembled in the United States have a U.S.-made parts content of 60 percent. Consider two generalized examples: A vehicle which sells for $35,000 contains approximately $26,000 in value from materials, automotive parts, and components. At 80 percent U.S. content for these inputs, a 25 percent tariff applied to all imported automotive parts would add $1,300 to the vehicle's price. If the U.S. content level were instead 30 percent, the price increase would be more than $4,500. At the vehicle model level, consumers are very sensitive to relative prices compared to other vehicles within the same class or segment – even the relatively small price change for the 80 percent U.S. content vehicle could drive significant sales losses for a dealership.

Table 1: Vehicle Sales & Price Impacts of Automobile & Automotive Parts Trade Restrictions

Trade Restriction Scenario		Vehicle Sales Impact (units)	Average Vehicle Price Increases ($/unit)		
			All Vehicles Sold in the U.S.	All U.S.-Assembled Vehicles Sold in the U.S.	All Imported Vehicles Sold in the U.S.
25% Tariff	Applied to All Imports	-2.0 M	$4,400	$2,270	$6,875
	Canada & Mexico Exempt	-1.2 M	2,450	1,135	3,980
10% Tariff	Applied to All Imports	-866.4 K	1,760	910	2,750
	Canada & Mexico Exempt	-493.6 K	980	455	1,345
Quota	Applied to All Imports	-1.9 M	4,075	1,890	6,610
	Canada & Mexico Exempt	-932.4 K	1,900	760	5,585

Source: CAR estimates

Table 2: Employment & Gross Domestic Product Impacts of Automobile & Automotive Parts Trade Restrictions

Trade Restriction Scenario		Total U.S. Employment	U.S. GDP ($ billions)
25% Tariff	Applied to All Imports	-714.7 K	-$59.2 B
	Canada & Mexico Exempt	-197.2 K	-15.3 B
10% Tariff	Applied to All Imports	-307.5 K	-25.5 B
	Canada & Mexico Exempt	-82.3 K	-6.4 B
Quota	Applied to All Imports	-749.2 K	-62.2 B
	Canada & Mexico Exempt	-122.8 K	-9.0 B

Source: CAR estimates

Table 3: Revenue and Employment Losses of New Automobile Dealerships

Trade Restriction Scenario		Effect on Dealership Revenues		Impact on Dealership Employment	
		Total	Per Dealership	Total	Per Dealership
25% Tariff	Applied to All Imports	-$66.5 B	-$4.0 M	-117.5 K	-7
	Canada & Mexico Exempt	-39.1 B	-2.3 M	-50.5 K	-4
10% Tariff	Applied to All Imports	-28.6 B	-1.7 M	-69.0 K	-3
	Canada & Mexico Exempt	-16.3 B	-1.0 M	-28.8 K	-2
Quota	Applied to All Imports	-62.2 B	-3.7 M	-109.7 K	-7
	Canada & Mexico Exempt	-30.8 B	-1.8 M	-54.4 K	-3

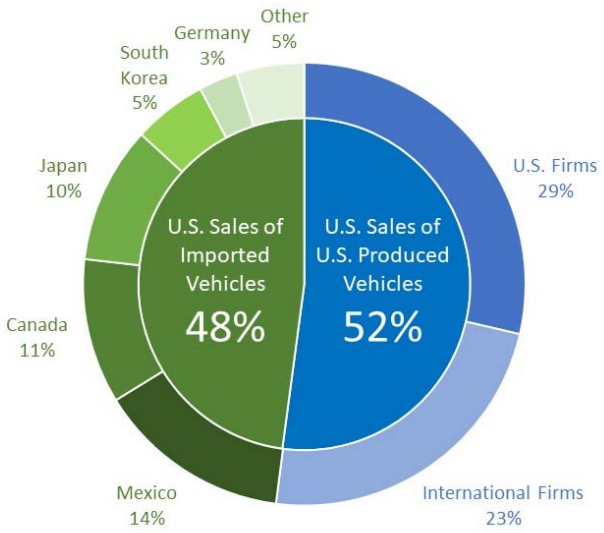
Source: CAR estimates

Trade Analysis

The U.S. market is heavily reliant on imported cars, CUVs, SUVs, trucks, and vans. The country of origin for 2017 light vehicle sales is shown in Figure 1. In 2017, 52 percent of vehicles sold in the United States were manufactured in the United States. FCA, Ford, General Motors, and Tesla's U.S. plants produced 29 percent of all vehicles sold ("domestic producers"), and nearly one in four vehicles sold were produced by international firms in manufacturing facilities located in the United States (BMW, Daimler, Honda, Hyundai, Kia, Renault-Nissan-Mitsubishi, Subaru, Toyota, and Volkswagen).[1] Of the remaining 48 percent of U.S. sales that were imported, more than half were assembled in either Canada or Mexico – with significant U.S. content (engines, transmissions, components, and automotive parts). In 2017, over half of all Canadian and Mexican imports were made by FCA, Ford, and General Motors.

