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ABSTRACT

The U.S.-Mexico-Canada Agreement (USMCA) updated many of the Rules of Origin (ROO) that were implemented under the North American Free Trade Agreement (NAFTA). We use an innovative database that catalogs and categorizes ROO and find substantial change among ROO between the two agreements. Based on the existing literature, we also develop an index of restrictiveness for different types of ROO. In applying the index to the ROO database, we find that 25 percent of the HS6 lines common to both agreements saw a decrease in ROO stringency upon USMCA's entry into force.

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1—Introduction

Many papers discuss the effects of the U.S.-Mexico-Canada Agreement (USMCA) on trade and welfare in North American economies.[1] Of these, several examine the effects of changes to Rules of Origin (ROO) in the agreement, chiefly focusing on the changes in ROO in the automotive sector. Despite the prominence of ROO in discussions of USMCA, few studies address how the new trade agreement changed the stringency of ROO at the product level relative to its predecessor, the North American Free Trade Agreement (NAFTA).

Analysis of NAFTA and USMCA, however, is complicated by the complex nature of the ROO in these two agreements. As noted in Powers and Ubee (2020), NAFTA has an unusually high share of compound rules (i.e., rules that include multiple elements to be satisfied) relative to other U.S. agreements, and USMCA has inherited much of this ROO structure from NAFTA.[2] In the database used for our analysis, there are 14 basic types of ROO criteria, such as "regional value content of 35 percent" or "requires specified process." These elements can be used singly or in combination with other basic criteria to produce the 135 different ROO we analyze in the NAFTA and USMCA agreements.

These compound rules are not well captured by existing indexes. Kniahin et al. (2019) show that one-half of all ROO internationally fall into one of three major ROO categories: regional value content, change in tariff classification, and wholly obtained. Pioneering indexes of ROO restrictiveness, such as Estevadeordal (2000), are designed to rank the restrictiveness of such common categories. Yet NAFTA's and USMCA's compound rules are built from these elements in ways that are not captured in previous indexes. It is common for ROO in these agreements to require multiple rules for compliance, or to allow alternative rules for compliance, or in many cases to do both at the same time. Complicating analysis, the few papers that have ranked such compound rules have not included the same combinations or agreed on their relative stringency.

Absent a rigorous empirical examination of the effects of these compound ROO on U.S. trade, which is outside the scope of this short paper,[3] it is difficult to determine how the stringency of a compound ROO depends on its underlying elements. In general, the stringency will depend on multiple factors, including (1) which specific elements are combined, and how they are combined; (2) the reason that specific elements were combined, which depends on the intentions of ROO negotiators, of which little is known; and (3) the difficulty in satisfying a second or third ROO after satisfying the first, which may differ by firm, given heterogeneity in firm-specific production or sourcing processes. In addition, each of these factors may differ by industry. Furthermore, for an exporter, the cost of complying with a rule must be weighed against the cost of non-compliance and shipping goods under non-preferential tariff rates.

To illustrate the first factor, we start with the rather nonsensical example of combining a regional value content requirement of 35 percent (RVC 35) with one of 40 percent (RVC 40). If the combined ROO

[1] For example, see: USITC (2019), Burfisher et al. (2019), and Ciuriak et al. (2020).

[2] NAFTA and USMCA also employ more complex ROO than most international agreements, as demonstrated by Kniahin et al. (2019).

[3] Further quantitative analysis presents some challenges. The number of individual ROO (135) and their compound nature may preclude the revealed preference approach of Herin (1986) and Cadot et al. (2006a). Also, while NAFTA and USMCA are negotiated trilaterally, ROO are tailored to each country's specific tariff schedule; the single-country aspect of these ROO presents challenges to gravity estimation (e.g., it precludes incorporation of the multilateral resistance term for exporters).

allows firms the choice of either element, the combined stringency is equal to that of the minimum of the two elements (RVC 35). If the combined ROO requires that both elements be met, the combined stringency is equal to the maximum of the two elements (RVC 40). In more realistic cases, where more than one element is required, we would expect that meeting one element (such as a change in tariff chapter) would at least partly contribute to meeting the other element (such as an RVC requirement). Hence meeting two elements together should be at least as restrictive as the more stringent element alone, and not more restrictive than the sum of meeting both separately.

The literature has traditionally used indexes to measure the stringency of ROO. The heterogeneity in ROO, combined with the heterogeneity of firms complying with them and the products they apply to, provides numerous challenges to ROO index construction. For example, when firms are provided with a choice between two elements to obtain preferential tariffs, it is seemingly intuitive that the resulting stringency should be the minimum of the two elements. Yet, it is not clear why negotiators would provide a choice, rather than simply providing a single option. It is possible that negotiators are considering heterogeneity in firm production processes and sourcing. Hence, the two options may be equally stringent for different types of firms. Or it may be that the use of exceptions and allowances lets negotiators adjust the stringency of one or both options, reducing any gap in stringency between the two options. Of course, either of these reasons casts some doubt on the use of a single stringency value for each type of ROO, or underlying ROO element. And, as Kniahin et al. (2019) notes, the relative restrictiveness of different ROO elements is subject to change based on a product's specific characteristics and production processes—in their example of roasted coffee, they explain that three different ROO essentially have the same restrictiveness.

