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MITIGATING NON-TARIFF MEASURES IN AGRICULTURE: PREFERENTIAL TRADE AGREEMENTS AND CONVERSATIONS

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EXECUTIVE SUMMARY

Regulatory divergence between countries is creating barriers to market access in international agri-food trade, becoming what are known as non-tariff measures (NTMs). NTMs create friction in international trade, increasing fulfillment costs and, if sufficiently burdensome, pose a very real threat to global food security.

More countries, including Canada, are turning to preferential trade agreements (PTAs) to liberalize trade. The Comprehensive Economic and Trade Agreement (CETA) between Canada and the European Union was heralded as comprehensive in its coverage, reducing or eliminating tariffs in virtually all aspects of trade. Overall bilateral trade has increased since CETA came into force but not for many of Canada's agri-food exporters. CETA's tariff-focused agenda did little to mitigate the NTMs impeding many Canadian agri-food exports.

NTMs are not unique to Canada-EU trade. They are an increasing factor impeding world food trade as more governments are basing policy decisions on ideological or political factors rather than sound science. As a result, regulatory divergence in NTMs is widening among a greater number of countries. The agri-food trade system becomes less predictable, riskier and more volatile. For international trade, it has been described as a slow death by 1,000 regulations.

The only means to address regulatory divergence is to facilitate regulatory convergence. This is not an easy task given the number of multi-disciplinary stakeholders involved, both domestic and international. While PTAs are not well equipped to legislatively force convergence, they do provide informal and formal opportunities for building networks, strengthening relationships and opening communication channels that can foster and facilitate regulatory convergence. Every opportunity to do so, whether bilaterally, through PTAs or multilaterally, must be taken advantage of.

POLICY RECOMMENDATIONS:

- Create and maintain a sustained, continuous, vocal global conversation to counter political factors in science-based decision-making, recognizing that economic rationale is not always an incentive.
- Use every forum and venue available to build networks, strengthen relationships and open communication channels among agri-food trading partners, including the informal and formal options provided by PTAs, multilateral groups and the World Trade Organization to facilitate and encourage any and all means of regulatory convergence. This may be through mutual recognition, equivalence, harmonization or international standards. Do this by:
 - Fostering co-ordinated and sustained collaborative processes among domestic agri-food stakeholders to address international agri-food NTMs. Repeat among and with international counterparts.
 - Take greater advantage of the role PTAs have as flexible mechanisms of bilateral co-operation and soft obligation to facilitate regulatory convergence.
- Counter death by 1,000 regulations of agri-food trade with 100,000 steps.

INTRODUCTION— NON-TARIFF MEASURES (NTMS)¹ IN AGRICULTURE

NTMs are a broad range of policy tools implemented by individual countries which affect the international trade in goods and services, either in price, quantity or both. Because individual countries have unique approaches to implementing and enforcing NTMs, regulatory divergence occurs. This causes friction for those foreign firms wanting to export to multiple international markets, as the rules and regulations will likely be different in each market for the same product (UNCTAD n.d.; Gourdon et al. 2020; Yeung et al. 2017a).

NTMs are most widespread in the agriculture/agri-food sector because of its broad geographic distribution and coverage across imported goods as well as, on average, more measures applicable per product. While there are other barriers² to agricultural trade, this discussion will focus on the sanitary and phytosanitary (SPS) rules and technical barriers to trade (TBT) which have become pernicious NTMs impeding the flow of agricultural goods. SPS and TBT are standards, rules and regulations intended to protect human, plant, animal or environmental health and well-being. As regulatory divergence occurs, SPS and TBT measures can act as barriers to trade, becoming NTMs.

¹ Also commonly known as non-tariff barriers. UNCTAD has revised the official terminology to measures.

² Tariffs and trade-distorting subsidies.

Differentiating between a legitimate regulatory measure and one intended for protectionist purposes can be a difficult task. The World Trade Organization (WTO) SPS Agreement provides rules on how science and trade policy should interact, but does not specifically instruct countries on how to achieve this balance. Some have chosen a more science-based approach while others include more social rationality or precautionary components in their regulatory frameworks (Isaac 2007). The WTO TBT Agreement strongly encourages members to base their measures on international standards as a means to facilitate trade, and its transparency provisions attempt to create a predictable trading environment (Hobbs 2007; WTO n.d.). Table 1 in Appendix 1 provides the classification system for NTMs and illustrates their variety and complexity.

This paper will discuss the NTMs impacting Canada's agri-food trade. The Comprehensive Economic and Trade Agreement (CETA) between Canada and the European Union (EU) gives examples of NTMs impeding market access in high-profile agricultural sectors, contrasting between the agreement's predicted results and actual outcomes. An assessment of prevailing global trends in NTMs and market access issues for agri-food exports is provided along with recommendations on how Canada might address them in bilateral, regional and multilateral forums.

TRADE PRE- AND POST-CETA

CETA is intended to be comprehensive in its coverage, reducing or eliminating barriers to trade in virtually all aspects of Canada-EU trade. The Agreement was to bring an estimated \$12 billion in benefits to Canada, with GDP increasing in Canada by 0.77 per cent and in Europe by 0.08 per cent (Government of Canada 2013). Historically, the largest component of trade between the two parties has been machinery and transport equipment. Agriculture is also a historically important trade sector, with Canada exporting grains and oilseeds to the EU while importing processed foods and alcoholic beverages. Canada has maintained a trade deficit with the EU in most sectors, including agriculture (Viju et al. 2010).

Since CETA came into force in September 2017, overall bilateral trade between the two parties has increased substantially, with Canadian exports to the EU increasing by 15 per cent from 2016–2021 and imports from the EU rising by 20 per cent for the same period (Industry Canada 2022). Table 2 in the Appendix presents a snapshot of the change in the top 25 Canadian exports to the EU in 2021 compared to their pre-CETA status in 2016, both in dollar value and percentage.

Canada and the EU are major international agricultural producers and traders. Both protect their agricultural sectors by restricting trade and supporting producers. They maintain high tariffs on sensitive subsectors and use tariff rate quotas (TRQ) with high over-quota tariffs. The Canadian government indicated interest in expanding exports of grains and oilseeds, including durum and common wheat, soybeans, canola oil, frozen fruit and maple syrup, to the EU, as well as meats, fruits and vegetables and processed foods through CETA (Government of Canada n.d.). The EU exports

processed foods and alcoholic beverages to Canada and its interests were to expand exports in these and other products including cheeses, wines and spirits, chocolate, confectionery, bread, pastries and biscuits (EC 2017).

“When CETA comes into force, almost 94 per cent of EU agricultural tariff lines will be duty-free, and seven years later, that number will rise to over 95 per cent. This duty-free access will give Canadian agricultural products, including for a specified amount of Canadian beef, pork and bison ... preferential access to the EU market and a competitive advantage over producers from other countries that do not have a free trade agreement.”

(Government of Canada n.d.)

