

NAFTA: Data at Odds with Proposed Changes to Auto Rules of Origin

- The US proposal to tighten NAFTA's rules of origin on vehicles is an ill-conceived solution in search of a problem. It would be an unnecessary restriction on the North American auto sector that would render it less competitive against its global peers.
- Canada and Mexico are rightly seeking alternatives to clear this 'redline' in the negotiations. This paper aims to clarify the current content shares in Canadian, Mexican, and US automobiles with a view to facilitating progress toward a compromise on 'renegotiating and modernizing' NAFTA's vehicle rules of origin.
- According to US public data from the National Highway Traffic Safety Administration (NHTSA), the NAFTA content in vehicles assembled in Canada and Mexico generally increased from 2011 to 2017, contrary to the US Commerce Secretary's speculation that these shares declined and that there aren't any data to verify this trend.
- A range of studies imply that the US and North American content shares in Canadian- and Mexican-produced vehicles are consistently higher than the percentages estimated in a 2017 paper by the US Department of Commerce. This paper has been used to justify the White House's demands for tighter rules of origin on autos, but the OECD data on which its findings are based appear systematically skewed.
- Ironically, the NHTSA data and the studies that we review also imply that the US and NAFTA content shares in US-assembled autos have been similar to those in Canadian- and Mexican-assembled vehicles, but they have decreased over the same periods that these shares have trended upward in both Canada and Mexico.

DATA DON'T SUPPORT US DEMAND FOR TIGHTER RULES ON AUTOS

The United States' (US) demands for tighter rules of origin on autos under the North American Free Trade Agreement (NAFTA) are set to remain a flash point at the sixth round of talks to 'renegotiate and modernize' NAFTA scheduled for 23–28 January, 2018 in Montréal. This paper examines the data that underpin the US request and finds them wanting: there is little evidence to support the US view that NAFTA content in Canadian- and Mexican-assembled automobiles is declining and that both countries are providing a so-called 'back door' for Asian content to enter North American value chains. A shared understanding of what the data actually say will be critical to reaching a compromise on this 'redline' for Canada and Mexico.

Contrary to some US assertions, data from the US Department of Transportation's (USDOT) and its National Highway Transportation Safety Administration (NHTSA) imply that US and NAFTA content shares have generally increased since 2011 in vehicles assembled in Canada and Mexico. We review NHTSA data on vehicle models built in both 2011 and 2017 in Canada and Mexico and we find that local content has broadly held steady or increased over this

CONTACTS

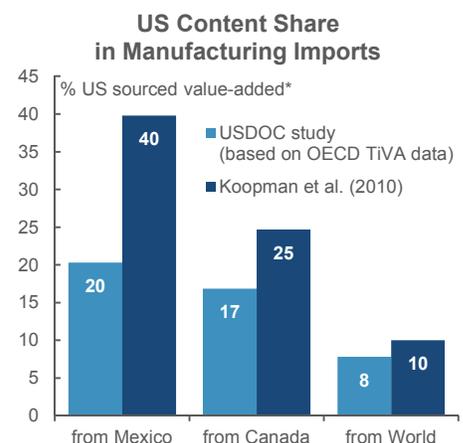
Brett House, VP & Deputy Chief Economist
 416.863.7463
 Scotiabank Economics
brett.house@scotiabank.com

Carlos Gomes
 416.866.4735
 Scotiabank Economics
carlos.gomes@scotiabank.com

Juan Manuel Herrera
 416.866.6781
 Scotiabank Economics
juanmanuel.herrera@scotiabank.com

Raffi Ghazarian
 416.866.4211
 Scotiabank Economics
raffi.ghazarian@scotiabank.com

Chart 1



Sources: Scotiabank Economics, USDOC using OECD TiVA data, Koopman *et al.* (2010).
 *2004 data from both sources.

period in most vehicle models. Ironically, the NHTSA data imply that local content shares in US-assembled vehicles have, on average, fallen over the same periods that these shares have trended upward in both Canada and Mexico.

Moreover, we review a set of papers that find higher local content shares in Canadian- and Mexican-assembled manufactured goods and autos than in estimates presented in a recent cornerstone study by the US Department of Commerce (USDOC 2017) that has been cited by Commerce Secretary Ross. Chart 1 summarizes some disparities in estimates of US value-added shares between the USDOC's report and Koopman *et al.* (2010), a prominent, in-depth analysis of global value chains detailed later in this paper. We identify similar gaps between the USDOC's findings and other studies on local content in North American manufacturing.

The available data don't support the US demand for tighter NAFTA rules of origin. The existing evidence implies that the local content shares in Canadian- and Mexican-assembled autos are: (1) higher than the USDOC's estimates; (2) on par with local content shares in US-assembled vehicles; and (3) broadly increasing when, on average, these local content shares are at the same time falling in US-assembled vehicles. Rather than helping the US auto industry, tighter NAFTA rules of origin on autos would likely make the sector more inflexible and less competitive. The Canadian and Mexican negotiating teams are right to seek alternatives to this US 'poison pill' to get past this negotiation 'redline' for their countries. The rest of this paper takes a critical look at the numbers.

Box 1. US AUTO SECTOR STRONGER THANKS TO NAFTA

GLOBALLY COMPETITIVE WITHOUT MORE ONEROUS CONTENT RULES

Vehicle and parts exports from NAFTA to the rest of the world have advanced by 3.5% a year over the past decade, more than half a percentage point quicker than the average increase in global auto industry exports. North America now accounts for roughly 22% of the industry's global exports, up from less than 19% a decade ago. While Mexico has led the export gains, the United States' motor vehicle industry remains strong. During the past decade, auto industry exports from the US have increased 3.1% annually and account for 9.0% of the global total, slightly higher than their share a decade ago (chart 2). The US gains have been concentrated in assembled vehicles, rather than parts, and have outpaced growth in global vehicle exports by a percentage point a year.

US auto industry exports to its NAFTA partners are advancing at more than double the pace of other manufacturing exports. US exports of vehicles and parts to its NAFTA partners have risen by nearly 5.7% a year over the past decade, while exports of other manufactured goods have increased by only 2.4% annually over the same period.

Similarly, US auto industry output is also outperforming other industrial sectors in the United States. Output gains for the auto industry have accelerated to nearly 2.5% annually since the introduction of NAFTA, almost a full percentage point faster than overall US manufacturing. The trade agreement has helped the auto sector to maintain its share of overall economic activity, while other manufacturing sectors have slumped (see chart 3).

EMPLOYMENT GROWTH OUT-PACES REST OF ECONOMY

The integration of the North American auto-supply chain has maintained employment in the industry. In this, the automakers have diverged from the large automation-driven job losses that other manufacturing sectors have experienced. Employment in the industry has increased by an average of nearly 6% y/y since the 2008 crisis, more than five times the growth in overall manufacturing employment. While the pace of job growth has been supported in recent years by the industry's decade-old restructuring, the sector has consistently outperformed other manufacturing segments since NAFTA's 1994 introduction: the US auto industry now represents a record 8% of overall US manufacturing employment, up from only 6.5% prior to NAFTA.