[1] Geely (Volvo) will begin production in 2018; Toyota-Mazda is expected to start production in 2021.

Figure 1: Sourcing of U.S. Light Vehicle Sales in 2017



Source: CAR analysis, U.S. International Trade Administration

Modeling Overview

To evaluate the impact of proposed tariffs on automobiles and automotive parts imports, CAR researchers developed a simulation model of the U.S. light vehicle industry. A fundamental assumption of CAR's model is that the light vehicle market features a unitary demand elasticity – any change in the overall average price is proportionately offset by an opposite change in total unit sales, such that the total dollar value of the market is unaltered. CAR's simulation also assumes that the full costs of the imposed tariff or quota are fully passed through to consumer prices.

The simulation model provides direct estimates of output changes for light vehicle sales and manufacturing – which includes all passenger cars, station wagons, and light trucks up to 14,000 pounds gross vehicle weight. Trade between the United States and its NAFTA partners, Canada and Mexico, is explicitly incorporated, enabling adequate representation of the tightly-woven NAFTA regional automotive supply chain. Trade between the United States and the rest of the world is similarly included so that the effects of a NAFTA exemption can be evaluated. The direct impacts are translated into total economic impacts via application of the U.S. Bureau of Economic Analysis' Regional Input-Output Modeling System ("RIMS II").

CAR's estimates of total economic impacts of the potential trade actions affecting automobile and automotive parts trade are understated for two reasons:

1) Use of RIMS limits our national estimates to an aggregation of separate regional impacts, which cannot incorporate cross-region feedback effects.
2) In even the most extreme scenario, the increase in U.S. vehicle production cannot be greater than the current free capacity. Thus, the model is not restricted with regards to the ability of the existing manufacturing footprint to meet this increase. However, a significant share of this free capacity exists due to consumers' shift of away from passenger cars, towards sport- and cross-utility vehicles. If the changes in relative prices across imported and U.S.-assembled vehicles do not result in an *en masse* shift towards U.S. passenger cars from imported vehicles belonging to all segments, the estimated increases in U.S. vehicle production will either not occur or will be far smaller than estimated.

The Appendix contains a more detailed discussion of CAR's modeling approach.

Discussion of Scenarios

The remainder of this briefing examines the estimated impacts of each potential trade restriction scenario in more detail. For each, the composition of effects is broken down by its source, such that the effects of tariffs being applied to only automobiles or only automotive parts can be evaluated. The composition of the vehicle sales impacts is also discussed – how significant is the decline in imported vehicle sales, and how large is the shift towards sales of U.S.-assembled vehicles? The key results – the changes in vehicle prices, total sales volumes, dealership employment, total U.S. employment, and U.S. GDP – are summarized in a table following each discussion.

Scenario 1: Tariffs Applied to Automobile and Automotive Parts Imports from All Countries at a Rate of 25 Percent

The first scenario involves a 25 percent tariff imposed upon imports of finished automobiles and automotive parts, regardless of origin. Under this scenario, consumers would see the price of the typical vehicle sold in the United States rise by $4,400. Prices of U.S.-assembled vehicles rise due to an increase in the cost of imported vehicle parts, adding $2,270 to the price. For the typical imported vehicle, these tariffs raise consumer prices by $6,875 per vehicle. As the prices of U.S.-assembled vehicles increase far less than those of imported vehicles, U.S. vehicle production increases substantially in this case, adding nearly 2 million additional units of U.S. production as imported vehicle sales fall by almost 4 million units. On net, the total number of vehicles sold decreases by just over 2 million.

