USMCA FORWARD 2023

BUILDING MORE INTEGRATED, RESILIENT, AND SECURE SUPPLY CHAINS IN NORTH AMERICA

B | Global Economy and Development at BROOKINGS

EDITORS

Joshua P. Meltzer
Brahima S.Coulibaly

WITH SPECIAL THANKS

Maricarmen Barron Esper
Diego Marroquin
Esther Lee Rosen
Jeannine Ajello
Molly Escobar
Nawal Atallah
Eric Abalahin
Katie Merris

AUTHORS

Alan Bersin
François-Philippe Champagne
Dan Ciuriak
David Dollar
Lance Fritz
Thomas Ewing
Jennifer Gordon
J. Bradford Jensen
Brian Kingston
Kevin Kolben
Beatriz Leycegui
Bradley Martin
Claudia Ruiz Massieu
Lourdes Melgar
Joshua P. Meltzer
Valeria Moy
Sylvia B. Ortega Salazar
Liz Shuler
Jay Timmons

DESIGN

Blossom.it

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INTRODUCTION

JOSHUA P. MELTZER

Senior Fellow, Global Economy and Development program at the Brookings Institution

BRAHIMA S. COULIBALY

Vice President and Director, Global Economy and Development program at the Brookings Institution

We are very pleased to launch our USMCA initiative's second flagship report **USMCA Forward 2023: Building more integrated, resilient, and secure supply chains in North America.** This report includes chapter contributions from experts from the U.S., Canada, and Mexico as well as shorter viewpoints from senior government officials and leaders from industry, civil society and academia. The focus of this year's report on supply chains reflects the opportunity presented by the significant investments that the U.S. in particular is making in developing semiconductors, electric vehicles, critical material, and clean energy. The USMCA underpins North American trade and investment and provides the set of rules and market access commitments that level-set business expectations. In turn, it lays the foundation for expanding investment into complex and capital-intensive manufacturing and supply chains across North America. In addition, the agreement's schedule of meetings including ones between the three trade ministers provide the basis for deepening trilateral cooperation. It is clear however, that additional investments and policies are needed if the the vision of building more integrated, resilient and secure North American supply chains is to be realized. USMCA has an important role to play in this respect, including in areas such as enabling worker education and training, ensuring access to the business services needed for new complex supply chains, providing a stable regulatory environment for cross-border data flows and access to digital technologies, and aligning non-tariff barriers. Finally, but not least, the USMCA labor chapter should be understood as a key pillar in building more resilient and efficient supply chains. This report addresses these issues, including the opportunities presented by USMCA, and what more is needed from the three governments.

Early in his Presidency, President Biden initiated a review of the resiliency of critical supply chains in semiconductors, large capacity batteries, critical minerals, and pharmaceuticals.[2] As Canadian Minister Champagne outlines in his contribution to this report, Canada is taking a number of

steps to strengthen North American supply chains. This includes investing in critical minerals under the government's Critical Minerals Strategy, strengthening domestic R&D, and expanding manufacturing capacity in support of semiconductor development in North America. At the North American Leaders Summit in January 2023, the three North American leaders also agreed to cooperate on a range of supply chain-related initiatives around semiconductors and critical minerals.

The current focus on supply chains in North America has been driven by three related developments. First is the view of China as a strategic competitor and the risks of relying on China as a source of supply. China's willingness to restrict trade to pressure governments on a range of non-trade-related issues has highlighted how North America's trade dependence on China exposes each country to coercion. From this perspective, strengthening North American supply chains is a national security goal. Second, the COVID-19 pandemic exposed the fragility of global supply chains where a priority by businesses on efficiency, just in time manufacturing, and low inventories made supply chains vulnerable to disruption. Third, job losses in manufacturing have led to a focus on reinvigorating manufacturing and expanding North American supply chains as drivers of scale, efficiency, and competitiveness.

Last year saw significant U.S. legislation that includes tax incentives and subsidies for manufacturing and supply chains. For instance, the Inflation Reduction Act (IRA) includes nearly $400 billion in federal funding for clean energy with special tax credits for EVs manufactured in the region. The Infrastructure Investment and Jobs Act (IIJA) includes $1.2 trillion that will increase the overall efficiency and competitiveness of the U.S. The CHIPS and Science Act includes over $50 billion in funding for domestic semiconductor manufacturing.

These developments create a defining opportunity to expand North American manufacturing capacity, strengthen supply chain integration, and increase overall competitiveness. However, to realize this opportunity will require leaning into the many ways that USMCA supports North American trade and investment, as well as building closer forms of international cooperation and coordination. Indeed, it is the agreement's rules, market access, and dispute settlement system that provides the foundation for developing an increasingly integrated, complex vision of how North America might cooperate and work together. In addition, a range of complementary policies and investments will be required to fully realize these opportunities. Liz Shuler, President of the AFL-CIO makes a similar point, underscoring how USMCA—along with complementary trade and domestic manufacturing policy—is a chance to take full advantage of the opportunities presented by the USMCA, IIJA, IRA, and CHIPS Act to generate jobs and improve working conditions in North America. Lance Frtiz, CEO of Union Pacific, also notes the need to build on USMCA in order to maximize these supply chain opportunities.

This report identifies how USMCA can support the trilateral goal of more integrated, resilient, and secure supply chains, and the complementary policies needed to achieve this goal. Given the complexity of the opportunities and challenges, the contributions to this report from senior government officials, business leaders, civil society, and academia identify important issues that need to be resolved. They also provide policy recommendations.

Reshoring supply chains and the national security imperative

The investments into reshoring supply chains into North America aim to grow manufacturing jobs and reduce dependence on China for the inputs and products deemed critical to U.S. economic security. Brad Martin's contribution analyzes the complex ways that economic engagement with China raises national security risks. As Martin notes, economic interdependence—rather than pacifying international relations—has become a source of geopolitical tension as countries have sought to weaponize the reliance this interdependence creates to achieve other policies. Part of the challenge as Martin sees it is the disconnect between company-level incentives to maximize efficiency, which drives investing in China-centered supply chains, and the broader national vulnerabilities these private investment decisions can create but which are often not taken into account by the firms making the investments. In addition, Martin sees the U.S.-China geopolitical tension including with respect to Taiwan as increasing risk for North America due to the concentration of supplies of semiconductor manufacturing in Taiwan. This underscores how the intersection between economic interdependence and U.S.-China geopolitical tensions are not confined to bilateral trade relations but extend more broadly to third countries that are part of the larger Chinese supply chain ecosystem. According to Martin, USMCA has an important role to play in assessing and addressing these national security risks by creating a common understanding among the three countries of their vulnerabilities, supporting the location of critical supply chains to North America, and demonstrating how interdependence through trade and supply chains can work among trusted partners.

The North American alignment on economic and security goals also raises complex questions about the nature of trade between North America and the rest of the world—in particular China—going forward. David Dollar in his chapter makes clear that Mexico cannot replace supply chains located in China and Southeast Asia. For instance, China alone produces 20 times manufacturing value add than Mexico. Seeking to displace all the manufacturing and supply chain links would be costly and likely fail. Dollar argues that North America should instead identify the products that need to be reshored for national security goals, such as semiconductors, electric vehicles, and components including batteries and critical mineral inputs. Yet, as he observes, China and other countries in Southeast Asia are important suppliers of intermediate products that support North American Supply chains. This fact demands a North American trade strategy for Asia that ensures access to the inputs needed to maintain the competitiveness of North American supply chains.

Complementary policies support North American supply chains

A common theme across the contributions is that while the abovementioned U.S. legislation provides the necessary starting point for reshoring critical supply chains, more will be needed. In particular, if Mexico is to attract additional investment, it will need to improve its business climate, infrastructure, and connectivity, which currently lags well behind China as well as peer economies in Southeast Asia. USMCA has an important role to play in strengthening Mexico's attractiveness as an investment destination. Compliance with USMCA commitments reduces business risk,

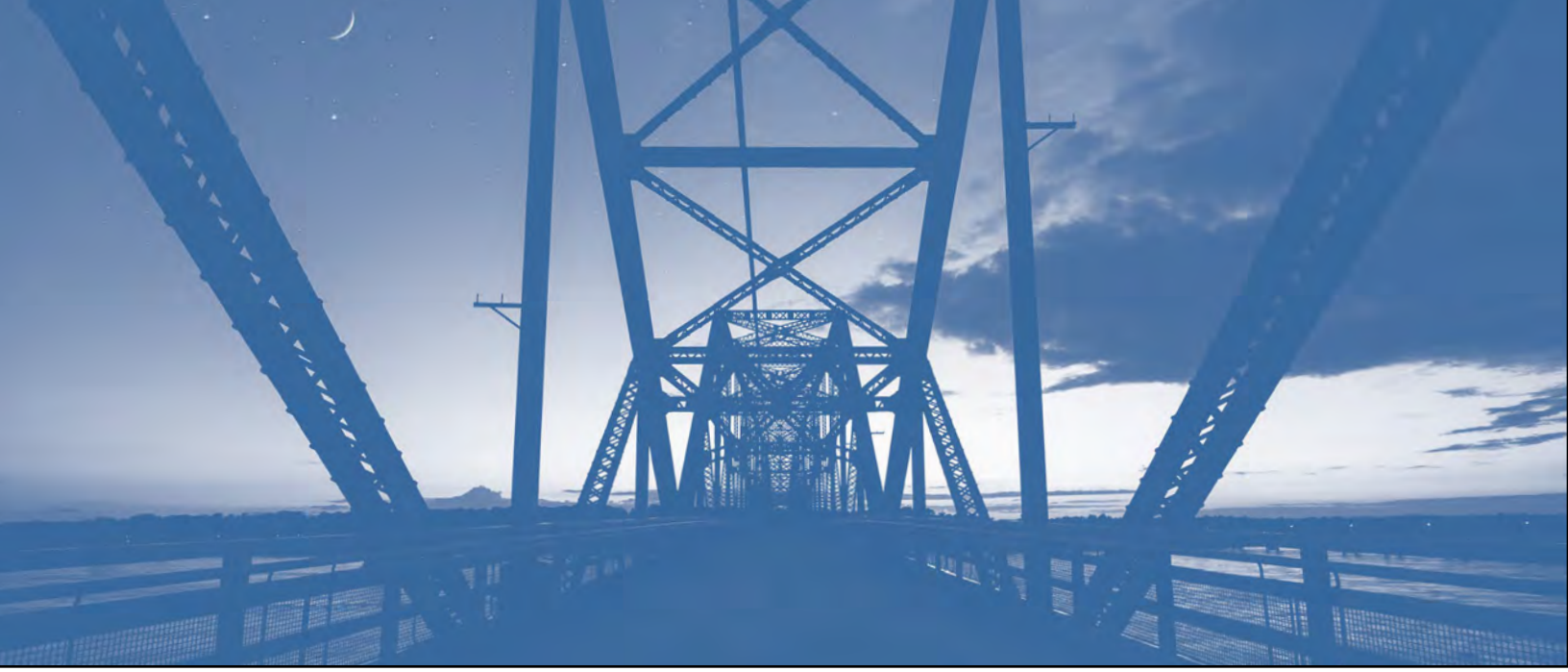
and open markets with predictable rules support investment and trade.

One of the challenges that needs to be addressed to expand manufacturing capacity and North American supply chains is access to skilled labor. In particular, significant improvements in Mexico's education system and training opportunities are required. Sylvia Ortega in her chapter provides a comprehensive look at the state of Mexico's education system and where it lags behind the U.S. and Canada as well as other peers in Southeast Asia. She notes that "increasing the competitiveness in Mexico depends largely on the development of its human capital nationwide." Sylvia outlines successful areas of trilateral cooperation on education and worker training under the North American Free Trade Agreement (NAFTA) and emphasizes the need to scale and update cooperation given the growing demand for educated Mexican workers to support North American supply chains. Sylvia suggests innovative models for training Mexican workers, such as dual education that connects workers and businesses, as well as apprenticeship models. Recent discussions at the North American Leaders' Summit that connect development of semiconductor supply chains with worker training needs are examples of how enhanced cooperation across government, industry, and civil society can deliver the workforce needed to realize these supply chain ambitions.

J. Bradford Jensen also underscores education as a precursor to delivering the business services needed for sophisticated supply chains. He observes that services inputs–whether domestic or imported–account for about 27 percent of the value of manufacturing exports in many countries, and this rises to 53 percent when accounting for services provided within manufacturing firms. Jensen notes that Mexico lacks the business services needed for sophisticated supply chains, which reflects a shortage of educated workers. He concludes that this will require increased business services imports to Mexico from the U.S. and Canada, and in the longer term, he points to the key need to improve educational attainment and training opportunities.

Addressing non-tariff measures (NTMs) is another complementary policy needed to support expanding and deepening supply chains across North America. Duplicate testing and certification requirements before goods can be used in North American supply chains create unnecessary costs and delays. Beatriz Leycegui outlines NTMs of concern as well as progress under NAFTA addressing NTMs. Importantly, USMCA includes even more robust commitments to address NTMs. Progress aligning technical regulations and standards as well as mutual recognition that cover new supply chains such as in batteries, EV components, and semiconductors will be needed to minimize unnecessary costs and enable competitive supply chains. Leycegui recommends government and industry prioritize these issues.

Data flows across North America and its regulation is another area where USMCA provides an important framework and where further work is needed in the context of strengthening North America supply chains. Indeed, Dan Ciuriak makes the key point that USMCA creates a stable policy framework that should make North America an increasingly attractive investment destination for digital technologies, many of which will be needed in realizing growth in manufacturing and supply chains. This point underscores more broadly the multidimensional ways that USMCA can reduce risk and policy



uncertainty and improve the investment environment in all countries.

Another related complementary policy issue raised in this report is access to clean energy as a crucial input into North American supply chains. Indeed, Valeria Moy notes that this will also be important to realize the digital economy opportunities that Dan Ciuriak describes given its energy intensity. More broadly, both Valeria Moy and Lourdes Melgar make clear the need for Mexico to follow the U.S. and Canadian investments in renewable energy. They also underscore the need to better integrate the North American energy market to increase energy security and deliver on renewable energy.

International labor standards and human rights in supply chains

Another theme in this report is the importance of compliance with labor standards and international human rights in supply chains as key elements of more secure and resilient supply chains. Kevin Kolben in his contribution makes the case that "there is a strong argument that FTA labor chapters should be viewed positively as a tool to mitigate supply chain risk and increase resilience." He argues that business labor practices consistent with ILO standards are more efficient and resilient. From this perspective, the USMCA labor chapter and its rapid response mechanism should be seen as tools in building more efficient and resilient North American supply chains. This can happen in a number of ways, including reducing strikes that affect supply chain resiliency and increasing political and consumer support for USMCA when goods are produced consistently with international labor standards. Kolben notes that UMSCA also bans importing goods made with forced labor, and the second USMCA Free Trade Commission meeting in July 2022 reaffirmed this commitment. This is a point that Jennifer Gordon also highlights and shines the spotlight on labor practices in the U.S. as they apply to migrant workers in the agricultural sector.

A joint contribution by Alan Bersin and Thomas Ewing sheds additional light on the extent that North American supply chains continue to use inputs that are made with forced labor. The authors note the challenge of getting visibility into supply chains to understand where products with forced labor may be entering. They discuss how federated learning can use data consistently with privacy and security standards to map supply chain participation globally. For

instance, this technology, the authors find, has helped to identify goods produced from Uyghur forced labor that continue to enter North American supply chains including in industries such as medical devices, wholesale chemical products, and food manufacturing.

Cooperation and enforcement

The need to expand trilateral cooperation among government, business, and civil society in the three countries is a point made repeatedly by many of the leaders from government and industry. The North American Leaders' Summit has the potential to drive a lot of the cooperative work needed to realize these supply chains ambitions. Indeed, Senator Ruiz Massieu notes the establishment of a trilateral semiconductor forum at the summit as an important development that will help address policy and investment needs. Also, there is the annual USMCA Free Trade Commission (FTC) meeting in addition to the regular work of the USMCA committees. Lance Fritz of the U.S. Business Roundtable highlights the need for a USMCA FTC mechanism to ensure trade continues during public emergencies.

Moreover, North American governments have revised bilateral and industry focused dialogues in response to the renewed focus on economic integration and resilient supply chains in North America. This includes the Canada-U.S. Supply Chain Working Group, U.S.-Mexico High Level Economic Dialogue, and Canada-Mexico High Level Economic Dialogue launched in 2022.

Finally but not least, many contributors emphasize that compliance with USMCA by all governments is crucial for it to serve as a framework for increased investment and cooperation. As Jay Timmons stated succinctly, "Trade agreements are only as good as their enforcement." Thus, the utilization of the USMCA labor chapter rapid response mechanism by the U.S. and reliance on the state-state dispute settlement mechanism to resolve disputes by all governments should be viewed as positive developments. This will be monitored through the USMCA Tracker and Scorecard that we have developed as part of the USMCA initiative. The use of the USMCA dispute settlement mechanisms demonstrates that trade disputes can be resolved through arbitration and, more broadly, shows a commitment to the agreement and the rule of law, which boosts confidence in USMCA overall.

The range of policy recommendations in this report outlines the investments and policies that are needed to maximize the opportunities presented to grow North American trade which already supports over 9.5 million jobs region-wide (latest estimates from the Brookings's USMCA Tracker). As made clear in this report, USMCA is central to this agenda. However, this report also speaks to the complementary policies needed in all three countries—together with the USMCA—that will help North America build the more integrated, resilient, and secure supply chains that it needs.

ENDNOTES

1 The White House, Building Resilient Supply Chains, Revitalizing American Manufacturing, And Fostering Broad-Based Growth", 100-Day Reviews under Executive Order 14017, June 2021 100-day-supply-chain-review-report.pdf (whitehouse.gov)

François-Philippe Champagne

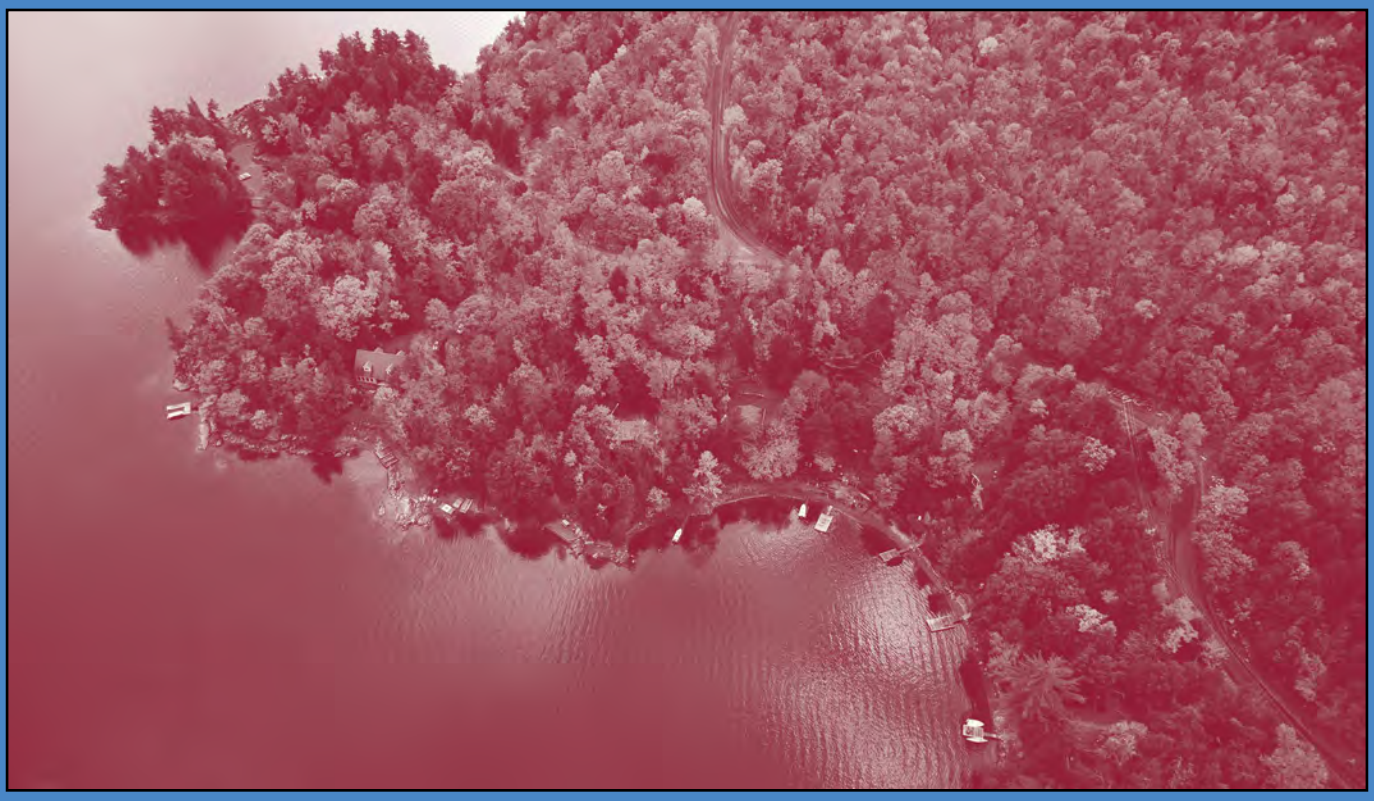
Minister of Innovation, Science, and Industry, Canada

STRATEGIC PARTNER OF CHOICE: CANADA'S ROLE IN ENHANCING NORTH AMERICAN SUPPLY CHAIN RESILIENCY

Around the world, the COVID-19 pandemic has exposed weaknesses in global supply chains. Changes to consumer demands, labor shortages, and other structural factors have created a perfect storm of bottlenecks and back-orders. Families and businesses around the world are feeling the impact, as the cost of consumer goods–food, energy, and everything in between–is rising. Russia's invasion of Ukraine, as well as other major geopolitical challenges, have since compounded this already difficult situation.

In this climate of uncertainty, jurisdictions around the world are looking for stability and predictability. They are turning to their most trusted allies, choosing to localize manufacturing capacity in locations with partners who are reliable, safe, and secure. As members of the world's largest free-trade zone, Canada, the United States, and Mexico know that they have no better friends than each other. Since 1994, free trade agreements among our three countries have raised the fortunes of all North American businesses, workers, and families, as our economies have become more integrated and prosperous.

By working together to improve the reliability and fluidity of our supply chains, we have a chance to seize the moment and enhance the overall North American value proposition–and each partner has a role to play. Domestically, Canada is making strategic investments in key sectors to make essential supply chains more accessible and secure. Our Critical Minerals Strategy, for example, is securing the key inputs in batteries and semiconductors needed to support the world's transition to the green digital economy of the future. In world markets driven by demand for microchips and batteries, Canada's critical minerals, coupled with our reputation as a safe, reliable, and secure supplier of goods and services, make us the strategic partner of choice. That is why we have already secured investments from globally leading companies, including battery manufacturers, and continue to put into place a domestic battery ecosystem that will help meet the global demand for cleaner transportation alternatives.