As shown in our approach, assigning a single value to a compound ROO requires making decisions on how to combine the stringency values associated with the underlying ROO elements that make up the compound rule. There are trade-offs to consider when using different methods, such as summing, to combine the values of different elements, as discussed below.

Notwithstanding the issues with ROO indexes, it remains important to estimate to what extent ROO have changed between NAFTA and USMCA, and whether these changes have made ROO overall more or less stringent. USMCA covers one of the globe's major regional trading blocs, with over $1 trillion in annual goods trade in the region. As noted above, many analyses of the effects of USMCA have focused on higher costs of trade in the auto sector (e.g., Chiquiar 2019 and Schott 2018). Yet our analysis finds that, overall, USMCA has reduced the stringency of ROO relative to NAFTA, reducing production costs. These results are particularly pronounced in chemicals, plastics, and machinery.

The remainder of this paper is organized as follows. Section 2 introduces the existing examinations of ROO in the USMCA agreement, only a few of which have analyzed product-specific ROO as in this paper. Section 3 introduces several of the ROO indexes in the literature, highlighting the challenges of applying these indexes to the compound ROO in NAFTA and USMCA. Section 4 presents our proposed methods to determine compound ROO stringency. Section 5 reports the extent to which ROO have changed across the two agreements, and our estimates of the extent to which stringency has increased, decreased, and stayed the same across the U.S. tariff schedule. Section 6 concludes.

2—Existing examinations of ROO in USMCA

Recent works that have analyzed the impacts of ROO in USMCA follow one of two methods. The first method makes ad hoc assumptions about changes in ROO costs, rather than empirically estimating them. This approach is common in CGE analyses of the agreement. The second method uses granular data on trade and production to estimate industry-level costs and effects of ROO.

Among CGE analyses of the agreement, Burfisher et al. (2019) and Ciuriak et al. (2020) both assume cost structures for ROO and use versions of the GTAP model to estimate the effects of USMCA on the United States.[4] Burfisher et al. (2019) assume that (1) compliance costs for finished vehicles amount to half the benefit of preference margins for imports under preferential tariffs, and (2) compliance costs for auto parts exceed preference margins, so all trade in North American auto parts will occur at MFN rates.[5] The paper concludes that motor vehicle production falls by 0.03 percent ($135 million) and auto parts production drops by 0.44 percent ($1.25 billion). Ciuriak et al. (2020) proxy the increased costs of ROO in three ways: (1) by applying tariffs on imports; (2) introducing nontariff barriers (NTBs) to induce pre-set targets for trade diversion; and (3) increasing production costs. They apply these shocks to the automotive, textiles and apparel, chemical, steel, and glass sectors. The authors find that there are negative welfare impacts in all cases due to higher costs, sub-optimal sourcing, and trade diversion. Overall, including the other changes in the agreement, the paper finds that the USMCA agreement will lead to a 0.10 percent (or $17.8 billion) decrease in real GDP for the United States.

While these papers estimate broad impacts on the United States, there is also recent research that utilizes granular data on trade and production to estimate industry-level impacts—specifically, for the auto and auto-parts industries. The Center for Automotive Research (CAR) released two studies—Dziczek et al. (2018) and Schultz et al. (2019)—that estimate the costs of USMCA ROO for motor vehicles, using data on motor vehicle sales and inputs by make and model. Both studies assume firms that do not currently comply with ROO will pay the higher MFN tariff rates of 2.5 percent, as opposed to shifting their production back to the United States. Dziczek et al. (2018) found that between 22 and 40 vehicle models imported by the United States from Canada and Mexico (representing 13–24 percent of all vehicles sold in the United States in 2017) qualify under NAFTA ROO, but may not comply with USMCA ROO. Paying the higher MFN tariff rates would raise vehicle costs by $470–2,200. Schultz et al. (2019) find that 24 vehicles produced and sold in North America that were compliant under NAFTA would not maintain compliance under USMCA. Thus, they would be subject to an average tariff increase of $635 per vehicle. The paper estimates that the loss of compliance will lead to an increase in the U.S. consumer price of vehicles assembled in Canada and Mexico by 0.22 percent and 1.70 percent, respectively, which are relatively close to the price effects estimated in USITC (2019).

USITC (2019) also looks at the auto and auto-parts sectors, but on an even more disaggregated level. The Commission's model analyzes cost-minimizing responses for almost 400 models covering four types of vehicles: small cars, mid-size to full-size cars, multi-passenger vehicles, and pickup trucks. In contrast to the CAR studies, the Commission analysis assumes that manufacturers relatively close to compliance would increase their North American content to meet USMCA requirements.[6] The resulting shift in sourcing of core parts to the United States raises U.S. auto parts production, employment, and capital expenditures of facilities that produce these parts. The higher costs would increase vehicle prices,

[4] Burfisher et al. (2019) use the static version of the GTAP model and Ciuriak (2020) use the GTAP-FDI model. Global Affairs Canada (2019) take a similar approach to estimating the effect of USMCA on the Canadian economy. They find that 65.7 percent of vehicles produced in Canada meet the USMCA ROO, covering 74.4 percent of the value of Canadian vehicle exports to the United States.

[5] They also assume that labor value content requirements would raise wages in the Mexican auto sector by 50 percent.