The Government of Canada reports that agricultural products (HS Codes 1-24 inclusively) represented 9.3 per cent of total bilateral trade in goods between the EU and Canada and increased 14.8 per cent between pre-CETA 2016 and 2019. Agricultural product imports from the EU account for most of this growth. Total Canadian agricultural exports to the EU are reported to have increased more than 59 per cent from 2016 to 2020 (Arnason 2021), as CETA eliminated tariffs on a majority of Canadian agri-food exports, including pet food, frozen french fries, prepared vegetables, fruit juices, condiments, maple syrup, fresh cherries and apples (Global Affairs Canada 2021a). Yet, for many of Canada’s most important and largest value agri-food exports, including many of those in Table 2, the elimination of tariffs has had no impact as they were already duty-free.³ Crustaceans and wheat⁴ appear to have significantly benefited from CETA’s implementation. Duty elimination benefited seafood but not salmon (AAFC 2021e; Global Affairs Canada 2021a, 2021b; Industry Canada 2022).

“CETA will provide new market access opportunities for key Canadian agricultural exports: beef, pork and bison. These world-class products will now benefit from preferential treatment in the EU. CETA establishes tariff rate quotas for each product, giving Canadian farmers yearly duty-free access for up to:

- *80,000 tonnes of pork (including consolidation of existing quota of approximately 6,000 tonnes);*
- *50,000 tonnes of beef; and*
- *3,000 tonnes of bison.*

In addition, CETA will give farmers duty-free access:

- *for high-quality beef under existing quota of nearly 15,000 tonnes (Hilton beef quota, current duty of 20 per cent); and*
- *for processed beef, pork and bison products.”*

(Government of Canada n.d.)

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Including soy beans, dried pulses, canola seeds, corn seed other than sweet corn (Government of AB 2017; Soy Canada 2017; Canola Council of Canada 2021; Brown 2018).

⁴

Due to the increase in its TRQ. Italy’s implementation of country-of-origin labelling rules, against EU policy, has curtailed Canadian wheat exports to its specific market.

According to the European Commission (EC), pork and beef exports were “one of the most important elements for Canada in this negotiation” (Powell 2019), yet CETA’s promised benefits for these internationally competitive Canadian sectors have not materialized (CBC 2019). Despite increases in their duty-free quotas, beef and pork exports have stagnated. Canadian beef has hardly used any of its allotted export quota and pork exports are not worth mentioning (Powell 2019, 2020; Canada Beef 2021; Arnason 2021). Bison exports have benefited from gaining a stand-alone quota separate from beef, tripling from 2014–2018 (MB Agriculture n.d; Arnason 2020b; Duckworth 2018).⁵ CETA eliminated the 26.5 per cent tariff for EU beef and veal entering Canada (Duckworth 2017) and imports of both have grown considerably (Arnason 2021, 2022). Since CETA’s implementation, Canada has sustained a growing trade deficit in red meat, growing from \$155 million in 2018 to an estimated \$275 million in 2021 (Arnason 2020a, 2022). The Canadian Agri-food Trade Alliance (CAFTA) reported in 2019 that since 2017, when CETA entered into force, EU agri-food exports to Canada have increased by over 10 per cent while Canadian agri-food exports to the EU have declined by 10 per cent, increasing the trade deficit to \$3.5 billion (CAFTA 2019). The agriculture component of CETA was supposed to be a beef and pork in exchange for cheese deal. The cheese portion has come to fruition as Canada’s doubling of the duty-free EU cheese quota to 18,500 tonnes (four per cent of Canada’s highly protected market) has been nearly fully used by European cheese exporters⁶ (Powell 2019), but the Canadian beef and pork exports side of expectations are far from being met (Charest et al. 2020; Fraser 2020; Montgomery 2020).

NTM BARRIERS TO MARKET ACCESS - SOME EXAMPLES IN CETA

Traditionally, governments granted domestic producers protection from international competition. The WTO, SPS and TBT were framed on this premise. More recently, members of civil society have been asking their governments for regulatory protection from imported goods, including food. These include opponents of genetically modified (GM) products, consumers concerned about the origin, quality and safety of their food supply, environmentalists, food ethicists and those opposed to international trade, among others. SPS and TBT measures have become the EU’s tool of choice in answering the demands of these groups, often against its WTO commitments (Isaac 2007; Kerr 2004, 2015; Viju et al. 2012, 2014; Isaac and Kerr 2007).

The WTO and its Agreements are poorly equipped to address these new calls for protection from consumers, but the SPS Agreement did enshrine science as the rationale behind implementing SPS measures (Isaac 2007; Hobbs 2007). Achieving international consensus on operationalizing and depoliticizing science-based

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Bison are still included as beef in the Harmonized System (HS) of tariff classification; therefore, statistics on Canadian beef exports using the HS system will include bison, inflating the value of beef exports, which can lead to confusion. The North American Industry Classification System (NAICS) does separate bison from beef where it is included in a category with other types of niche livestock.

⁶

The EU has raised concerns with Canada’s administration of the cheese TRQ affecting the consistency of the EU’s market access (Smith 2019). Canada has similar issues with the EU’s administration of the beef TRQ (Government of Canada 2021).

decision-making has, however, proven to be acrimonious and difficult, with the global community largely divided into two camps — the U.S. and Canada, among others, in one, the EU, among others, in the other (Smyth et al. 2011, 2013; Isaac and Kerr 2007). The EU’s inclusion of social rationality and a strong precautionary principle in its risk assessment framework for SPS measures makes its framework only partially reliant on science (Van den Belt 2003; Viju et al. 2012; Isaac 2007). The role of science is to inform the approval process, along with a political process that involves non-scientific factors, in decision-making (Viju et al. 2012) and places the EU on a divergent path from that of Canada, the U.S. and others, resulting in increasingly misaligned regulatory systems and more market access barriers (Smyth et al. 2011, 2013; Yeung et al. 2017b). While CETA demonstrates many examples of regulatory misalignment where SPS and TBT measures remain effective market barriers for Canadian agricultural products,⁷ only a few will be discussed here to illustrate the complexity of NTMs.

GM PRODUCTS AND BIOTECHNOLOGY

Canada, the U.S. and other major agricultural producers are broad adopters of GM technology while other countries maintain a full or partial ban on GMs. The EU maintains a de facto zero tolerance policy for such products in the human food chain⁸ but permits their use and sale for non-human (mostly livestock feed) and industrial uses (Hobbs et al. 2014; Viju et al. 2014). GM products must be authorized by the EU and must meet strict traceability and labelling requirements, regardless whether for food or feed use (Viju et al. 2014). In 2015, 19 of the 27 member states chose to opt out of the pan-EU policy allowing cultivation of GM crops, essentially maintaining a de facto EU-level cultivation ban (EC n.d.). In sharp contrast, the EU imports 60 per cent of its feed for the livestock sector, most of which is GM (USDA 2021; Coghlan 2015; BBC 2015). While the feed must be labelled as GM, the products that are created from the livestock consuming GM feed do not have to be labelled as such (EC 2004; Southey 2020b).