When I was in Washington recently for a meeting with U.S. Secretary of Commerce Gina Raimondo, we discussed, among other things, our commitment to improve supply chain security in North America, including in the semiconductor industry. This includes work to strengthen domestic research and development, commercialize emerging technologies and innovations, and ramp-up manufacturing capacity in both countries to support our mutual goals for supply chain resilience and industry competitiveness. The Canada-U.S. Supply Chain Working Group, launched in 2021, is also central to our efforts to strengthen supply chain security and reinforce the deeply interconnected and mutually beneficial North American economic relationship.

I was also pleased to launch the Canada-Mexico High-Level Economic Dialogue in August. This was an opportunity to discuss ways that we can strengthen our North American competitive advantage through enhanced collaboration and cooperation. We also discussed the importance of supply chain resiliency as a means of fostering a more collaborative business environment and working with the private sector to enhance economic ties. Strengthening our competitive advantages as USMCA economies also requires us to grow our shared innovation ecosystems. In this regard, we also discussed ways to increase research collaboration to meet the complex challenges of our age.

As a friend, neighbour, and trusted partner, Canada is well positioned to help strengthen North America's supply chain resiliency and industry competitiveness. What is more, we can take pride in knowing that our highly-integrated North American economy, founded and built upon the principles of transparency, diversification, security, and sustainability, allows us to offer an excellent value proposition in world markets. Canada will continue working with like-minded partners–especially our North American friends and neighbours–to help build a cleaner, greener, and more resilient global economy that is founded on the principles of free and open trade that has served us all so well.

Claudia Ruiz Massieu

Senator, Mexican Congress, and Chair, Special Committee for the Implementation of the USMCA

THE USMCA IN 2023: OPPORTUNITIES AND CHALLENGES

A trade agreement is much more than a text; it is a legal and institutional framework that lays the foundations for integration among the countries that sign it. It opens opportunities to prompt competitiveness, growth, and inclusive development, as well as boosts exchange dynamics beyond trade—in culture, education, and shared principles and values.

Nevertheless, without constant political dialogue, without the exchange of experiences, without a permanent updating effort, and without a tangible commitment in all the sectors that benefit from economic integration, a trade agreement runs the risk of becoming a "dead letter": A simple list of rules to govern commercial transactions between its parties.

Nearly three years after its entry into force, the United States-Mexico-Canada Agreement (USMCA) has been instrumental in ensuring the competitiveness of the North American region's economy in a complex and unprecedented global environment. This is no coincidence: It is the result of a joint effort among governments, the private sector, and civil society in our three countries.

During these years, the Special Committee for the USMCA Implementation in the Mexican Senate has worked in close coordination with government officials and stakeholders to take full advantage of the agreement for the benefit of Mexico and North America.

Now, it is precisely this unprecedented context that calls us to expand and deepen our integration, consolidating and creating new value chains through strategies such as nearshoring.

Global events and crises such as the COVID-19 pandemic, Russian invasion of Ukraine, trade dispute between the U. S. and China, and their effects on the global economy—while dire—have presented an opportunity that we must take advantage of.

Mexico, for instance, is a great destination for nearshoring. We have a strategic location, huge communications infrastructure network, and multiple border crossings with the U.S. that service cargo vehicles (15 according to NADBank): All factors that would make international transportation logistics more efficient in a context that demands prompt and effective solutions.

In this context, 2023 is a year full of opportunities in the USMCA implementation, in terms of opening of new markets, creation of new value chains, and innovation in strategic sectors for the future.

Recently, in the North American Leaders' Summit, our three countries agreed to deepen economic cooperation, promote investment, and reinforce competitiveness, innovation, and resilience by:

- Organizing the first trilateral semiconductor forum with industry to adapt government policies and increasing investment in semiconductor supply chains across North America in early 2023.
- Coordinating semiconductor supply chain mapping efforts to develop a collective understanding of unmet needs.
- Expanding North American critical minerals resource mapping to collect details on resources and reserves. The Geological Surveys of each country will organize a trilateral workshop to share data and facilitate cooperation.
- Partnering with the region's private sector to increase student development and mobility under a new North America Student Mobility Project.
- Convening industry and academia experts in semiconductors, ICT, biomanufacturing, and other key advanced manufacturing and logistics industries for design sessions on the skills needed to develop the workforce of North America over the next five years.

These announcements are great news for all of us involved in the USMCA implementation and for our countries, as they represent the possibility of consolidating a highly competitive sector, crucial for technological development in the coming decades.

Another piece of good news is the recent resolution of the panel on the differences in interpretation of the regional content rules for the automotive industry, which ruled in favor of Mexico and Canada, granting certainty to one of the most integrated sectors in our region.

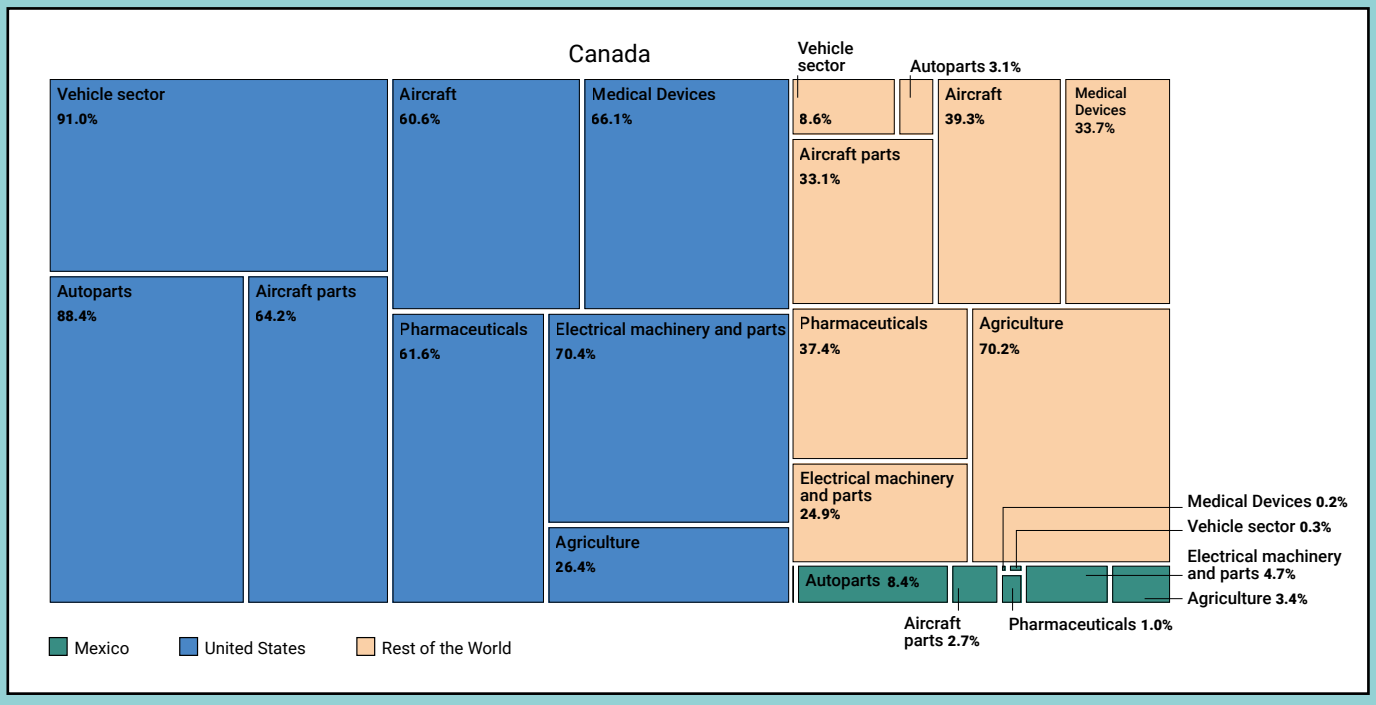
But it must be said that it's not all peaches and cream. There are some reasons for concern. Among the issues that require our

special attention, the presidential decree banning transgenic corn in Mexico as of 2025 stands out; as well as the controversies over the legislation that privileges state-owned companies over their private competitors in the energy sector, which directly affected investors from our main trading partners.

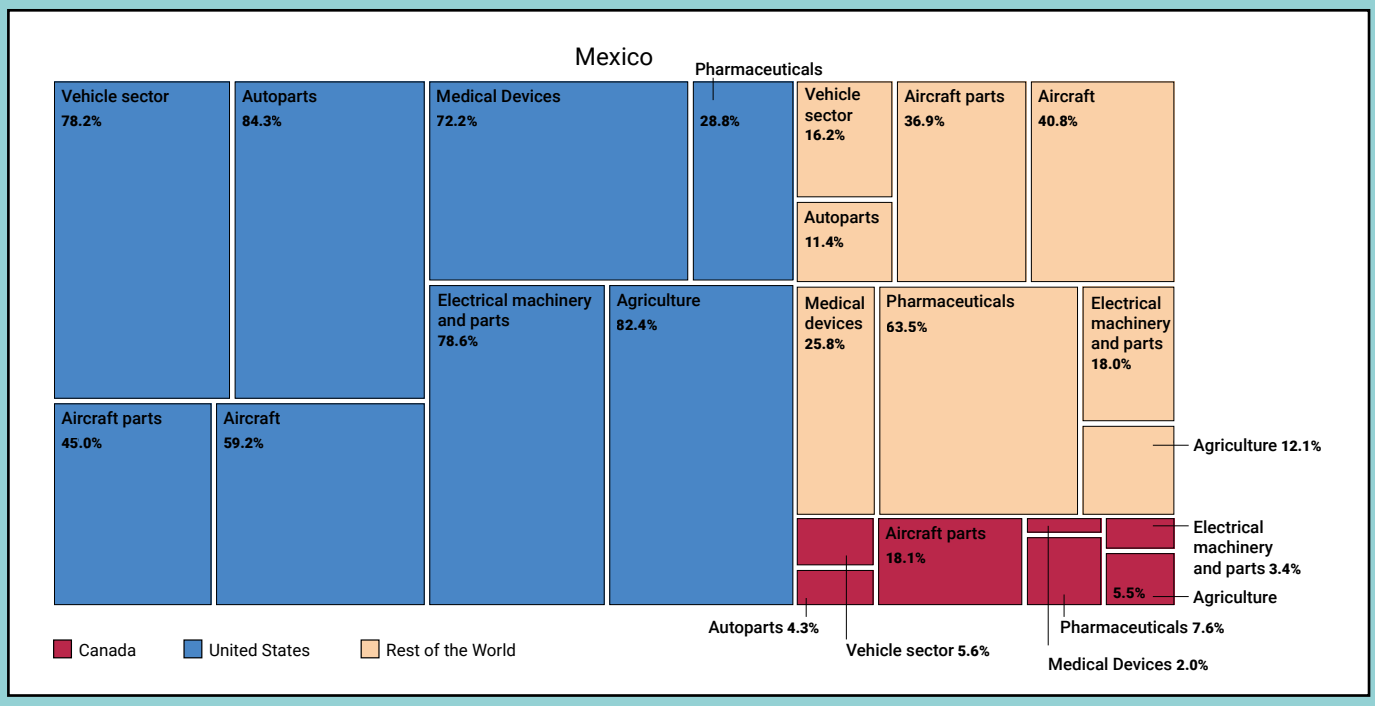
On the other hand, the transition period of NAFTA's investment protection and arbitration regime for legacy investments ends on July 1st. According to NAFTA (Article 1119), a notice of intent must be submitted at least 90 days before a claim is filed. So, the deadline to file a notice of intent and trigger the start of a NAFTA legacy investment dispute is April 1st, 2023 at the latest. Investors should be prepared for this new phase.

Finally, nothing is set in stone. As before, in 2023, seizing the opportunities and facing the challenges depends on us. From the Mexican Senate—in the Special Committee for the USMCA Implementation—we will continue working with the government, the private sector, and civil society to write new success stories in the book of our regional integration.

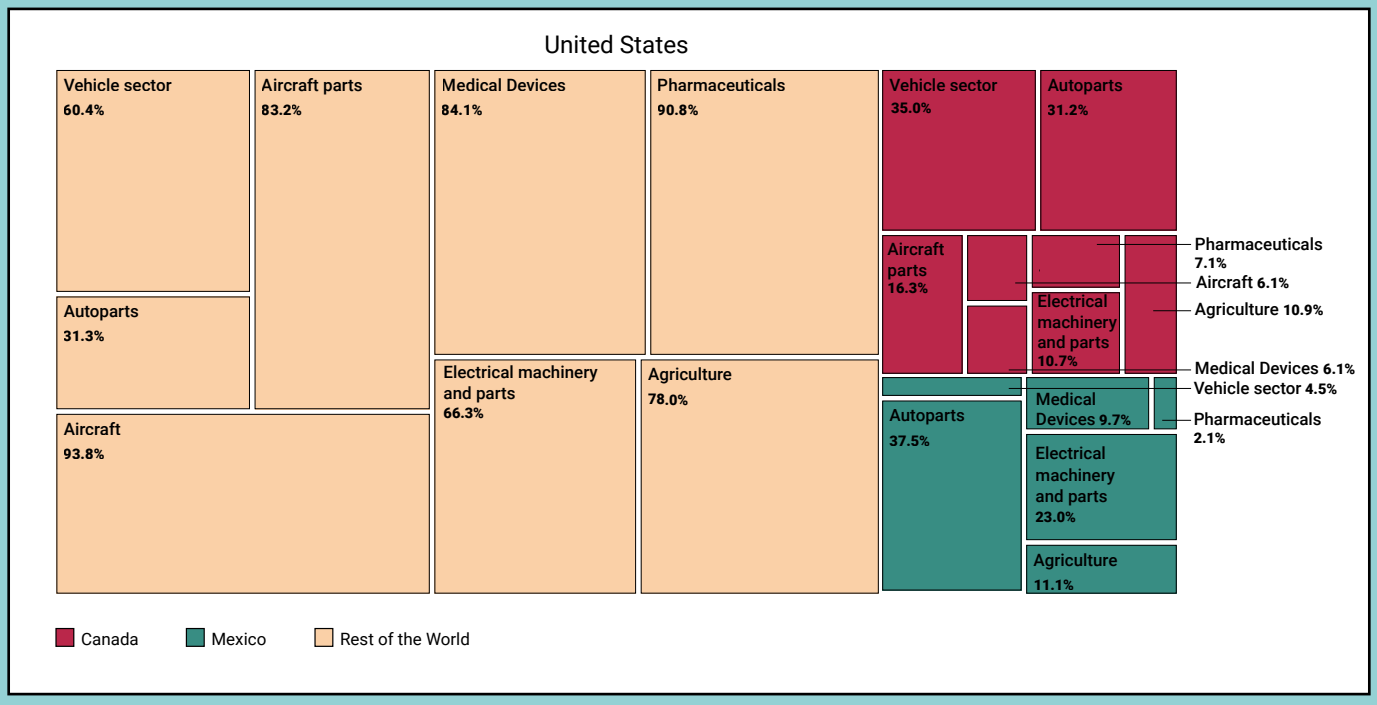
GRAPH 1 **Share of exports by sector from each North American country to its North American partners and the rest of the world in 2020.** While North American supply chains are the destination for a significant amount of exports in key sectors from each North American country, each North American country is also a significant exporter into global supply chains



Source: Observatory of Economic Complexity (2022).
Notes: Percentages shown represent the share of Canadian exports within the specified sector by destination.



Source: Observatory of Economic Complexity (2022).
Notes: Percentages shown represent the share of Mexican exports within the specified sector by destination.



Source: Observatory of Economic Complexity (2022).
Notes: Percentages shown represent the share of United States exports within the specified sector by destination.

CHAPTER 1
THE USMCA PLAYS A NATIONAL SECURITY ROLE

BRADLEY MARTIN

Director, RAND National Security Supply Chain Institute, and Senior Policy Researcher, RAND Corporation

Looking at the political backdrop in which it was ratified in 1994, the North American Free Trade Agreement (NAFTA) came at a unique historic moment; the security threat from the Soviet Union had receded and one from a rising China was not yet apparent. NAFTA reflected an understandable focus on economic development and encouraging mutually beneficial trade relationships.[1]

Thirty years since NAFTA's ratification, while globalized markets and supply chains have multiplied and become more complex, geopolitical conflict has also become more prevalent. This simultaneous growth in interdependence and tension has created U.S. vulnerability from economic reliance on actors such as China.[2] China is both the world's largest trading nation and an aggressive military and political competitor with the United States. The intersection between very complex supply chains and national security vulnerability is stronger than it has ever been.[3] While these dynamics are most notable in relationships with China, they are in fact present in other regions.

NAFTA's successor, the U.S.-Mexico-Canada Agreement (USMCA), is similar to NAFTA but includes important additional commitments on the environment and labor. This piece will discuss how developing closer economic ties across North America also has an important security dimension. In fact, USMCA plays a crucial role for all three parties in terms of mitigating the risks associated with economic interdependence with strategic competitors, primarily China.

A new era: Global interdependence, while in some respects beneficial, also creates vulnerability

Defining national security solely in terms of military power–or even political or diplomatic influence–does not reflect the many ways critical national interests may be threatened or advanced. While "national interest" is not coextensive with "national security," nations face the challenge of sometimes interconnected military, economic, diplomatic, and political considerations that might have been separable in earlier eras.[4]

Economic actors–companies, labor markets, and governments–rely on globally efficient and intertwined supply chains to deliver products. These highly interconnected supply chains are a fact of life, and in many ways beneficial. Highly interconnected global trade has, among other things, reduced global poverty by distributing capital and labor to places where it is most efficiently used.[5]

But, with benefit comes vulnerability. Dispersed supply chains develop because actors find it economically advantageous to seek the least expensive and most productive sources of supply. While this may be individually beneficial for some actors, pursuit of least-costly and most efficient supply chains is not necessarily consistent with collective national security needs. Indeed, Individual optimization of supply chains can create vulnerabilities more broadly. For instance, disruptions in supply chains, whether from malign human action or natural disasters, are rarely confined to a single company and can have broader economic impacts.[6]

In some cases, supply chain disruptions can have national security implications. These include pharmaceuticals[7] and personal protective equipment,[8] semiconductors used in multiple different systems to include military applications, energy, food, and raw materials used in manufacturing.[9]

The impact on vulnerable populations may be particularly severe. Supply chain disruptions cause higher prices and shortages among basic commodities such as generic drugs or canned food or energy, increasing the cost of living and provision of basic needs. While more affluent nations or individuals can often find ways to mitigate disruptions, those who start with fewer resources are the first to—and

more severely—suffer than their wealthier counterparts.

Disrupted supply chains can set the stage for heightened tension, even open conflict

For the most part, nations will try to secure their supply chains by peaceful means such as stockpiling, direct investment in partner nations, and use of other financial incentives.

However, if supply chain disruptions become chronic and severe, more aggressive actions might be initiated. International competition becomes a matter of using national power to ensure access to resources.[10] This might come in the form of military action, but it need not. Initiatives such as China's "Belt and Road" initiative is an effort to both assure supply and transportation and deny the same to potential adversaries.[11]

What is also increasingly clear is that economic interdependence—which supply chains enable—will not necessarily pacify international relations and can instead be a source of risk and geopolitical tension.[12] Such conflicts have occurred even during times of significant interdependence between nations, such as in the European system prior to World War I.[13] Furthermore, aggressive action short of outright war can still be very dangerous for actors in the system.

Turning to a recent example, Taiwan currently dominates the market for semiconductors, which in some respects gives it leverage with other actors, such as mainland China.[14] However, this very dominance—plus Taiwan's proximity to mainland China—may in fact raise the incentive for China to take aggressive military action against Taiwan to ensure access to semiconductors.

Such action could range from a coercive "quarantine" to an actual invasion.[15] Such actions would put semiconductor production at risk to the detriment of nearly every actor in the world economy–including China–but also possibly forcing a resolution on China's terms. Both the cause and the resolution of this potential security challenge are the product of vulnerable overseas supply chains.

China as a unique actor and possible systemic destabilizer

China's potential as a disrupter cannot be ignored. China is an economic powerhouse. Since 2014, China has become the world's largest manufacturer and trading nation, which gives it unique influence.[16] It is at the very center of several key supply chains–from rare earth processing and batteries to pharmaceuticals and medical devices—and is at least potentially able to use its influence to promote its geopolitical objectives.[17]

China's leverage does not mean that it is free of exposure. Indeed, its status as a "workshop" requires that it has access to markets that allow export of its goods. Because China plays such a critical role in complex supply chains, just like the rest of the world, it is also subject to disruptions in unexpected ways. Indeed, the disruptions experienced during the COVID pandemic illustrate that there is much about these interactions that China itself did not understand.[18] Moreover, just as China can use its dominance in parts of critical supply chains, the U.S. also has leverage in denying the export of intellectual property and advanced technology.[19] Such sanctions affect all the parties involved, and the important point is that interdependence creates risks, as well as possibilities, for everyone.

USMCA, secure supply chains, and national security

This essay does not presume that the geopolitical interests of the United States perfectly intersect with those of Canada[20] and Mexico.[21] All three USMCA signatories have their own foreign policy and national goals. However, there is a common interest in ensuring the availability of key materials and the resilience of supply chains. Supply chain interdependence is a fact of life, which is very unlikely to change in the next generation.

China has multiple reasons and means for disrupting supply chains. USMCA may be very helpful in mitigating the temptation and ability for China to disrupt. It can do this in three major ways: Creating a common understanding of vulnerability among the three countries; promoting the location of critical supply chain sources within the territories of the three signatories; and demonstrating that supply chain interdependence can be managed within a cooperative trading bloc.

A common understanding of vulnerability

A characteristic of recent supply chain crises is that they occur in unexpected ways. When the COVID-19 pandemic began having a major global impact in March 2020, the world experienced shortages of ventilator parts, personal protective equipment, and nasal swabs, not just as demand exploded for these commodities but as the factories that produced them closed. These were only the first in a whole series of shortages of multiple commodities over the next two years.

This essay does not presume that the geopolitical interests of the United States perfectly intersect with those of Canada and Mexico.

What they had in common was broad–and to a very large degree unexpected–systemic impact. Many of these vulnerabilities developed with no clear understanding that they were in fact developing.

USMCA can at a minimum provide a forum for nominating and assessing key challenges. The preamble for USMCA calls for measures to promote transparency and macroeconomic cooperation. USMCA already imposes rules of origin and tracking for automobiles and automobile parts, to include the provenance of raw materials. The tracking requirements are indeed held to be more stringent than NAFTA's.[22] While this tracking is in some ways onerous, it has the positive effect of more precisely identifying vulnerability. Requiring that origins be shown all the way back to production inputs and raw material no doubt is onerous, it is one very sure way of identifying where supplies may be vulnerable.