Such a substantial increase in U.S. production may not be realistic, however, as discussed above. Roughly half of the current available capacity is in factories dedicated to passenger car manufacturing – which the American vehicle buyer has dramatically shifted away from over the past several years. Nearly all of the factories which produce the trucks, SUVs, and CUVs which dominate the U.S. market are already running above 100 percent capacity utilization (other than those that are down for retooling). If buyers substitute away from imported vehicles to U.S. passenger cars, production could increase within the existing manufacturing footprint. If instead of buying imported vehicles, consumers shift to trucks, SUVs, and CUVs that are already in high demand, the estimated economic losses would grow. Rather than a loss of 715,000 jobs and U.S. GDP loss of $59.2 billion, without an offset from increased U.S. vehicle manufacturing, employment would decline by 1.1 million, and GDP would fall by $99 billion because there is no spare capacity to meet the demand for the types of vehicles consumers prefer and automakers would need to take plants down for a year or more to convert to in-demand vehicle models.

With a 25 percent tariff enacted on all imports of automobiles and automotive parts, the loss of 2 million vehicle sales leads to a decline in dealership revenues which exceeds $66.5 billion (6.6 percent), and dealership employment falls by nearly 117,500 (10.3 percent). The average dealership experiences a loss of $4 million in annual revenues, and seven jobs are lost. While this appears small, most dealerships are small businesses – 29 percent have fewer than 20 employees, and 59 percent have fewer than 50 employees (U.S. Census Bureau, 2018). Further, these averages mask considerable variation across dealership – many establishments will suffer far more significant losses.

Table 4: Estimated Economic Impact of a 25 Percent Automobile & Parts Tariff Applied to All U.S. Trading Partners

25% Tariff Applied to All Imports		Trade Restriction Applied to…		
		Vehicles Only	Parts Only	Vehicles & Parts
Vehicle Price Increase ($/unit)	All Vehicles Sold in the U.S.	$3,180	$1,220	$4,400
	U.S.-Assembled	0	2,270	2,270
	Imported	6,875	0	6,875
Vehicle Sales Impact		-1.5 M	-609.8 K	-2.0 M
… per dealership		-30	-90	-120
Dealership Revenue Impact		-$46.4 B	-$20 .2B	-$66.5 B
… per dealership		-2.8 M	-1.2 M	-4.0 M
Dealership Employment Impact		-81.9 K	-35.6 K	-117.5 K
… per dealership		-5	-2	-7
Total U.S. Employment Impact		-155.9 K	-558.8 K	-714.7 K
U.S. GDP Impact ($ billions)		-$9.5 B	-$49.8 B	-$59.2 B

Source: CAR estimates

Scenario 2: Tariffs Applied to Automobile and Automotive Parts at a Rate of 25 Percent with Exemptions for Canada and Mexico

The second scenario modifies the first by exempting the United States' NAFTA partners. Such exemptions would grant recognition to the importance of the long-established cross-border supply chains integral to the North American vehicle manufacturing cluster.

If Canada and Mexico were exempted, the adverse impacts of the tariffs would be dramatically reduced. Overall, consumers would see the price of a typical vehicle sold in the United States increase by $2,450 – with U.S.-assembled vehicles prices rising only $1,135 and imported vehicle prices increasing by $3,980. With the price of U.S.-assembled vehicles increasing less than those assembled abroad, U.S. vehicles would gain market share and production increases by approximately 1.3 million units, while sales of foreign vehicles – except for the exempted Canadian and Mexican vehicles – would fall by 3.6 million units.

With vehicles from Canada and Mexico exempt from tariffs in this scenario, and with the production cost of U.S.-assembled vehicles increasing due to tariffs on parts imported from outside of North America, sales of vehicles from these two countries would increase by 1.1 million units. Overall, total sales of new vehicles in the United States would decline by 1.2 million units. Total U.S. employment falls by nearly 200,000, and GDP losses amount to roughly $15.3 billion. Without the offset from increasing U.S. automobile manufacturing, job losses instead surpass 484,000 and GDP falls by $41.6 billion. Even without an increase to domestic vehicle production, U.S. automotive parts production expands, providing some cushion against the effects of the tariffs on non-NAFTA vehicles and parts, by supplying components to the increase in Canadian and Mexican vehicle assembly.

The impacts on dealerships fall dramatically, just as the impacts on the overall economy when Canada and Mexico are exempted. A 25 percent tariff on imports of automobiles and automotive parts, excluding those from Canada and Mexico, leads to a vehicle sales decline of 1.2 million. This volume drop causes dealerships revenues to fall by $39.1 billion, and employment at dealerships to decline by 69,000. The average dealership loses $2.3 million (3.9 percent) in annual revenue and loses four jobs (6.1 percent).