The vast majority of Canadian canola (rape), corn and soy crops are GM and are therefore precluded from entering the human food chain in the EU. Canadian exports of canola seed to the EU are destined for livestock feed and biodiesel.⁹ Canadian exports of non-sweet corn (maize) and soybeans are intended for livestock feed. All three were already tariff free prior to CETA (Government of AB, 2017). Thus, growth in exports of these three major agricultural commodities to the EU, as shown in Table 2, are not attributable to CETA tariff reductions. Canadian food products such as canola oil, soybean oil, soybean meal or confectionary items using ingredients derived

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Including but not limited to maximum residue limits (MRLs) of crop protection products, Italy’s country-of-origin labelling requirements for pasta, which contravene EU policy; production and trade-distorting subsidies for sugar and related products; and non-recognition of sustainability practices in canola for biodiesel (White 2020; CAFTA 2020a).

8

While the sale and use of GM crops in food is technically legal in the EU, onerously stringent SPS and TBT requirements, as well as consumer opposition, have effectively precluded GM products from entering the human food chain (EC 2015; Viju et al. 2014; Southey 2020b).

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Canadian canola has been certified to meet EU livestock feed requirements but farms wishing to supply canola for biodiesel must be also be certified for the EU’s Renewable Energy Directive (Canola Council of Canada 2022).

from GM crops are also effectively banned from the EU human food chain, making the elimination of their applicable tariffs under CETA irrelevant. If such products are destined for animal feed or non-food industrial uses, then the tariff elimination may be of benefit if the particular product is not subject to other NTMs.

BEEF, PORK, BISON

The EU maintains layered protection for beef, with reducing high tariffs being the low-hanging fruit in gaining market access. SPS and TBT measures are extensively used by the EU, including banning the import of beef produced using growth hormone¹⁰ (Viju and Kerr 2011; Kerr and Hobbs 2015) and banning the use of antibiotics in cattle production, certification and testing requirements (Powell 2019; Canada Beef 2021; CBC 2019).

Canadian producers can produce beef without using growth hormone but the EU market must be sufficiently profitable to: first, entice this change in production practice which will reduce efficiency by roughly 10 per cent; and second, incent the creation of a requisite segregated supply chain for hormone-free beef. It appears that there is some interest among Canadian beef producers in changing their production practices to specifically meet EU requirements but this remains a very small group (Canada Beef 2021; CBC 2019). Most are not willing to undertake the extra efforts to meet EU requirements when there is high demand for Canadian beef in other markets that can be met without the additional cost and effort. Canadian pork exports also face SPS and TBT measures that impede EU market access, including banned growth promotants (Hobbs and Kerr 2015), labelling requirements, certifications and inspection requirements (Duckworth 2017). Specific changes to meet the EU's requirements in either beef or pork will require completely segregated supply chains that offer full traceability and identity preservation throughout (Viju et al. 2010; Kerr and Hobbs 2015). Unless the underlying SPS and TBT issues are addressed, Canadian exports of meat products to the EU will continue to underperform compared to CETA expectations. However, for specialty or niche producers willing to undertake the additional steps required, the EU can be a promising market.

“The EU market is a mature market where there is a considerable fortress policy to keep out cheap (meat) imports. There is absolutely scope for Canada to secure an interesting niche position in the European market. You need to listen very carefully to what it is they want and deliver it...”

(Duckworth 2017)

In the processed foods sector, Devadoss and Luckstead (2018) list high tariffs and NTMs, including SPS measures, restrictions on GM products, food labelling requirements, certification, traceability, classifications, security-related measures, geographical indications and differences in trademark legislation as barriers impeding Canada-EU trade. CETA reduced or eliminated tariffs in product categories such as

¹⁰ Despite having been ruled as violating its WTO commitments, the EU maintains this ban and chose to accept retaliatory tariffs from the U.S. and Canada on its goods for nearly a decade (Kerr and Hobbs 2015).

sugar and confectionary, prepared cereals, pet foods, seafood and berry products (AAFC 2021a, 2021b, 2021c, 2021d, 2021e). Broad NAICS categories¹¹ show growth in Canadian exports of various processed foods to the EU from 2016 to 2021 (Industry Canada 2022), as shown in Table 3 in the Appendix, likely attributable to CETA.

CETA specifically created a co-operation mechanism to address NTMs for agricultural exports – the CETA Joint Committee and the CETA Committee on Agriculture, which hold regular meetings and discussions (Government of Canada 2021; EC 2020). Canadian agri-food sector stakeholders have communicated their ongoing concerns to the committees yet little resolution has been achieved (Charest et al. 2020; Canadian Pork Council. 2017; Canadian Meat Council. 2018; CAFTA 2019, 2020a, 2020b, 2021).

*“CETA also includes provisions to address non-tariff barriers in the EU, such as those related to animal and plant health and food safety. Building on the strength of existing Canada-EU cooperation in these areas, **CETA establishes a mechanism under which Canada and the EU will cooperate to discuss, and attempt to prevent or resolve, non-tariff barriers that may arise for agricultural exports.** CETA will provide opportunities and tools for Canadian and EU regulators to exchange information in order to better understand each other’s requirements to assist importers and exporters alike.” (emphasis added)*

(Government of Canada n.d.)

When intentions to negotiate a trade agreement with the EU were announced, there was much speculation that given the highly sensitive and protected status of certain agricultural sectors within each party, the agreement would not be overly ambitious about liberalization in agriculture. In a tacit tit for tat, marginal gains in market access for dairy and poultry for the EU would be exchanged for marginal gains in market access for Canadian products with SPS issues, such as growth hormones in beef and biotech (Viju et al. 2010; Viju and Kerr 2011; Kerr and Hobbs 2015). CETA did achieve a modest agenda of liberalization in agriculture but to garner support and goodwill, much more was publicly promised. Negotiating modest liberalization in agriculture could then prevent the sector from becoming an obstacle in the overall negotiations and ultimate ratification of CETA (Kerr and Hobbs 2015; Viju and Kerr 2011). Agricultural liberalization *light* provides tariff reduction or elimination mostly in non-sensitive products but in sensitive products, a high degree of protection with NTMs remains. The agreement does not address NTMs, deferring to its co-operation mechanism to “discuss, and attempt to prevent or resolve” non-tariff barriers. It is a forum to keep talking where difficult issues are typically deferred to later discussions. With no mechanism to incent closure, sensitive or contentious issues will have slow or no resolution (Kerr 2004, 2015; Kerr and Hobbs 2015).

¹¹ NAICS provides data on an industry basis rather than a product basis as the Harmonized System (HS) does. NAICS and HS data are measured and categorized differently and therefore will report results differently.

GLOBAL AGRICULTURE, TRADE POLICIES AND NTMS

Regulatory misalignment and divergence are occurring more frequently, due to asynchronous approvals, lack of equivalence or harmonization and overall declining international co-operation. More countries are implementing individual regulatory regimes, particularly related to food safety, that do not necessarily align with other nations' policies, or international standards or practices as prescribed by the TBT Agreement. There is a myriad of causes for this and the reasons why it is so difficult to address are equally numerous (Smyth et al. 2017). The more divergence, the more friction is created in agri-food trade, which raises fulfillment costs whose cumulative effect thickens borders, gradually grinding trade movement to a halt.