The promotion of "friend-shoring"

USMCA is best seen as a mechanism for ensuring free and fair trade between neighbors with shared borders and interests. However, the very existence of a market generally free of trade barriers may provide an opportunity for addressing critical supply chain threats.

Specifically, where there are known vulnerabilities in current supply chains, whether in raw material extraction, materials processing, manufacturing, or even transportation, a trade agreement that already provides a framework for governance and sourcing may be a real asset. What recent events have shown is that there are large and unappreciated risks for operating elsewhere. USMCA can make "friend-shoring" an attractive option for private actors.

The promotion of equity common values

The previous two recommendations were focused on using USMCA to improve visibility and understanding of supply chain vulnerabilities and thus more generally promote security in an interdependent world. USMCA has an additional value, which is to show that nations can arrive at common approaches to supply chains that protect national interests and do so without resorting to coercion, armed or otherwise. The partners work within a framework, allow for waivers and mitigations when some local interest might be damaged, and agree to a conflict resolution process that serves the interests of all parties. USMCA signatories are long-standing friends, so the model might not be as readily executed among other partners. But, the agreement does show that interdependence–even with the resulting vulnerabilities–does not have to result in conflict.

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22 USMCA takes effect. How does it affect supply chains? | Supply Chain Dive

Lance Fritz

Chairman, President, and Chief Executive Officer, Union Pacific Railroad

NORTH AMERICAN COMPETITIVENESS: A TEAM EFFORT

As businesses and policymakers grappled with disruptions from the COVID-19 pandemic, Russia's invasion of Ukraine, and rising geopolitical tensions, the importance of strengthening and diversifying North American supply chains cannot be overstated. President Biden initiated a comprehensive review of critical supply chains early in his administration to assess capabilities, vulnerabilities, and resilience. The review's findings highlighted the importance of working with North American trading partners to support trilateral cross-border supply chains in critical sectors.[1]

Decades of economic integration through the North American Free Trade Agreement (NAFTA) and now the United States-Mexico-Canada Agreement (USMCA) have created a foundation for a deeply integrated North American manufacturing and supply chain ecosystem. A competitive North American economy can draw investment and diversify supply chains, particularly for advanced technologies such as semiconductors and the inputs needed to sustain and develop critical sectors. To achieve our common supply chain goals, however, requires a trilateral North American approach.

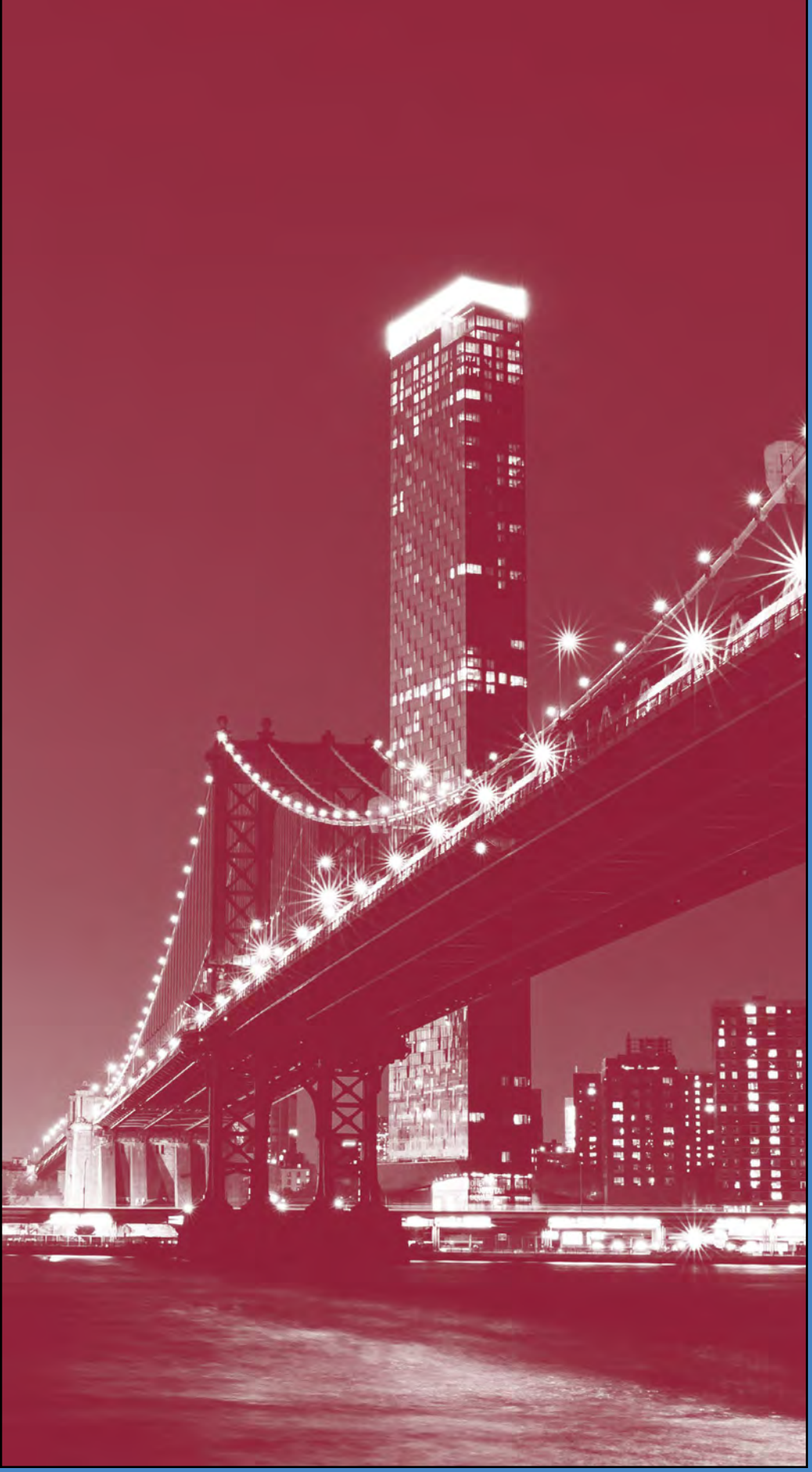
USMCA sets the foundation for resilient supply chains

Since entering into force, USMCA has proven critical to anchoring the economic competitiveness and resilience of the North American region. It includes state-of-the-art rules of origin, trade facilitation, intellectual property, and regulatory practice provisions, while preserving the market access commitments that facilitated the level of integration achieved under NAFTA.

Although issues have arisen with aspects of the agreement's implementation, its improved consultation and dispute settlement procedures have enabled the parties to address issues as they occur. Full implementation of USMCA will provide businesses the certainty and stability needed to invest in sustainable and innovative supply chains across the region that can better respond to future economic disruptions.

Beyond USMCA

USMCA's consultative mechanisms also provide the parties with avenues to move beyond the agreement's commitments to improve supply chain competitiveness and resilience. For example, at the USMCA Free Trade Commission on July 8, 2022, the United States Trade Representative, the Mexican Secretary of Economy,



and the Canadian Minister of International Trade agreed that integrated supply chains provide a competitive advantage for North America and help all three economies better navigate economic disruptions, such as from the COVID-19 pandemic.[2] Accordingly, these officials directed the USMCA Competitiveness Committee to design a mechanism and process to ensure that North American trade flows continue during future public emergencies. This new USMCA tool, strongly supported by the Business Roundtable and its Canadian and Mexican counterparts, will also strengthen public-private partnership to mitigate supply chain shocks across North America during future crises.

Better integration of efforts on semiconductors and other critical sectors

In the United States, there is growing bipartisan support for measures that secure increased access to critical materials and products. The U.S. Congress recently passed the CHIPS and Science Act, which appropriated $52 billion to incentivize the expansion of semiconductor manufacturing and supply chains in the United States. The Infrastructure Investment and Jobs Act and the Inflation Reduction Act both also included a wide range of provisions aimed at strengthening and diversifying critical supply chains. Certain provisions in these bills could incentivize North American supply chain integration

and resilience through increased investments and procurement under USMCA and the WTO Government Procurement Agreement and by prioritizing North American content. Other restrictions and content requirements, however, could complicate and even undermine efforts to integrate North American semiconductor and critical supply chains due to rigid requirements beyond the scope of agreements with Mexico and Canada.

Critical mineral production and processing increasingly have been concentrated in China and outside North America. The United States, Canada, and Mexico should work together to ensure the region develops its considerable deposits of critical and rare earth minerals. Several of these resources are important components of batteries and other technological parts that will power the green transition. In addition, critical minerals are essential components of our industrial and defense systems.

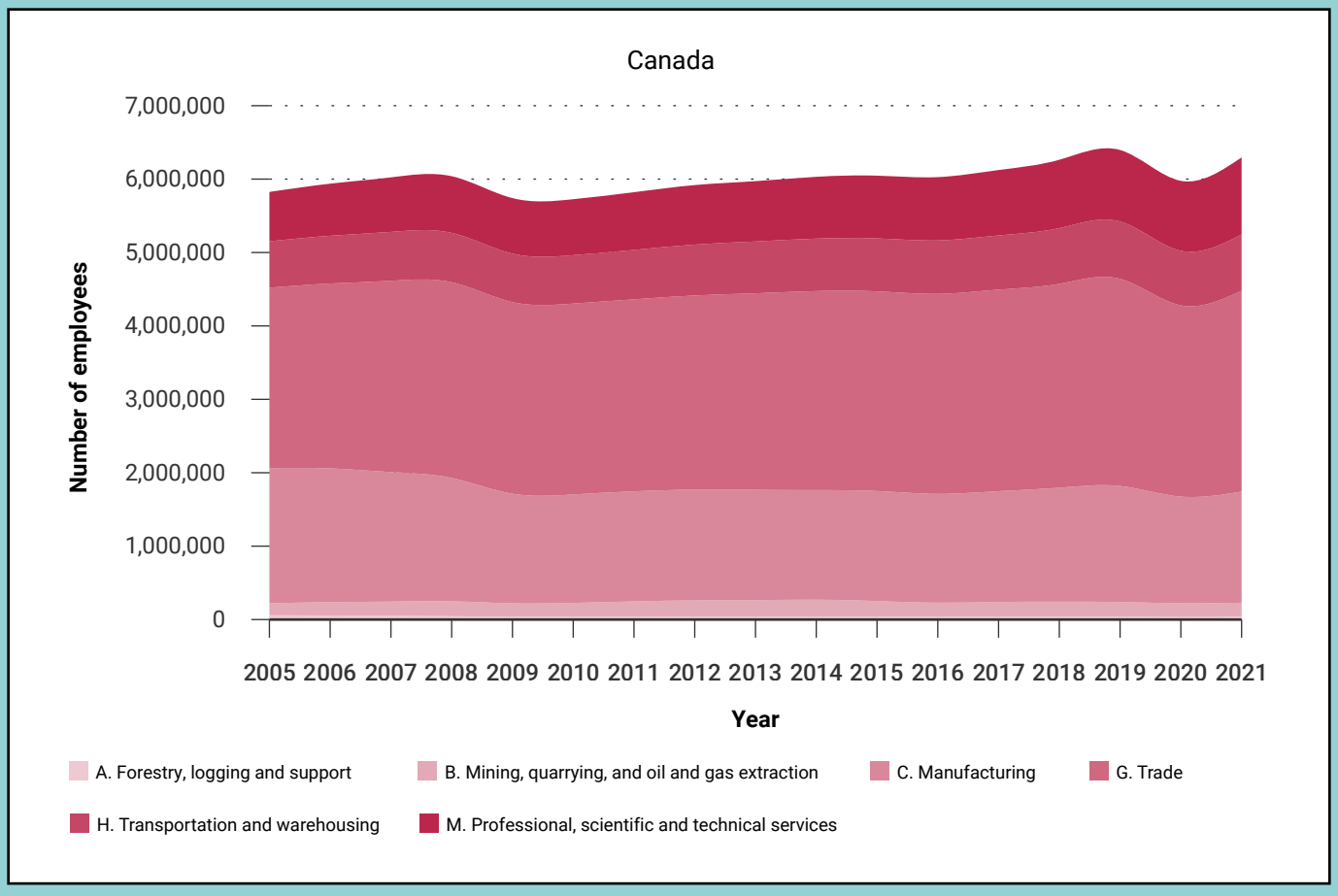
A dependable supply of these minerals requires increased investment to expand sustainable mining and processing, as well as enhanced trade facilitation measures to ensure that these materials can be freely traded throughout North America. As the U.S. governmnet implements these new laws, it should work closely with industry partners and the Canadian and Mexican governments to create that dependable critical mineral supply chain.

Commitment to North American supply chain

Fully implementing USMCA will help facilitate the development of North American semiconductor, critical materials, and critical-sector supply chains by enhancing economic integration, making regulatory standards more uniform, and facilitating cross-border trade. But all three governments—United States, Mexico, and Canada—must go beyond USMCA and commit at the highest levels to a trilateral supply chain approach that leverages the comparative advantages and combined capabilities of all three countries. The U.S., Canadian, and Mexican private sectors should identify opportunities for enhanced supply chain integration and partner with governments to achieve a more competitive and resilient North American economy. If governments instead go it alone, fail to abide by USMCA commitments, and choose not to cooperate, then none of the three countries will fully realize their shared supply chain goals.

GRAPH 2 **Employment levels of each North American country in key supply chain sectors**

A substantial part of the workforce in each country works in sectors that are part of North American supply chains.



Source: Statistics Canada. Table 14-10-0202-01 Employment by industry, annual.

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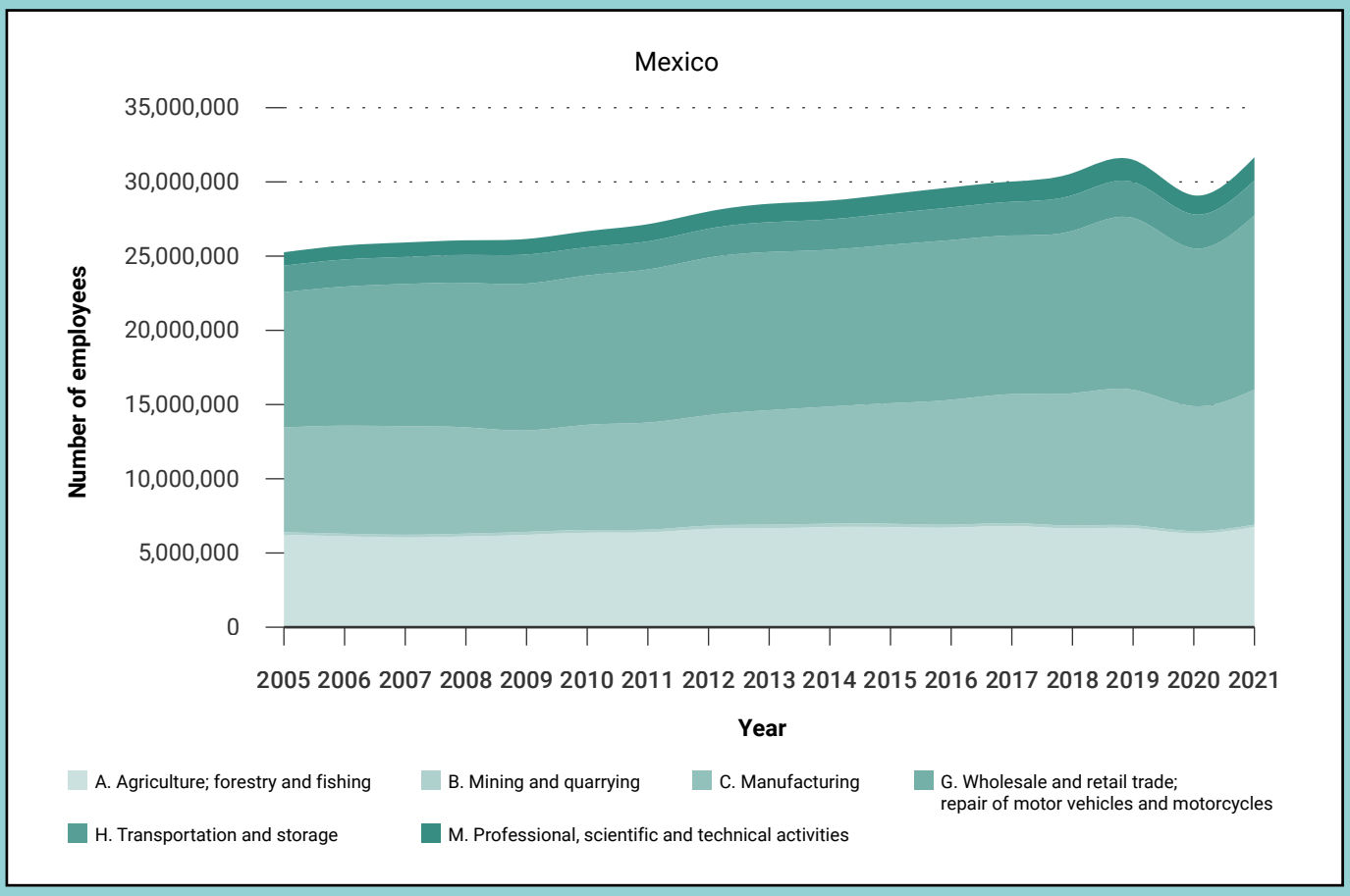

Source : International Labour Organization (2022). Industries are categorized according to International Standard Industrial Classification (ISIC-Rev. 4) codes.

"Full implementation of USMCA will provide businesses the certainty and stability needed to invest in sustainable and innovative supply chains across the region that can better respond to future economic disruptions."

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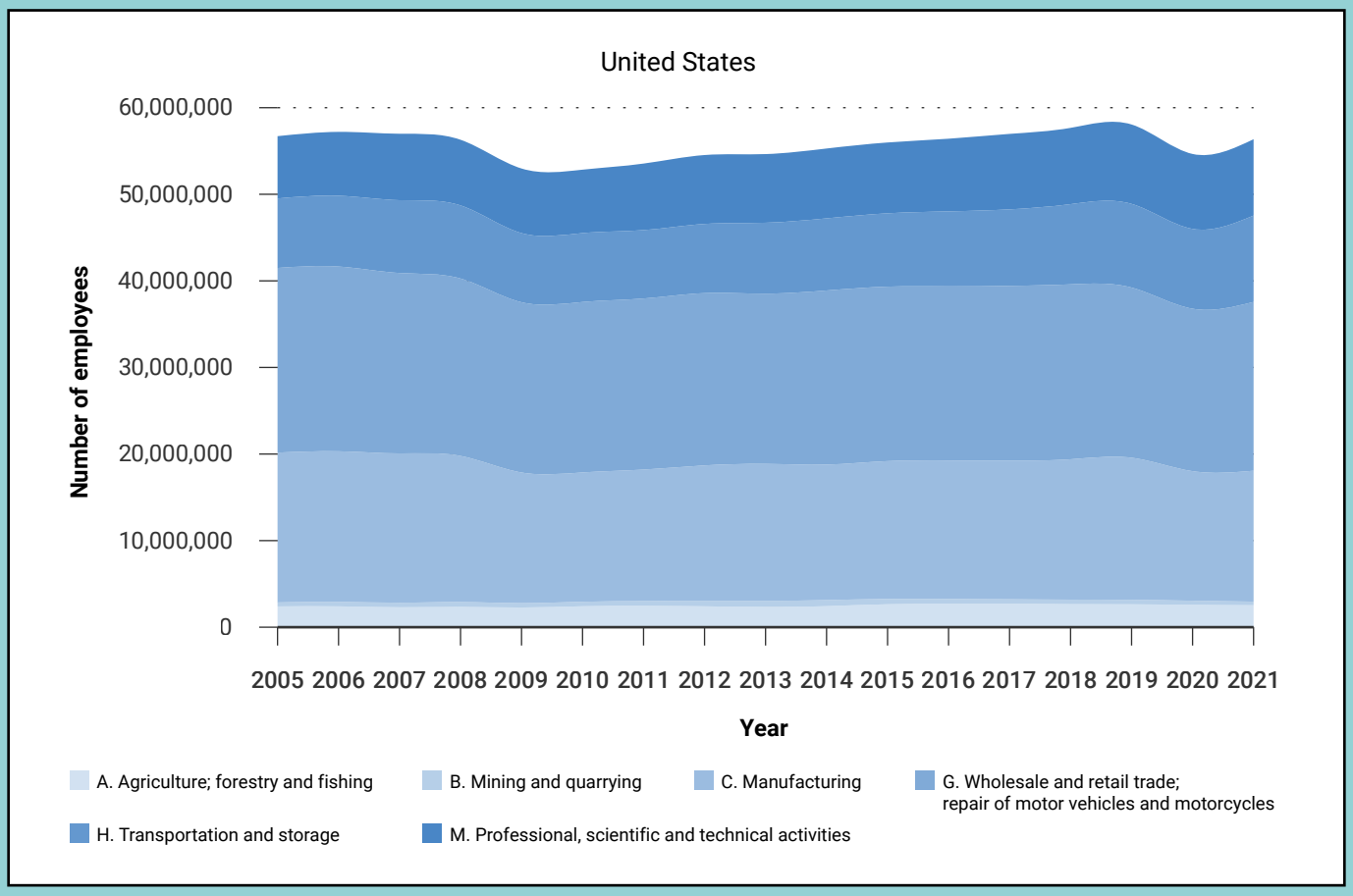

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CHAPTER 2
THE FUTURE OF ASIA-PACIFIC VALUE CHAINS

DAVID DOLLAR

Senior Fellow,
John L. Thornton China Center,
Brookings Institution

Asia-Pacific value chains have undergone a series of shocks in recent years, including the COVID-19 pandemic, environmental disasters, and geostrategic tensions between China and the U.S. As a result there has been much speculation about how these supply chains might evolve: Will some "reshore" to the U.S. or "nearshore" to partners in North America? Will there be significant shifts of value chains out of China? If so, where will they go? It is still early days, but we can already bring some evidence to bear on these questions, which is the purpose of this piece.

Reshoring

Reshoring of manufacturing back to the U.S. has become an important focus of policy. In his 2022 State of the Union address, President Biden stated that "it's time to bury the label rust belt. It's time to see what used to be called the rust belt become the home of a significant resurgence of manufacturing. Instead of relying on foreign supply chains, let's make it in America." Buy American provisions have been included in significant pieces of recent legislation such as the infrastructure bill and the climate-focused bill (named the Inflation Reduction Act). President Trump used similar rhetoric to extol protectionist policies such as import tariffs on steel and aluminum or the 25 percent tariff on about half of what the U.S. imports from China. These policies have been in place since 2018, long enough to see if they are having the effect of promoting a generalized reshoring of manufacturing. By generalized reshoring I mean a widespread nascent trend that is visible in the macroeconomic data.