[6] The report notes that industry representatives from most light-vehicle manufacturers in North America have stated that they plan to bring all vehicles that they still produce in North America into compliance.

reducing U.S. vehicle production and employment. The net effect would be an increase of 28,000 full-time equivalent employees in the automotive sector, while overall U.S. vehicle consumption would fall by 140,000 vehicles, with small cars most negatively affected.

As noted above, the literature using granular trade data to estimate product-specific ROO restrictiveness is much smaller: only Kniahin et al. (2019) systematically estimate changes in product-specific ROO between the agreements. The authors use a new, unique, and innovative database developed by the National Graduate Institute for Policy Studies (GRIPS) and the International Trade Centre in Geneva which catalogs ROO in 271 trade agreements at the HS6 level.[7] Kniahin et al. (2019) are the first to use this database to construct a restrictiveness index of origin criteria, which they use to provide some cursory unweighted comparisons between NAFTA and USMCA (we provide further detail on restrictiveness indexes in the next section). They find USMCA to be less restrictive than NAFTA overall, and that USMCA has the most trade-facilitating provisions among all U.S. agreements. They also provide sector-level comparisons that show, on average, the ROO in USMCA are more restrictive than those in NAFTA in the textiles and the oilseeds, fats, and oils sectors. Most notably, USMCA is less restrictive than NAFTA in the petroleum, chemicals, electrical machinery and transport equipment sectors.

Our paper performs analysis similar to that in Kniahin et al. (2019), using the same GRIPS-ITC Geneva dataset of the 14 basic types of ROO. It is distinguished from that study in two ways. First, we take an approach that, while grounded in more general literature, is tailored to the types and combinations of ROO common in NAFTA and USMCA. This focus allows us to more closely examine the types of ROO and the transitions in ROO across the two agreements. Second, it uses a less data-intensive approach than Kniahin et al. (2019) to estimate the relative stringency of ROO with multiple elements. We show that our rankings of ROO stringency are robust across alternative specifications, demonstrating the reliability of this simplified approach.

3—ROO indexes in Prior Work

As noted above, the construction of product-specific indexes is an established method to analyze the restrictiveness of ROO that exporters may choose to comply with. Before we can begin describing various indexes, we must define and explain the different types of rules of origin. The basic types of ROO fall under 4 categories: wholly obtained (WO), change in tariff classification (CTC), regional value-added content (RVC), and specified process (SP). CTC criteria can include requirements for a product to change at the item level (CTI), subheading level (CTSH), heading level (CTH), and chapter level (CC) in the exporting nation before it is granted origin. In a few cases, an agreement may confer originating status with no change (NC) to tariff classification. Since Estevadeordal (2000), the literature has generally applied the following ranking of restrictiveness for CTC rules:

$$CTI < CTSH < CTH < CC$$

The logic behind this ranking is that higher level changes in the HS hierarchy require more processing. For example, a rule requiring a CTH is more stringent than one requiring a CTSH since the former requires more substantial processing of non-originating inputs to achieve a larger change in product classification. The distance between each category may not be equal, as processing a product to induce a given tariff shift may not be similar to the amount of processing needed to induce a higher-level shift. Furthermore, these distances may be different across products. This characteristic of ROO is apparent

[7] The database can be browsed at http://findrulesoforigin.org. As of May 2, 2021, the database provides information on 374 trade agreements.

with WO requirements, which can be minimally restrictive for agricultural products but substantially restrictive for others. As mentioned above, such product-specific idiosyncrasies can lead to situations where the ranking above is not as strict as presented. For example, Kniahin et al. (2019) note that, for roasted coffee, criteria of WO, CC, and CTH have almost the same restrictiveness because the processing to satisfy a CTH rule would also nearly satisfy a CC or WO rule.

The foundation of ROO ranking is provided in Estevadeordal (2000), who developed an index to classify CTC and RVC ROO by restrictiveness based on assumptions about the relative difficulty exporters would have to comply with different types of ROO. The index takes values from 1–7, where 1 is the least restrictive value and 7 is the most restrictive (table 1). Underlying the index is the same assumption about CTC ROO above, that a change at a higher level in the HS hierarchy is more restrictive than a change at a more disaggregated level.[8] The methodology includes a limited number of ROO requiring multiple criteria (e.g., CTH + RVC), which raise the index value. When ROO provide alternative methods to confer origin, Estevadeordal assigns the most restrictive score among the available options.

Table 1: Estevadeordal (2000) index values

ROO Category	Index value
≤CTI	1
≤CTSH	2
≤CTSH + RVC	3
≤CTH	4
≤CTH + RVC	5
≤CC	6
≤CC + SP	7

Source: Estevadeordal (2000).

Cadot et al. (2006a) builds on Estevadeordal (2000) by including variations in percentage requirements for RVCs, and exclusions or exceptions (ECT) and additions or allowances (ALW).[9] As a result, Cadot et al. (2006a) provides index scores for a larger group of ROO combinations. In contrast to Kniahin (2019), Cadot et al. (2006a) scores the "wholly obtained" category as the least restrictive, noting it is almost exclusively used in agriculture.[10] They base their reasoning on an assessment of agricultural trade in the PANEURO trade agreement. Another important difference from Estevadeordal (2000) is that when alternative ROO are available, Cadot et al. (2006a) assign the minimum score among the available options. Scores again range from 1–7, with 7 being most restrictive.