Table 5: Estimated Economic Impact of a 25 Percent Automobile & Automotive Parts Tariff Applied to All U.S. Trading Partners Except Canada & Mexico

25% Tariff Imports from Canada and Mexico Exempted		Trade Restriction Applied to…		
		Vehicles Only	Parts Only	Vehicles and Parts
Vehicle Price Increase ($/unit)	All Vehicles Sold in the U.S.	$1,840	$610	$2,450
	U.S.-Assembled	0	1,135	1,135
	Imported	3,980	0	3,980
Vehicle Sales Impact		-904.2 K	-310.4 K	-1.2 M
… per dealership		-52	-18	-70
Dealership Revenue Impact		-$28.8 B	-$10.3 B	-$39.1 B
… per dealership		-1.7 M	-611 K	-2.3 M
Dealership Employment Impact		-50.9 K	-18.1 K	-69.0 K
… per dealership		-3	-1	-4
Total U.S. Employment Impact		87.2 K	-284.4 K	-197.2 K
U.S. GDP Impact ($ billions)		$10.1 B	-$25.3 B	-$15.3 B

Source: CAR estimates

Scenario 3: Tariffs Applied to Automobile and Automotive Parts Imports from All Countries at a Rate of 10 Percent

The third scenario applies a tariff rate of 10 percent to imports from all countries, matching the rate imposed on vehicle imports by the European Union, rather than the 25 percent rate used in the previous two scenarios. This lower rate provides less support for domestic automotive manufacturing but causes significantly less damage to the remainder of the economy than the global 25 percent tariff. Likewise, the estimated increase in sales of U.S.-assembled vehicles is lower than currently open capacity, increasing the likelihood that domestic manufacturing could expand to offset some of the losses caused by this policy.

With a global tariff of 10 percent applied to imported automobiles and automotive parts, the price of the average vehicle sold in the United States increases by $1,760; U.S.-assembled vehicles increase by $910, and imported vehicles increase by $2,750. With relative prices again shifted in favor of domestically built vehicles, U.S. sales are estimated to increase by 800,000 units, while imported vehicle sales would fall by 1.7 million. Overall, vehicle sales fall by 870,000 units. Total employment in the United States declines by nearly 310,000, despite the offsets from increases in domestic vehicle manufacturing, and GDP falls by nearly $25.5 billion. If U.S. vehicle assembly does not increase to offset the economic harm caused by the tariff, employment losses instead total 493,000 and GDP declines by $42.5 billion; with Canadian and Mexican vehicle production harmed by the global tariff, U.S. automotive parts manufacturing cannot provide a cushion on its own, and instead contributes to these losses.

A 10 percent tariff applied to all imports of automobiles and automotive parts leads to a decline in dealership revenues of nearly $29 billion, and employment at dealerships declining by almost 51,000. On average, each new vehicle dealership experiences a revenue loss of $1.7 million (2.9 percent) and loses three jobs (4.5 percent).

Table 6: Estimated Economic Impact of a 10 Percent Automobile & Automotive Parts Tariff Applied to All U.S. Trading Partners

10% Tariff Applied to All Imports		Trade Restriction Applied to…		
		Vehicles Only	Parts Only	Vehicles and Parts
Vehicle Price Increase ($/unit)	All Vehicles Sold in the U.S.	$1,272	$488	$1,760
	U.S.-Assembled	0	910	910
	Imported	2,750	0	2,750
Vehicle Sales Impact		-635.2 K	-249.3 K	-866.4 K
… per dealership		-37	-15	-52
Dealership Revenue Impact		-$20.4 B	-$8.2 B	-$28.6 B
… per dealership		-1.2 M	-490.3 K	-1.7 M
Dealership Employment Impact		-36.0 K	-14.5 K	-50.5 K
… per dealership		-2	-1	-3
Total U.S. Employment Impact		79.2 K	-228.4 K	-307.5 K
U.S. GDP Impact ($ billions)		-$5.1 B	-$20.3 B	-$25.5 B

Source: CAR estimates

Scenario 4: Tariffs Applied to Automobile and Automotive Parts at a Rate of 10 Percent with Exemptions for Canada and Mexico

The fourth and final tariff scenario applies a 10 percent tariff rate to imports but excludes products from Canada and Mexico. As before, this exemption dramatically reduces the economic harm caused by the trade restriction.