As of mid-2022, there is no evidence of a generalized resurgence of manufacturing in the U.S. The index of real manufacturing output from the St. Louis Federal Reserve Bank shows remarkable stability in U.S. manufacturing output over the past decade. There was some decline in the early days of COVID, but then a quick rebound. As for trend: Real manufacturing output was 4 percent higher in mid-2022, compared to a decade earlier. Growth of 4 percent over a decade is quite slow and means that manufacturing continued a long trend of decline as a share of the U.S. economy. While manufacturing output has stagnated, manufactured imports have surged. It used to be that the manufacturing trade deficit was a significant part of the overall U.S. trade deficit, but there were other important factors as well, notably imports of crude oil. But now the U.S. is largely self-sufficient in energy, so the overall trade deficit consists almost exclusively of the manufacturing trade deficit, which reached $900 billion in 2020.

This overall trade deficit equals the gap between investment and savings in the U.S. In other words, the trade deficit enables the U.S. to invest more than its saves. For there to be generalized reshoring of manufacturing to the U.S., would require a change in this savings-investment balance. The U.S. could invest less, but that would be bad for long-run growth, and no one is advocating this. Holding the investment rate constant, savings would have to rise to reduce the manufacturing trade deficit. That is, Americans would have to consume less of their income. The most direct path to achieve this would be to increase taxes and reduce government spending. It is hard to find any politician in America advocating this kind of fiscal tightening. The actual budgets passed by the U.S. Congress generally go in the other direction, increasing fiscal deficits. So, generalized reshoring and a reduction of the U.S. trade deficit is unlikely.

While generalized reshoring is unlikely, it is still possible to subsidize the expansion of particular industries, such as semiconductors or electric vehicles, as done in the recent CHIPS bill and Inflation Reduction Act passed by Congress. But without a change in the macroeconomic stance, it is likely that these policies will crowd out other manufacturing sectors, with the result that the overall size of U.S. manufacturing is unaffected. Subsidizing particular industries could bid up wages for certain types of labor and/or appreciate the exchange rate, with the result that other sectors become less competitive and hence contract. Also, the subsidies have to be paid for, either directly through taxation (or cutting other expenditures) or indirectly through inflation. Either way, paying for the subsidies will tend to reduce other consumption and hence lead to some contraction of other industries. There is no free lunch, so subsidizing the expansion of, say, semiconductors will lead to contraction of other sectors, including some manufacturing industries.

Nearshoring

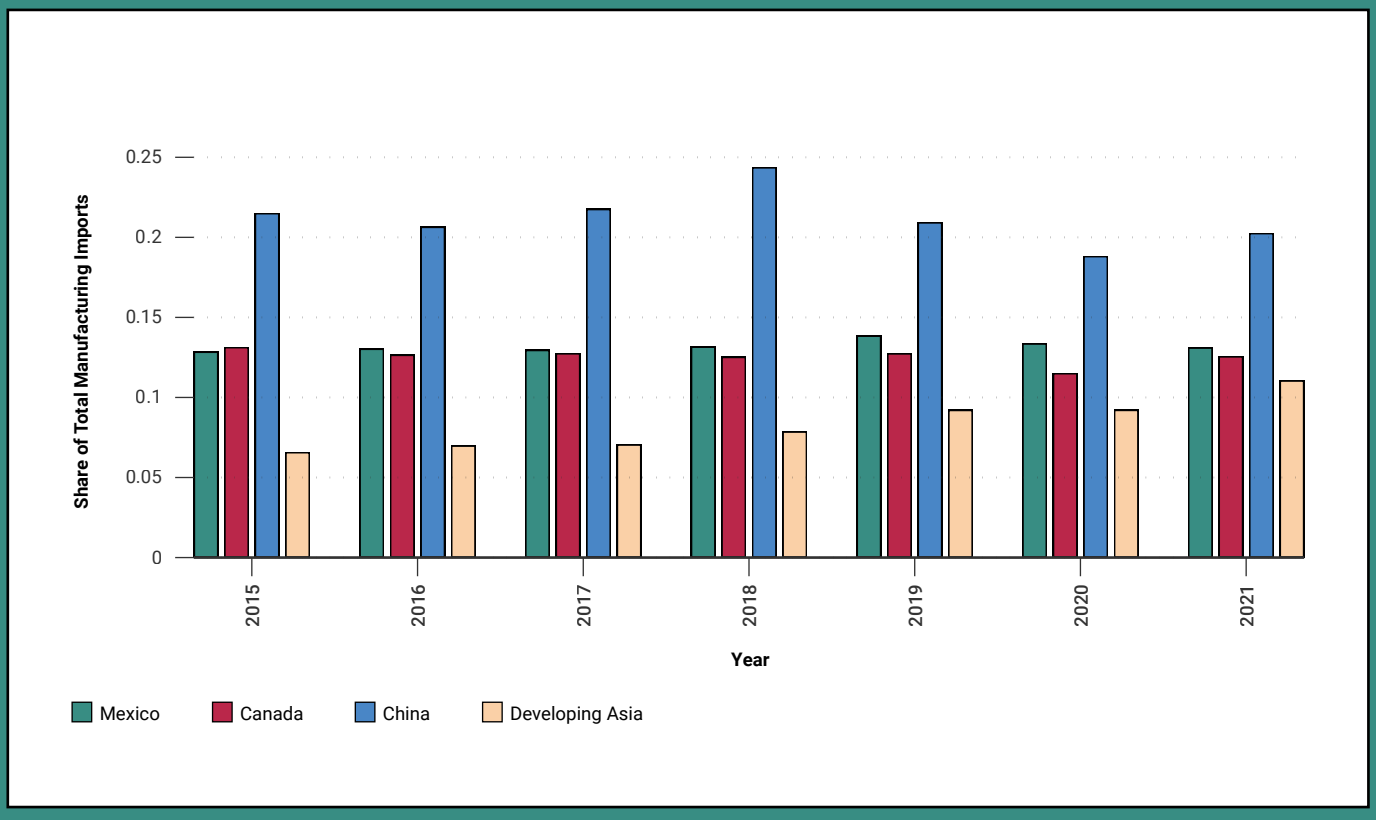
There is also talk in the U.S. about "nearshoring," that is, bringing back some manufacturing production from far-away Asia to nearby economies, especially Mexico and Canada. The renewal of the North American free-trade arrangement under the name USMCA fueled this talk. But note that the revised trade agreement did not involve any new trade liberalization of significance, and in fact introduced protectionist measures in the auto sector.

So far, there is little evidence of "nearshoring." Mexico and Canada each have high shares of U.S. manufacturing imports, around 13 percent, that have been stable for a long time. Between 2015 and 2021 the combined share did not budge from its 26 percent level (Graph 5). There is good reason for this. Canada is a high-wage economy not well suited to producing the kinds of products that the U.S. imports from Asia. Mexico is a low-wage developing country, but it has a lot of weaknesses in its investment climate, as discussed in the next section.

Shift of some supply chains out of China

Despite 25 percent tariffs on Chinese products being in place for four years, they have had only a modest effect on both the volume and value of U.S.-China trade. They have certainly had some effect as U.S. imports from China have declined modestly, and there has clearly been diversion of certain products to Southeast Asia. Between 2018 and 2021, China's share of U.S. manufactured imports declined from 24 percent to 20 percent. While overall imports

GRAPH 5 Shares of US Manufacturing Imports



Source: U.S. Department of Commerce.

Between 2018 and 2021, China's share of U.S. manufactured imports declined from

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have held up, there is a lot of variation by product category. U.S. imports from China of telecommunication equipment or semiconductors are down 50-60 percent, and surely this reflects in part the technology war. On the other hand, imports of other products such as computers or agricultural machinery have risen briskly. During the COVID-19 pandemic, demand shifted to the kinds of goods that China exports, including TVs, exercise equipment, and furniture.

For the sensitive products like semiconductors and telecommunication equipment, it seems that some production shifted out of China to other Asian developing economies, most notably Vietnam. U.S. imports from Vietnam increased by more than 100 percent between 2018 and 2021, reaching $100 billion and making Vietnam America's sixth largest source of imports. Referring back to Graph 5, China's share of U.S. manufactured imports fell four percentage points between 2018 and 2021, while imports from other Asian developing countries rose an equivalent amount, with Vietnam leading the pack. The large increase in imports came in quite a few categories, including toys, sports equipment, furniture, and cell phones. But particularly large increases were registered in the three product lines where U.S. imports from China declined: Computer accessories, semiconductors, and telecommunication equipment. Vietnam is a much smaller economy than China; additional imports from Vietnam made up about 40 percent of the shortfall in imports from China in these product lines. Some production has moved to other ASEAN countries, such as Thailand and Malaysia, but Vietnam so far has been the big winner.

The economic conflict between the U.S. and China is more of a tech war than a trade war in the sense that a few specific hi-tech categories have been affected a lot, while overall trade has continued at a high level. But some hi-tech products have been sharply affected by tariffs, subsidies, and other protection. A good example is the solar industry. The U.S. imposed tariffs on Chinese solar products in 2012 to counteract subsidies that the industry had gotten as it developed. Since then, China's exports of solar panels to the U.S. have fallen to nearly zero, while those from Southeast Asia soared, with Vietnam as the main supplier. In March 2022, the U.S. Commerce Department initiated an investigation into whether Chinese solar photovoltaic (PV) makers were shifting production to Southeast Asia to avoid tariffs, with the implication that solar PV imports from those countries could be subjected to tariffs as well. The result was a collapse in solar imports and a drop in investments in solar installation and energy storage, putting at risk thousands of jobs as well as U.S. targets for switching from fossil fuels to renewable energy. On June 7, 2022, the White House announced that it would suspend solar tariffs on Southeast Asian nations for 24 months. Hence the U.S. will continue to import solar panels from ASEAN countries, often from Chinese firms.

These adjustments in supply chains are visible in the data, especially when one takes into account value added exports. For example, Vietnam's gross exports to the U.S. have been growing rapidly, at 24.7 percent per year over 2010-2021. The growth rate of the value added in Vietnam's exports to the U.S. was distinctly slower, at 19.0 percent (Dollar 2022). The latter figure is calculated using trade in value added (TIVA) data from the ADB. The difference between the two figures indicates that the imported content in Vietnam's production is on the rise. Furthermore, China's share of the imported

content in Vietnam's exports has risen rapidly, according to the same source.

In 2017, China accounted for 10.8 percent of the imported content in Vietnam's exports; by 2021 that figure had nearly doubled to 20.3 percent. These trends are consistent with some parts of value chains shifting out of China to Vietnam but remaining connected to China because it is Chinese firms making the new investment and/or Chinese firms supplying key intermediate inputs and machinery. Also, over the same period, China's exports to Vietnam, both gross (24.6 percent) and value added (22.0 percent) have been rising rapidly.

Evolution of supply chains up to now cannot be characterized with a single generalization. There is no large-scale onshoring or near-shoring to the U.S. though there might be some specific products for which such a characterization would be valid. U.S. efforts to subsidize specific industries such as semiconductors or electric vehicles are not likely to increase total manufacturing production in the U.S. as long as the macroeconomic stance is unchanged. In other words, the U.S. is likely to import more of other manufactured products, providing opportunities to developing countries that can take advantage of it. Some value chains are getting shorter, but others are getting longer. For example, the products whose final assembly moved to Southeast Asia now have longer supply chains. Many developing countries in Asia have wages below those of China, as Chinese wages have risen with productivity. These countries can potentially attract more investment and have a greater role in supply chains, but cheap labor is not enough, as evidenced by the many low-income countries that cannot get a foothold in supply chains. What are some of the factors that determine where production moves?

Global supply chains are largely organized by multinational companies, hence openness to direct foreign investment is critical (Xing et al., 2021). Most countries have gotten this message and are open to direct investment in manufacturing. But manufacturing supply chains also increasingly rely on service inputs–for example, finance, transportation, and telecom. Many developing countries are still quite closed in key service sectors, with the result that their overall openness is only partial.

Other important aspects of the investment climate are logistics, Intellectual Property Rights (IPR) protection, and quality and extent of education. Table 1 shows some relevant indicators for the ASEAN countries plus Mexico, China, and India. High-income countries such as Japan, South Korea, and Singapore are listed for comparison. Among the developing countries, China stands out as having the best logistics and human capital. Its measure on the Logistics Performance Index is the same as South Korea, even though the latter country is at a much higher level of development. Among the lower wage economies, Vietnam stands out as having relatively good logistics. India has weak performance in this area, a reason why Indian manufacturing continues to punch below its weight.

Mexico has various weaknesses in its investment climate. For example, Schott (2021) considers Mexico's potential as a manufacturing hub, but finds it hampered by investment climate weaknesses: "intrusive Mexican business regulations, inadequate and irregular power supplies, and clogged road and rail networks." The U.S. State Department's 2021 assessment of Mexico's investment climate likewise

notes that "uncertainty about contract enforcement, insecurity, informality, and corruption continue to hinder sustained Mexican economic growth."

Another important issue is intellectual property rights (IPR) protection. Multinational corporations (MNCs) are bringing their intellectual property to the value chains and reasonably good IPR protection is one factor that attracts them to particular locations. Developing countries typically have weaker protection than advanced economies, but among developing countries there is much variation. China stands out with relatively good IPR protection. At the other end of the spectrum, Mexico is rather poor. This hampers the potential for significant near-shoring back to North America. Vietnam looks pretty good on all the measures, which is why it has received most of the shift in production occasioned by the tech war. But it would need to improve in all areas if it wants to keep expanding its role in supply chains, especially hi-tech ones.

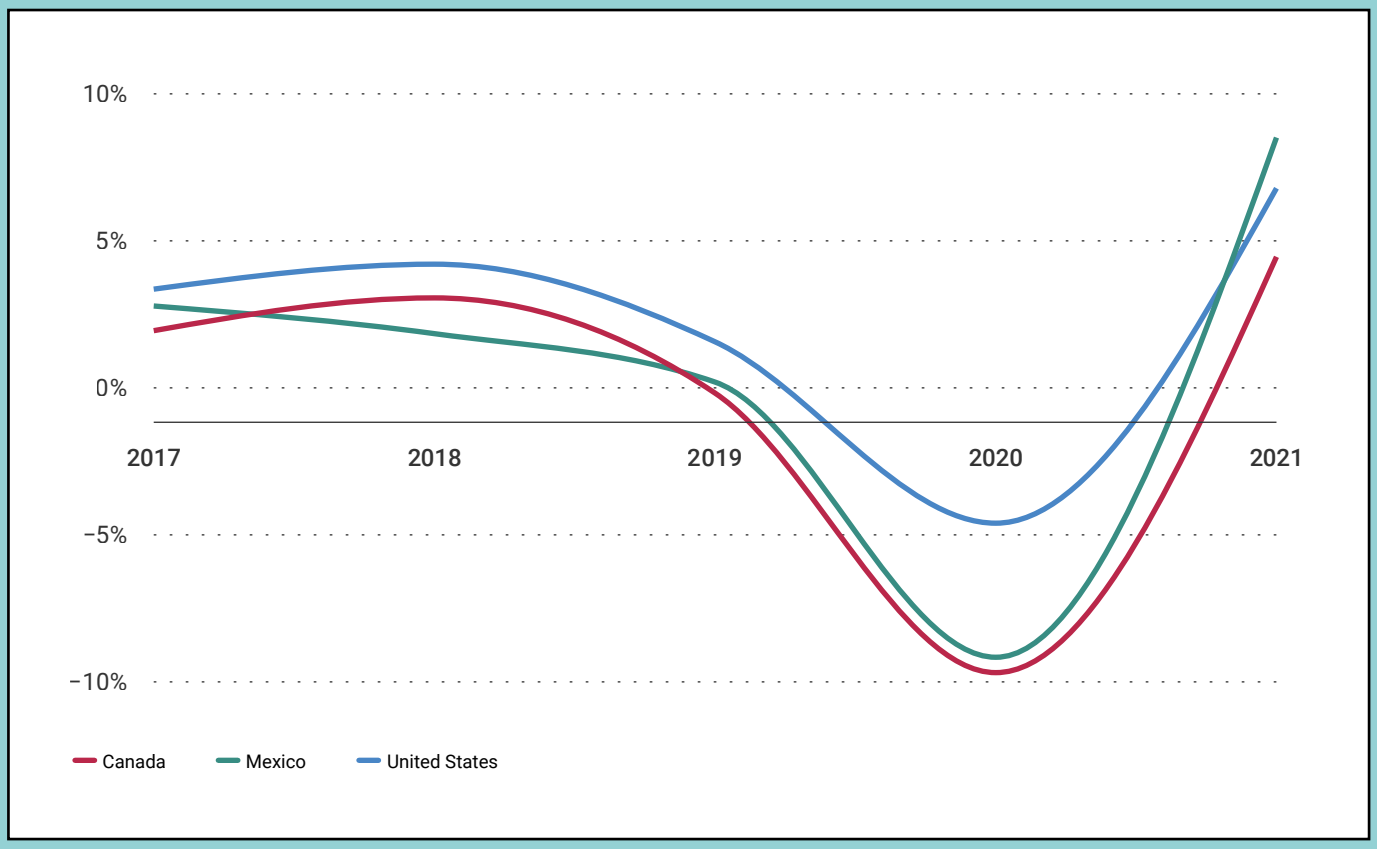
Finally, there is the important issue of human capital. The table includes two indicators: Tertiary school enrollment rate and PISA math scores. China stands out as having outstanding human capital indicators, with tertiary enrollment and PISA scores analogous to developed countries such as Japan and Korea. The PISA testing covers only Beijing, Shanghai, and some coastal provinces, but still these areas have a population of hundreds of millions. The outstanding human capital, plus excellent logistics and relatively good IPR protection, explains China's position at the center of manufacturing value chains. Human capital weaknesses hold back countries such as India, Indonesia, Thailand, the Philippines, and Mexico. Suffice it to say at this point that there is no evidence of a surge in Mexican manufacturing as a result of shifts in value chains.

TABLE 1. Investment Climate Indicators, Mexico and East Asia

	Logistics Performance Index (1-5)	Intellectual Property Rights Index (1-10)	Tertiary School Enrollment Rate (%gross)	Programme for International Student Assessment (PISA) Math Mean Score
	2018	2016	2019	2018
Vietnam	3.27	4.497	28.6	496
Philippines	2.90	4.495	31.6	353
Indonesia	3.15	4.799	36.3	379
China	3.61	5.594	53.8	5911
Thailand	3.41	4.735	n.a.	419
Mexico	**3.05**	**4.623**	**42.8**	**409**
Malaysia	3.22	6.3	43.1	440
Korea	3.61	6.384	98.4	526
Japan	4.03	7.677	64.1	527
Singapore	4.00	7.967	91.1	564
India	3.18	5.143	29.4	n.a.

Source: The data for LPI are from the "World Development Indicators," 2018, the World Bank. The data for IPR are from the "International Property Rights Index 2022," 2022, the Property Rights Alliance. The data for Tertiary School Enrollment Rate are from "World Development Indicators," 2019, the World Bank. The data for PISA Math Mean Score are from the "PISA 2018 Results," 2018, the Organisation for Economic Co-operation and Development.

GRAPH 6 **Rate of annual growth in manufacturing value added in N.A. from 2017 to 2021.**
After stagnation and then decline during COVID, North American manufacturing is trending up in 2021.

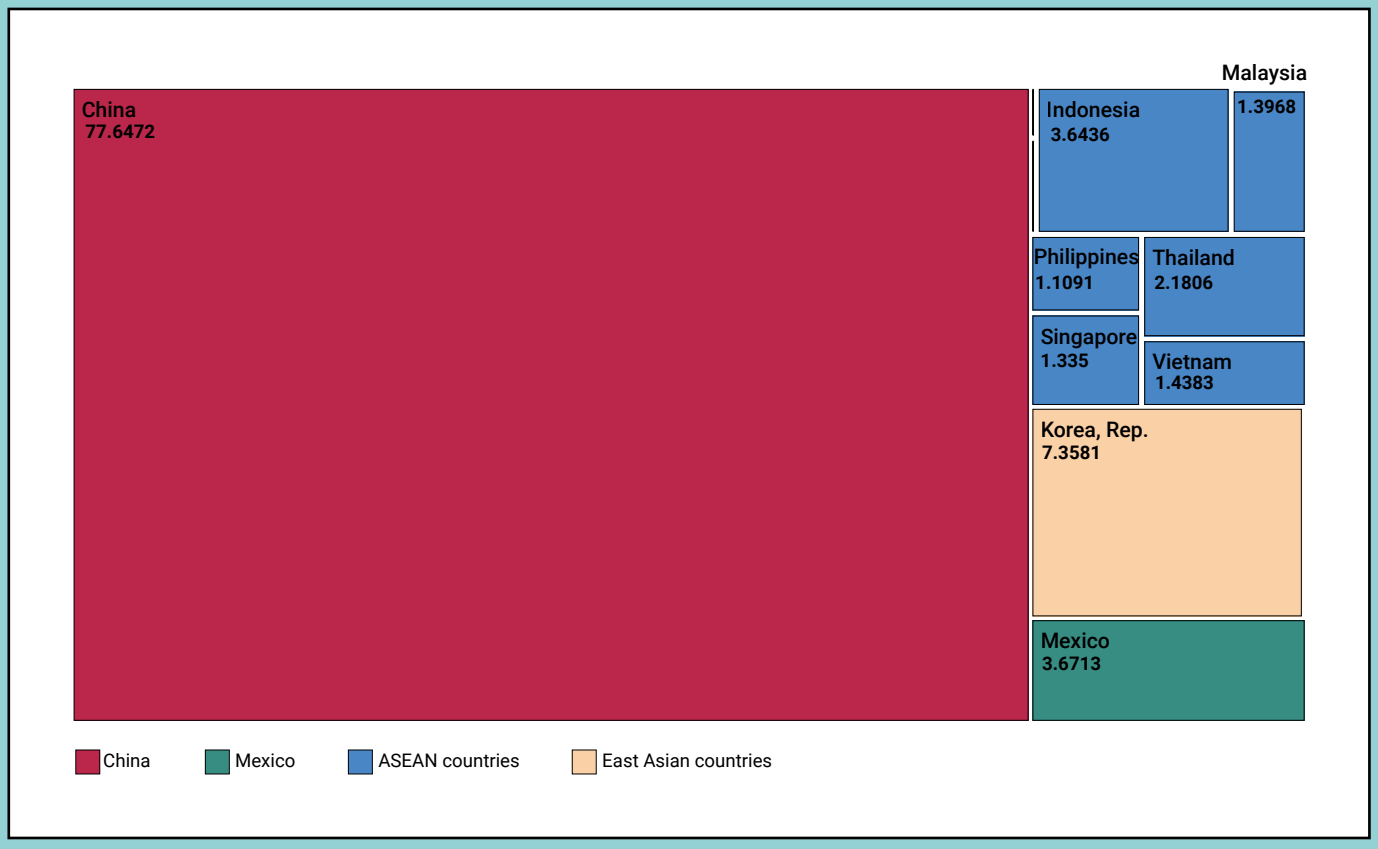


Source: World Bank World Development Indicators (2022)

ENDNOTES

1 CONALEP, a technological subsystem with over 315 000 students nationwide, pioneered the Mexican Model of Dual

GRAPH 7 **Relative size of manufacturing sector (measured by manufacturing value added in current US $) in 2021 between Mexico, China, and other Asian players in the global supply chain market.**



Source: World Bank World Development Indicators (2022).