Chart 2

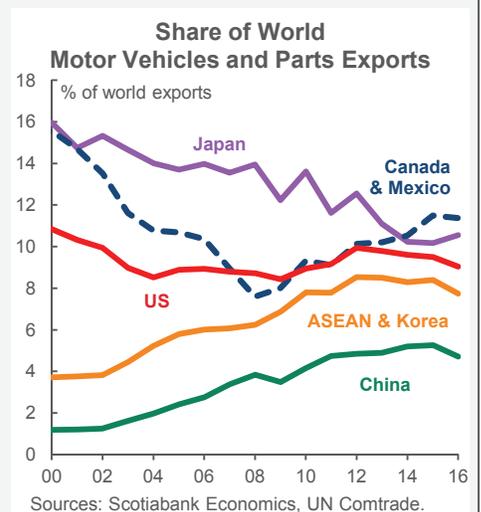
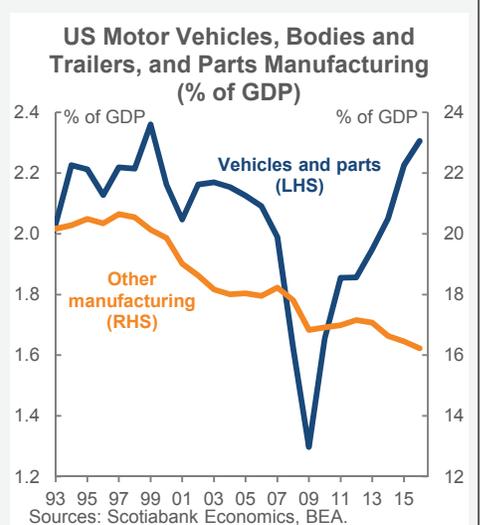


Chart 3



THE SOURCE OF THE 'UNWORKABLE' DEMAND FROM THE US

During the fourth round of NAFTA talks during 11–17 October in Washington, DC, the United States negotiating team proposed a tightening of NAFTA's rules of origin on automobiles to increase the minimum share of US and North American value-added required in vehicles in order for them to move duty-free across the borders between the US, Canada, and Mexico. Under NAFTA's existing rules of origin on autos, 62.5% of the total value of a finished automobile must have originated in North America in order to qualify for NAFTA's trade preferences—higher than the 60% North American share mandated for most other goods. The US now wants to raise the minimum North American share for duty-free movement under NAFTA to 85% on vehicles, with a new additional requirement that 50% of their value must have been generated in the US (i.e., an '85/50' rule of origin'). The US negotiating team is expected to continue pursuing these tighter NAFTA rules during the remaining rounds of negotiations—demands Canada's lead negotiator has [called](#) "extreme" and "unworkable" and which prompted [talk](#) of a counterproposal from Mexico's Economy Minister.

The US demand was prompted by a [paper](#) by USDOC (2017) researchers based on data from the Organisation for Economic Cooperation and Development's (OECD) [Trade in Value Added](#) (TiVA) database that implies that the share of North American value in autos assembled in Canada and Mexico gradually declined between 1995 and 2011. The USDOC inferred from the TiVA data that some NAFTA-sourced value in Canadian and Mexican autos was replaced by Asian, principally Chinese, components introduced to the North American vehicle production chain through imports into the US's two NAFTA partners. US Commerce Secretary Wilbur Ross further argued in a subsequent [Washington Post op-ed](#) that "The data is available only until 2011, but there is no reason to think that the situation has improved since then."

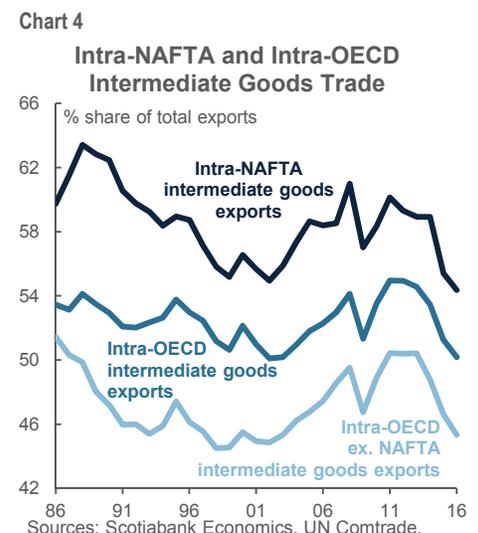
This paper challenges the US claims on the NAFTA content of Canada and Mexico autos on two major grounds:

- **First, the TiVA data are skewed.** While there's little doubt that Asian imports to all three NAFTA countries have grown over the last two decades, the TiVA data cited by the USDOC researchers likely overstate the extent to which Asian-made parts have displaced North American value in vehicles assembled in Canada and Mexico and underestimate US content shares in these vehicles; and
- **Second, NHTSA data indicate that NAFTA-sourced content is increasing, not falling.** Automaker data compiled by the NHTSA imply that Secretary Ross's assertion is wrong: the share of NAFTA-sourced content in vehicles assembled in Canada and Mexico [increased](#) from 2011 to 2017 even as the North American share of content in vehicles assembled in the US [decreased](#).

In short, the US proposal to tighten requirements on the share of US and North American content for vehicles to qualify for NAFTA tariff preferences is a solution in search of a problem. NAFTA has helped the US auto sector to maintain a much stronger position than the rest of US manufacturing (see box 1). The US proposal would reduce the cost-effectiveness of integrated production chains in North America and impair the global competitiveness of the industry as a whole. The Canadian and Mexican negotiating teams should continue to seek adjustments to the US proposal to amend NAFTA's rules of origin on autos.

NAFTA HASN'T DENTED US SHARE IN MANUFACTURED IMPORTS FROM CANADA & MEXICO

The deep integration of production chains across North America ensures that intermediate goods account for a higher proportion of trade within NAFTA than is typically the case between industrialized economies (chart 4). In the auto sector, some vehicle components are estimated to cross NAFTA borders six to eight times on the way to final assembly in a finished car (CME 2011, Wilson 2011). Although Secretary Ross dismisses this as "loose talk", it's clear that a substantial share of US imports of Canadian and Mexican finished automobiles is US value-added returning to its country of origin, which further blunts US handwringing about US trade deficits in vehicles and parts with its NAFTA partners. This paper's Appendix provides a detailed response to Mr Ross' claims that autos have led a so-called "explosion" in US trade deficits.



The USDOC argues that the OECD TiVA data imply that the US content shares in manufactured goods imports from Canada and Mexico have steadily declined since NAFTA's 1994 inception. The USDOC contends that the TiVA data exhibit two major trends with respect to national content shares in manufactured goods and vehicles, respectively:

- **Manufactured goods.** The share of US-sourced value-added in manufactured goods imports from Canada appeared to fall from a high of about 22% in 1998 to about 15% in 2011; similarly, the US-sourced-share of value-added in manufactured goods imported from Mexico appeared to come down from a peak of 30% in 1996 to around 16% by 2011 in the OECD numbers; and
- **Vehicles.** The share of US-sourced value-added in motor vehicles imported from Canada appeared to decline from about 36% in 1998 to around 26% in 2011, while the parallel share of US value-added in vehicles imported from Mexico appeared to fall from about 30% in 1998 to 18% in 2011.

Note, however, that immediately following the January 1994 entry into force of NAFTA, the USDOC study shows that the US shares of value added in total US manufactured imports and in vehicles specifically from Canada, Mexico, and the entire world rose through the remainder of the 1990s and began falling only after China joined the WTO in 2001. This doesn't mean, however, as Secretary Ross implies, that Canada and Mexico became a backdoor for non-NAFTA parts to enter North American production chains: a substantial portion of the increase in some non-NAFTA value shares from China and others came through the displacement of other existing non-NAFTA producers.