Meeting SPS and TBT requirements becomes increasingly burdensome for exporters in what has been described as a death by 1,000 regulations in a spaghetti bowl of rules. They must incur search, monitoring and compliance costs for each market an individual product may enter. Exporting entails greater risks due to uncertainty and reduced transparency. Reducing disruptions and friction in agri-food trade requires the opposite of divergence. Convergence or harmonization in the establishment of standards is critical to a functional trading system¹² (Yeung et al 2018).

All agri-food exports, including Canada's, are vulnerable to such regulatory differences, strategic use of trade instruments and unilateral actions. It is impossible to provide an exhaustive list of the types of NTMs that affect agri-food trade because there are so many. There are, however, some overreaching issues with inordinate global ability to act as barriers in agricultural trade — maximum residue limits (MRLs) in pesticides and trade in biotechnology/GM products.

MAXIMUM RESIDUE LIMITS¹³

Agricultural chemical use is virtually universal in conventional agriculture as a means of protecting crops from pests, disease and weeds, thus increasing productive crop yield. MRLs are standards to regulate chemical use in domestic production and in imports. They are indicators that Good Agricultural Practices (GAPs)¹⁴ were used in the production of that crop. MRLs are not direct indicators of food safety. There are tens of thousands of MRLs worldwide. The Codex is tasked with developing internationally harmonized MRLs but countries are increasingly creating their own nationally based MRLs, leading to asynchronous regulations. Each crop has an MRL for every chemical product used in its production but the MRL will vary for the same commodity/chemical combination in different countries due to differences in GAPs, climate, growing conditions and pest profiles, as well as testing and evaluation methods. An importing

¹² Not only in agriculture but all goods and services.

¹³ MRLs are also used in veterinary medicines and animal health but this discussion will focus on crop-related agriculture and agri-food applications of MRLs. They are also known as tolerances.

¹⁴ The FAO defines Good Agricultural Practices as "practices that address environmental, economic and social sustainability for on-farm processes and result in safe, quality food and non-food agricultural products" (FAO 2008). See Hobbs (2003) for a discussion of Good Agricultural Practices.

country may not have established the MRL for a particular crop and/or chemical combination (a missing MRL)¹⁵ or the MRL may be different from that of the exporting country (a divergent MRL).

An agricultural producer or exporter that correctly and legally uses the chemical in producing a GAP-compliant food for their home market can find that the same product is rejected at the border of an importing country¹⁶ because of these differences in MRLs, resulting in delays, increased costs and, if a perishable, degradation and possible physical loss of the product itself. Consumers and importers are also affected as they lose access to choice and selection in agri-food and are faced with higher prices. The frequency of these rejections was enough to become a major impediment to the global movement of agri-food products by the early 2000s (Yeung et al. 2017b). Countries are also increasingly banning the use of specific agricultural products on certain crops or altogether,¹⁷ significantly affecting producers' production choices and yields. Stakeholders in global agri-food supply chains are raising their growing concerns about MRL divergence.

Divergent MRLs force producers and exporters to either segregate their product's supply chains in order to export to multiple divergent markets, use alternative crop protection products if available or forgo a particular market altogether, all of which imposes considerable adjustment costs. The USITC (2020, 2021) showed that for the 30 largest globally traded crops, MRL divergence and MRL stringency both reduce trade. It also showed that the loss of export markets due to MRL divergence and stringency negatively affects producer incomes, even if exports are a small portion of their sales. There are many studies available that quantify and measure the impact of MRLs.

The MRL issue is further complicated by public misperceptions about the role of MRLs (Winter and Jara 2015), to which governments are responding with increasingly stringent MRLs in a race to zero tolerances. There is no scientific evidence of demonstrable benefit to food safety in approaching zero, but it is occurring at the expense of significant disruptions to agri-food trade (Hobbs et al. 2014; Yeung et al. 2018). MRLs are one of the most complex and dynamic issues facing global agri-food trade and, of greater concern, global food security.

¹⁵ Missing MRLs present greater risks for exporters due to uncertainty in how the importing country will treat and/or penalize the shipment. The lack of transparency can completely deter shipments.

¹⁶ Clarification between misaligned global MRL regulatory policies and true MRL violations must be made. This discussion focuses on MRL violations due to misaligned global MRL standards for agricultural commodities moving across borders. In this type of MRL violation, crops are produced properly and legally in their domestic market but are being rejected at destination markets. However, MRL violations and rejections also occur as a result of true failures in residue management by producers and exporters and illustrate that the MRL system is in fact operating as intended, as MRLs indicate that GAPs were used. If a true violation occurs, it indicates the resulting product is not GAP compliant. These types of violations are not the focus of this discussion.

¹⁷ This is particularly disruptive for developing countries' producers and exporters who often do not have access to the latest and greatest crop protection products. Producers are often using older generic pesticides which they can afford, have access to and rely upon for efficacy or for which there are often no viable alternatives.

GM AND BIOTECHNOLOGY IN AGRICULTURE

The earlier discussion of GM products in the context of CETA hinted at their contentiousness in global agri-food trade. Global polarization between the non- and pro-GM countries has segregated the world's agri-food trade into two camps and results in asynchronous authorizations whereby a GM crop is authorized for full commercial use in one country but not in another. Most countries do not permit the import of GM products not authorized by their own national bodies even if authorized elsewhere.

Unintended mingling between authorized GM, non-authorized GM and conventional crops can occur at any point in the supply chain, from the seeds planted by producers to fields to handling, transport, distribution or processing. Identity preservation, monitoring, traceability and testing are therefore required along the entirety of domestic and international supply chains, all of which expends significant resources, whose cumulative effects will thicken borders, becoming NTMs. As GM crops and products proliferate, the likelihood of unintended mingling will also increase, whether species-specific mingling (i.e., GM and non-GM corn), interspecies mingling (i.e., GM corn in non-GM wheat), asynchronous mingling (i.e., a GM product authorized in one country but not in another is found in the non-authorizing market) or adventitious mingling (when the GM product is not approved in any market; for example, it is experimental and undergoing field trials).

The degree of tolerance (or lack thereof) for mingling incidents further heightens risk levels for all agri-food exporters to the EU or any GM-restrictive market, whether their product is GM or not. The mingling of a conventional product into a GM one is inconsequential for the GM exporter. In sharp contrast, the mingling of a GM product into a conventional one is disastrous if the destination maintains zero tolerance.¹⁸ SPS and TBT measures play a pivotal role in the regulatory oversight and management of GM products. These regulatory requirements are not established in any harmonized manner globally, reducing transparency and placing considerable increased expense and risk upon all agri-food exporters.

¹⁸

The Canadian flax industry's experience with Triffid flax and the EU is illustrative. See Viju et al. (2014).