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Liz Shuler

President, AFL-CIO

RAISING LABOR STANDARDS: A MEANS TOWARDS A MORE COMPETITIVE NORTH AMERICA

The world is confronting a number of challenges, including a global health pandemic and the Russian invasion of Ukraine. These shocks have exposed the vulnerability of the global supply chains created by decades of failed trade policy and corporate-driven globalization, resulting in shortages of critical supplies and manufacturing inputs and amplifying inflation.

The Biden–Harris Administration has advanced a bold plan to strengthen America's resilience against the costly supply disruptions that have placed workers' and our families' health and safety at risk, idled major manufacturing plants, and exposed significant threats to our economic and national security. Building on an early executive order on the U.S. supply chains, together with commitments on domestic manufacturing and workers' rights, the administration and Congress have enacted a set of policies aimed at achieving a coherent industrial strategy—one long overdue to make us competitive with other major manufacturing economies and to address decades of job loss and economic dislocation. These actions include:

- Supply-side incentives to establish, retool, or expand U.S. manufacturing capacity in economically critical and emerging sectors. This includes, for example, semiconductors and semiconductor components (through the CHIPS and Science Act); battery components and materials (through the bipartisan infrastructure law); the manufacture and production of critical minerals; and offshore wind, solar, and battery components; and other clean energy technologies (through the very substantial manufacturing tax credit provisions of the Inflation Reduction Act).

- Demand-side incentives that require, encourage, or reward domestic procurement in major infrastructure investments, and increased domestic content in publicly supported energy investments.

- Strengthened labor standards, community benefit, and targeted investment requirements across these policies—including key tax credits—to help set industries on equitable high-wage pathways.

- Agency attention to the details of implementation, including the meaningful engagement of labor and community stakeholders.

The success of this effort also depends on advancing a complementary trade agenda that supports domestic manufacturing, supply chain resiliency, and strong commitments to uphold fundamental labor and environmental standards. The United States–Mexico–Canada Agreement (USMCA) can be a critical starting point in developing trade policy that can support resilient and sustainable supply chains, bolster domestic manufacturing, and create good jobs in America.

Resilient, sustainable supply chains must be built on a foundation of respect for internationally recognized workers' rights. The USMCA recognizes this principle by containing the strongest labor provisions in any trade agreement backed up by an innovative facility-specific "rapid response" mechanism (RRM) to hold companies accountable. Under the RRM, companies that fail to respect the new Mexican labor law guaranteeing workers' right to organize and bargain collectively risk paying higher tariff rates or even losing access to the U.S. market altogether. The mechanism has already proven to be a potent enforcement tool: In all six cases in which the Biden administration has invoked the RRM, it has delivered meaningful results for Mexican workers, including job reinstatements, back pay, and the growth of independent trade unions that have successfully negotiated new collective bargaining agreements raising wages and standards.

The USMCA also recognizes the importance of the North American automotive industry, which supports more than 7 million jobs across the region, by adopting strong rules of origin (ROO) to ensure the cars and trucks that qualify for duty-free treatment are largely made with content from North America. When fully phased in, it will require 75 percent of a vehicle to be made with content sourced from North America. In addition, it requires that nearly half of the vehicle be made by workers who make at least $16 per hour on average. Together, the strong auto ROO and wage requirement signal a welcome change where trade policy complements industrial policy, rather than undermining it. These USMCA provisions make great strides in rolling back decades of anti-worker trade policies and incorporating strong, enforceable labor standards that must be included in future international trade and commercial agreements.

Worker-centered trade policy, properly crafted and strongly enforced, is meant to, and must, address the needs of workers throughout the region and the world. In the U.S., it should be partnered with commonsense policies and incentives to reshore critical manufacturing capacity that strengthens the U.S. economy, creates good-paying U.S. jobs, and bakes resilience into the supply chain to minimize the economic jolts that have rocked the economy and working families over the past few years. All too often, past efforts to innovate, build or sustain domestic manufacturing in key sectors—in steel, aluminum, solar or batteries, for example—have been undermined by rigid, neoliberal trade rules that encourage offshoring and outsourcing.

While there is still plenty of room for improvement and innovation, the USMCA model—coupled with the bipartisan infrastructure law, the Inflation Reduction Act, and the CHIPS and Science Act investments in addressing known gaps in domestic regional automotive supply chains—provides a welcome course correction. As the recent USMCA rules of origin decision weakening the regional content requirements for vehicles to trade tariff free shows, these first of a kind policies won't always get everything right and must be developed and written with care.

However, with the effective implementation of complementary trade and domestic manufacturing policy, we have the opportunity to reverse the all-too-familiar narrative of job loss from technological change and turn a generational shift in a critical industry into an engine of economic recovery that protects and reshores jobs and manufacturing, fills dangerous supply chain gaps, and improves conditions for workers at home and abroad.

CHAPTER 3
PREPARING MEXICAN YOUTH TO HARNESS JOB OPPORTUNITIES IN NORTH AMERICAN HIGHER TECHNOLOGY SUPPLY CHAINS

SYLVIA B.
ORTEGA SALAZAR

External advisor, General Directorate
at the National College
of Professional Technical Education
of Mexico (CONALEP)

Three decades ago, access to education in Mexico was defined as a basic human right and consequently as an obligation of the State. This constitutional principle has guided public policy, investment, diversification of services, and more importantly, the quest for quality, relevance, and connection to social needs and economic growth.

Despite an impressive expansion in coverage and access to all levels of education, the system needs to focus on quality and inclusion to improve the opportunities that young people may have in the more dynamic labor markets that will develop in the North American Region.

The main challenges are related to the inclusion of children and adolescents that have traditionally left school before they complete compulsory education; the second area of improvement has to do with pedagogy and teaching and learning practices; the third involves a radical change in the preparation of adolescents and young adults for work and lifelong learning.

Specifically, in youth's case, their skills and abilities will need to be better aligned to the requirements of the more demanding formal employment markets expected to develop soon.

As we advance in the context of USMCA towards the integration of supply chains in high tech manufacturing and other sectors of our economies, more human talent will be needed, and more of our young people will have unprecedented opportunities to be creative and progress through a trajectory of professional and personal achievement.

If Mexico is to improve its productivity and eventually become an alternative manufacturing destination to China (Meltzer, 2021), it needs to strengthen the national education system with more decentralized and flexible educational policies, with school-based improvement of learning, with more and better investments in educational technology and infrastructure and with a continuous dialogue with all national and regional stakeholders.

The increase of competitiveness in Mexico depends largely on the development of its human capital nationwide, a process that would benefit from a wide array of cooperative regional projects involving student mobility, research, and short-term practical courses for young students engaged in dual and apprenticeship programs in which corporations and small businesses play a key role.

During the NAFTA years, international cooperation flourished mainly in universities and research centers. Although the dynamic has suffered from changing circumstances in policy, funding, and the negative impacts of the COVID-19 pandemic, there is a valuable accumulation of successful experiences and best practices to build on. The two new emphases in the construction of a new generation of trilateral agreements entail a specific focus on work related learning and the inclusion of high school level students currently pursuing vocational and technical training.

"Despite an impressive expansion in coverage and access to all levels of education, the system needs to focus on quality and inclusion to improve the opportunities that young people may have in the more dynamic labor markets that will develop in the North American Region."

The size and organization of the Mexican education system

In 2020-2021, the Mexican Education System served over 37 million students or 29 percent of the total population. About two-thirds received basic education (preschool, primary, and lower high school), 14 percent were in upper high school, 13.4 percent in higher education and about 5 percent were enrolled in vocational and training non-degree programs. (MEJOREDU, 2022; SEP, 2022)

School attendance in primary and lower high school is practically universal, in contrast, only two thirds of adolescents, 15 to 17, were enrolled in upper high schools. Over the next decade, the number of children in primary, secondary, and upper high school will continue to decrease, while the demand for higher education—if graduation rates from upper high school improve—is expected to continue growing at a fast pace. These demographic changes are a chance to achieve universal coverage in upper high school and transition to tertiary studies for most young adults.

In all levels of education, services are predominantly public with 89.3 percent of preschool to upper high school students enrolled in a public school. In higher education 29 percent attended a private establishment.

In Mexico, the organization of the upper high school level is highly complex as there are general (or preparatory) and technological schools under the control of the federal government (22.7 percent of enrollment); state governments are responsible for about half of the students and the rest attend a private or an autonomous school. From the organizational standpoint, problems are the dispersion of the programs of study, lack of coordination among levels of governance, and the lack of common standards.

When considering human capital development policies, it is critical to focus on the 15 to 17 age group for the following reasons: First, there is the question of the large proportion of out of school adolescents in this age group who need access to knowledge and skills in order to participate in the work force; second, those who are enrolled in upper high school need to graduate in a larger proportion and with the knowledge, skills, and abilities needed to make successful transitions to tertiary studies and/or formal employment; and last, because these still numerous young generations will be strategic to the goals of increasing productivity, sustained economic growth, and a better distribution of wealth.

The opportunities to access formal employment in supply chains: A reference to semiconductors

The last census (INEGI, 2020) reports 31 million Mexicans between the ages 15 and 29, representing a fourth of an otherwise aging population. Although the demographic bonus is not as large as it was at the beginning of the 21st century, there is still a good opportunity to take advantage of the potential of a large pool of young people adequately trained, motivated, and guided to opportunities in labor markets and life-long learning.

In the context of the United States-Mexico-Canada Agreement (USMCA) trade agreement and in the aftermath of the COVID 19 pandemic, the design of new policy approaches to strengthen education, skills, and competences for all the young residents in the three countries, assumes a remarkably high priority.

As widely accepted, access to talent is fundamental to innovation and the construction of ecosystems favorable to the development of initiatives that may scale and multiply in selected manufacturing and service sectors throughout our territories (Meltzer, 2021). If we focus on the 15- to 19-year-old Mexican population, a subset of 10.8 million, we observe that only about half of them are currently enrolled in high school and that about 70 percent will finish. In contrast, recent indicators show universal coverage for this age group in the U.S. and Canada and completion rates of 83.2 percent in the U.S., 86 percent in Canada, and up to 99 percent in Korea. The goal of including all the Mexican youth in the opportunities afforded by the integration of supply chains will be possible if gaps in access and graduation rates are closed and quality and relevance of education and training are substantially enhanced. (OECD, 2018; 2019)

In 2021-2022, the Mexican Ministry of Education reported over 5 million men and women enrolled in higher education,

89.2 percent undergraduates with over a third attending private establishments. Coverage in higher education has been growing dynamically over the past two decades (ANUIES, 2022).

Approximately 650,000 young adults graduate from tertiary studies every year; out of this total, some 140,000 are engineers. In principle, there is an attractive pool of professionals in the diverse areas of the field with about 100,000 individuals specialized in electronics and automatization, ICT, and the largest proportion, in mechatronics, that is, in areas with potential growing demand in high-tech manufacturing sectors like semiconductors (Filippo; Guaipatín, Navarro and Wyss, 2022).

As recent studies show, there is presently an apparent excess of engineers, however, when data is disaggregated by region, there is a deficit of qualified professionals in the west and northeastern states where the most dynamic enterprises linked to the semiconductor chain of value are located. This fact speaks to the weak coordination within the higher education system and between all actors engaged in innovation (Filippo; Guaipatín, Navarro and Wyss, 2022).

Although recent indicators point to a relatively satisfactory supply of trained professionals in engineering and technology at the national level (ANUIES:2022), there is a bottleneck in the transition from lower to upper secondary schools, and an even more visible difficulty for young adults to complete high school.

There are challenges to educating and training young people, not only in access to high school and completion rates. Learning results and employability also underperform. At the same time, it is important to acknowledge progress as the 15-24 population features higher educational attainment compared to the 40-49 age group. The gains are larger for women, who by 2022 represented 55 percent of new professionals.

Education is an essential part of participating and progressing in the formal labor markets. As in other countries, Mexican youth has faced severe restrictions to secure employment and reasonable wages, a situation that worsened during the pandemic. In 2022, there were 9 million young men and women 15 to 24 who worked or were seeking employment. About half of them worked full time and two fifths earned the minimum wage (IMCO, 2022).

The unemployment rate of the young (6.4 percent), is almost twice the general rate of

3.5 percent, additionally, 67.4 percent were engaged in the informal sector, a fact that, as has been shown, may have a negative effect over their occupational trajectories because there is a higher probability for them to remain in the informal sector (IMCO, 2022).

Young adults with a college or a high school diploma do better in terms of securing formal employment and better wages, but even if their school attainment is higher than the one featured by previous generations of workers, the probability of first entering the informal sector and remaining there for a prolonged period, is still high (Blanco, Solís y Robles, 2014; CEPAL/OIT, 2017; INEGI, 2019; Lund, Madgavkar, Manyika, Smit, Ellingrud and Robinson, 2021).

In sum, education and training for adolescents and young adults does not connect to the opportunities of emerging labor markets, particularly in the higher technology sectors linked to North American supply chains. In the case of recent bilateral and trilateral discussions on the high-profile sector of semiconductors, the consensus is that coordination between policymakers in the areas of economic development and education is essential to the successful launching of a strategic and comprehensive plan to develop new talent and retrain workers with a focus on the priorities of subnational development programs.

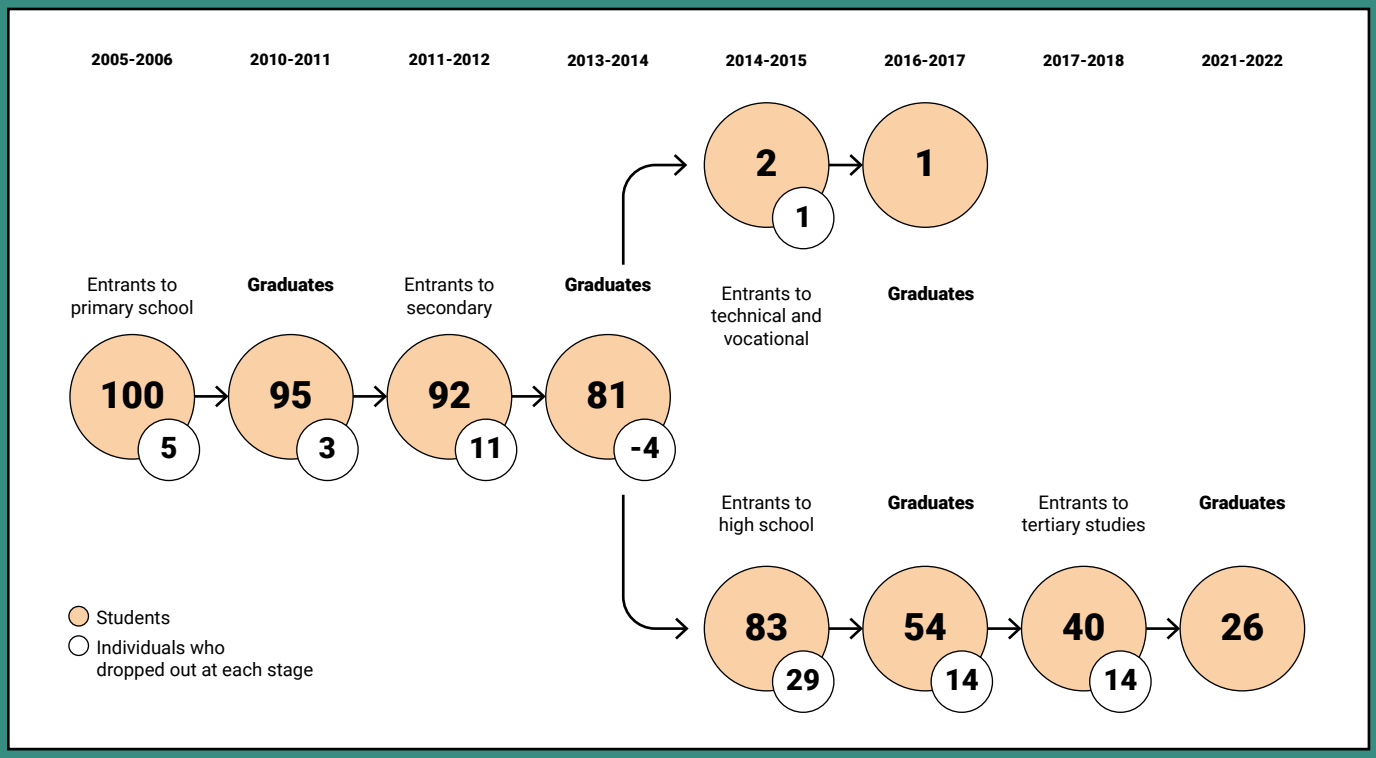
Public policy in education: The thrust towards inclusion, quality, and successful trajectories

The performance of the national education system, one of the largest in the world, needs to improve substantially in terms of inclusion, quality, relevance, and adaptation to global changes and societal needs. Not only do children leave school before completing junior high school, but a considerable proportion of those who enroll in upper high school will not graduate.

This means that close to a million young adolescents will be working in the informal sector with a high probability of not returning to education (MEJOREDU, 2022; OECD, 2022; SEP,2022).

In the case of recent bilateral and trilateral discussions on the high-profile sector of semiconductors, the consensus is that coordination between policymakers in the areas of economic development and education is essential.

GRAPH 8 School transitions of a cohort 2004-2020



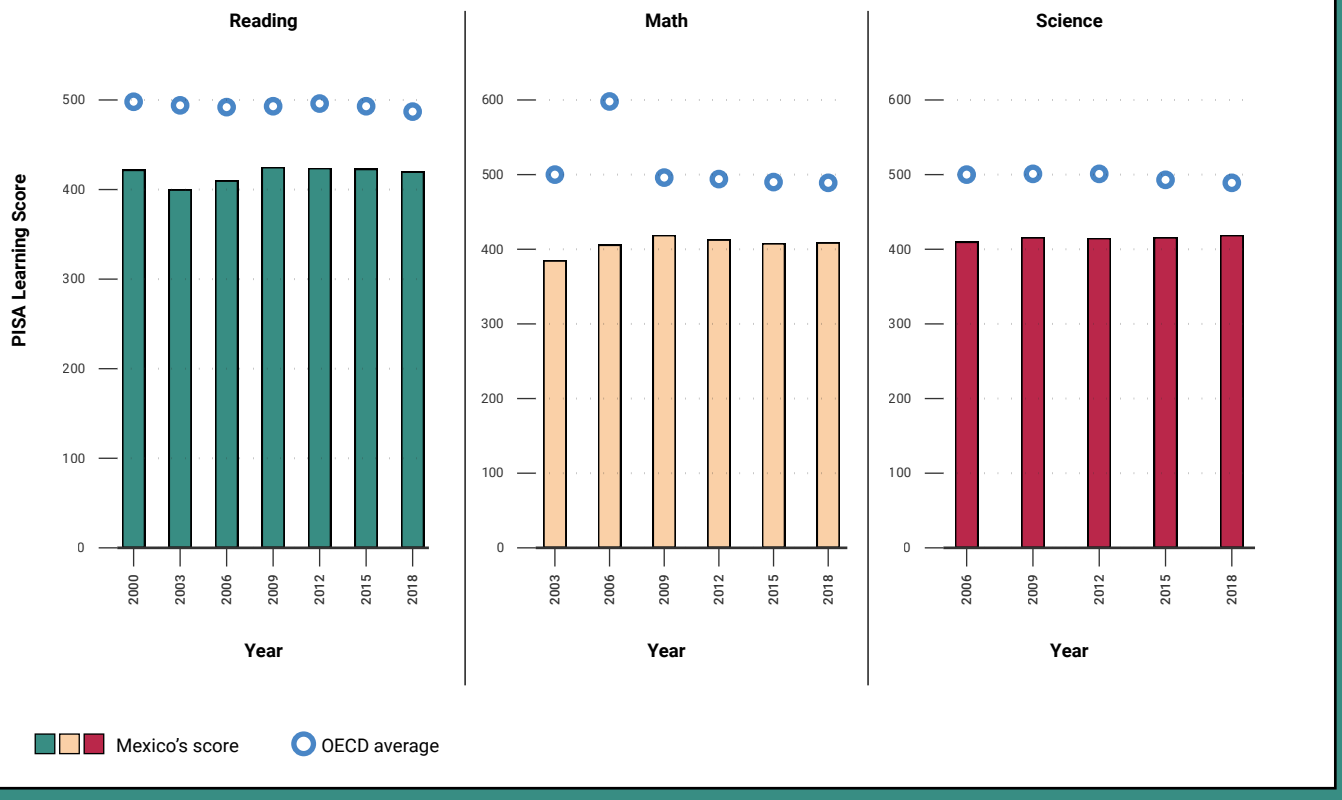
Source: SEP (Ministry of Public Education, 2022).
Notes: The model shows how many students out of 100 entrants to primary school in 2005-2006 earned a college level degree in 2021-2022. The digits in the circles report the number of individuals who dropped out at each stage.
The neagtive sign (-) in the number of individuals who dropped out after secondary education reflects that four individuals got incorporated at the specified education level.

Learning outcomes of children and adolescents have been measured with internal and international standardized examinations from year 2000 and onwards. Accordingly, national (PLANEA and EXCALE) and international evaluations (PISA) were conducted on a yearly basis. Results of national testing for the period 2014-2018 show that six out every 10 students in Mexico scored below proficiency in math, and about half of them in reading (INEE:2017).

More importantly, evidence shows that whether we consider national or international evaluations, test scores in core areas such as math, language, and science, have remained stable for over a decade.

As an example, in 2018 most 15-year adolescents of the 79 participating economies in the PISA exam scored between 482 and 545 points while Mexican students scored between 358 and 409. The highest

GRAPH 9 **Programme for International Student Assessment (PISA)**



Source: OECD (2018).

averages were achieved by China (600), Singapore (570), Macao (560), and Hong Kong (550) (OECD, 2018).

Before the prolonged school closure period due to COVID-19, the Mexican education system was already in need of a total revamp. In the aftermath of COVID-19, overcoming the devastating learning effects on children and adolescents will likely require more decentralized policies geared at recovering learning, but this will not be enough. Transforming education means redesigning schools and how they teach, it also involves inclusion, equity, celebration of diversity, and commitment of teachers and educational communities to protect the environment and develop a culture of peace (MEJOREDU, 2020; Darling Hammond, 2020.; Acevedo, Flores, Székely y Zoido, 2022).