THE US TEAM'S DATA LIKELY UNDERSTATE US SHARES IN NAFTA IMPORTS

The OECD data are subject to some serious caveats. Although the USDOC presents the OECD TiVA data as definitive indicators of waning US content shares in manufactured imports from Canada and Mexico, it is important to note that

1. **The TiVA data don't come from direct measurements**, but are instead constructed based on two critical assumptions that almost certainly bias downward the USDOC's findings on US-sourced value-added in US imports from Canada and Mexico;
2. **Competing studies have produced starkly different results** that show much higher US value-added shares in manufactured imports from the NAFTA countries; and
3. **The USDOC findings are at odds with the only minor changes in the relatively large share of intermediate goods in total NAFTA trade over the last 23 years** (chart 4 again).

Estimating value-added shares is trickier than it may seem. The construction of the OECD TiVA data relies on two key assumptions—'proportionality' and 'production':

- **Proportionality** assumes that all goods, whether consumed domestically or intended for export, comprise the same shares of imported intermediate products as goods sold at home; and
- **Production** assumes that all firms in an industry use the same inputs for the fabrication of the same outputs.

These two assumptions imply that in the case of two different motor-vehicle manufacturers:

- **the OECD assumes that the companies use the same shares of intermediate goods in production** regardless of whether the specific vehicle models they make are sold in the local market or assembled for export; and
- **the OECD assumes manufacturers use the same parts in the same proportions in the production of vehicle models destined for export and others intended for sale in the local market.**

These assumptions are more sensitive than they may sound. Chart 5 shows the OECD TiVA data on US value-added shares, or content, in motor vehicle and trailer imports from Canada into seven major countries. The chart isn't plotted poorly: the OECD TiVA data on US content shares in vehicles and parts from Canada are simply the same regardless of the importing country. Whether a Canadian car is shipped to Brazil, for instance, or one of its NAFTA partners, the OECD's assumptions posit that US

value-added share in this car was uniformly 26.4% in 2011 across very different markets. This is unlikely to have been the case: auto-sector shipments to the US and Mexico would certainly have had higher US content shares to ensure qualification for duty-free passage under NAFTA. The proportionality and production assumptions lead to the same uniform US content shares in Mexican exports to all six countries in Chart 5 plus Canada. Box A1 in the appendix explains in more depth the skew or bias in the OECD TiVA data generated by the proportionality and production assumptions.

NBER RESEARCHERS FOUND HIGHER US CONTENT IN IMPORTS FROM CANADA AND MEXICO

The frequently-referenced National Bureau of Economic Research (NBER) analysis by Koopman *et al.* (2010) finds much higher US-sourced shares in Canadian and Mexican manufactured imports into the US than in the 2017 USDOD study. Using data from the UN COMTRADE database and Purdue University Global Trade Analysis Project (GTAP) for 2004, Koopman *et al.* (2010) generate detailed input-output tables that eschew the OECD's proportionality and production assumptions. Avoiding these two assumptions also partially addresses Secretary Ross's claim that the existing NAFTA rules of origin are too loose because they are based on outdated 'tracing' lists of auto components: the NBER study's detailed approach is a decade more recent than the original NAFTA rules of origin formulations.

In the NBER study, Koopman *et al.* (2010) find that:

- Canadian manufactured imports into the US in 2004 had a 25% US value-added share versus the 17% share in the USDOD study; and
- Mexican manufactured imports into the US in 2004 had a 40% US value-added share versus the 20% share in the USDOD study.

The wide gap between the 2017 USDOD study's findings and the Koopman *et al.* (2010) results stems, in part, from the only partial inclusion of Mexican export-processing plants in the OECD TiVA database. The NBER study implies that this omission is a big deal: **the US value-added share in 'maquila' plants' production is estimated at 45% compared with only a 5% share in regular factories that produce for the domestic Mexican market.** Since more than three quarters of the value of Mexican auto manufacturing takes place in the export-assembly plants, the USDOD study **massively** understates the share of US value embodied in Mexican autos sent to the US.

Chart 6 compares the results from Koopman *et al.* (2010) to those derived by the USDOD from the OECD's TiVA database for imports into the US during 2004. Imports to the US from Canada and Mexico stand out as cases where the USDOD study strongly biases downward the US value-added shares compared with the NBER paper's results. **This side-by-side comparison implies that the OECD's proportionality and production assumptions particularly fail to capture the full involvement of US intermediate inputs in US imports from Canada and Mexico.**

INSIGHT IS IN THE DETAIL: INDUSTRY-, FIRM- & MODEL-LEVEL DATA ALL SHOW HIGHER US CONTENT

When there are differences in international industrial and trade data such as those outlined above, it makes sense to look at more focused industry-, firm- and model-level studies for additional insights. **At all three levels of detail, available data show higher shares of US value-added in Canadian and Mexican vehicle exports to the US than in the OECD TiVA numbers cited by the USDOD and Secretary Ross.** Table A2 in the Appendix summarizes the four sets of data reviewed below.

Chart 5 US Value-Added Share in Motor Vehicles and Trailers Imported from Canada

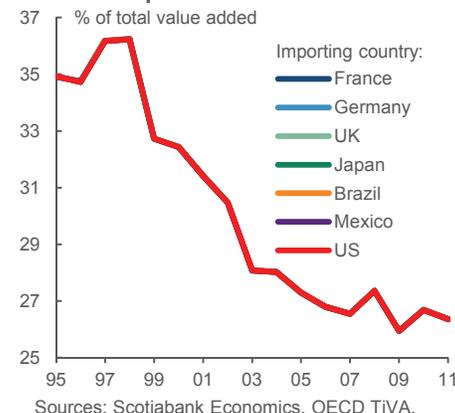
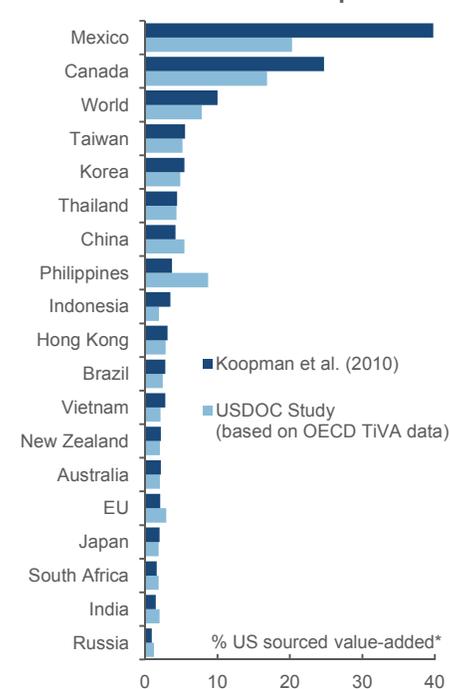


Chart 6 US Content Share in Manufactured Goods Imports



1. Auto Industry-Level Data Indicate US Content Shares at Twice USDOC Estimates

For both Canada and Mexico, auto-industry estimates indicate US-content shares at least twice as large as the USDOC figures cited by Secretary Ross:

- Canadian auto exports to the US.** Statistics on US content shares in Canadian exports are not publically available from a Canadian industry source, though the five companies that have assembly operations in Canada (i.e., Fiat Chrysler, Ford, GM, Honda, and Toyota) [report](#) that their **Canadian-made vehicles satisfy the 62.5% North American content rule of origin under NAFTA**. The Canadian Vehicle Manufacturers' Association ([CVMA](#)), which represents only the Detroit Three, [argues](#) that there is a "high level of US content in Canadian Assembled vehicles." The Mexican Automotive Industry Association ([AMIA](#)) estimates that **the US share in Canadian-assembled vehicles exported to the US was between 48% and 52% in 2016**, while DesRosiers Automotive Consultants [estimates](#) the **US parts content in Canadian-made vehicles at 53.3% in 2016**. Looking at auto parts alone, DesRosiers estimates that US parts accounts for 52% of the Canadian market; and
- Mexican auto exports to the US.** Similarly, AMIA [finds](#), based on data from its members, that **US content shares in Mexican-manufactured autos exported to the US during 2016 were between 37.0% and 39.5%**;

2. Mexican Firm-Level Data Puts US Content Shares in Mexican Exports at Twice USDOC Estimates

In a recent research paper that uses confidential firm-level data on Mexican vehicle manufacturing, de Gortari (2017) estimates the **US value-added share in Mexican vehicle exports to the United States at 38% in 2014**, in line with AMIA's figures. De Gortari (2017) also sheds light on the differences in content shares between Mexican exports to the US and the exports Mexico sends to the rest of the world. Chart 7 shows the input content shares by country embodied in Mexican vehicle exports to the US and Germany, respectively.

De Gortari (2017) shows that **foreign-input composition varies significantly depending on the destination country of Mexican vehicle exports: the US share of foreign inputs is 74% in vehicles shipped to the United States, while the US share is only 18% in autos shipped to Germany**. If one were to assume the same inputs for all finished components and vehicles—the proportionality and production assumptions employed in the OECD's TiVA data—the US share embodied in Mexican shipments to the US would be underestimated given the influence of lower US shares in auto exports to other countries.

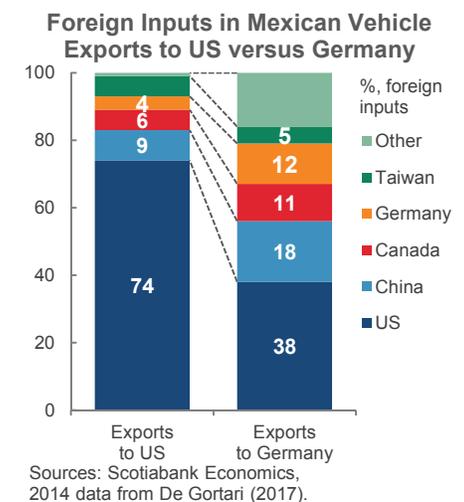
Furthermore, de Gortari's (2017) data show that the US share in its vehicle imports from Mexico is much higher than Germany's share in its imports from Mexico: German content in vehicles shipped to Germany is 38%, around half of the US content in Mexican vehicles bound for the US. NAFTA has facilitated the creation of supply chains that are much more highly integrated than North America's trade with the rest of the world.

3. US Data Show NAFTA Content In Canadian & Mexican Vehicles Increasing

Data on individual vehicle models collected by the US government's NHTSA¹ implies that Secretary Ross is wrong on two fronts: we **do** have data on the content shares in Canadian- and Mexican-assembled vehicles after 2011 and these data show that the NAFTA content in these autos has generally **increased**. We note that 2011 may be a poor point for comparison as it fell just a few years after the 2008 global financial crisis and the bankruptcy filings by GM and Chrysler during 2009. Nevertheless, we refer to 2011 because it is the USDOC's (2017) last benchmark year.

¹ The NHTSA's data comes from the American Automotive Labeling Act's (AALA) requirement that passenger vehicles sold in the US must display a label that specifies the sum of US and Canadian content shares in the automobile, as well as the country of origin for the vehicle's engine and transmission. US and Canadian content shares are not available independently of one another. Mexican content is specified in the AALA data only when it represents more than 15% of the vehicle's equipment; hence, it is possible that Mexican shares are underestimated in Canadian- and US-assembled vehicles, particularly in the case of Canadian autos. AALA national content measurements are not necessarily calculated on the same basis as national content shares for the purposes of tariff preferences under NAFTA's rules of origin. In one case, Toyota Rav4 production in Canada, the AALA data look at odds with actual production processes.

Chart 7



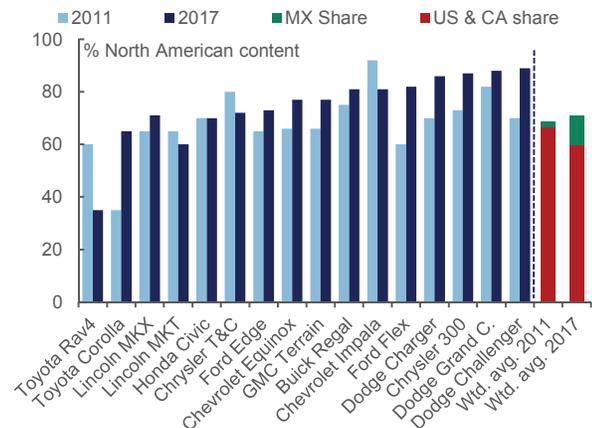
Charts 8 and 9 compare the North American content shares in vehicles sold in the US whose final assembly took place in Canada and Mexico, respectively. The charts include data only on those models that were sold in both 2011 and 2017; some models included in the charts may have ceased production in 2016, but were still sold in 2017. **Amongst Canadian-assembled vehicles sold in the US in both 2011 and 2017, 12 of 16 models saw an increase in NAFTA content shares over these six years. Amongst Mexican-assembled vehicles sold in the US in both 2011 and 2017, the NAFTA content shares increased in 10 of 12 models.**

Using total production figures by model and by country, we estimate a weighted average North American share in vehicles manufactured in Canada and Mexico in 2011 and year-to-date in 2017 based on all vehicles for which there is production data and NHTSA data on content shares (charts 10 and 11, next page). Our estimates show that **across all auto models, the NAFTA content share increased from 71% to 74% in Mexico and from 68% to 70% in Canada during 2011–17. Notably, there is a larger increase from higher levels in North American content shares in Detroit Three autos made by GM, Ford and Fiat Chrysler: NAFTA content shares rose from 73% to 80% in Canada and from 83% to 86% in Mexico.**

These figures imply that the NAFTA bloc has maintained its collaboration in the automotive sector, particularly for companies headquartered in the state of Michigan, and slightly increased the North American share in its vehicles since the last 2011 observation in the USDOC study. Given that these estimates are based on total vehicle production, for export and domestic markets, they likely underestimate the North American shares as these proportions are pulled down by domestic-market production figures. Manufacturers would use relatively more North American parts in their exported vehicles to qualify for duty-free movement under NAFTA. Also, in the case of Mexico, foreign automakers have a significant share in the domestic compact-vehicle market. That is, cars exported from Mexico have a higher North American share than those that remain in the country: cars for the domestic Mexican market are different—simpler and cheaper—than those destined for export. In addition, the US and Canadian share in Mexican cars can for the most part be thought of as solely US parts as Mexican imports of US parts are around 15 times larger than Canadian parts imports.