MEXICO AND GMOS

Mexico is the world's second largest importer of yellow corn,¹⁹ 95 per cent of which is sourced from the U.S., 92 per cent of that being GM. In October 2021, Mexico announced plans to ban GM corn by 2024, for both food and feed, intending to replace 30 per cent of its total corn imports with increased domestic production. As Mexican corn production has been stagnant for the past five years, this increase in domestic production is unlikely. Since Mexican farmers are banned from cultivating GM corn,²⁰ rapid productivity improvements are equally as unlikely (Pratt 2021a; Garcia 2021; de la Barrera et al. 2020; Alcántara-de la Cruz et al. 2021; Ventura 2021b). The government plans to source the remaining 70 per cent of its needed corn imports from non-GM corn suppliers. As most corn grown is GM, it is unclear where the non-GM corn will be sourced from. Analysts are predicting moderate starvation for the Mexican livestock herd as a result of the GM corn ban²¹ and the improbability of finding non-GM supplies.

The government is also banning glyphosate by 2024. Mexico's National Agricultural Council states that the combined ban threatens to decrease the country's corn production by 30–45 per cent, in sharp contrast to the government's plan to increase production by 30 per cent (Alcántara-de la Cruz et al. 2021; Pratt 2021a; Garcia 2021). Converting Mexico to the government's envisioned agro-ecological-organic production system will require more farmland and resources, neither of which is readily available (de la Barrera et al 2020; Ventura 2021b). Agricultural groups, farmers' groups and other agricultural stakeholders' efforts to stop the bans have been unsuccessful thus far. Observers expect food prices to drastically increase, exacerbating existing inflationary pressures on consumers' food purchases (Garcia 2021; Alcántara-de la Cruz et al. 2021).

Most of the world's corn production is grown for livestock feed or industrial uses and is GM. Conventional and organic corn is mostly for human consumption.²² To switch from importing GM to non-GM corn means Mexico requires a combination of organic and conventionally produced corn. Organic production is always more expensive than conventional. Even if organic supplies were to be sourced, it is improbable that Mexico's consumers and livestock producers could afford them (Ventura 2021a).

The government of Mexico has since clarified that the GM ban is applicable to corn

¹⁹ Yellow corn is primarily used for feed and industrial uses while sweet corn is intended for human consumption.

²⁰ Mexico has long maintained a GM cultivation ban in corn to protect heritage varieties amid fears of mingling, environmental release and cross pollination (de la Barrera et al. 2020; Deslandes 2022). Although other GM crops are not technically banned from cultivation, no new GM crops have been approved in Mexico since 2018 (Ventura 2021b).

²¹ This is a similar situation that the EU livestock industry faced due to the totality of the EU's 2009 GM ban (Euractiv 2009). In 2011, the EU amended its policy to allow trace amounts of GM in crops to enter as livestock feed (Euractiv 2011) and has since been regularly authorizing GM crops for livestock feed (USDA 2022; BBC 2015). The EU is one of the world's largest importers of livestock feed (Hasha 2002).

²² In the U.S., conventional corn accounts for five to 10 per cent of corn grown, while organic accounts for less than one per cent.

intended for human consumption only and imports of GM corn for feed and industrial use will be allowed to continue. The situation remains volatile and observers believe that Mexico's officials have been warned their actions could violate USMCA provisions, which could bring dispute settlement action from its major trade partners (Deslandes 2022).

While Mexico's GM corn/glyphosate ban mainly affects U.S. exporters, Canadian producers are closely monitoring the situation. Canada grows varieties of GM soy and canola which are tolerant of glyphosate. Mexico's bans could easily be expanded to other crops. It could potentially reduce the MRLs for glyphosate or other pesticides. Glyphosate use is nearly universal in conventional crop production in Canada. The situation clearly illustrates the unpredictability and risks posed by NTMs that agricultural and agri-food supply chains must contend with, particularly in relation to GM products and crop protection chemicals. It also shows how decisions not based in sound science can have negative impacts on an industry governed by biological science. The situation also demonstrates the complex cross-sectoral linkages between culture, environment, policy, science, international trade, food and agriculture. It is these cross-sectoral linkages that create the most risk for agricultural and agri-food trade as policy actions have complex and lasting ripple effects.

Harmonization or convergence is needed to mitigate these disruptions. Yeung et al (2017a) show a number of factors inhibiting regulatory convergence in NTMs. These include Type 1 errors,²³ incentives alignment within bureaucracy, limited negotiating resources and capacity, political precaution and economic protection. They also show that the higher the degree of politicization, particularly when combined with bureaucratic resistance, the more difficult achieving regulatory convergence will be.

CROSS-SECTORAL POLICIES AND SCIENCE-BASED DECISION-MAKING

Agriculture is based upon fundamental biological processes that are needed to produce food commodities. There are biological lags associated with agricultural production, governed by the constraints of nature and the seasons. It takes time to grow and manufacture them. The food available (or not) today is the result of decisions, good or bad, made months or even years ago. It is a flow that cannot be increased, slowed or diverted easily. The development of the green revolution and biotechnology is based in science. These have facilitated increases in yield and productivity that otherwise would not be available, which in turn has produced sufficient food for growing populations.²⁴

²³ Type 1 errors are well-recognized in decision-making literature. They occur when a positive decision is made when it should not have been (i.e., approve, allow, etc.). Their consequences are obvious and can be costly, for example, thalidomide and BSE in the U.K. Decision-makers are hesitant as the probability of a Type 1 error is unknown at the time of decision (Van den Belt 2003).

²⁴ Agriculture faces a lack of investment, research and development, which has slowed the pace of innovation, essential to increasing productivity and yields given finite resources. See Smyth et al. (2017) and Mussell and Hedley (2019) for discussion of the impact that the loss of investment has on agriculture.

What the broader global policy initiatives and trends in civil society presenting wholesale challenges to agriculture and agri-food supply chains have in common is an increasing disconnect between desired outcomes and the realities of what is biologically possible or available. Policy-makers can strategize and envision their goals as much as they want but are more frequently failing to take into consideration the boundaries constraining agricultural production and the impact their decisions have in broader contexts. The consequences of such decisions can have disastrous results.

In 2020, Mexico's president unilaterally issued the executive order to phase out glyphosate and GM corn by 2024 (Barrera 2022) without consultation with the agricultural sector or stakeholders. The decree has been interpreted as an expression of political will, motivated by the government's ideology to position agro-ecology as the main food production system in the country (Ventura 2021b; Deslandes 2022). The highly probable results of this ban were discussed previously. Deciding that domestic production will increase by 30 per cent is far easier than actually accomplishing it, given the existing factors of production at hand. Deciding to switch to non-GM corn imports is far easier than the realities of sourcing it, given the lack of non-GM supply in the global corn profile.