There is an opportunity in technological upper high schoolswhere students and teachers showed during the pandemic—outstanding adaptation to distance learning, success in retaining students, and resilience and a will to contribute to the solution of their school community´s problems (SEMS-GIZ, 2022; CONALEP, 2021). One important finding of surveys conducted during the school closure period is that students greatly appreciated the focus of the curriculum in practical problems and the development of abilities and skills for work (CONALEP, 2021, Filippo; Guaipatín, Navarro and Wyss, 2022).

As many educators and policymakers have concluded, not only in Mexico but in other countries and regions, we have an opportunity to make radical changes in education (Darling-Hammond, 2020 and 2022 Acevedo, Flores, Székely y Zoido, 2022; UNESCO-SM, 2022). There is a chance to reinvent education and restart schools, particularly the ones that serve the young.

Dual education as a strategy to connect youth to work at an early age

As already noted, mitigating the dropout rates is contingent upon changes in the curriculum, the development of strong teaching methods and practices, access to technological resources, more investment, and the construction of supportive, safe, and motivating school environments. Studies and survey data show that for most, the main reason to leave school is poverty, however, a considerable proportion of dropouts report that they were bored or considered class attendance senseless (Solís, Leal and Brunet, 2014 and 2015).

The feeling of futility is stronger among students enrolled in technological high schools, who expected a more hands-on approach to learning and a closer connection to work. One of the policies launched (in 2013) to respond to students´ interest in practical training and a better alignment with opportunities in formal labor markets, was the "Mexican dual education model" developed by the Ministry of Education in collaboration with the most important national business organizations (SEMS, 2018)

The first projects in areas like electricity, mechanics, ICT, administration, and tourism were implemented in 11 States, with the participation of 59 schools, 197 large companies, mostly in the automobile sector, and 915 students (SEMS, 2018).

Follow up and qualitative evaluation studies (UNICEF, 2018) showed that the rules and processes of the program were rigid and demanded excessive time and energy from schools and companies. Ultimately, requirements for graduation and certification of competences were complicated and long.

These factors were major impediments to scalability and multiplication of initiatives. Nevertheless, the outstanding results in terms of the quality of the learning experience of students and teachers—in combination with a renewed interest in the development of young talent on the part of industries engaged in high-tech manufacturing—make dual and apprenticeship models an attractive collaborative endeavor, where all the players may coordinate and construct local and regional ecological systems to foster innovation.

Dual and apprenticeship models in technological schools, colleges, and vocational training centers are an effective response to the learning crisis of adolescents and young adults (López, Opertti and Vargas, 2017; Smeck, Oviedo and Fiszbein, 2020) and a tool to address their employability and early engagement in the world of work, business, and entrepreneurship.

A recent survey (SEMS, 2018) among students, school principals, and company staff who took part in dual initiatives illustrates the enthusiastic perceptions of students both male and female. They valued especially a new sense of self-worth, their enhanced abilities in communication, teamwork, commitment, and discipline, and the feeling that they could succeed in their future careers.

Opinions in the case of schools and companies were less passionate but still positive. In the first case, school prestige is highly valued, while connection with the education sector and social recognition are seen as positive outcomes for companies (SEMS-GIZ, 2018).

However, companies tended to regard their participation as part of their social responsibility rather than as a device to find talent that could, once recruited, contribute to productivity gains and enhanced quality of processes and products.

External evaluations, surveys, and the analysis of norms, supported the launching of a fresh, more flexible version of dual education, a new concept that encourages local designs of content and practice with the participation of sectors, companies, academia, schools, and communities (UNICEF, 2018; SEP, 2022).

Case studies: Learning how to coordinate, complement, and work as North American teams

Recent dialogues among relevant actors involved in the manufacture of semiconductors in the North American region has facilitated a flow of information on the industry´s needs and expectations. Research and development centers brought to the table their strengths in science and engineering, while universities and technical high school-level subsystems presented their dual education success stories and expectations to take part in the configuration of regionally based ecosystems with the support of national and subnational governments (Secretaría de Economía, 2022).

From the standpoint of the kind of education and training that young entrants to the labor market need to progress in an attractive lifelong learning career, the consensus was that the best roadmap would start with a concrete experience—a case study—from which all parties could learn.

As an illustration, the case of an important firm in the semiconductor sector, Skyworks, may be cited. The company located in the state of Baja California, has a long-standing

Progress will depend on a better understanding of the way technical and vocational systems work in each country and on our determination to adapt so that ambitious and sustainable collaborative training and development programs are viable.

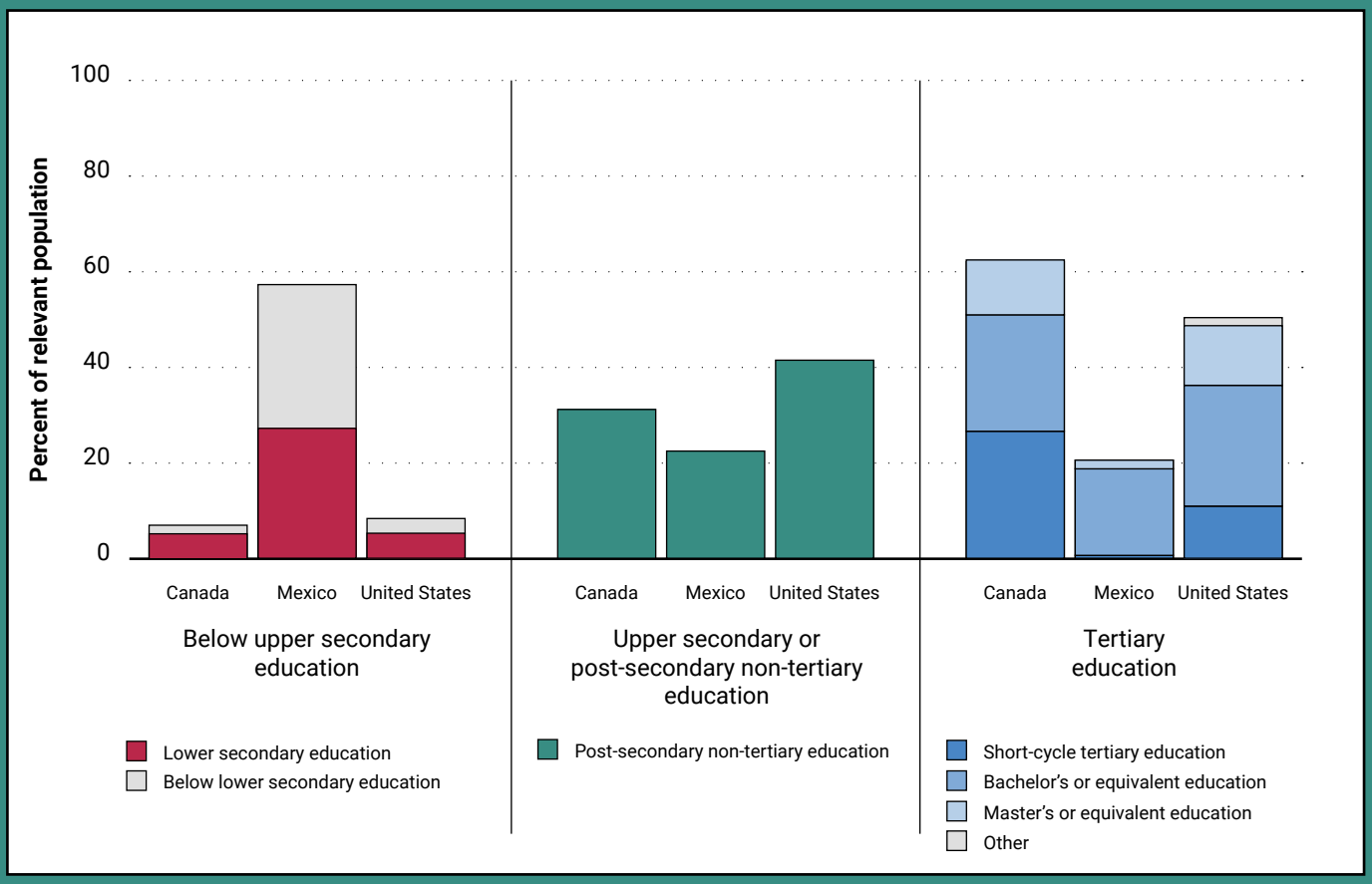
interest in human capital development, and has already built strong ties with local and regional universities, research centers, and high schools. Recently, in alliance with CONALEP,[1] a dual program, including curriculum and schedules for practice in their Mexicali plant was jointly developed and will start operating next academic year with the support of the subnational government and all parties engaged. After a three-year cycle, external evaluation will show necessary adjustments. It is expected that the model may be adapted to the contexts of the States of Jalisco and Chihuahua where governments, research centers, and corporations have already engaged in building up an adequate environment for investment and collaborative development of resilient supply chains.

This is only an example to illustrate the potential economic and social impact of consortia and alliances that are already multiplying in other sectors and regions in Mexico. Careful follow-up will be instrumental in our search for effective educational, economic, and social policies that address the needs of all parties and especially those of our young cohorts.

Progress will depend on a better understanding of the way technical and vocational systems work in each country and on our determination to adapt so that ambitious and sustainable collaborative training and development programs are viable.

We should draw from the wealth of our technical and scientific cooperation experiences2 (ANUIES, 2022) to design more focused projects with the purpose of building a stronger, diversified, and well compensated workforce that may flourish and thrive in the North American region.

GRAPH 10 **Percent of population 25 - 64 years old by highest level of education attained in Mexico, the US, and Canada as of 2021.** Compared to the US and Canada, too many Mexicans are leaving school early and low levels of tertiary education may become a labor market barrier to growing complex manufacturing and supply chains.



Source: OECD (2022).

ENDNOTES

Education from its inception. The institution is presently committed with the expansion of the Dual Option.

2 Successful cooperative agreements involved research consortia; double degree undergraduate and graduate programs; "sandwich graduate programs" and many other creative schemes. Participation of community colleges and professional training institutions has been comparatively low. A good point of departure to develop this new generation of agreements is comparing the landscape of the three systems in order to identify common interests, adequate partners and industries that are already involved. The expected agreements will most probably differ with respect to the more traditional academic partnerships.

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Jay Timmons

President and CEO, National Association of Manufacturers

USMCA POSITIONS NORTH AMERICA FOR GLOBAL COMPETITIVENESS

Manufacturers of all sizes, from small, family-owned and -operated businesses, to multinational enterprises, are counting on the United States–Mexico–Canada Agreement (USMCA) to strengthen their supply chains and help them grow. The USMCA can be a model for how the U.S., Mexico, and Canada can capitalize on our close regional ties, but it will require all three governments to live up to and uphold the spirit of the agreement. The rewards are worth it—if the USMCA works as intended, it can help address bigger geopolitical challenges and strengthen our supply chain resiliency.

This summer will mark the third year since the USMCA was ratified. Free trade between our markets has been advantageous for manufacturers across the U.S. and North America for decades, and the USMCA helps to secure those advantages. The USMCA updated the standards for the 21st century digital economy and top-class intellectual property rules—which are absolutely essential for innovation. It ensured duty-free exports across our markets and broadened manufacturers' access within the three North American countries in markets for products such as food and remanufactured goods.

Under these conditions, more than $2 billion worth of manufactured goods cross the U.S., Mexican, and Canadian borders each day. More than two million U.S. manufacturing jobs depend on the exports our industry sends to Mexico and Canada. Our business partners in these countries purchase one-fifth of the value of U.S. manufacturing output.

But the U.S. can and should do more to ensure that our partners live up to the spirit and letter of the USMCA. Major free trade agreements are only as good as their enforcement, and while the USMCA has valuable enforcement mechanisms, it is vital that we utilize these enforcement tools. For example, Mexico has taken up measures that create new regulatory hurdles and other commercial challenges that negatively impact market access for manufacturers in the U.S. Mexico's energy generation and power policies are often preferential toward Mexican state-owned enterprises, the Federal Electricity Commission (CFE), and PEMEX, making it more difficult for manufacturers in the U.S. to do business in the market. These manufacturers have also faced holdups in the issuance of operating and customs permits for energy projects, limits on advertising and

IP, and bans and new customs barriers that especially harm small businesses.

Other challenges impacting manufacturers in Mexico include expanded food-labeling requirements that threaten U.S. exports, the failure of Mexico's regulators to promote competition in the telecom market, measures that would require excessively burdensome electronic waybills, a ban on imports of crop-protection products and biotechnology-derived agricultural products, and efforts to introduce new, problematic technical regulations and compliance requirements.

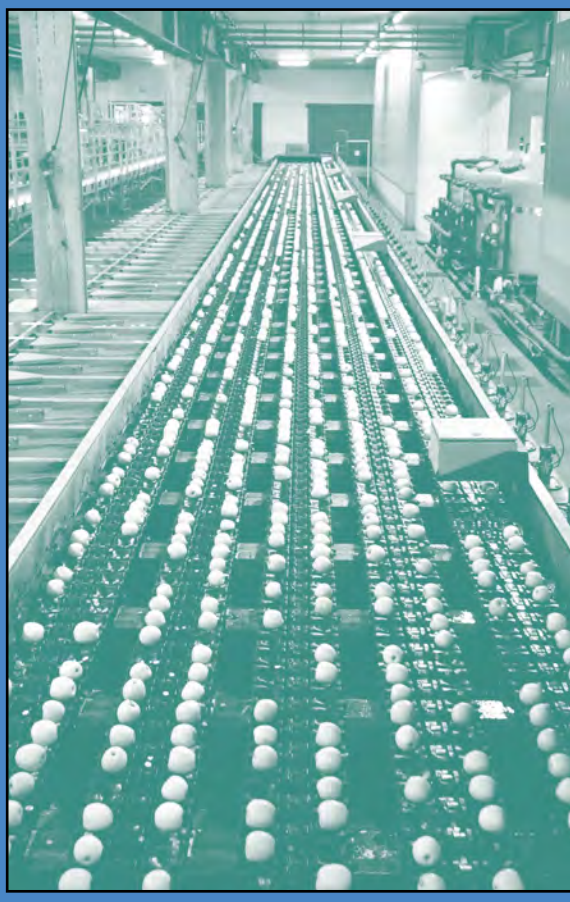
The Canadian government has also taken actions that undermine the spirit of the agreement. There is a Canadian government proposal to brand "plastic manufactured items" as "toxic substances" under the Canadian Environmental Protection Act, with direct implications for U.S. exports in a wide range of manufacturing sectors. And although Canada committed to opening its market for dairy producers under the USMCA, it has skirted these obligations through the manipulation of import license procedures and tariff-rate quota allocations that undermine access to the Canadian market.

Addressing these disruptive actions is essential to securing the long-term success of the agreement.

Our governments can also boost the effectiveness of the USMCA by strengthening the underlying fundamentals of our economies—especially our workforce. Manufacturers in the U.S. are facing a significant skills gap and will need to fill more than four million jobs by 2030, according to research by Deloitte and the Manufacturing Institute—the workforce development and education partner of my association, the National Association of Manufacturers. That means we should invest in training the skilled workforce we need. Our countries should also invest more in domestic production of key inputs, as the U.S. did with the CHIPS and Science Act last year to heavily boost U.S. production of semiconductors, providing a boon for the entire North American economy. And our countries should continue making historic investments in our critical infrastructure—which helps us move our goods and inputs across our markets—as the U.S. did with the Infrastructure Investment and Jobs Act in 2021.

These kinds of policies will position us well for continued global leadership and for economic competition with China. The connection between the USMCA countries should make it easier for us to coordinate our use of domestic and multilateral trade enforcement tools to target and counter problematic Chinese trade behaviors. As we continue to grow our own manufacturing capacity, we can build more resilient North American supply chains and source vital inputs to each other without depending on China for essentials, such as critical minerals. The U.S., for example, has more critical mineral reserves than any other country, and this should help bolster our supply chains across the continent without being subject to supply shocks in Asia.

The USMCA is an essential part of the foundation not only for the next manufacturing decade in North America, but also for our countries to strengthen our global competitiveness and economic influence. If our partners address these concerns—and they certainly can do so swiftly—then we will have even more to celebrate when that third anniversary rolls around.



CHAPTER 4
THE IMPORTANCE AND POTENTIAL ROLE OF SERVICES IN NORTH AMERICAN SUPPLY CHAINS

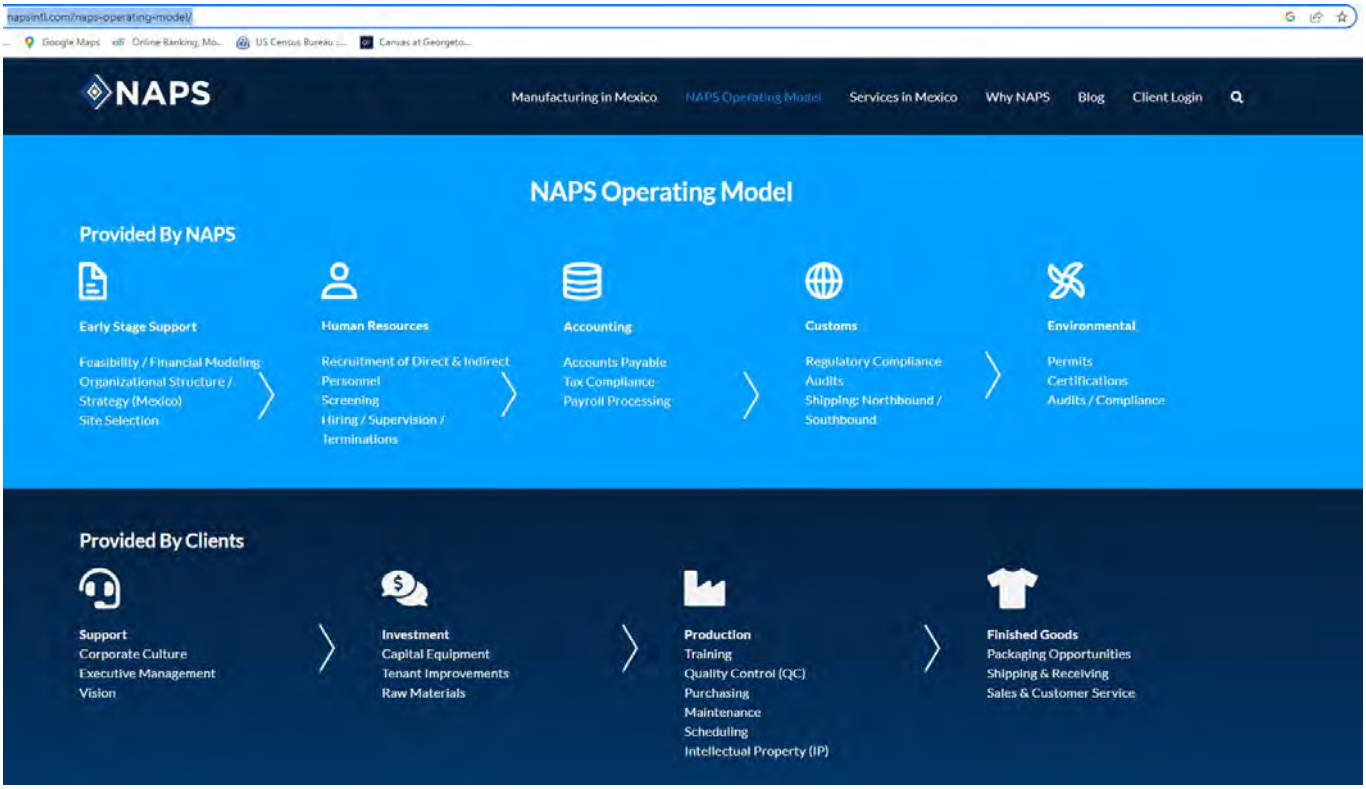
J. BRADFORD JENSEN

McCrane/Shaker Chair
in International Business and director
of the Izmirlian Program in
Business and Global Affairs,
Georgetown University

Imagine you are a manufacturing firm in the United States considering locating a stage of your manufacturing process in Mexico. What is the full set of activities you would need to provide or procure to ensure that the operation in Mexico successfully integrates with your operations in the U.S.?

One approach to answering this question would be to work with a firm that specializes in helping American firms relocate production to Mexico. As an example, you could work with North American Production Sharing, Inc. (NAPS), a firm headquartered in southern California. The figure below, taken from the NAPS website, shows a number of considerations and inputs to successfully source from Mexico. The figure lists a number of services NAPS provides, including feasibility study, financial modeling, organizational structure and strategy development, site selection, human resources management, accounting, tax compliance, regulatory compliance, customs management, shipping and logistics, and environmental regulation compliance. A firm would also need to provide corporate culture, executive management, product designs and intellectual property (patents and trade secrets), process design and technology, research and development (R&D), marketing, distribution, and after-sales servicing. The list of important inputs provided by NAPS and a firm make clear that successful manufacturing production in a foreign country requires a significant number of business and professional services.

There is growing recognition among policymakers that (business) services are crucial inputs into global value chains.[1] Business services like R&D, engineering, design, and marketing are key differentiators for firms' products



Source: https://napsintl.com/naps-operating-model/

and services. Other business services like logistics, telecommunications, insurance, and finance enable firms to connect their global value chains and produce where it is most efficient. Business services are crucial inputs into global value chains, so the availability of low-cost, high-quality business services is essential for regions to successfully join global value chains.

In this brief, we assess the current state of business services in North America and explore the role of the USMCA in enabling business services to support value chains in North America.

What are business services?

We will use North American Industrial Classification System (NAICS) industry codes that begin with "5" as our definition of business services. Below is a list of business service sectors with a brief description of the sector:

- **51 Information:** The main components of this sector are motion picture and sound recording industries; publishing industries, including software publishing; broadcasting and content providers; telecommunications industries; computing infrastructure providers, data processing, web hosting, and related services; and web search portals, libraries, archives, and other information services.

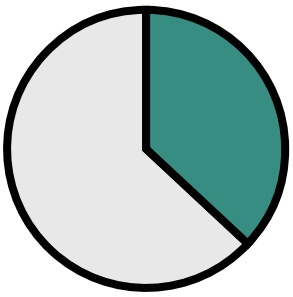
- **52 Finance and Insurance:** The Finance and Insurance sector comprises establishments primarily engaged in financial transactions (e.g., transactions involving the creation, liquidation, or change in ownership of financial assets) and/or in facilitating financial transactions. Three principal types of activities are identified: 1) Raising funds by taking deposits and/or issuing securities and, in the process, incurring liabilities; 2) Pooling of risk by underwriting insurance and annuities; and 3) Providing specialized services facilitating or supporting financial intermediation, insurance, and employee benefit programs.

- **53 Real Estate and Rental and Leasing:** The major portion of this sector comprises establishments that rent, lease, or otherwise allow the use of their own assets by others. The assets may be tangible, as is the case of real estate and equipment, or intangible, as is the case with patents and trademarks.