With imports from Canada and Mexico exempted, the increase in the average vehicle price is $980, with U.S.-assembled vehicles increasing by $455 and imported vehicles by $1,345. Sales of U.S.-produced vehicles increase by nearly 525,000 units, while sales of Canadian and Mexican vehicles increase by 467,000 units, and vehicles imported from outside North America would decline by almost 1.5 million. In sum, vehicle sales fall by 493,000 units. The total effect on U.S. employment levels is a decline of 82,000 – which is far more modest than in all other scenarios – and GDP falls by $6.4 billion. However, if U.S. vehicle manufacturing does not expand, employment losses surpass 200,000, and GDP losses reach $17.4 billion.

A 10 percent tariff on imported automobiles and automotive parts which exempts Canada and Mexico will reduce dealership revenues by $16.3 billion. The associated employment loss at dealerships is nearly 29 thousand. For the average dealership, the revenue loss is $971 thousand, and employment falls by 2.

Table 7: Estimated Economic Impact of a 10 Percent Automobile & Automotive Parts Tariff Applied to All U.S. Trading Partners Except Canada & Mexico

10% Tariff Imports from Canada and Mexico Exempted		Trade Restriction Applied to…		
		Vehicles Only	Parts Only	Vehicles and Parts
Vehicle Price Increase ($/unit)	All Vehicles Sold in the U.S.	$736	$244	$980
	U.S.-Assembled	0	454	454
	Imported	1,345	0	1,345
Vehicle Sales Impact		-373.5 K	-125.5 K	-493.6 K
… per dealership		-22	-7	-29
Dealership Revenue Impact		-$12.2 B	-$9.2 B	-$16.3 B
… per dealership		-725.1 K	-247.0 K	-971.0 K
Dealership Employment Impact		-21.5 K	-7.3 K	-28.8 K
… per dealership		-1	-1	-2
Total U.S. Employment Impact		32.7K	-115.0 K	-82.3 K
U.S. GDP Impact ($ billions)		$3.9 B	-$10.2 B	-$6.4 B

Source: CAR estimates

Scenarios 5 and 6: A Quota is Enacted on All Automobile and Automotive Parts Imports or All Imports Except Those from Canada and Mexico

The final two scenarios harken back to the voluntary export restraint policies of the 1980s. Rather than a tax imposed upon imported products, a quota establishes a hard limit where no more than a fixed import volume may enter the country. For purposes of this analysis, CAR assumed the vehicle import quota would be set at 80 percent of the 2017 import volume. Without a unit number for parts imports, the quota for parts is set to 80 percent of the 2017 dollar value imported.

The consumer price increases under quotas mainly fall between the price increases under the 25 percent and 10 percent tariff scenarios. Consumers would see the average price of vehicles sold in the United States rise by $4,075 if the quota were applied to all trading partners. The consumer price increase for U.S.-built vehicles would be $1,890 per vehicle and $6,610 per vehicle for imports. If quotas were instituted with exemptions for Canada and Mexico, the average price of vehicles sold in the United States would increase $1,900. The consumer price increase for U.S.-built vehicles would be $760 per vehicle and $5,585 per vehicle for imports. Since fewer than half of all imports come from non-NAFTA countries, the import price increase is smaller under quotas where Canada and Mexico are exempted from the policy.

Due to the magnitude of trade between the United States and Canada and Mexico, the imposition of a U.S. quota is more harmful to U.S. trade with Canada and Mexico than it is to the rest of the world. With the reduction in units valued at the overall average U.S. vehicle sale price, the enactment of an 80 percent quota on vehicles imported from Canada and Mexico is equivalent to a 29 percent tariff placed upon these vehicles. In contrast, the 80 percent quota is equivalent to a 20.3 percent tariff on vehicles imported from outside of North America.

Across all scenarios evaluated, the quota system leads to the most significant harm to the U.S. economy. Total vehicle sales decline by 1.8 million, with job losses of nearly 750,000 and GDP falling $62.2 billion. These impacts are net of a large offset from expanded U.S. automobile manufacturing, where U.S.-assembly is estimated to increase by 2 million units as imported vehicle sales fall by 3.9 million. Spare capacity for vehicle manufacturing does presently exist, with much of it tied up in sedan products which

American buyers have largely abandoned. Automakers cannot readily convert this capacity to produce other vehicles in high demand, and without this offset, employment losses instead exceed 1.2 million, and GDP falls $103.9 billion.