Policy-makers in Mexico and elsewhere should closely observe the recent developments in Sri Lanka. As part of its Vistas of Prosperity and Splendour strategy, the government abruptly switched to 100 per cent organic farming in April 2021, banning all chemical fertilizers and pesticides with little warning or transition time for farmers,²⁵ against the advice of agricultural experts (Beillard and Galappattige, 2021). Food shortages are now widespread, food inflation is rampant, destitute farmers and suppliers have exited the sector and the overall economy is spiraling into default, necessitating a probable bailout by the International Monetary Fund (Short 2022; The Economist 2021). The country's currency reserves are insufficient to purchase fuel, medicines, food or fertilizer for the next crop. Yields are unlikely to rebound or may be lower for the next harvest season, providing little relief for food supply or prices (Jayasinghe 2021, 2022). The risk of famine is very real (Short 2022; Ghoshal, 2022). The policy has decimated the country's food security and plunged the entire economy into a self-induced crisis (Short 2022; Jayasinghe and Ghoshal 2022; The Economist 2021). A Sri Lankan economist lamented the organic drive as "a dream with unimaginable social, political and economic costs" (Short 2022).

The EU's Farm to Fork and Biodiversity Strategies propose a comprehensive agenda for sustainable, circular food production in the EU as part of its overall Green Deal policy. It proposes a 50 per cent reduction in the use and risk of pesticides, a 20 per cent cut in fertilizer use, increasing organic land from eight to 25 per cent, country of origin labelling for certain products and emphasizing plant-based diets, among its 27 measures (Pratt 2021b; Morrison 2020).

²⁵

The strategy was supposed to transition to organic production over a 10-year period. While farmers found appeal in the idea of organic farming, many recognized that they required a transition period, and that a combination of organic and conventional farming was more feasible (Jayasinghe 2021).

EU farmers have warned that the strategy's plan to increase organic food production at conventional food prices is unrealistic (Morrison 2020). The EU's producer and agri-food associations have collectively warned the policy is "well intentioned" (Pratt 2021b), but the current approach will threaten the "viability of European agri-business culture" (CropLife Europe 2021) with environmental protection forcing the "outsourcing of European agriculture" (Barreiro et al. 2021). Multiple studies,²⁶ including the EC's own Joint Research Council, collectively warn that the entirety of the EU's agricultural production will decrease, drastically in some commodities, transforming the EU from a net exporter of food to a net importer. Beckman et al. (2020) calculate the policy could make an additional 22 million people food-insecure. Where science and data are only considered one part of its decision-making, the EU is choosing to change itself from an area of surplus food production to a net deficit food production area and in the process, willingly place its food security at risk.

Further, EU policy-makers are considering imposing trade barriers against agri-food products that do not comply with the Farm to Fork policy (Southey 2021). The Green Deal's Carbon Border Adjustment Mechanism will force exporters²⁷ to adjust their production practices to meet the EU's green standards in order to enter the EU market (Pratt 2021b; White 2021). There is considerable disconnect between the proposed policy that will greatly increase the EU's dependence on food imports and its concurrent measures that make it much more difficult and costlier for the world's exporters to supply them.

These examples illustrate the growing uncertainty and risks posed to global agri-food trade, international supply chains and agri-food exporters, including Canada, by an exponentially complicated regulatory global environment, mainly based on NTMs. Regulatory divergence in NTMs is widening among more countries. Their cumulative effect is of sufficient friction to reduce agricultural trade and therefore threatens global food security.²⁸

It must be emphasized that this discussion is not to besmirch organic farming²⁹ in support of GM or conventional farming. This discussion demonstrates the impact that policy changes, particularly those based in ideology or political strategy,

²⁶ Barreiro et al. 2021; Beckman et al. 2020; Noleppa and Carlsburg 2021; Henning and Witzke 2021.

²⁷ If the EU's own producers cannot do so, it will be even more unrealistic for developing-country exporters who lack capacity institutionally, in infrastructure and in factors of production. Many already have difficulties entering the EU market due to SPS and TBT requirements.

²⁸ As Anderson (2016), Yeung et al. (2017a), Martin and Laborde-Debutquet (2018), Laborde and Pineiro (2020), Gillson and Fouad (2015) and many others have shown, global food security is not an issue of a food shortage. The problem is one of ensuring access to food, which must move, often across borders, from surplus production areas to deficit ones at prices that consumers, particularly low-income ones in developing countries, can afford. Imported food acts as a buffer against fluctuations in domestic food supply. Combined worldwide production of any given food commodity is far less variable than that of individual countries; hence, more trade integration through functioning international supply chains can stabilize food prices, improve farmer incomes and reduce the prices consumers face.

²⁹ Organic production is inherently more costly than conventional food production for a number of reasons. See FAO (n.d.). It is currently a niche food production system for consumers with higher income levels. It lacks the capacity to replace conventional food production systems on any large scale.

without science-based decision-making, appropriate transitions or broader impact assessments, have on agriculture, agricultural trade and food security. The role that global trade has in food security has been thoroughly explored elsewhere.³⁰ Measures that impede the movement of food across borders should be avoided or reduced as much as possible. The only way to mitigate this divergence is some form of regulatory convergence.

CANADA'S PTAS IN AN INCREASINGLY CHAOTIC WORLD

Given these worldwide trends facing agri-food trade, can PTAs provide the means to facilitate convergence, to mitigate the impact of NTMs on Canada's agri-food trade? Most of Canada's PTAs have specific SPS and TBT provisions with relatively extensive provisions on transparency, equivalence and mutual recognition. Puig and Dalke (2016) show that Canada's PTAs establish institutions or soft obligations that promote bilateral co-operation and facilitate dispute prevention through regular discussions and information exchanges. Rather than deep harmonization, Canada's PTAs implement a flexible model of regulatory convergence and co-operation through equivalence and mutual recognition of SPS and TBT measures. Despite promising intentions, roughly half of the SPS and TBT provisions in Canada's PTAs were found to be unenforceable due to vagaries in language or structure (Puig and Dalke 2016).

CETA reflects this model, containing significant SPS and TBT provisions, bilateral committees, equivalence and mutual recognition provisions in several sectors including agriculture and biotech. CETA contains a regulatory co-operation chapter which encourages a high level of interaction between regulatory authorities (Puig and Dalke 2016), including a Dialogue on Biotech Market Access Issues where co-operation and exchange of information occurs on issues of mutual interest (Kerr 2015). Regular meetings and discussions are occurring under the bilateral forum. To what extent the EU's NTMs impeding Canadian agri-food exports are being raised is unknown but Canadian industry is concerned that Ottawa has disengaged from the issue (White 2020). Resolution is proving elusive. Given how intractable the EU position is on many of these issues, meaningful change or benefit for Canadian agri-food exports is unlikely. In fact, should the EU proceed with its Farm to Fork initiative, the situation will likely worsen.³¹ Canada does have contingency options under CETA's dispute settlement provisions if necessary but such actions, even if successful, will ultimately not increase Canadian agri-food exports. As shown by the hormone-treated beef case, even if

³⁰ See footnote 25. See also the work of the International Food Policy Research Institute, the World Bank and the International Trade Centre among many others.