Harris (2007) also provides an index. This index of product-specific ROO is additive in nature. For ROO requiring multiple criteria, index scores for each element are added together, while the total is reduced modestly for ROO that provide alternatives. The method also adjusts the total to account for exceptions and allowances.

Most recently, Kniahin et al. (2019) provide a methodology to develop a restrictiveness index of ROO based on the GRIPS-ITC Geneva dataset. They define 14 basic types of ROO, and combinations thereof, across their universe of nearly 1.5 million observations covering 271 trade agreements. Their specificity

[8] This assumption is also used in Cadot et al (2006a), and Harris (2007).

[9] Exceptions increase restrictiveness of CTCs since they preclude specific non-originating input(s) from satisfying a CTC, whereas allowances reduce restrictiveness for CTCs by allowing specific non-originating input(s).

[10] We follow the scoring rationale from Cadot et al. (2006a) for the very few "wholly obtained" ROO in NAFTA and USMCA.

(i.e., how ROO restrictiveness depends on the subject product), as well as flexibility to account for ROO combinations, sets their methodology apart from other indexes, though at the time of this writing, their index is not publicly available.

4—Proposed Methodology

The ROO indexes discussed above allow for combinations of ROO elements. Yet the indexes take very different approaches to complex ROO that are common in NAFTA and USMCA. For example, when ROO provide alternatives, Estevadeordal (2000) assigns the maximum value of the ROO's individual elements; in contrast, Cadot et al. (2006a) assigns the minimum; and Harris' reduction for alternatives can bring the total below the minimum of the individual elements.[11] Further, none of the existing indexes explicitly incorporate so-called "hybrid" ROO that include requirements to meet multiple elements while also providing alternatives to confer origin. For example, grand pianos (HS6 920120) have the following ROO in both agreements: "CC or (CC and ALW and RVC 60/50)."

To account for such complexity, we start by incorporating the fundamentals of ROO stringency from prior literature and assume that a change from a more aggregate tariff classification (such as a chapter heading) will be more stringent than a change from a less aggregated classification (such as subheading).

First, we score each of the elemental ROO types in table 2. These values are also used as the basis for scoring more complicated ROO that involve multiple elements. Following Estevadeordal and Cadot et al., we set CTI to a stringency of 1, CTSH to 2, CTH to 4, and CC to 6. We set the stringency of RVC criteria between 4 and 6, depending on the required share of regional content.[12] These choices provide consistency with earlier studies and also ensure that the underlying component ROO have similar stringencies in our index.

Table 2: Element scores

Score	Tariff or processing criteria	Regional value content
1	WO, NC, CTI	
2	CTSH	
4	CTH, SP	RVC 30/25–RVC 45/35
5		RVC 50/40–RVC 65/55
6	CC	RVC 62.5, RVC 65, RVC 75/65

As noted above, it is outside the scope of this small paper to econometrically quantify exact ranking for the many complex ROO appearing in NAFTA and USMCA.[13] A simpler alternative, employed here, is to apply different ranking schemes to indicate whether the alternatives broadly agree in changes of stringency between the two agreements. Although we present only two alternatives here, they have

[11] For examples, see Harris (2007), 119–120.

[12] Regional value content can be measured multiple ways. RVC 30/25, for example, confers origin if a 30 percent share is achieved using the transaction value method or 25 percent share by the net cost method; when only one value is given for RVC, the net cost method is usually required. There are also less frequently used content measures, such as the regional quantity share for parts (RQP), which confers origin if a regional quantity percentage for parts, as measured by weight of materials, has been achieved. These other ROO were ranked assuming that similar required shares indicated similar stringency as RVC.

[13] Our index values are targeted to NAFTA and USMCA and may require some adjustments if applied to other trade agreements.

been designed to represent the lowest and highest stringency that various combinations of elements are likely to present.[14]

The first index, the “floor”, is designed to present the lowest stringency that can be reasonably assumed to represent complex ROO. This index assumes that, when ROO require multiple elements to be satisfied, satisfying the most restrictive element fully satisfies origin requirements for all other elements. For example, in a rule of “CC and RVC 50”, this index assumes that RVC 50 is met in the course of the processing required to meet the tariff shift, and hence, does not act as an additional restriction, per se. Mathematically, this is equivalent to using the maximum stringency of individual elements when presented with multiple requirements. For ROO that provide alternatives, this index follows Cadot et al. (2006b), assuming that the least restrictive element represents the overall restrictiveness. Mathematically, this is equivalent to using the minimum stringency among individual elements when presented with alternatives.

The second index, the “ceiling”, is designed to present the highest stringency that can be reasonably assumed to represent complex ROO. This index assumes that, when ROO require multiple elements to be satisfied, satisfying the most restrictive element does not make it easier to comply with other elements. Mathematically, this rule applies the sum of individual elements in these cases.[15] For ROO that provide alternatives, this index follows Estevadeordal (2000), assuming that the most restrictive element represents the overall restrictiveness. Mathematically, this is equivalent to using the maximum stringency among individual elements when presented with alternatives.

The ceiling index is our preferred specification, as it provides a wider range of restrictiveness scores and less compression of values for individual ROO. Hence, it helps to identify more of the movement in restrictiveness across the two agreements. Table 3 presents some examples of ROO in the agreements and how they are scored under the two methods.