The severity of a blanket quota is primarily due to its impact on Canadian and Mexican vehicles. In 2017, the United States imported more than 4 million vehicles from our NAFTA partners – more than the 3.9 million imported from all other countries combined. If imports of vehicles from Canada and Mexico are restricted to 80 percent of the 2017 import level, the effect on the U.S. parts manufacturing sector would be extreme due to the dependency on U.S. parts exports to those countries, with an estimated loss of $27.5 billion of exports to Canada and Mexico and employment declining by almost 100,000 within the automobile parts industry alone.

If Canada and Mexico are instead exempted from the quota system, vehicle sales decline by 933,000 units. Sales of vehicles from Canada and Mexico expand by 882,000 units, while U.S. vehicle sales increase by 1.1 million, with imports from outside North America falling almost 2.1 million. Here, the final impact on U.S. employment is a job loss figure of 123,000, and GDP falls by $9 billion. If offset from increased U.S. vehicle manufacturing does not materialize, job losses would instead be 382,000 and GDP would decline by $32.3 billion.

Under a quota which does not exempt Canada and Mexico, new vehicle dealerships will lose $62.2 billion in revenue, and employment within the industry will fall by nearly 110,000. The average dealership loses revenues of $3.7 million (6.2 percent), and employment declines by seven jobs (9.7 percent).

If imports of automobiles and automotive parts from Canada and Mexico are exempted from the quota, revenue losses instead total $30.8 billion, and employment losses are above 54,000. In this case, the typical dealership experiences revenue losses of $1.8 million, and its employment level shrinks by 3.

Table 8: Estimated Economic Impact of an 80 Quota Applied to Automobile & Automotive Parts Tariff Applied to All U.S. Trading Partners and All U.S. Trading Partners Except Canada & Mexico

Quota Placed on Imported Vehicles and Parts		Quota Applied to…	
		All Imports	Canada and Mexico Exempt
Vehicle Price Increase ($/unit)	All Vehicles Sold in the U.S.	$4,075	$1,900
	U.S.-Assembled	1,890	760
	Imported	6,610	5,585
Vehicle Sales Impact		-1.9 M	-932.4 K
… per dealership		-112	-55
Dealership Revenue Impact		-$62.2 B	-$30.8 B
… per dealership		-3.7 M	-1.8 M
Dealership Employment Impact		-109.7 K	-54.4 K
… per dealership		-7	-3
Total U.S. Employment Impact		-749.2 K	-122.8 K
U.S. GDP Impact ($ billions)		-$62.2 B	-$9.0 B

Source: CAR estimates

Discussion of Tariff & Quota Impacts on Used Vehicles Prices, Repair & Maintenance

Tariffs on new automobiles and automotive parts will impact the market – increasing demand, and therefore prices, for used vehicles as well as increasing the price consumers pay to repair and maintain their existing vehicle due to higher parts prices. Higher costs for vehicle purchases result in higher valuations of existing vehicles and longer service lives, yet higher operating costs lower the value of existing vehicles and shorten their service lives. The dearth of literature presently available makes it impossible to determine which of these effects is likely to dominate. As an attempt at modeling these effects would rely upon assumed parameters, with little guidance as to their appropriate values, we exclude the impacts on used vehicles and vehicle repair and maintenance from our analysis.

Used vehicle prices typically follow a well-behaved and consistent depreciation pattern, with a given vehicle's value declining approximately 20 percent per year. Deviations from this generalized depreciation curve result from macro-level shocks in the economy, such as large changes in fuel prices, or shocks to used vehicle supplies, such as widespread destruction of vehicles due to a natural disaster (Center for Automotive Research) (Yerger, 2010).

The relative value of new and used vehicles is influenced by the relationship between used and new vehicle purchases. The supply of used vehicles is highly inelastic, as additional supply primarily results from either current vehicle owners bringing in-use vehicles onto the market to reduce their vehicle holdings or to replace them with newly-manufactured vehicles, thereby expanding the in-use fleet. Absent a dramatic change to transportation needs or planned owned-fleet downsizing, sold vehicles must be replaced – and often with high transaction costs experienced in the used vehicle sale process.