³¹ Due to the COVID-19 pandemic, the EU delayed progress of the Farm to Fork strategy, resulting in vociferous protest from some civil society groups. Agricultural and food associations had been pressuring the EC to delay and rethink the strategy as the sector is already suffering from pandemic-imposed hardship (Southey 2020a). With the 2022 war in Ukraine posing a severe risk to European and global food security, Spain has suggested flexibility for grain import rules (Gualtieri and Soto 2022). The Ukraine war may result in sufficient severity of food shortages, food inflation and food insecurity (World Bank 2022) to cause EU policy-makers to re-examine the strategy, given its expected reduction of total EU food production capacity. On March 10, 2022, the EC reaffirmed its commitment to the Farm to Fork strategy, with the Agriculture Commissioner stating that co-operation and co-ordination could contain the risks to food security (Foote 2022).

the EU is found to be in violation of its trade agreement obligations, it has accepted retaliation rather than amend its violating policies.

While Canadian agri-food exporters are highly frustrated at the lack of progress in addressing their NTM issues in CETA, the Canadian government's seeming lack of engagement on the issue may be a tacit recognition that agri-food issues are highly entrenched and politicized in the EU. Gains in exports in non-sensitive subsectors have been achieved in agri-food, CETA has been successful in improving Canadian exports in sectors other than in agriculture and other policy priorities may have been achieved.

USMCA has, for the most part, remained very similar to its predecessor NAFTA (Kerr 2019). USMCA maintained the significant SPS and TBT provisions but added new regulatory practices that emphasize co-operation in developing harmonized standards and reducing regulatory barriers to trade. It created broader committees, including a new regulatory co-operative committee, but the committees do not offer a closure mechanism (Kerr 2019). Undoubtedly, Canadian and U.S. agri-food exporters and governments are working closely with their Mexican counterparts to address the proposed GM and glyphosate ban across all available avenues, including through USMCA committees and the regulatory co-operative committee. Recourse to consultations and dispute settlement through the SPS provisions are also an available contingency.

The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) is also reflective of the discussion and co-operation model in establishing a committee on agricultural trade to address any issues and also has a biotech working group for information exchange and co-operation (Global Affairs Canada 2020). An SPS committee acts as a forum, facilitating information sharing and co-operation for early resolution of issues and includes a co-operative technical consultation mechanism. In a new approach to try to address NTMs, the CPTPP facilitates central co-ordination within governments to prevent conflicting regulations (Global Affairs Canada 2020).

Despite the provisions pertaining to NTMs, SPS and TBT in trade agreements, these measures still become barriers to market access. One criticism has been that all that can be accomplished in trade agreements is discussions – an official forum to talk and talk – which has been the CETA outcome thus far. Given the emphasis on co-operative engagement and conflict prevention in Canada's PTAs, and the lack of actual enforceability in many SPS and TBT provisions, the likelihood of regulatory convergence occurring through legislation in PTAs is slim. Moreover, in Canada's case, political willingness to resolve regulatory issues is far more necessary and effective than relying upon legislated provisions in its trade agreements (Puig and Dalke 2016). This is true for most PTAs.

Willingness to resolve regulatory issues is the first step. Politicized issues are less responsive to the rationale of economic benefit. Issues that are highly politicized and experience bureaucratic resistance will be very difficult to address. Figure 1 illustrates the probability of regulatory convergence given levels of political and bureaucratic

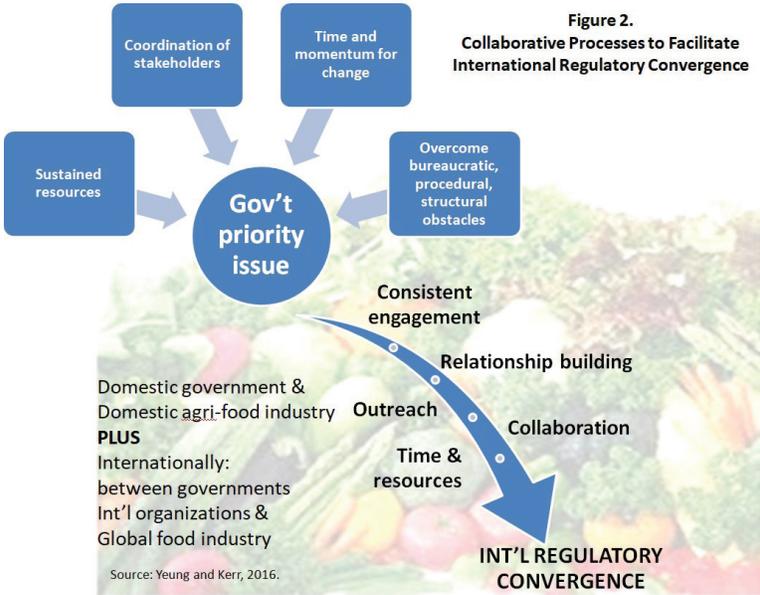
resistance. Green indicates high levels of probability, purple indicates possible or medium levels of probability and red indicates entrenched issues that will be difficult to address. The situation in Mexico could be characterized as purple as its opposition is mostly political, given that the new policy was by presidential decree, with many within government advising against it. In contrast, the EU’s positioning is red.

Figure 1. Resistance to Regulatory Convergence

		Politicized issue	
		Yes	No
Pre-existing regulations	Yes	bureaucratic resistance and political resistance	bureaucratic resistance only
	No	political resistance only	no resistance

Source: Yeung and Kerr, 2016.

Mitigating NTMs in agri-food trade will involve building networks, strengthening relationships and opening communication channels among disparate groups of stakeholders, both nationally and internationally. Agriculture’s multi-disciplinary stakeholders from producer, processor and commodity groups and associations, the crop protection industry and exporting associations, as well as various multi-disciplinary departments and agencies within government, must engage with their national government and then collectively reach out to their international counterparts, who must also do the same. The same process must occur between diplomats, trade officials, scientists, technical experts and regulators, both domestic and abroad (Yeung et al. 2017a; Yeung et al. 2016; Kerr and Yeung 2017). Figure 2 illustrates the process of collaboration necessary to mitigate the friction in international agri-food trade caused by NTMs.



The discussion forums and bilateral consultation mechanisms in Canada's PTAs are therefore useful in facilitating this degree of continuous collaboration. As regularly scheduled forums to talk and talk, they are opportunities to facilitate informal and formal discussions that can foster movement on issues. The more opportunities there are to do so, the better. Such opportunities do not have to be large, attention-grabbing diplomatic forums; every opportunity to discuss the issues is a valuable contribution as a drop in the bucket. It is a long, slow process that is encumbered or expedited by levels of political and bureaucratic willingness.

Beyond PTAs, other international forums are also opportunities to build on continuous collaboration. The WTO's SPS Committee is a forum for multilateral discussion, both formal and informal, working towards the development of multilateral NTM reduction strategies. This already occurs for MRLs. The 21-member Asia-Pacific Economic Cooperation (APEC) group is another opportunity to collaborate and co-ordinate, including at its Food Safety Cooperation Forum, which has undertaken efforts towards harmonizing international standards, trade facilitation and MRLs (Kerr and Yeung 2017). More recently, Canada has come together with 13 WTO members³² to form the Ottawa Group to work towards suggestions for WTO reforms (Global Affairs Canada 2019) with emphasis on the critical role of the multilateral, rules-based trading system underpinned by the WTO (Kerr 2021). Meetings of Codex, the G7 and G20 groups would also be useful venues. Ideally, revitalization of multilateral efforts at the WTO would also be very helpful.