As noted above, one limitation of this paper is that we do not incorporate exclusions or allowances in either index; similarly, we do not include sector-specific supply chain information as in Kniahin (2019). Incorporating this information might allow us to determine which of the two indexes is more appropriate for product-specific ROO. However, given the consistency in results provided by the two alternative indexes here, we do not feel this detail would alter the conclusions below.

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[14] Other unreported approaches, such as using averages, consistently produced results intermediate to these two alternatives.

[15] The ceiling index should be interpreted as a comparison of maximum stringency represented by ROO combinations. It cannot provide exact comparisons, since the stringency of elements in table 2 upon which our index is based are ordinal rankings, not set by underlying values of stringency such as administrative costs. For example, a requirement to meet two elements, one with a stringency ranking of 1 and the other with ranking 5, may have different overall stringency than a single non-compound ROO element of ranking 6.

Table 3: Examples of ROO scoring by index

ROO	Underlying element values	Floor sub-elements (Or = min; And = max)	Floor overall score	Ceiling sub-elements (Or = max; And = sum)	Ceiling score
CC or (CTSH and RVC 60/50)	6 or (2 and 5)	6 or 5	5	6 or 7	7
(CTH and SP) or RQP 75	(4 and 4) or 6	4 or 6	4	8 or 6	8
CTSH or (CTSH and RVC 60/50)	2 or (2 and 5)	2 or 5	2	2 or 7	7
CC and SP	6 and 4	6	6	10	10
CTH and RVC 60/50	4 and 5	5	5	9	9

5—Results

As noted above, this analysis uses a dataset produced by GRIPS and ITC-Geneva—the same dataset used by Kniahin et al. (2019). This dataset encompasses all ROO in U.S. RTAs and contains 135 distinct types of ROO in the NAFTA and USMCA agreements.

Our analysis of the differences regarding ROO in USMCA and NAFTA begins with a basic accounting of changes in ROO at the HS6 level. This comparison is limited to the 4,092 HS6 subheadings that are defined in both agreements. It omits (1) HS6 subheadings present in NAFTA but obsolete by the implementation of USMCA, and (2) HS6 subheadings present in USMCA that did not exist at the time of the NAFTA's implementation.[16] The following analysis goes through our results at different levels of aggregation, starting with the HS sections, then HS chapters, and ending with a presentation of changes in ROO at the HS6 level.

As shown in table 4, over one-third (35.9 percent) of product-specific ROO changed between NAFTA and USMCA. The extent of change varies widely by section of the tariff schedule, which contain one or more HS chapters. Sections 6 (chemical products) and 7 (plastic and rubber products) exhibit the greatest change, in both the number and share of HS6. Chemicals in particular had close to 100 percent change. In contrast, most agriculture and food products as well as textile, apparel, and footwear products had limited change in ROO across the two agreements.

[16] In the GRIPS-ITC database, there are 928 HS6 tariff lines that in NAFTA and not in USMCA, and 1,112 that are only in USMCA and not in NAFTA.

Table 4: ROO changes by HS section

Section	HS chapters	Number of HS6	Number of ROO changes	Share of ROO changes (%)[a]
01: Live animals and animal products	1–5	138	0	0.0
02: Vegetable products	6–14	193	21	10.9
03: Animal and vegetable fats and oils	15	37	34	91.9
04: Food, beverages, spirits, and tobacco	16–24	157	15	9.6
05: Mineral products	25–27	128	57	44.5
06: Chemicals and allied products	28–38	625	614	98.2
07: Plastic and rubber products	39–40	173	161	93.1
08: Leather, fur, travel goods and handbags	41–43	36	5	13.9
09: Wood, wood products, and other plant-based products	44–46	49	7	14.3
10: Wood pulp, paper, and paperboard	47–49	109	14	12.8
11: Textiles, textile products, and apparel	50–63	699	60	8.6
12: Footwear, headgear, and accessories	64–67	43	1	2.3
13: Stone, ceramic, and glass products	68–70	112	24	21.4
14: Pearls, precious stones and metals, jewelry, and coins	71	49	15	30.6
15: Base metals and articles of base metals	72–83	451	89	19.7
16: Machinery and mechanical appliances; electrical equipment and parts	84–85	658	231	35.1
17: Vehicles, aircraft, and vessels	86–89	121	51	42.1
18: Precision machinery, including optical, medical, and other	90–92	188	52	27.7
19: Arms and ammunition	93	12	0	0.0
20: Miscellaneous manufactured goods	94–96	107	16	15.0
21: Works of art and antiques	97	7	0	0.0
Total		**4,092**	**1,467**	**35.9**

Source: Authors' calculations based on GRIPS and International Trade Centre, 2019, "U.S. Rules of Origin Database."

[a] Includes changes to exceptions and allowances, factors we did not include in our stringency index.