- **54 Professional, Scientific, and Technical Services:** Activities performed include legal advice and representation (accounting, bookkeeping, and payroll services), architectural, engineering, specialized design services, computer services, consulting services, research services, advertising services, photographic services, translation and interpretation services, veterinary services, and other professional, scientific, and technical services.

- **55 Management of Companies and Enterprises:** The Management of Companies and Enterprises sector comprises: 1) Establishments that hold the securities of (or other equity interests in) companies and enterprises for the purpose of owning a controlling interest or influencing management decisions or (2) Establishments (except government establishments) that administer, oversee, and manage establishments of the company or enterprise and that normally undertake the strategic or organizational planning and decisionmaking role of the company or enterprise.

Services inputs, whether domestic or foreign, account for about



37%

of the value of manufacturing exports in the sample of countries covered.

- **56 Administrative and Support and Waste Management and Remediation Services:** The establishments in this sector specialize in one or more of these support activities and provide these services to clients in a variety of industries and, in some cases, to households. Activities performed include office administration, hiring and placing of personnel, document preparation and similar clerical services, solicitation, collection, security and surveillance services, cleaning, and waste disposal services.

Source: North American Industrial Classification System, United States 2022. www.census.gov/naics

Business services are crucial intermediate inputs to business

Business services are important intermediate inputs into the production of many goods and services. Miroudot and Cadestin (2017) examine supply chains in a number of OECD countries and report "manufacturing companies increasingly produce and export services either as complements or substitutes to the goods they sell. This shift to services is related to strategies aiming at adding more value and creating a long-term relationship with customers. The report highlights that services inputs, whether domestic or foreign, account for about 37% of the value of manufacturing exports in the sample of countries covered. By adding service activities within manufacturing firms, this share increases to 53% and the overall contribution of services to exports is close to two-thirds. Across countries, between 25% and 60% of employment in manufacturing firms is found in service support functions such as R&D, engineering, transport, logistics, distribution, marketing, sales, after-sale services, IT, management and back-office support." Business services, whether produced within the firm or purchased from suppliers, are increasingly important inputs to manufacturing products and, presumably, services.

There is growing recognition among policymakers that fostering a robust and efficient business service sector is an important prerequisite for successfully joining and upgrading within global value chains.[2] A key fundamental factor in the prospects for a robust business service sector are the availability of skilled workers.

Skill intensity of business services

Business services are significantly more skill-intensive than other sectors. As a measure of the skill intensity of business services, Table 2 below reports the share of workers with only a college degree and the share of workers with an advanced degree across sectors in the U.S. The economy-wide average share of workers with a college degree is 25 percent and the share with an advanced degree is 14 percent. Table 1 reports that for business service sectors, that share of workers with a college degree is typically significantly higher than 25 percent. For example, in the Information sector, over 40 percent of workers have a college degree and more than 16 percent have an advanced degree. In Professional, Scientific, and Technical Services, the shares are even larger–42 percent and 29 percent respectively.

TABLE 2: Educational attainment and average incomes by industry for U.S.

NAICS		Number of	Share with	Share with	Average
Sector	**Description**	**Workers**	**College Degree**	**Advanced Degree**	**Income**
11	Agriculture, Forestry, Fishing and Hunting	1.320.456	0,172	0,032	48.777
21	Mining, Quarrying, and Oil and Gas Extraction	625.128	0,162	0,084	92.760
22	Utilities	1.149.586	0,243	0,099	84.633
23	Construction	8.175.838	0,122	0,026	58.835
31-33	Manufacturing	13.232.511	0,200	0,093	68.741
42	Wholesale Trade	3.294.777	0,278	0,065	70.860
44-45	Retail Trade	11.996.661	0,189	0,047	45.486
48-49	Transportation and Warehousing	5.768.798	0,141	0,036	56.889
51	Information	2.471.414	0,406	0,164	86.265
52	Finance and Insurance	6.313.247	0,426	0,159	96.560
53	Real Estate and Rental and Leasing	2.289.144	0,293	0,090	75.546
54	Professional, Scientific, and Technical Services	9.344.451	0,423	0,285	101.801
55	Management of Companies and Enterprises	191.190	0,433	0,204	100.725
56	Administrative and Support and Waste Management and Remediation Services	4.789.661	0,182	0,046	46.525
61	Educational Services	9.771.584	0,284	0,409	56.011
62	Health Care and Social Assistance	17.264.321	0,240	0,187	61.579
71	Arts, Entertainment, and Recreation	2.102.803	0,305	0,094	47.866
72	Accommodation and Food Services	6.899.181	0,137	0,023	32.708
81	Other Services (except Public Administration)	5.454.835	0,178	0,092	43.111
92	Public Administration	6.303.502	0,301	0,179	70.438
	Economy	118.759.088	0,246	0,138	63.344

Source: American Community Survey Public Use Microsample 2016-2020, author's calculations.

One potential impediment to establishing a robust and efficient business service sector in a country is the availability of educated workers.

Educational attainment

Business services are skilled worker intensive and thus require a supply of college educated workers. Canada, Mexico, and the U.S. have different endowments of college workers and advanced degrees. Table 3 below shows the share of workers in each country with a college degree and an advanced degree. Mexico has lower shares of both college educated workers and advanced degree holders suggesting that Mexico has fewer skilled workers relative to the overall labor force than either Canada or the U.S. T**he lower availability of skilled workers will make it more difficult for Mexico to produce business services**.

TABLE 3: Educational attainment of 25-64 year-olds (2018)

Percentage of adults with a given level of education as the highest level attained		
	Bachelor's or equivalent	Master's or equivalent
Canada	22	10
Mexico	16	2
United States	24	11
OECD average	17	13

Source: OECD / ILO / UIS (2019). See Source section for more information and Annex 3 for notes (https://doi.org/10.1787/f8d7880d-en).

Business services in Canada, Mexico, and the U.S.

Given the relative scarcity of college educated workers and workers with an advanced degree, it is likely that Mexico will have difficulty producing business services. Table 4 below shows that relative size, in terms of employment, of the business service sector in each of the USMCA countries.[3]

The business service sector in Mexico is significantly smaller than the business service sectors in Canada and the U.S. For example, business services (NAICS industries 51-56) overall account for 24 percent of employment in the U.S., 20 percent in Canada, and roughly 8 percent in Mexico. Professional, scientific, and technical services, which include things like architectural, engineering, specialized design services, computer services, consulting services, research services, and advertising services and are important inputs into modern supply chains, account for 6 percent of the labor force in the U.S. and only 1 percent of the labor force in Mexico–the professional, scientific, and technical services sector is six times larger (relative to the size of the economy) in the U.S. than in Mexico.

Business services are important inputs to value chains (and development in general), and the business service sector in Mexico is relatively small–likely due to lower educational attainment in Mexico. One way for Mexico to "make up" for the relatively small business service sector is to import business services from the U.S. and Canada—suggesting an opportunity for mutually beneficial trade in services in North America.

Trade in business services

When economists think about what trade levels "should be" between two countries, they often think about the "gravity model" which suggests that trade flows should be a function of the size of the economies involved and the distance between them. Because both Canada and Mexico share a border with the U.S., we can think of the distance between Canada and Mexico and the U.S. as being equal.[4] So, the size of each country's economy should have an important influence on the trade flows between the countries. Here, we will focus on flows between the U.S. and each country.

Canadian GDP is about $2 trillion and Mexico's GDP is $1.3 trillion. Interestingly, goods trade between Canada and the

TABLE 4: Composition of employment by industry for Canada, Mexico, and the U.S.

		USA		Canada		Mexico		Mexico	
NAICS	NAICS	2017		2019		2019		Household Survey 2017	
Code	Description	EMP	share	EMP	share	EMP	share		
	Unclassified (CAN)/Estimated Informal(MEX)	--		294.340	2%	27.763.073	49%	0,5%	Not Specified
11	Agriculture, forestry, fisheries, and related activities	3.600.000	2%	38.547	0%	233.554	0%	12%	Agriculture, forestry, and fishing
21	Mining, quarrying, and oil and gas extraction	598.620	0%	200.453	1%	190.685	0%	1%	Mining and Electricity
22	Utilities	658.384	0%	127.522	1%	216.300	0%		
23	Construction	6.647.047	4%	1.041.246	6%	676.301	1%	8%	Construction
31-33	Manufacturing	11.522.039	8%	1.580.706	9%	6.493.020	11%	17%	Manufacturing
42	Wholesale trade	6.242.335	4%	822.977	5%	1.582.933	3%	19%	Trade
44-45	Retail trade	15.938.821	11%	1.998.611	12%	5.899.054	10%		
48-49	Transportation and warehousing	4.954.931	3%	781.351	5%	997.000	2%	5%	Transportation, communication, shipping
51	Information	3.565.063	2%	355.886	2%	363.805	1%	7%	Professional, financial, and corporate services
52	Finance and insurance	6.499.871	4%	749.771	4%	662.239	1%		
53	Real estate and rental and leasing	2.194.885	1%	297.339	2%	327.129	1%		
54	Professional, scientific, and technical services	9.015.366	6%	973.837	6%	848.651	1%		
55	Management of companies and enterprises	3.571.409	2%	109.430	1%	138.987	0%		
56	Administrative and support and waste management and remediation services	11.889.169	8%	845.595	5%	2.407.276	4%		
61	Educational services	722.823	0%	1.355.803	8%	817.536	1%	19%	Social and other services
62	Health care and social assistance	20.506.502	14%	2.045.109	12%	763.881	1%		
71	Arts, entertainment, and recreation	2.390.279	2%	312.300	2%	267.775	0%	7%	Accomodation and food service activities
72	Accommodation and food services	14.002.624	9%	1.342.150	8%	2.668.898	5%		
81	Other services (except public administration)	3.696.831	2%	556.600	3%	1.577.903	3%		
90	Government	22.300.000	15%	1.145.925	7%	1.700.000	3%	4%	Government and international organizations
		150.516.999	**100%**	**16.975.498**	**100%**	**56.596.000**	**100%**	**100%**	

Sources: U.S. Census Bureau, Economic Census, Census of Governments; U.S.D.A., Census of Agriculture; Statistics Canada, Economic Census; Instituto Nacional de Estadística, Geografía e Informática, Economic Census; Instituto Nacional de Estadística, Geografía e Informática, Household Survey

U.S. and Mexico and the U.S. are similar orders of magnitude for both imports and exports.[5] The U.S. exports about $213 billion in goods to Mexico and about $255 billion to Canada. The U.S. imports about $330 billion in goods from Mexico and about $285 billion from Canada.

Table 5 reports total service trade flows between the U.S. and Canada and Mexico and the values of select service categories. **In contrast to the rough equivalence in goods trade, U.S. services exports to Canada are about two times larger than its services exports to Mexico**. In looking at more detailed business service categories (charges for intellectual property and information, computer, and telecommunications services), Canada's imports are about double Mexico's.

For "other business services" (e.g., legal, accounting, management consulting, advertising, and R&D services), Canada's imports are more than four times larger than Mexico's imports. If we remove travel from U.S. service imports, U.S. service imports from Canada are more than two-and-a-half times as large as U.S. service imports from Mexico.

The lower level of U.S. non-travel related service imports from Mexico are not surprising given the skill-intensity of services and the lower educational attainment in Mexico (relative to Canada). However, the lower level of U.S. business service exports to Mexico is surprising given the smaller business service sector in Mexico.

TABLE 5: U.S. trade in services, by type of service and by country, select countries and services

2019 [Millions of dollars]						
	U.S. Exports to:			U.S. Imports from:		
	All countries	Canada	Mexico	All countries	Canada	Mexico
Total services	891.177	68.707	32.869	593.594	38.897	30.268
Select Services:						
Transport	91.058	8.310	3.182	112.813	5.890	5.375
Travel (for all purposes including education)	198.982	18.486	15.263	132.271	9.391	18.951
Construction	3.161	243	29	1.361	418	51
Insurance services /2/	18.579	1.954	566	51.219	419	21
Financial services	142.546	8.126	3.233	44.360	3.032	500
Charges for the use of intellectual property n.i.e.	122.533	7.586	3.285	42.273	1.828	657
Telecommunications, computer, and information services	55.742	5.742	2.022	42.768	5.660	862
Other business services (total)	186.178	15.063	3.389	112.496	8.359	2.936
Research and development services	47.273	(D)	199	33.089	1.866	431
Legal, accounting, management consulting, and public relations services	81.365	4.606	1.521	48.906	3.979	708
Advertising and related services	21.523	6.772	341	6.002	457	92
Technical (architecture), trade-related, and other business services	36.016	(D)	1.329	24.499	2.057	1.705

Source: U.S. Bureau of Economic Analysis, Trade in Services, Table 2.2

Business services are important inputs to value chains (and development in general), and the business service sector in Mexico is relatively small—likely due to lower educational attainment in Mexico. One way for Mexico to "make up" for the relatively small business service sector is to import business services from the U.S. and Canada—suggesting an opportunity for mutually beneficial trade in services in North America.

Policy needs

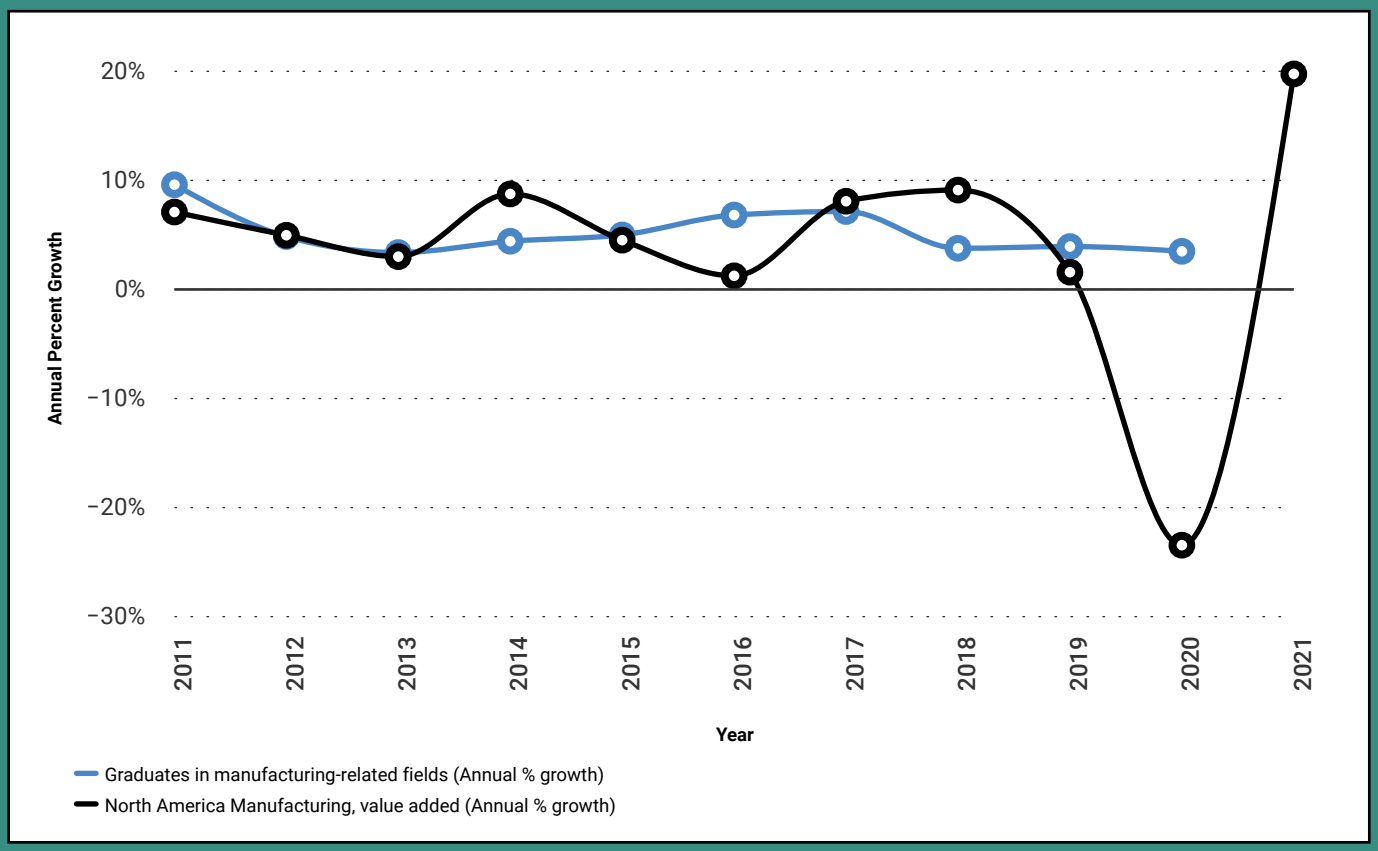
While barriers to services trade are very difficult to quantify, most analysts believe that service barriers worldwide are much higher on average than tariffs on goods. NAFTA did have a fairly robust chapter on cross-border services trade which was an innovation at the time. However, NAFTA was negotiated before there was widespread internet usage. USMCA includes a new chapter on digital trade which prohibits the application of customs duties to digital products, ensures that data can be transferred across borders, prohibits data localization measures used to restrict where data can be stored and processed, protects against forced disclosure of proprietary computer source code and algorithms, and updated intellectual property protections.[6] USMCA also includes a chapter on good regulatory practices which will hopefully lead to increasing alignment of regulatory standards and practices in the three countries.[7]

The more robust service sector provisions in USMCA are relatively new and might not have had enough time to fully influence behavior on the ground. Yet, it seems unlikely that the surprisingly low level of U.S. business service exports to Mexico relative to U.S. business service exports to Canada is due to trade policy impediments–the same trade policy rules apply in Canada and Mexico.

It seems possible that the low level of Mexican imports of business services is due to a kind of chicken-and-egg problem: Mexican products and services are not as sophisticated as U.S. or Canadian products and services (on average), which is likely due to a relative lack of (indigenous) business service capacity in Mexico (which is in turn due to the lower level of educational attainment in Mexico). Increasing the sophistication of Mexican production will require importing business services in the near term–which will likely increase the need to import business services.

The goal of developing efficient and globally competitive supply chains in North America is likely to require the use of more business services in production in Mexico. The goal of enabling Mexico's continuing economic development and movement up the value chain is likely to require the use of more business services in production in Mexico. In the long term, increasing the availability and use of business services in production will likely depend on the ability of Mexican policymakers to increase educational attainment and training opportunities for Mexican workers. In the near term, increasing Mexican imports of Canadian or U.S. business services is one way to increase the availability of business services in Mexico (and fostering continuing economic development in Mexico). Additional research to identify specific ways to increase imports and use of business services in production in Mexico would be beneficial.

GRAPH 11 **Comparison of rate of growth of manufacturing sector in North America measured by manufacturing value added with rate of growth of graduates in related fields.**



Source: OECD (2022), and World Bank World Development Indicators (2022).
Notes: Education fields included are Information and Communication Technologies (ICTs), and Engineering, manufacturing and construction. Education levels included are short-cycle tertiary education, Bachelor's or equivalent level, Mater's or equivalent level, Doctoral or equivalent level.

ENDNOTES

1 See, for example, Nayyar, Gaurav, Mary Hallward-Driemeier, and Elwyn Davies. 2021. At Your Service? The Promise of Services-Led Development. Washington, DC: World Bank. doi: 10.1596/978-1-4648-1671-0 and Miroudot, S. and C. Cadestin (2017-03-15), "Services In Global Value Chains: From Inputs to Value-Creating Activities", OECD Trade Policy Papers, No. 197, OECD Publishing, Paris. http://dx.doi.org/10.1787/465f0d8b-en.

2 See for example, World Bank. 2020. World Development Report 2020: Trading for Development in the Age of Global Value Chains. Washington, DC: World Bank. doi:10.1596/978-1-4648-1457-0 and Nayyar, Gaurav, Mary Hallward-Driemeier, and Elwyn Davies. 2021. At Your Service? The Promise of Services-Led Development. Washington, DC: World Bank. doi: 10.1596/978-1-4648- 1671-0.

3 The informal sector in Mexico is quite large. Because the informal sector is not in scope for each country's Economic Census, this makes it somewhat difficult to use comparable data from each country's Economic Census data collected using the North American Industrial Classification System (NAICS). I include an estimate of the informal sector in Mexico and (implicitly) assume that informal sector workers are unlikely to work in business service industries. As a reality check on the Economic Census data for Mexico, I also include estimates from INEGI's Household survey of employment. The magnitude of the business service sector from the two different collection programs are of similar magnitude.

4 This is obviously a simplification as there are (different) distances between concentrations of economic activity in each country and each country's border, but we will ignore those realities here.

5 See Graph 1 in "USMCA Forward 2022," edited by Meltzer and Coulibaly, Brookings Institution.

6 One area where USMCA could have gone farther is supporting temporary entry for business persons. It has been reported that the U.S. sought new restrictions on the temporary entry of business persons into the U.S. and worked against efforts to expand and update the list of professionals eligible for temporary visas. See, for example, https://www.whitecase.com/insight-alert/overview-chapter-16-temporary-entry-us-mexico-canada-agreement. Allowing more Mexican professionals temporary entry into the U.S. would increase opportunities for knowledge transfer to Mexican professionals and would likely improve the capacity of Mexican firms to utilize U.S. (and Canadian) business services.

7 Achieving regulatory convergence is a desirable objective because domestic regulations can serve as impediments to services trade.

Lourdes Melgar

Research Affiliate at the Center for Collective Intelligence, MIT and Non-Visiting Fellow, Baker Institute

MEXICO AT THE CROSSROADS: THE GOLDEN OPPORTUNITY OF NEARSHORING AND ENERGY POLICY AS ITS ACHILLES' HEEL UNDER USMCA

Mexico is called upon to be an essential partner in bringing dynamism, competitiveness, and resilience to North American production and in reaching its ambitious decarbonization goals. With an economy closely integrated with that of the United States, Mexico has much to gain from the relocation of production to serve the U.S. market. Yet, Mexico is at risk of missing this unique opportunity, as the López Obrador Administration has thus far failed to understand the primacy of climate objectives of its North American partners and of the firms interested in setting their operations in Mexico—and the role clean energies play in this equation.

Indeed, Mexico's current energy policies promote the use of fossil fuels, undermine the electricity market, and hinder the deployment of renewable energies. These measures likely inconsistent with USMCA commitments have also led the U.S. and Canada to seek formal consultations with Mexico under the USMCA dispute settlement mechanism. The stakes are high. Since 2020, sustainability has evolved into a critical business objective. Companies are accelerating the implementation of strategies to meet their environmental, social, and governance commitments aligned to the 2030 Agenda, while regulation is mandating compliance. The issue is not one of overriding nationalistic sentiment, but of understanding the profound redefinition of economic processes and relations to advance climate commitments.