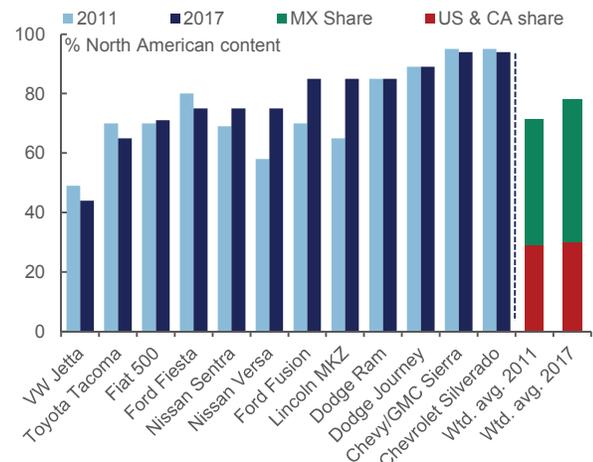
More strikingly, these same data and methodologies imply that the NAFTA shares in autos built in the US have actually decreased since 2011! US-assembled autos had a 71% North American share in 2011, which dropped to 65% by 2017 (chart 12, next page). The drop in NAFTA shares in Detroit-Three vehicles was less pronounced: from 78% in 2011 to 75% in 2017. The data imply that US plants have seen the biggest increase in the share of non-NAFTA components in production, with foreign firms leading the way. In 2011, the NHTSA data show 110 vehicles were assembled in the US, of which 45% were made by foreign automakers. Six years later, with over 130 models built in the US, 60% are produced by foreign auto companies from Japan, Korea, and Germany, while the Detroit Three automakers plus Tesla account for the remainder.

Chart 8 North American Content Shares in Canadian-Assembled Vehicles



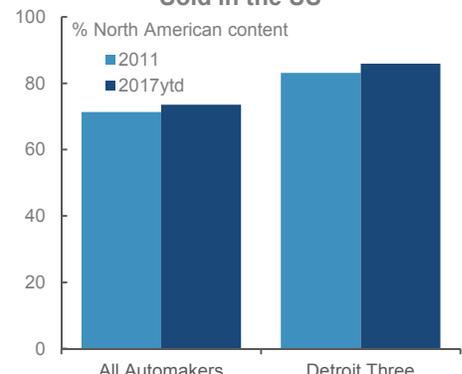
Sources: Scotiabank Economics, NHTSA, WardsAuto. Weighted average includes only those models shown in the chart. Chrysler Town & Country no longer assembled, 2017ytd is 2016ytd.

Chart 9 North American Content Shares in Mexican-Assembled Vehicles



Sources: Scotiabank Economics, NHTSA, WardsAuto. Weighted average includes only those models shown in the chart.

Chart 10 North American Content Shares in Mexican Assembled Autos Sold in the US



Sources: Scotiabank Economics, NHTSA, WardsAuto.

US producers—be they foreign or Detroit Three firms—may import parts and accessories for motor vehicles under Most Favoured Nation (MFN) status with a tariff rate of only 2.5% on most auto-sector items. Under a relatively low MFN-tariff regime, foreign firms operating in the US may particularly prefer to purchase parts from abroad instead of sourcing them domestically or from Canada and Mexico, owing to the design of their vehicles. This preference, combined with the loss in market share by the Detroit-Three automakers over time, may account for the relatively poorer North American content share developments in the US compared with Canada and Mexico.

4. US & NAFTA Content Dominates North American Parts Markets

Notwithstanding the apparent decrease in North American content in US-assembled passenger vehicles, parts sourced from the NAFTA members continue to dominate North American auto-parts markets (table 1). Efforts to impose stricter local content requirements under NAFTA could have a severe impact on US parts manufacturers. Under a simple estimate of apparent domestic demand for motor vehicle parts—i.e., domestic shipments minus exports plus imports of parts—we reckon that **around 80% of vehicle parts sold in North America originate from one of the NAFTA members.** This share has remained stable since 2010 (table 1 again). **US parts account for slightly over 50% of all parts used and produced in North America: they garner a market share of 60% in the US, and around 50% and 35% in Canada and Mexico, respectively.** This straightforward calculation roughly approximates US value-added shares, and highlights the widespread incorporation of US components in motor vehicles assembled in North America. It is worth highlighting, however, that this is a rough estimate and is not a fully accurate reflection of actual North American value-added content shares in auto parts..

NAFTA HAS CONCENTRATED PRODUCTION IN WAYS THAT TIGHTER RULES OF ORIGIN WOULD NOT REVERSE

With the introduction of NAFTA and the integration of vehicle supply chains, the production of certain components has shifted and concentrated in particular countries. For instance, US-fabricated seating, transmission, and metal-stamping components have a market share of 79% or higher in the US, whereas US-built electrical and electronic parts have a 44% share. Parts for vehicle steering systems and electrical products are generally built in Mexico and shipped to the US market; US steering systems represent only 13% of the domestic US market. Mexico has amassed a 30% share of the US market in electrical products and steering assemblies, more than double its share in other auto-parts categories.

The shift in the production of these products to Mexico and other low-cost jurisdictions is unlikely to be reversed with tighter NAFTA rules of origin. Looking at the US trade deficit in auto parts with its NAFTA partners, 75% of this deficit is in electrical products or in the catch-all ‘other parts’ category. In view of the relatively low MFN tariffs on these products, changes in NAFTA’s rules of origin are unlikely to motivate manufacturers to engage in the costly rebuilding of their manufacturing supply chains to push more production back into the US.

Chart 11

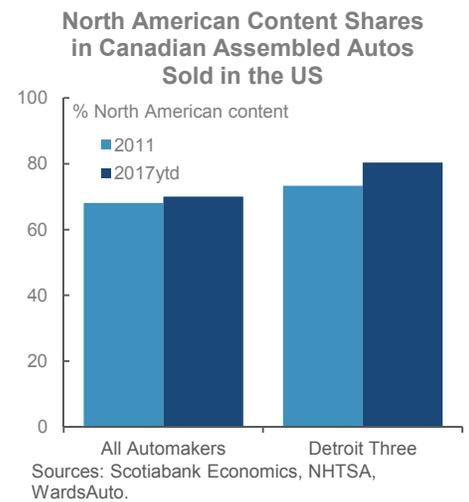


Chart 12

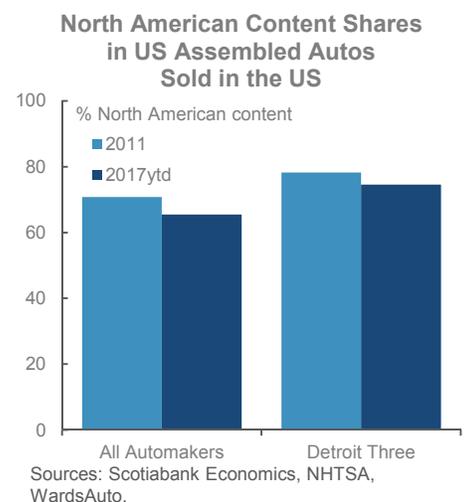


Table 1

NAFTA-sourced content shares in national motor vehicle parts markets, in percent

| | 2010 | 2015 |
|------------------|------|------|
| Canada | 85.2 | 84.3 |
| Mexico | 81.7 | 81.4 |
| US | 75.3 | 76.7 |
| Average | 80.7 | 80.8 |
| Weighted average | 78.2 | 78.6 |

Sources: Scotiabank Economics, Statistics Canada, US Census Bureau, INEGI, US International Trade Centre.