Table 5: ROO stringency changes by HS section

Section	HS chapters	Total HS6	Share less stringent, floor (%)	Share more stringent, floor (%)	Share less stringent, ceiling (%)	Share more stringent, ceiling (%)
01: Live animals and animal products	1–5	138	0.0	0.0	0.0	0.0
02: Vegetable products	6–14	193	4.1	0.0	4.1	0.5
03: Animal and vegetable fats and oils	15	37	0.0	0.0	0.0	0.0
04: Food, beverages, spirits, and tobacco	16–24	157	2.5	2.5	2.5	2.5
05: Mineral products	25–27	128	35.2	3.9	30.5	3.9
06: Chemicals and allied products	28–38	625	87.8	3.2	92.0	4.5
07: Plastic and rubber products	39–40	173	51.4	0.0	50.9	0.0
08: Leather, fur, travel goods and handbags	41–43	36	13.9	0.0	13.9	0.0
09: Wood, wood products, and other plant-based products	44–46	49	8.2	0.0	8.2	0.0
10: Wood pulp, paper, and paperboard	47–49	109	12.8	0.0	12.8	0.0
11: Textiles, textile products, and apparel	50–63	699	0.3	0.0	0.3	5.0
12: Footwear, headgear, and accessories	64–67	43	4.7	0.0	4.7	0.0
13: Stone, ceramic, and glass products	68–70	112	3.6	17.9	3.6	17.9
14: Pearls, precious stones and metals, jewelry, and coins	71	49	30.6	0.0	30.6	0.0
15: Base metals and articles of base metals	72–83	451	13.3	0.2	8.9	4.7
16: Machinery and mechanical appliances; electrical equipment and parts	84–85	658	22.6	0.2	25.7	4.0
17: Vehicles, aircraft, and vessels	86–89	121	4.1	6.6	9.1	10.7
18: Precision machinery, including optical, medical, and other	90–92	188	13.8	0.0	13.3	12.8
19: Arms and ammunition	93	12	0.0	0.0	0.0	0.0
20: Miscellaneous manufactured goods	94–96	107	12.1	0.0	15.0	0.0
21: Works of art and antiques	97	7	0.0	0.0	0.0	0.0
Total		**4,092**	**24.3**	**1.4**	**25.0**	**4.3**

Source: Authors' calculations based on GRIPS and International Trade Centre, 2019, "U.S. Rules of Origin Database."

Having considered the changes in ROO, we now look at whether those ROO became more or less difficult for exporters to comply with. Table 5 presents the shares of HS6 subheadings with ROO that changed stringency in each HS section. Focusing on our preferred index, the ceiling, of the 21 sections in table 5, 5 had no change in overall stringency, 13 became less stringent, and 3 became more stringent, as measured by the net shares of HS 6 that changed stringency.

Chemical products (section 6) have by far the greatest share of subheadings—around 90 percent—with reduced stringency in USMCA. Plastics and rubber as well as pearls and precious stones also have notable declines. Sections with notable shares of subheadings that become more stringent include section 13 (stone, ceramic, and glass), section 17 (vehicles and aircraft), and in our preferred specification, section 18 (precision machinery).[17] Notably, animal and vegetable fats and oil products did not have any change in stringency in table 5, despite over 90 percent of the products changing ROO, as shown in table 4. This is because all changes to ROO involved addition or removal of exceptions and allowances, criteria not included in our index scores.

A similar pattern emerges when we disaggregate to the HS chapter level. While 39 of the 97 HS chapters saw no ROO changes, 28 chapters experienced a change in at least 50 percent of HS6 sub-headings, and 13 chapters had a change in all subheadings. Thirty-eight of the 97 chapters had a higher share of tariff lines that moved to a less stringent ROO than subheadings that were assigned a more stringent rule, and only 5 chapters had the opposite occur. The majority of ROO changes (742 of 1,467 total changes, or 50.6 percent) took place in five chapters that include chemicals, plastics, and machinery products (table 6). Each of these chapters show substantial movement of subheadings towards less stringent ROOs.

Table 6: HS chapters with the most ROO changes

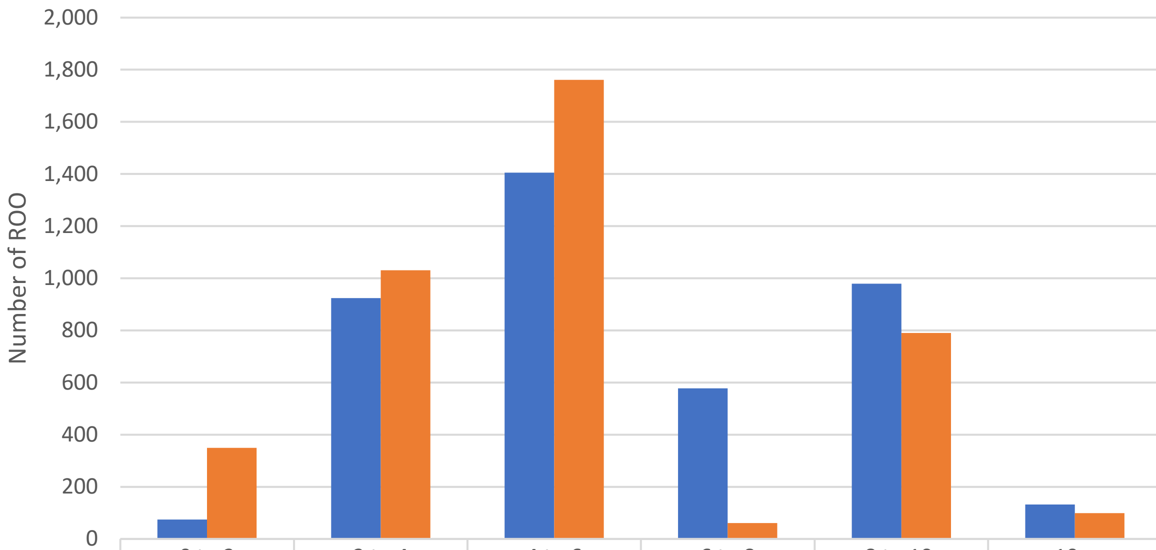
HS Chapter	Total HS6	Changed ROO criterion	Percent changed	Share less stringent, floor (%)	Share more stringent, floor (%)	Share less stringent, ceiling (%)	Share more stringent, ceiling (%)
29 – Organic chemicals	236	236	100.0	100.0	0.0	100.0	0.0
28 – Inorganic chemicals	158	158	100.0	98.1	0.0	98.1	1.9
85 – Electrical Machinery and parts	196	132	67.3	36.2	0.0	44.4	7.1
39 – Plastics	117	117	100.0	52.1	0.0	52.1	0.0
84 – Machinery	462	99	21.4	16.9	0.2	17.7	2.6