That the global trade of agri-food products requires a reliable, predictable and stable operating environment, consistently based on sound science, has been acknowledged and agreed upon multilaterally. This is even more necessary as new advances in agri-biotechnologies are developed in order to feed an ever-growing world population. An unworkable international regulatory system that resembles a spaghetti bowl must not impede the critical flow of agri-food commodities and products. However, economic rationale is often not the only factor in decision-making as political factors also affect agricultural trade. These can persuade governments to adopt measures not based upon sound science. Continuing to challenge such measures that unjustifiably impede trade is therefore important. Whether bilaterally, regionally or multilaterally via the WTO, Codex or other avenues, collaboration must occur at every forum available to reduce the influence of political factors on a global trading system. It must be able to provide transparency and certainty for consumers, producers, processors, importers and exporters.

In a recent webinar regarding the EU Farm to Fork initiative, Iliana Axiotiades, secretary general for Cocal, the EU trade association for grains and oilseeds, encouraged exporting and importing countries to make presentations to the European Parliament through their embassies in Brussels. "We need to have a global conversation on these things" (Pratt 2021b). This applies to all NTMs. Death by 1,000 regulations cannot be cured with a silver bullet. It will require 100,000 steps or more. Progress is slow, incremental and frustratingly difficult to see.

³²

Australia, Brazil, Canada, Chile, the European Union, Japan, Kenya, South Korea, Mexico, New Zealand, Norway, Singapore and Switzerland — and is chaired by Canada. The United States and China are not members.

APPENDIX

Table 1: UNCTAD MAST Classification System for NTMs

	Measures Corresponding to UNCTAD-MAST	Description
Technical Measures	Chapter A. Sanitary and phytosanitary measures (SPS)	Are those protecting human, plant and animal life, the environment; restricting substances, food safety, preventing the dissemination of diseases or pests. Includes all safety conformity measures related to SPS (i.e., certification, testing and inspection and quarantine).
	Chapter B. Technical barriers to trade (TBT)	Refers to measures that are related to product characteristics, such as technical specifications, quality requirements; related processes and production methods; and measures, such as labelling, packaging, consumer safety and national security. Includes all conformity assessment measures related to technical requirements, such as certification, testing and inspection.
	Chapter C. Pre-shipment inspection and other formalities	Refers to measures related to pre-shipment inspections and other customs formalities.
Non-technical Measures	Chapter E. Non-automatic import licensing, quotas, prohibitions, quantity control measures and other non SPS/TBT restrictions	Includes licensing, quotas and other quantity-control measures, including tariff-rate quotas.
	Chapter F. Price control measures, additional taxes and charges	Measures implemented to control or affect the prices of imported goods (i.e., those that are designed to support or establish the domestic prices of certain products due to price fluctuation, instability or to increase or preserve tax revenue). Also includes measures other than tariffs that increase the cost of imports in a similar manner (para-tariff measures).
	Chapter H. Measures affecting competition	Those that grant exclusive or special preferences or privileges to one or more limited groups of economic operators. They are mainly monopolistic measures, such as state trading, sole importing agencies or compulsory national insurance or transport.
	Chapter N. Intellectual property	Those related to intellectual property measures and rights (IPR).

Source: UNCTAD-MAST 2019

**Table 2. Change in Top 25 Canadian Exports to EU from 2016 to 2021,
C\$ in Thousands and Per Cent**

HS4 Code	Product Category	Change from 2016 (C\$ in thousands)	Change from 2016 (%)
7108	Gold	-111,435.358	-1.0
2601	Iron ores and concentrates	2,067,561.787	85.4
8802	Helicopters, airplanes and spacecraft	196,920.906	10.8
2709	Crude petroleum oils	1,327,900.233	76.9
3004	Medicaments	189,660.559	16.9
8411	Turbo-jets, Turbo-propellers and other gas turbines	-503,093.595	-45.8
7102	Diamonds	113,831.959	14.3
2844	Uranium and other radioactive elements	384,110.169	49.2
1001	Wheat	145,502.41	18.7
2603	Copper ores and concentrates	233,840.649	37.7
1201	Soya beans, whether or not broken	45,315.026	7.6
7502	Unwrought nickel	191,712.001	33.4
1205	Rape or colza seeds	285,588.08	54.0
7112	Waste and scrap of precious metals	58,032.336	11.1
8703	Passenger motor vehicles	295,584.692	57.6
2701	Coal and solid fuels manufactured from coal	74,154.667	16.8
8803	Parts of helicopters, airplanes, balloons, dirigibles and spacecraft	-337,218.426	-83.1
1005	Maize (corn) seed (excluding sweet corn)	235,836.121	69.0
7118	Coin	267,918.65	82.5
7601	Unwrought aluminum	277,422.189	87
0306	Crustaceans	63,565.839	20.3
0713	Leguminous vegetables	4,869.187	2.0
4401	Fuel wood; wood chips, dust, shavings, waste and scrap	-14,039.954	-5.8
3304	Beauty or make-up preparations	74,272.728	31.1
9031	Other measuring or checking instruments, appliances, machines	74,191.704	32.3
	Subtotal change in top 25 exports to the EU	4,432,512.285	15.7
	Change in other goods exports to the EU	2,138,830.822	18.3

Source: Derived from Trade Data Online, Industry Canada, 2022.

Table 3. Change in Canadian Exports of Food Processing Goods, by NAICS Code, to EU from 2016 to 2021, C\$ in Thousands and Per Cent

NAICS Code	Product Category	Change from 2016 (C\$ in thousands)	Change from 2016 (%)
3111	Animal food manufacturing (pet food)	76,597.49	63.7
3112	Grain and oilseed milling (incl. refining fats and oils, breakfast cereals)	5,335.13	6.2
3113	Sugar and confectionery product manufacturing (processing of sugar cane, beet and cacao)	80,289.93	303.3
3114	Fruit and vegetable preserving, specialty food manufacturing (incl. freezing and preserving – can, pickle, dehydrate)	119,692.25	82.2
3115	Dairy product manufacturing (incl. frozen and substitute products)	4,732.14	75.7
3116	Meat product manufacturing (incl. processing and rendering)	-2,791.95	-4.4
3117	Seafood product preparation and packaging (incl. canning, smoking, salting, drying, freezing seafood)	-25,276.15	-5.5
3118	Bakeries and tortillas manufacturing (incl. cookies, crackers, pasta, bread, tortillas)	37,270.15	108.9
3119	Other food manufacturing (incl. snacks, coffee, tea, flavourings, spice, dressings, perishable prepared foods)	34,252.71	58.9
3121	Beverage manufacturing (incl. soft drinks, bottled water, breweries, wineries, distilleries)	15,648.74	37.0
	EU Subtotal	345,750.43	33.1
	Other countries	13,693,101.87	42.2
	Total all countries	14,038,852.30	41.9

Source: Derived from Trade Data Online, Industry Canada, 2022.

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