TIGHTER US RULES OF ORIGIN WOULD BE NEARLY IMPOSSIBLE FOR AUTOMAKERS TO SATISFY

An amendment to NAFTA to tighten rules of origin on autos and auto parts—already amongst the most onerous in any trade agreement—may drive auto and parts production overseas rather than pull it back to the US. Compliance with an 85/50 NAFTA/US rule of origin may be nearly impossible for automakers to achieve. The increasing use of electronics in automobiles makes the 85% North American value-added target particularly elusive. For instance, in 2016, electrical and electronic equipment accounted for about 11% of the Canadian auto parts space, up from 8.7% in 2010, with an average annual growth rate of 12% over this time. Electronics are also embodied in other auto components such as brake systems, steering and suspensions, and transmissions. Additionally, electronics feature in a catch-all ‘other parts’ category that currently accounts for about a third of all auto components. This implies that 11% is a lower bound on the share of electronics in the total value of an average automobile. About 40% of these components are imported from outside the NAFTA area and import growth is advancing at an even faster pace than their total share of the auto parts market as few local suppliers exist or for those that do, their assembly facilities are located outside of North America. With all of this in mind, an 85/50 NAFTA/US rule of origin would already be nearly impossible to satisfy and it is likely to become even more difficult to meet in the future. Automakers may find it more economical to source parts overseas and pay the 2.5% US MFN tariff on importing them rather than engage in relatively costly additional production in North America. For some models with habitually low profit margins, such as compact cars, entire production lines could be moved to lower-cost jurisdictions outside of North America if NAFTA’s rules of origin are tightened.

For light trucks, the US proposal could hit the Detroit Three particularly hard. At present, pickups are not assembled in Canada, but GM is expected to begin producing these vehicles at its Oshawa, Ontario plant in early 2018. In contrast, there are at least six pickup models currently under production in Mexico, according to data compiled by the US NHTSA, four of which are produced by GM and Fiat Chrysler, the other two by Toyota and Nissan, respectively. Although the Mexican-assembled pickups are amongst those with the highest shares of North American content, NHTSA data implies that only two of these trucks have more than 50% US content. With the US MFN tariff on pickups set at 25%, it would not be feasible to move all or part of their production out of North America. Light truck makers would likely face a costly shift to reconfigure their supply chains toward higher-cost production in the US. The Detroit Three, which depend most heavily on substantial profit margins from light-truck production, would likely be most negatively affected by a tighter NAFTA rule of origin on vehicles. Nissan, Honda, and Toyota light-truck production in the US, along with Ford F-150 output, would be relatively less affected.

It has been mooted that under the proposed NAFTA/US 85/50 rule of origin, companies would have one year to shift production to reach the 50% US content requirement and two years to reach the 85% NAFTA content threshold for duty-free movement of goods. This tight time horizon would pose difficulties for most manufacturers currently operating in North America whose current production models are constrained by contractual arrangements with suppliers that often extend beyond two years. For some components, such as electronics, it’s not clear that a North American source could be found within two years. The further uncertainty posed by the US demand for a ‘sunset clause’ on NAFTA would make the search for new suppliers difficult as investors would be unlikely to invest in a value chain that could be undone every five years or so if NAFTA lapses.

There is also a possibility that the 50% US-content requirement could be effected asymmetrically such that it would be applied to imports to the US from Canada and Mexico, but would not govern US exports to its NAFTA partners. This could lead to more assembly in the US—but with components imported from outside North America such that even as US value generated in the auto sector may increase, overall North American value-added could fall.

CPTPP ADDS TO THE PRESSURE TO KEEP THE RULES OF ORIGIN AS LOOSE AS POSSIBLE

The reinvention of the 12-member Trans-Pacific Partnership (TPP) as the post-US 11-member Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) increases the imperative for Canada and Mexico to avoid tighter rules of origin for vehicles and parts under NAFTA. With the US outside the CPTPP, any move to tighten the NAFTA rules on US content in Canadian- and Mexican-assembled automobiles and parts would make it less likely that these products would qualify for tariff-free movement amongst the CPTPP countries. Similarly, the US’s self-imposed exclusion from the CPTPP makes it important for Canada and Mexico to push for lower thresholds on the CPTPP’s own auto-related rules of origin to ensure their parts and vehicles, heavy with US content, are able to move duty-free amongst the CPTPP’s Asian members. Under the draft TPP and now draft CPTPP, duty-free movement for autos would require 45% of value-added content to come from member

countries, with a 30–45% minimum local content threshold for auto parts. Of course, it is worth remembering that duty-free access to sell into Asia is meaningful only if the North American auto-sector's output is tailored to a greater extent to Asian consumer preferences such that there is increased demand for vehicles and parts from Canada and Mexico. Additionally, the Canadian and Mexican auto sectors may find that improved access to cheaper Asian inputs may sufficiently reduce their costs such that they are able remain competitive in the US market even if their exports don't have sufficient local content to qualify for NAFTA tariff preferences.

TRACING OUR WAY TO A SOLUTION

Just-concluded, informal 'inter-sessional talks during 11–15 December in Washington, DC are said to have touched on the possibility of revising the methods by which national content shares are calculated in ways that could make a compromise on rules of origin more feasible. At present, automobile value-added formulae are based on an over decade-old 'tracing' system that spells out the components of a typical vehicle—in a manner similar to the proportionality and production assumptions employed to construct the OECD TiVA database—that count toward national value-added content shares. The dated nature of these tracing lists means that they tend to under-recognize contributions to a vehicle's total value from research and development, software, new composite materials, and electronics, amongst other newer things.

Since a large proportion of the electronic componentry in vehicles originates outside of NAFTA, including more electronics in the tracing lists may complicate the feasibility of assembling autos with 85% North American content. Thus, any new tracing list needs to be based on a reasonably accurate measure of the current—and yet to be recognized—sources of value in North American car production. For instance, outlays for research and development account for a significant share of the cost of manufacturing computer chips for cars. The intellectual work behind these components is, for the most part, carried out in tech hubs in the US and to a slight degree in Canada. Modernized tracing guidelines may also have to consider that technology companies tend to register their intellectual property in low-tax jurisdictions, which would then tend to cause local content to be understated in North American vehicles. This paper, especially in the review of other studies provided above and summarized in Table A2, provides a credible foundation for any effort to update the tracing system in an even-handed manner based on proper, if potentially costly, due diligence process. Accounting for non-tangible inputs to production is likely to require a highly meticulous effort.

IT'S TIME TO GET PAST THE 'REDLINE' AND NEUTRALIZE THE 'POISON PILL' ON AUTO RULES OF ORIGIN

The US proposal to tighten NAFTA's rules of origin is one of five major extreme demands introduced by the US Trade Representative that threaten to leave efforts to renegotiate and modernize NAFTA at an impasse. This paper is intended to help neutralize at least one of these 'poison pills' by providing the negotiating teams with a fresh perspective on the current sources of value in North American auto and parts production. This paper takes a critical look at the US claim that Canada and Mexico have become indirect pathways for offshore content to enter North American auto production chains and finds that

- Local North American content in Canadian- and Mexican-assembled vehicles has trended upward in recent years following the 2008 global financial crisis even as local content shares have declined in US auto-sector production; and
- Major studies peg the shares of North American content in Canadian and Mexican production at much high levels than those posited by US official sources.

These data imply that the US 85/50 proposal to tighten NAFTA's rules of origin on vehicles and parts is a solution in search of a problem. But rather than dismissing the US proposal, these data should help provide grounds for a fresh look at the way value-added in the auto sector is identified and calculated under the tracing system. A renewed tracing system, based on a shared understanding of the sources of value in the auto sector, could help satisfy the US interest in the generation of more North American and US content, without disrupting the integrated production chains that have helped the US, Canadian, and Mexican auto industries remain competitive with the world.