Source: Authors' calculations based on GRIPS and International Trade Centre, 2019, "U.S. Rules of Origin Database."

Overall, as shown in table 5, ROO for HS6 subheadings were more likely to become less stringent (25 percent) in USMCA than more stringent (4.3 percent). Figure 1 visually illustrates the changes occurring between NAFTA and USMCA, based on our index, and the trend towards less stringent ROO. There is a clear distinction between the two agreements. Many tariff lines that originally had a ROO in NAFTA rated between 6–10 became less stringent in USMCA, with a rating between 0–6.

[17] The difference between the two indexes in section 18 are driven by the share of changes that involve compound and hybrid ROO in the section. Table 7 presents the changes by category of ROO.

Figure 1: ROO index values for NAFTA and USMCA



	0 to 2	2 to 4	4 to 6	6 to 8	8 to 10	10 +
NAFTA	74	924	1405	578	979	132
USMCA	350	1031	1761	61	790	99

Note: Lower bound on bins is exclusive while upper bound is inclusive.
Source: Authors' calculations based on GRIPS and International Trade Centre, 2019, "U.S. Rules of Origin Database."

The ROO transitions between NAFTA and USMCA are presented in more detail in table 7, which presents the number of HS6 codes that transition between ROO categories from NAFTA to USMCA. ROO categories have been combined for presentation purposes and we have arranged this matrix so that average stringency, based on the unweighted average index score for each category, declines as you move from left to right or top to bottom. If an HS6 subheading moves to the right in the table, it is subject to a less stringent ROO category in USMCA than NAFTA, while conversely moving left indicates a transition to a more stringent ROO category in USMCA. The diagonal represents products that did not change ROO category. Given the volume of subheadings in the upper right half of the table, generally, we contend that it became easier for exporters to obtain origin for many products under USMCA.

A comparison of corresponding row and column totals shows the prevalence of each category in the two agreements. This comparison shows that the most stringent ROO, shown in the first row, had the most change. These products required a shift in tariff chapter in NAFTA, but about 80 percent were changed to less stringent categories that required only a shift in tariff heading or subheading. Other common changes in USMCA involve a change from a ROO requiring a change in tariff heading to one requiring a change in subheading. Lastly, we see that USMCA created two new categories of ROO—"CTSH or RVC" and NC. The latter does not require that a product be transformed from a different subheading to obtain origin. However, there are combinations of rules involving NC that may raise the stringency score.

Table 7: ROO transitions between NAFTA and USMCA

NAFTA	USMCA: CC hybrid / CC + RVC	SP hybrid / CC + SP	CTH + RVC	CTH Hybrid	CTSH hybrid / CTSH + RVC	CC / CTSH + SP / RVC	CTH or RVC	CTSH or RVC	CTH	CTSH	NC	Mul-tiple	Other	Total
Average index score	10.62	10.00	9.00	8.89	6.02	6.00	5.17	4.35	4.00	2.00	1.05	5.52	4.00	5.90
CC hybrid / CC+RVC	110	0	0	13	391	4	0	40	7	47	1	8	0	621
SP hybrid / CC+SP	0	253	0	0	0	0	5	0	0	1	0	0	1	260
CTH+RVC	0	0	115	0	0	0	0	0	61	3	0	15	0	194
CTH hybrid	0	0	0	357	2	0	3	19	24	134	9	12	0	560
CTSH hybrid / CTSH+RVC	0	0	0	0	9	0	0	8	0	5	23	0	0	45
CC/CTSH+SP/ RVC	4	35	0	7	0	1163	0	6	72	27	1	44	7	1,366
CTH or RVC	0	0	0	0	0	0	20	0	0	0	0	0	0	20
CTSH or RVC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTH	0	2	0	5	1	44	32	9	764	16	7	15	0	895
CTSH	1	0	0	0	3	0	0	2	0	50	17	1	0	74
NC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Multiple	0	0	0	1	0	0	0	0	1	2	2	49	1	56
Other	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Total	115	290	115	383	406	1,211	60	84	929	285	61	144	9	4,092

Source: Authors' calculations based on GRIPS and International Trade Centre, 2019, "U.S. Rules of Origin Database."
Note: These categories are aggregations and do not necessarily correspond to those in the database. For space considerations, the term "hybrid" is used here to denote ROO that include multiple elements to be satisfied as well as an alternative rule. For example, the first ROO in table 3, "(CC + ETC) or (CTSH and RVC 60/50)" would be considered a CC hybrid in this table.