A secondary effect from increasing vehicle prices is an extension of vehicle service lives. Multiple studies indicate that the typical response to increasing vehicle prices – both for new vehicles, and for used vehicles – is to extend the length of ownership for currently-held vehicles, resulting in fewer sales of both new and used vehicles (Copeland, 2013) (Alberini, Bareit, & Martinez-Cruz, 2016) (Bento, Roth, & Zuo, 2016). However, this effect is offset by the increase in vehicle repair and maintenance costs which a tariff on imported vehicle parts will cause. Increases in vehicle operating costs have been conclusively tied to shorter periods of ownership and lower vehicle valuations (Hamilton & Macauley, 1999).

A 25 percent tariff applied to automotive parts will increase the cost of aftermarket parts by 8.3 percent, if applied to all countries, or 3.8 percent if Canada and Mexico are exempted. In the case of a 10 percent tariff, aftermarket parts costs increase by 2.7 percent, or, with Canada and Mexico exempted, 1.3 percent. It is difficult to determine the impact these costs would have on the providers of automotive repair and maintenance services. Parts are 100 percent of the cost for do-it-yourself (DIY) repair and maintenance, and, on average, 33 percent for commercial vehicle repair and maintenance work. The research suggests that, as the relative cost of DIY would increase against commercial providers, more consumers would opt for commercial vehicle repair and maintenance services. However, budget tightening, whether due to price increases or income decline, historically results in a shift towards DIY work. With currently available information, no reliable conclusion can be drawn (Automotive Aftermarket Suppliers Association, 2012) (U.S. Bureau of Economic Analysis, 2018) (U.S. Census Bureau, 2018).

Appendix: Methods

To evaluate the impact of potential economic impacts of automobile and automotive parts trade changes, CAR developed a simulation model of the U.S. light vehicle industry. By design, the model assumes that the U.S. light vehicle market is competitive. Changing prices cannot expand the size of the market, but only alters market shares; a change in prices results in an opposite, proportionate volume change, such that the total dollar value of the market remains unchanged.

CAR's model provides direct estimates of the output changes for light vehicle sales and manufacturing. The model explicitly incorporates both trade between the United States and its NAFTA partners, so that the tightly-woven regional automotive supply chain is adequately represented, and the rest of the world, so that impacts may be appropriately differentiated by whether Canada and Mexico are exempted. The direct impacts calculated by the simulation model are translated into total economic impacts via application of the U.S. Bureau of Economic Analysis' Regional Input-Output Modeling System ("RIMS II"). Though not a limitation of the simulation model, but rather an assumption, the results demonstrate the effects of full pass-through of costs to consumer prices.

National economic multipliers are not available through RIMS. Instead, to calculate total national impacts of the various trade restrictions, CAR researchers regionalized the national impacts provided by the simulation model such that these could be applied to the RIMS multipliers. CAR approximated the national impact by summing the RIMS regional impacts. To regionalize the national estimates, CAR researchers weighted the national direct impact by the regional share of gross output, or total revenue, for each industry evaluated. For automobile dealerships, the direct impact was regionalized via each region's share of national new vehicle dealership revenue, as listed in the 2017 NADA Data report (National Automobile Dealers Association, 2017). To regionalize the estimated national, direct impacts on the light vehicle and automotive parts manufacturing industries, CAR researchers weighted the national impacts by each region's share of total gross output, as indicated by the Annual Survey of Manufactures (U.S. Census Bureau, 2018; U.S. Census Bureau, 2018).

To avoid overstating the impacts of tariffs on imports of automotive parts on U.S.-assembled vehicles, CAR researched the division between original equipment and aftermarket parts and found that, in a typical year, aftermarket parts constitute 25 percent of the total value of automotive parts. When estimating the impact on the costs of U.S.-assembled vehicles, CAR considered trade impacts upon 75 percent of imported vehicle parts, by value (Automotive Aftermarket Suppliers Association, 2012) (International Trade Administration, 2011) (International Trade Administration, 2009) (International Trade Administration, 2007). Prior research does not provide illumination on the impacts of parts price increases upon the automobile maintenance and repair industry or shifts towards do-it-yourself work. The tariff impact on vehicle repair and maintenance prices were not incorporated into CAR's estimates of overall economic changes due to potential new trade policy options.

Evaluating the impact of restrictions on automotive parts imports on U.S.-assembled vehicles requires knowledge of the amount of imported content in U.S. vehicles. There are two methods to arrive at this figure which were applied in the present research.