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APPENDIX

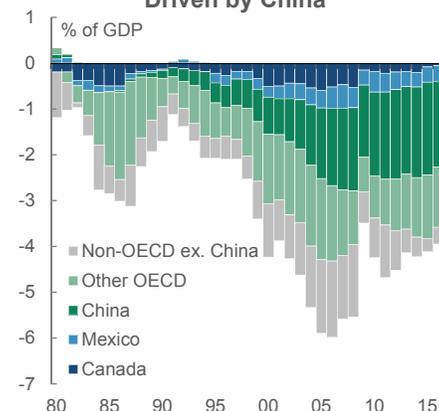
THE US CAN'T REDUCE ITS TRADE DEFICIT WITH CHINA BY ATTACKING CANADA AND MEXICO

In his [Washington Post op-ed](#), Secretary Ross (2017) asserts that autos and auto parts account for the “vast majority” of the US total trade deficit in goods with Canada and Mexico—but this total deficit itself is tiny. At about USD 75 bn in 2016, the US deficit in goods with its NAFTA partners is equivalent to only about 0.4% of US GDP. As chart A1 highlights, the US trade deficit in goods with Canada and Mexico has remained stable as a share of US GDP since the advent of NAFTA in 1994—it hasn’t “ballooned” as Secretary Ross claims, but has instead sat between 0.2% and 1.0% of GDP since the deal’s inception. It’s also worth repeating, as we noted in our earlier [report on NAFTA’s successes](#), that if one adds in the US trade surplus in services with Canada and Mexico, the US trade deficit with its NAFTA partners would narrow by around USD 30 bn.

ENERGY AND RESOURCES, NOT AUTOS, DRIVE US TRADE DEFICITS IN NAFTA

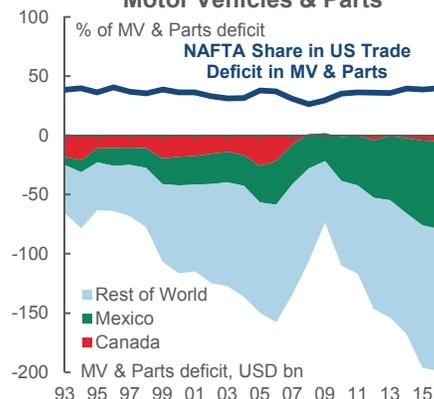
Vehicles and parts have accounted for a majority of the US goods deficit with NAFTA during only the last three years of what is notoriously volatile data. In 2016, the US trade deficit with Canada and Mexico in vehicles and parts was indeed equivalent to 84% of the US overall goods trade deficit with its NAFTA partners, and averaged 73% annually during 2014–16. But for the fourteen preceding years 2000–13, the US deficit with its NAFTA neighbours in motor vehicles and parts was never more than half of the US-NAFTA deficit in goods and averaged 33% of the total deficit annually. Autos and auto parts haven’t accounted for the “vast majority” of the US total trade deficit in goods with

Chart A1 US Goods Trade Deficit Driven by China



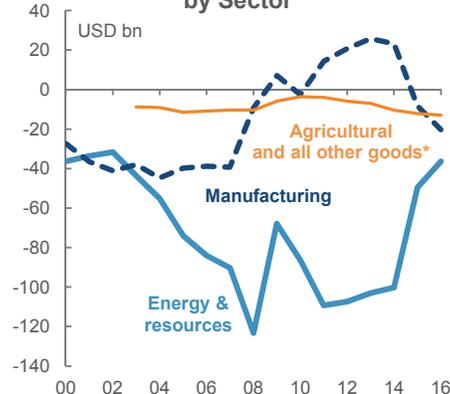
Sources: Scotiabank Economics, Bureau of Economic Analysis, Census Bureau.

Chart A2 US Trade Balance in Motor Vehicles & Parts



Sources: Scotiabank Economics, US Census Bureau.

Chart A3 US Trade Balances With NAFTA, by Sector



Sources: Scotiabank Economics, US Census Bureau. * data on printing products not available pre-2003.

Table A1

US trade balances in goods with Canada and Mexico, 2009–16

| | 2016 balance, USD bn | 2016 balance, % of US GDP | Average annual balance, USD bn | Average annual balance, % of US GDP |
|--|----------------------|---------------------------|--------------------------------|-------------------------------------|
| I. US trade balances in goods with NAFTA | | | | |
| Total | -75.3 | -0.4 | -85.6 | -0.52 |
| Manufactured goods | -20.3 | -0.1 | 7.5 | 0.05 |
| Energy and resources | -36.3 | -0.2 | -82.5 | -0.51 |
| Agriculture and food | -5.3 | 0.0 | -2.4 | -0.01 |
| All other goods | -13.4 | -0.1 | -8.1 | -0.05 |
| II. US trade balances in goods with Canada | | | | |
| Total | -11.0 | -0.1 | -26.3 | -0.16 |
| Manufactured goods | 35.9 | 0.2 | 42.4 | 0.26 |
| Energy and resources | -33.9 | -0.2 | -60.8 | -0.37 |
| Agriculture and food | 0.0 | 0.0 | -0.3 | 0.00 |
| All other goods | -13.0 | -0.1 | -7.5 | -0.04 |
| III. US trade balances in goods with Mexico | | | | |
| Total | -64.4 | -0.3 | -59.3 | -0.36 |
| Manufactured goods | -56.2 | -0.3 | -34.9 | -0.21 |
| Energy and resources | -2.4 | 0.0 | -21.7 | -0.14 |
| Agriculture and food | -5.3 | 0.0 | -2.1 | -0.01 |
| All other goods | -0.4 | 0.0 | -0.6 | 0.00 |
| IV. US trade balances in goods with world | | | | |
| Total | -736.8 | -4.0 | -687.6 | -4.17 |
| Manufactured goods | -648.7 | -3.5 | -488.0 | -2.93 |
| Energy and resources | -79.0 | -0.4 | -218.1 | -1.36 |
| Agriculture and food | 19.3 | 0.1 | 25.1 | 0.15 |
| All other goods | -28.4 | -0.2 | -6.4 | -0.03 |

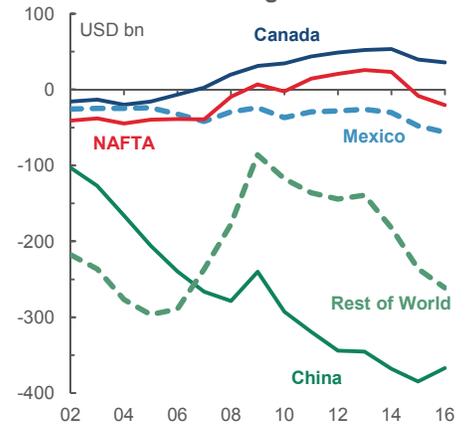
Sources: Scotiabank Economics, US Census Bureau.

Canada and Mexico in any consistent way. Moreover, even as the global US trade deficit in vehicles and parts has expanded (chart A2, below horizontal axis), the share of this deficit accounted for by imports from its NAFTA partners has remained flat since the inception of NAFTA (chart A2, above horizontal axis).

For most of the years since the 2008 global financial crisis, the US has actually run a surplus in manufactured goods with its NAFTA partners (charts A3 and A4). During 2009–16, the US recorded an average annual trade surplus in manufactured goods of USD 7.5 bn with its NAFTA partners (table A1), where an average deficit in motor vehicles and parts of USD 54 bn partially offset a USD 61.5 bn surplus in all other manufactured goods.