6—Conclusion

This paper looks closely into the evolution of rules of origin between NAFTA and USMCA. We find that, generally, the ROO in USMCA became simpler and less stringent. We employ an innovative database on ROO from GRIPS and the International Trade Centre in Geneva to categorize ROO and an index, of our own construction, to quantify the restrictiveness of their requirements. The index maintains consistency with other indexes in the literature while accounting for the idiosyncrasies in NAFTA and USMCA ROO.

There was substantial change in ROO between NAFTA and USMCA. Among the 4,092 HS6 common to both agreements, almost 36 percent of the HS6 lines changed ROO categories. There are notable concentrations of changes in the chemicals, rubber and plastics, and machinery sectors. However, changes to ROO do not tell the complete story. Considering ROO restrictiveness (i.e., difficulty of compliance), using our index, we find that 25 percent of the HS6 common to both agreements are subject to a less restrictive ROO in USMCA, while only 4 percent became more restrictive. Once more data is available for trade under USMCA, we expect that future research will be able to delve into questions of how these changes may have affected trade flows.

References

Anson, Jose, Olivier Cadot, Antoni Estevadeordal, Jaime de Melo, Akiko Suwa-Eisenmann and Bolormaa Tumurchudur. “Rules of Origin in North-South Preferential Trading Arrangements with an Application to NAFTA,” mimeo, University of Lausanne, 2003.

Burfisher, Mary, Frederic Lambert, and Troy Matheson. “NAFTA to USMCA: What is Gained?” IMF Working Paper WP/19/73, 2019.

Cadot, Olivier, Céline Carrère, Jaime De Melo, and Alberto Portugal-Pérez. "Market access and welfare under free trade agreements: textiles under NAFTA." *The World Bank Economic Review* 19, no. 3 (2005): 379–405.

Cadot, Olivier, Céline Carrère, Jaime De Melo, and Bolormaa Tumurchudur. "Product-specific rules of origin in EU and US preferential trading arrangements: an assessment." *World Trade Review* 5, no. 2 (2006a): 199–224.

Cadot, Olivier, Antoni Estevadeordal, and Akiko Suwa-Eisenmann. "Rules of origin as export subsidies." In *The origin of goods: Rules of origin in regional trade agreements*. Oxford University Press on Demand (2006b).

Carrère, Céline, and Jaime de Melo. ‘‘Are Different Rules of Origin Equally Costly? Estimates from NAFTA.’’ Discussion Paper 4437. London: Centre for Economic Policy Research (2005).

Chiquiar, Daniel, Jesus Cañas, Armando Aguirre, and Alfonso Cebreros. “Mexico’s Higher Costs Under USMCA May Potentially Offset Gains from China-Related Trade Spurt with U.S.” *Southwest Economy*, 2020. https://www.dallasfed.org/research/swe/2020/swe2001/swe2001b.aspx

Ciuriak, Dan, Ali Dadkhah and Jingliang Xiao. “Quantifying CUSMA: The Economic Consequences of the New North American Trade Regime,” C.D. Howe Institute, Working Paper, February 2020.

Conconi, Paola, Manuel García-Santana, Laura Puccio, and Roberto Venturini. "From final goods to inputs: the protectionist effect of rules of origin." *American Economic Review* 108, no. 8 (2018): 2335–65.

Dziczek, Kristin, Michael Schultz, Bernard Swiecki, and Yen Chen. “NAFTA Briefing: Review of current NAFTA proposals and potential impacts on the North American automotive industry.” Center for Automotive Research, 2018. https://www.cargroup.org/wp-content/uploads/2018/04/nafta_briefing_april_2018_public_version-final.pdf.

Estevadeordal, Antoni. “Negotiating Preferential Market Access: The Case of the North American Free Trade Agreement.” *Journal of World Trade* 34, no. 1 (2000).

Francois, Joseph. “Preferential Trade Arrangements and the Pattern of Production and Trade when Inputs are Differentiated.” Tinbergen Institute and CEPR, 2005.

Global Affairs Canada. *The Canada-United States-Mexico Agreement: Economic Impact Assessment*. Global Affairs Canada, 2020. https://www.international.gc.ca/trade-commerce/assets/pdfs/agreements-accords/cusma-aceum/CUSMA-impact-repercussion-en.pdf.

Kniahin, Dzmitry, Duy Dinh, Monder Mimouni, and Xavier Pichot. “Global Landscape of Rules of Origin: Insights from the New Comprehensive Database.” Presented at the 22nd Annual Conference on Global Economic Analysis, Warsaw, Poland, 2019.

Schott, Jeffrey. "For Mexico, Canada, and the United States, a Step Backwards on Trade and Investment," Peterson Institute for International Economics, 2018. https://www.piie.com/blogs/trade-investment-policy-watch/mexico-canada-and-united-states-step-backwards-trade-and.

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

U.S. International Trade Commission (USITC). United States-Mexico-Canada Agreement: Likely Impact on the U.S. Economy and Specific Industry Sectors. USITC Publication 4889. Washington, DC: USITC, 2019.