- The first is the "Trade Data Approach," wherein the value of imported original equipment parts are applied equally to all vehicles assembled in the United States. The value of imports is adjusted to remove aftermarket parts, and this original equipment parts value is divided by the total number of vehicles produced in the United States to establish an average value of foreign content per vehicle. For the global import restrictions, CAR used parts imports from all countries; for the scenarios where Canada and Mexico are exempt, CAR used total imports less the imports from Canada and Mexico. The resulting foreign content per vehicle figures are

combined with the appropriate trade restriction to arrive at a per-vehicle cost. This analysis, coupled with the assumption that the full value of a cost change is passed along to consumer prices, provides the impact on prices and sales volumes due to own-price changes.

- The second method is the "Foreign/Domestic Content Approach," which was used to evaluate the impacts of restrictions on imported automotive parts centers around estimates of the U.S.- and NAFTA-content of the typical U.S.-assembled vehicle. CAR previously compiled these estimates and employed in this present research to ensure the robustness of the foreign content calculations. These estimates are formed from a multitude of data points and sources: the American Automobile Labeling Act[2] U.S. and Canadian parts content values, which reflect heavily rounded estimates on parts content, excluding engines and transmissions, scaled to reflect share of total vehicle value; engine and parts values, based upon powertrain and vehicle sourcing data available through LMC Automotive and IHS|Market; and data from the U.S. Census Bureau, Statistics Canada, and Mexico's *Instituto Nacional de Estadística y Geografía*.

While the two methods differ dramatically, with no common sources or required assumptions, both arrive at the same levels of foreign (non-U.S. or non-NAFTA) content in the average U.S.-assembled vehicle.

As the RIMS multipliers are single-region, these estimates do not account for feedback across regional boundaries, let alone national borders. Instead, CAR explicitly modeled the relationship between U.S. vehicle parts manufacturing and Canadian and Mexican vehicle manufacturing. This relationship was evaluated similarly to the "Trade Data Approach" discussed in the previous paragraph to estimate foreign content in U.S.-assembled vehicles.

Finally, CAR's simulation model needed to properly incorporate market share shifts across the origins of vehicles and vehicle parts. As the price of imported goods increase, the amount sourced either domestically or from an unaffected foreign market increases. Estimated "Armington" trade elasticities represent this effect. However, estimates of trade elasticities vary wildly. For example, a review of the literature on U.S. Armington elasticities finds values for automobiles which range from near 1 – indicating a 1 percent cost increase for imported vehicles results in 1 percent decrease in vehicle imports, to values greater than 9. Bilateral trade elasticity values are even less consistent than Armington elasticities, even when for the same country pair. The average of values found, for U.S. imports of vehicles, is just below 5 (Donelly, Johnson, Tsigas, & Ingersoll, 2004) (Zhang & Verikios, 2006) (Gallaway, McDaniel, & Rivera, 2003). A separate review of the pattern of vehicle imports by vehicle segment, combined with estimates of cross-price elasticities finds, on a sales-weighted basis, imported vehicles belong to a segment with an elasticity value of 6, based upon 2017 sales and import segmentation. With this finding and considering the Armington elasticity literature, CAR modeled the sales response of imports and domestic (U.S.-assembled) vehicles to a change in relative prices such that a 1 percent increase in imported vehicle prices, relative to domestic vehicles, results in a market share shift of 5 percent away from imported vehicles and towards domestic vehicles. Increases to imported vehicle prices result in a significant gain to the market share of U.S.-assembled vehicles and the scope of U.S.-vehicle manufacturing.

CAR's simulation model does not differentiate sales and production volume effects by vehicle segment. Thus, the results are biased towards positive outcomes for the U.S. economy. While roughly 3 million units of open capacity exists in U.S. automobile manufacturing, this capacity is unused due to retooling or movements in consumer preferences. Many of the factories operating below 100 percent capacity utilization are currently tooled for the production of passenger cars, the sales of which have collapsed in

[2] NHTSA regulation Part 583 (49 CFR 583), *Automobile Parts Content Labeling*

recent years as consumer preferences have shifted to CUVs. CUVs now comprise 40 percent of U.S. light vehicle sales, and these vehicles have similar fuel economy as passenger cars, but far more interior space for passengers and cargo. The process of converting an under-utilized factory from passenger car to CUV production is costly and time-consuming, with each retooled factory entailing costs near, if not exceeding, $1 billion, and requiring, on average, one year to complete. Where CAR's simulation model suggests that U.S. production of vehicles will increase dramatically, that domestic manufacturing expansion is unlikely to occur quickly – and potentially may not occur at all.

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