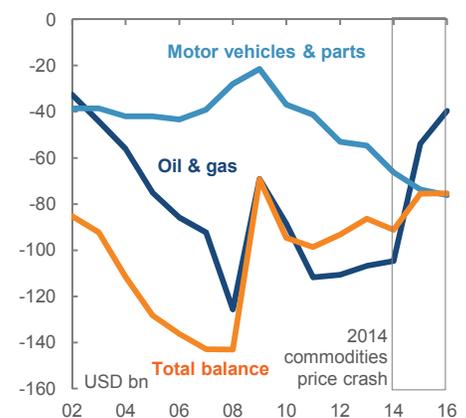
All of these numbers are dwarfed, however, by the US trade deficit in energy and resources with its NAFTA counterparts, which averaged USD 82.5 bn during 2009–16 (table A1). In fact, the US total trade deficit in goods with the NAFTA countries has been dominated by imports of Canadian and Mexican energy and resources since the early 2000s (chart A5). Up to 2014, the US trade deficit in oil and gas accounted for nearly twice the deficit of motor vehicles and parts. Since then, the crash in commodities prices that began in 2014, the surge in US shale production that has reduced the US need for imports, and an increase in US exports of refined petroleum products to Mexico have all together massively reduced the US trade deficit in oil and gas with Canada and Mexico. **This reduction in the US trade deficit in energy and resources—not a recent spike in vehicle and parts imports—explains the recent prominence of autos and parts in the US deficit in goods trade with the NAFTA countries.**

Chart A4 US Manufacturing Trade Balance



Sources: Scotiabank Economics, US Census Bureau.

Chart A5 US Goods Trade Balance with NAFTA



Sources: Scotiabank Economics, US Census Bureau.

Box A1. OECD TiVA DATA SKEWED BY UNDERLYING ASSUMPTIONS

While the proportionality and production assumptions seem superficially reasonable—and are necessary to construct estimates of value-added shares without directly measuring the content in each make and model of vehicle—these assumptions likely lead to a systematic underestimation of the US-sourced shares in Canadian and Mexican autos, and indeed on most manufactured goods, in two key ways.

Proportionality assumption. Vehicles manufactured in Canada and Mexico for export markets are assumed to have the same proportions of components and labour value-added as vehicles produced for these local markets. This assumption is unlikely to be borne out when countries with very different income levels and production frameworks are involved. Autos manufactured in Mexico that are destined for the Mexican market are generally simpler, lower-quality, older designs with cheaper componentry and lower retail price points than cars sent to the wealthier US market. Similarly, cars sold in Canada typically have smaller engines and lower trim levels than models sold in the US where average household incomes are higher. The relatively more sophisticated and expensive models sold to the US market would generally feature a relatively greater share of more complex US-sourced parts and skilled labour value-added than vehicles destined for Canada and Mexico. As a result, the proportionality assumption likely leads to a systematic underestimation of the US-sourced value-added shares in Canadian and Mexican cars exported to the US.

Production assumption. The same value-added shares are assumed to hold across all factories in a single industry, but this is unlikely to be the case. The OECD's (2017) own documentation on the TiVA data notes that factories devoted to production for export—such as the 'maquiladora' assembly factories in Mexico and the 'branch plants' in Canada—typically have much higher foreign value-added shares than facilities that produce and sell to their local markets. Given the deep production-chain integration in the North American auto industry and the fact that the Mexican export-assembly factories are only partially accounted for in the TiVA database, the production assumption likely leads to further under-estimation of the US-sourced value shares in Canadian and Mexican vehicles exported to the US. Moreover, the already-high 62.5% North American value-added share required for vehicles to qualify for NAFTA preferences provides a strong incentive for exporting factories to have a higher NAFTA content than domestic-oriented firms.

Table A2

US Imports and Value-Added Sources in Vehicles and Manufactured Goods in NAFTA

| Source | Measure | Year | Exporting Country or Content Origin | | | |
|--|---|--|---|---------------|---------------|-----------|
| OECD TiVA (USDOC 2017) | Value Added Share in US Motor Vehicle Imports, % | US imports from | Canada | Mexico | US | |
| | | | Sourced from NAFTA | | | |
| | | | 1995 | 84.0 | 86.8 | - |
| | | | 2004 | 78.4 | 76.2 | - |
| | | | 2011 | 71.2 | 70.5 | - |
| | | | Sourced from US | | | |
| | 1995 | | | 34.9 | 26.5 | - |
| | 2004 | | | 28.0 | 23.1 | - |
| | 2011 | | | 26.4 | 18.1 | - |
| | Koopman <i>et al.</i> (2011) | Value Added Share in US Final Manufacturing Goods Imports, % | US imports from | Canada | Mexico | US |
| Sourced from NAFTA | | | | | | |
| 1995 | | | | 87.9 | 86.2 | - |
| 2004 | | | | 83.3 | 74.3 | - |
| 2011 | | | | 79.2 | 73.2 | - |
| Sourced from US | | | | | | |
| 1995 | | | 20.9 | 26.1 | - | |
| 2004 | | | 16.9 | 20.3 | - | |
| 2011 | | | 14.7 | 15.7 | - | |
| De Gortari (2017) | | Foreign Inputs in Mexican Vehicle Exports, % | Inputs from | Canada | Mexico | US |
| | to Germany | | | | | |
| | 2014 | | | 12.0 | - | 18.0 |
| | to US | | | | | |
| | 2014 | | | 6.0 | - | 74.0 |
| | Value Added Share in Mexican Final Manufacturing Goods Exports to the US, % | Value-added source | Canada | Mexico | US | |
| | | | Motor vehicles, trailers, and semi trailers | | | |
| | | | 2014 | - | 37.0 | 38.0 |
| All products (15 manufacturing industries) | | | | | | |
| 2014 | | | - | 40.0 | 27.0 | |
| All Products excluding computers, electronics, and optical equipment | | | | | | |
| 2014 | | | - | 34.0 | 31.0 | |
| American Automobile Labeling Act Reports (NHTSA), WardsAuto | Total Canadian, Mexican, and US Content in Motor Vehicles Sold in the US, % | Assembled in | Canada | Mexico | US | |
| | | | Detroit Three: Fiat Chrysler, Ford, and General Motors | | | |
| | | | 2011 | 73.3 | 83.0 | 78.2 |
| | | | 2017 | 80.3 | 86.0 | 74.6 |
| | | | All automakers | | | |
| | | | 2011 | 68.0 | 71.0 | 70.8 |
| | | | 2017 | 70.0 | 74.0 | 65.5 |
| | | | All automakers (common sample of models made in both 2011 & 2017) | | | |
| 2011 | 68.6 | 71.4 | - | | | |
| 2017 | 70.9 | 78.2 | - | | | |
| Industry sources | US Content in US Motor Vehicle Imports, % | Imports from | Canada | Mexico | US | |
| | | | Mexican Automotive Industry Association (AMIA): US content | | | |
| | | | 2016 | 48.0–52.0 | 37.0–39.5 | - |
| DesRosiers Automotive Consultants: US parts content | | | | | | |
| 2016 | | | 53.3 | - | - | |

Sources: Scotiabank Economics, OECD Trade in Value Added (TiVA), Koopman *et al.* (2011), De Gortari (2017), WardsAuto, Mexican Automotive Industry Association (AMIA), National Highway Traffic and Safety Administration (NHTSA) American Automobile Labeling Act (AALA).

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