In 2022, geopolitical tensions accelerated the relocation of supply chains from global to regional markets, a movement bolstered over the pandemic, as it uncovered the limits of overseas manufacturing dependency. The quest for resilience to de-risk

production of goods and services, particularly those considered essential to national security, is bringing about prospects for nearshoring that could deepen North American integration and ignite an era of prosperity. Conditions seem ideal. North America offers prime geostrategic location, abundant and diverse natural resources, skilled talent, a sizable market, and an economy amid a profound decarbonization, sustained by the prospects of greater integration under the USMCA.

Mexico stands to gain as businesses look to relocate production from Asia, particularly from China. Mexico's integrated border with the U.S., competitive labor force, established logistic chains, fiscal incentives, and the USMCA framework are the basis for new investments into Mexico and deepening North American supply chains. This would build on a vast platform of production of sophisticated goods in electronics, auto parts,

"With an economy closely integrated with that of the United States, Mexico has much to gain from the relocation of production to serve the U.S. market. Yet, Mexico is at risk of missing this unique opportunity."

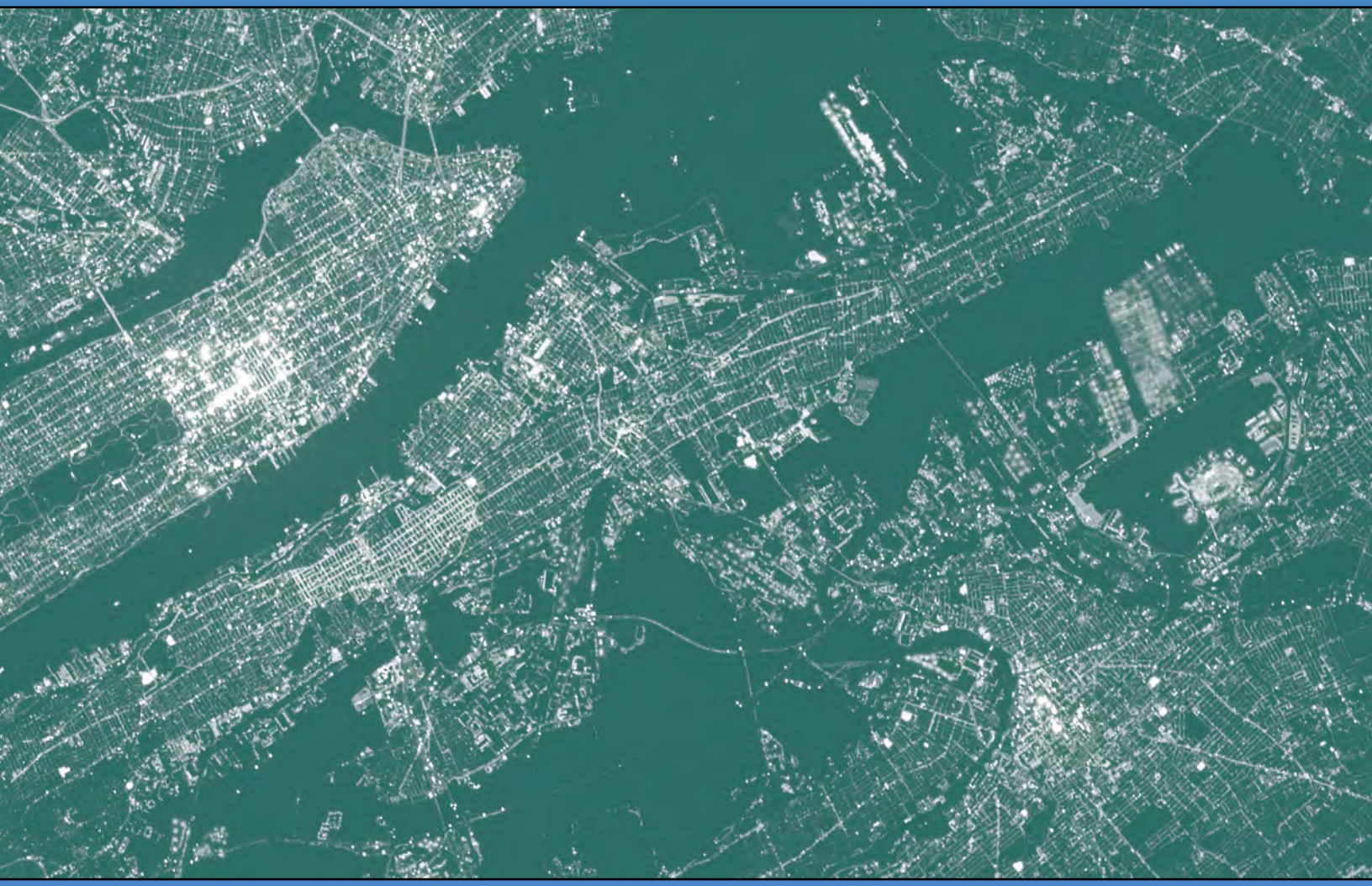
aerospace, transportation, and medical equipment. Additionally, Mexico could be a base for exports globally – it has in place 14 free trade agreements with 50 countries, 30 investment promotion and protection agreements.

Nearshoring presents Mexico with a golden opportunity to revitalize its industrial platform, modernize its infrastructure, grow its skilled labor force, create well-paid jobs, and significantly decarbonize and boost its economy. According to Mexico's Secretary of Foreign Affairs, at the recent North American Summit, the partners agreed to relocate 25% of Asian imports to North America, which would be adding up to 2% GDP growth to Mexico. According to financial analysts, over the next decade, between $60 billion and $150 billion could flow into Mexico as part of the efforts to move production closer to consumption centers. In 2022, $30 billion in investments have been allocated in strategic sectors, such as semiconductors manufacturing and advanced packaging, critical minerals mining, batteries, electric vehicles, logistics, and medical supplies.

Yet, those prospects could be stalled by Mexico's growing inability to supply firms with clean energy, an essential precondition for companies with net-zero commitments and a distinct priority for the U.S. and Canada as both partners accelerate the pace to decarbonize their economy.

Indeed, while climate policy is a keystone of the Biden and Trudeau administrations, President Lopez Obrador sees oil as the driver of economic development. Whereas Mexico builds a refinery and burns fuel oil, the U.S. government enacts ambitious climate policies to cut emissions by half by 2030 and reach carbon neutrality by 2050.

For the first time in decades, the U.S. government is defining industrial policy, based on the premise of "Making more in America" with domestic technologies, local manufacturing lines, ensuring that critical strategic products are produced locally. With the Bipartisan Infrastructure Law, the U.S. is embracing the Fourth Industrial Revolution, in which clean energy technologies are at the center of the transformation and the redesign of the economy for



a sustainable future, all of it supported by the Infrastructure Reduction Act and its allocation of $365 billion for energy security and climate change programs.

Likewise, the private sector has accelerated the implementation of its sustainability goals. Firms are compelled to comply with strict climate regulation, demanding suppliers to adhere to targets, regardless of geographic location.

The financial and insurance sectors are tightening the requirements to back projects.

Mexico is at the crossroad. To appease its trade partners, it has issued updated climate commitments and announced landmark projects to generate and export solar energy. Yet, rhetoric needs to be paired with concrete actions. Allowing the economic dispatch of the electricity market and the operation of renewable plants would instantly add 800 MW of low-cost clean energy, a much sought-after resource by companies relocating in Mexico.

The resolution of consultations under USMCA on energy will determine whether Mexico is a full-fledged member of North America or gives up the opportunity to become anew a dynamic economy and reliable partner.

CHAPTER 5
NON-TARIFF MEASURES AS BARRIERS TO DEEPENING AND STRENGTHENING NORTH AMERICAN SUPPLY CHAINS

BEATRIZ LEYCEGUI

Partner of SAI Law
& Economics

Since the beginning of this century, due to NAFTA and the USMCA, practically all of trade in North America is free of tariffs. However, one of the most important and prevalent challenges to trade in goods among the North American partners is the different, behind-the-border non-tariff measures such as technical regulations, standards, measures, and certification processes that products must comply with.

Due to such differences, producers need to have diverse production lines to supply domestically and regionally. In addition, they must apply to separate certification processes since what is certified in one country is not valid in others.

Technical regulations (applicable to industrial products) or sanitary and phytosanitary (SPS) measures (applicable to animals, plants, or products thereof) aim to protect human, animal, or plant life or health. Imported products must undergo conformity assessment or certification and approval procedures such as testing, verification, and inspection to confirm compliance with these non-tariff measures.

Through diverse mechanisms (e.g., dialogue through bilateral or trilateral committees or working groups) and negotiations, progress has been made since NAFTA came into force. However, many non-tariff measures have deterred greater integration and reduced the competitiveness of North American supply chains.

There has been a temptation by North American partners to use regulations to protect their markets. Such protectionist measures have led on occasion to trade tensions and disputes (see WTO cases *U.S.–Tuna II* and *U.S.–COOL* below).

One way to reduce the costs to trade from non-tariff measures is for Mexico, Canada, and the United States to adopt common regulations, and for each country to recognize the testing of compliance done in the exporting country in the importing country, thereby avoiding the need for duplicative conformity assessment costs. However, harmonizing regulations and certification processes has been difficult to accomplish since countries want to maintain their policy space.

Thus, attempts to reduce regulatory divergence by agreeing to base technical regulations on international standards have been limited as countries have retained the right to diverge from international standards where they exist, as long as these (i) do not arbitrarily or unjustifiably discriminate among partners; (ii) are not applied in a manner that would constitute a disguised restriction on international trade; and (iii) are not more trade-restrictive than necessary to fulfill a legitimate objective (USMCA- Chapter 9, SPS Article 9.6.6 (d) and Chapter 11, Technical Barriers to Trade, Article 11.5).

An alternative to harmonization has been to focus on whether regulations are equivalent in that they achieve similar goals, despite differences in approaches (e.g., aeronautical components, telecommunications equipment, and used cars).

Regulatory efforts

The strive for regulatory alignment within the North American region started in 1994 with the entry into force of NAFTA. NAFTA established the Committee on Standard-Related Measures and the Committee on Sanitary and Phytosanitary Measures to address regulatory cooperation.

In the context of the first North American Leaders Summit (the "Summit") held on March 2005, the three countries' leaders launched the Security and Prosperity Partnership of North America ("SPP"), a trilateral initiative aimed at bolstering the economic and commercial relationship with a special focus on guaranteeing greater security over shared borders. The SPP provided a mechanism that allowed for the heads of government and ministers in charge of security, foreign affairs,

and trade agendas of the three countries, to maintain a constant dialogue. This mechanism envisaged the establishment of multidisciplinary national working groups, annual reports on their accomplishments, and meetings that reunited high-level officials on a periodic basis to advance progress on, among many strategic issues, the technical barriers to trade and SPP's objectives.

In 2009, the SPP ceased to operate due to the change in the U.S. administration, 2008-2009 financial crisis, and other political hurdles in the three countries. From then on, regulatory cooperation has mainly been pursued bilaterally.

In 2010, Presidents Obama and Calderón created the High-Level Regulatory Cooperation Council (the "Council"), which was integrated by senior-level regulatory

Mexico reached the following relevant results with its North American partners during the Calderón administration in the following sectors:

- The Bilateral Aviation Safety Agreement with the U.S. in 2007, for the mutual recognition of standards in the fabrication of aeronautical components and the corresponding conformity assessment procedures;
- Mexico's unilateral recognition of equivalence of technical regulations and certifications applied to certain electronic devices in the U.S. and Canada, in August 2010;
- Mexico's unilateral recognition of equivalence of technical regulations and conformity assessment procedures with respect to medical devices that already have marketing authorization in the U.S. and Canada, in 2010;
- The Mutual Recognition Agreement for Conformity Assessment of Telecommunications Equipment with the U.S., in 2011; and
- The recognition of equivalence of technical regulations and certifications applied to used cars in the U.S. and Canada, in October 2011.

and trade officials. The Council's main goal was to make regulations more compatible, increase simplification, and reduce burdens without compromising public health and safety, environmental protection, or national security.

Despite its positive initial progress, political support for the Council reached a stalemate.

Canada, Mexico, and the United States have also advanced their regulatory efforts through the World Trade Organization (WTO) Agreements on Technical Barriers to Trade ("TBT Agreement") and the Application of Sanitary and Phytosanitary Measures ("SPS Agreement") and their respective Committees. Both agreements include obligations that foster alignment of national regulations with international standards.

In 2018, Mexico and Canada—as part of their participation in the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)—adopted NAFTA plus text aimed at addressing non-tariff barriers, the main commitments being:

- Chapter 8 (Technical Barriers to Trade): Requires Parties to intensify their collaboration on mechanisms to facilitate the acceptance of conformity assessment results. This chapter also contains specific annexes pertaining to wine and distilled spirits; information and communications technology ("ICT") products; pharmaceuticals; cosmetics; medical devices; proprietary formulas for pre-packaged foods and food additives; and organic products.

- Chapter 7 (Sanitary and Phytosanitary Measures): Encourages Parties to apply equivalence to a group of measures or on a system-wide basis.

- Chapter 25 (Regulatory Coherence): Commits Parties to continue striving to attain regulatory coherence by using good regulatory practices in the development of regulatory measures.

In addition, the CPTPP establishes Committees on Technical Barriers to Trade; Sanitary and Phytosanitary Measures; and Regulatory Coherence.

USMCA built upon and intended to go beyond NAFTA, WTO, and CPTPP rights and obligations. Under the **USMCA Chapter 9 (Sanitary and Phytosanitary Measures)** SPS measures were enhanced by increasing transparency on the development and implementation of SPS measures—improving processes and simplification of procedures for the certification, regionalization, and equivalency determinations, and establishing mechanisms to increase cooperation and exchange information. USMCA Chapter 9 also improves equivalence, by requiring parties to recognize SPS measures to the extent feasible and appropriate to a group of measures or on a systems-wide basis, if the exporting Party demonstrates to the importing Party that the exporting Party's measure achieves the importing Party's appropriate level of protection.

USMCA Chapter 11 (Technical Barriers to Trade) goes beyond WTO and CPTPP provisions in relation to the identification

"It is crucial that future initiatives and negotiations on regulatory alignment are tied to: strong leadership; a shared prioritization of the regional regulatory agenda; recognition of the institutional arrangements."

of international standards, guides, and recommendations, as it requires Parties to apply the decisions and recommendations adopted by the WTO Committee on Technical Barriers to Trade since January 1, 1995, and to cooperate to ensure that international standards and recommendations do not create unnecessary obstacles to trade. With respect to conformity assessment, this chapter includes the Parties' commitments to reduce the number of times a product must be tested to comply with technical regulations. Furthermore, considering Mexico's negative experience with the United States' application of labeling standards (see section *Technical barriers to trade and phytosanitary tensions and disputes* below), this chapter obliges parties to ensure that all technical regulations pertaining to labels accord treatment no less favorable than that accorded to like goods of national origin and do not create unnecessary obstacles to trade.

The USMCA incorporates the commitments embodied in the CPTPP pertaining to Sectoral Annexes (USMCA Chapter 12) and Good Regulatory Practices (USMCA Chapter 28). This agreement also creates committees on: Sanitary and Phytosanitary Measures, Technical Barriers to Trade, and Good Regulatory Practices.

Technical barriers to trade and sanitary and phytosanitary tensions and disputes

North American supply chains would greatly benefit from the parties' cooperation towards harmonizing or recognizing the equivalence of their regulations. However, on certain occasions, North American partners have opted for an opposite path, not only departing from the former objective, but using technical regulations and SPS measures to protect their domestic production. These decisions have led to tensions and disputes.

Following are regulatory disputes that Parties decided to escalate to the WTO dispute settlement mechanism, and others that could eventually be presented either under a WTO or a USMCA arbitration panel. Such disputes, aside from affecting trade, have had a negative impact on regional supply chains and have distracted Parties from advancing a constructive agenda, not only regarding regulatory issues, but the cooperation agenda in general.

In the WTO case ***U.S.–Tuna II***, the U.S. did not allow the use of the "dolphin safe" label on tuna imported from Mexico because of the way the tuna had been caught (although it was more sustainable than other techniques), which affected the marketing of Mexican tuna in the U.S. The WTO Appellate Body found that the measures violated the TBT Agreement, as they discriminated against Mexican tuna and tuna products.

In the WTO case ***U.S.–COOL,*** the dispute hinged on the United States' adoption of country of origin labeling provisions ("COOL measure") for certain products that mandated that for a product to be labeled as originating in the U.S., all stages of production had to take place in that country's territory.[1] These requirements impacted beef from calves born in Mexico as well as Canada, that although raised and slaughtered in the U.S., could not benefit from the label, imposing a disproportionate burden on upstream producers and processors. In June 2012, the Appellate Body found that the COOL measures were inconsistent with the TBT Agreement.

More recently, there is tension surrounding ***glyphosate and genetically modified corn.*** Mexico has rejected import permits for

glyphosate-containing chemical products and has delayed the registration and marketing of at least 2,686 applications for certain pesticides and agricultural chemicals. In parallel, on December 31, 2020, Mexico's Ministry of Agriculture issued a decree that mandates the phase-out and eventual replacement of the use of glyphosate and glyphosate-containing products by January 31, 2024 (the "Decree"). Agricultural and livestock supply chains heavily depend on Mexico's imports of yellow corn for animal feed.

On October 3, 2022, President López Obrador announced the implementation of the ***Agreement against Inflation and Scarcity***. Through this measure, the federal government granted "Unique Universal Licenses" to import and distribute basic foods and inputs, exempting the holders from import taxes and the noncompliance of regular procedures and permits. This measure could have sanitary and phytosanitary repercussions.

Mexico has rejected import permits for glyphosate-containing chemical products and has delayed the registration and marketing of at least

2,686

applications for certain pesticides and agricultural chemicals.

Final considerations

There are relevant challenges to overcome in the regulatory arena. Thus far, they have been mainly addressed bilaterally. However, given the impact of each country's non-tariff barriers on North American supply chains, a trilateral approach seems necessary. This should include the following:

- At the highest political level between heads of government and high-level officials: Monitor the discussions and follow-up on the trilateral relationship; and

- At the private sector level among the wide range of industries involved in the regulatory environment: Active participation from all stakeholders would facilitate the prioritization of the dialogue at a political level, as well as the subsequent signing of agreements.

In addition, Parties should try to conciliate economic interests within industries and the agencies charged with the certification of compliance with technical standards, as such interests have on many occasions prevented the three countries from achieving deeper cooperation.

On the political front, incoming governments have tended to undo existing institutions to create new ones, thus when the new mechanisms of dialogue are finally in place, the window of opportunity for making any progress is small, and the accomplishments fall short of the imperious needs within

the North American region. It is crucial that future initiatives and negotiations on regulatory alignment are tied to: strong leadership; a shared prioritization of the regional regulatory agenda; recognition of the institutional arrangements in place; and organized efforts through the offices of the leaders of each country. This would limit opportunities for bureaucratic infighting and encourage the effective coordination between government agencies.

Hopefully, the legal and institutional framework provided under the USMCA will help shorten and perfect global value chains through regulatory alignment in strategic sectors (e.g., vehicle, oil and gas, information technology, electric-electronic, agriculture). Mexico, the U.S., and Canada must strengthen their economic cooperation and ties. Regulatory bridges must be constructed to connect these nations, instead of walls, in its literal and broader meaning.

ENDNOTES

1 The provisions were stipulated in the Agricultural Marketing Act of 1946, as amended by the Farm, security and Rural Investment Act of 2022 and the Food, Conservation and Energy Act of 2008, as implemented through the regulations published as 7 CFR Parts 60 and 65. See Id.

Brian Kingston

President and Chief Executive Officer, Canadian Vehicle Manufacturers' Association

BUILDING A NORTH AMERICAN ELECTRIC VEHICLE SUPPLY CHAIN

The automotive industry is undergoing a once-in-a-century technological transformation to electrification with significant implications for the North American auto supply chain. Automakers worldwide are committing an estimated $1,2 trillion to electrification globally through 2030 to build tens of millions of electric vehicles (EVs), more than double the amount from onlyone year ago.

This transformation creates a generational opportunity to build an integrated and resilient North American EV supply chain underpinned by the United States-Mexico-Canada Agreement (USMCA). Given the importance of the auto industry to North America with annual production approaching 15 million vehicles in 2022, it is critical that Canada, Mexico, and the U.S. work together to ensure a smooth transition to electrification.

The automotive industry is competitive as part of the highly integrated North American market. The success of the industry has been enabled by the North American Free Trade Agreement (NAFTA) and now the USMCA that provides certainty and stability to the industry. Duty-free treatment given to originating vehicles and parts has enhanced supply chain integration and incentivized investments in North American production.

As a result of this integration, thousands of trucks and train cars ship vehicles, parts, and components across the continent every day as part of the assembly process. To make this happen, automotive companies operate complex logistical plans that ensure scheduled, uninterrupted delivery to and from the plants.

With the industry transitioning to electrification, a parallel supply chain is being created across North America from the mining of critical minerals to battery cell production and vehicle final assembly. According to the Centre for Automotive Research, automakers in the region announced $36 billion of investments in North America to build facilities dedicated to manufacturing EVs and batteries in 2021 and double the amount announced the same time last year for EV-related projects through the first half of 2022. The USMCA provides the certainty companies depend on to invest billions into this transformation in Canada, Mexico, and the U.S.; and the transformation is just getting started.

The scale of the opportunity facing North America is enormous. For example, the International Energy Agency (IEA) projects that for the

world to achieve net zero globally by 2050, six times more mineral inputs will be required by 2040 than today. Of this increase, EVs and battery storage demand for mineral inputs are expected to grow by a least 30 times to 2040.

Fortunately for North America, Canada is in the top five countries producing cobalt, copper, graphite, precious metals, nickel, and uranium, and has the potential to expand in lithium, magnesium, and rare earths production. Canada is the only nation in the Western Hemisphere with deposits of the complete suite of minerals required to make next-generation electric batteries.

Increasing and diversifying Canadian production of critical minerals will enhance North American security and increase trilateral trade. Building North American supply chains from mineral exploration to production for these elements presents an important opportunity for job creation and economic growth, while ensuring responsible mining practices.

To achieve this, Canada's recently released Critical Minerals Strategy aims to increase the supply of responsibly sourced critical minerals and support the development of domestic and global value chains for the green and digital economy. It includes $3.8 billion (CAD) in funding for a range of industrial activities, from geoscience and exploration to mineral processing, manufacturing, and recycling applications.

Combine this with the U.S. Inflation Reduction Act (IRA) and the blueprint for an integrated North American EV battery supply chain is beginning to take shape.

The IRA is arguably the most significant development for the North American auto industry since implementation of the USMCA. The U.S. is committing more than $370 billion to fight climate change, including massive new investments in EV manufacturing, sales, and infrastructure.

The IRA includes consumer EV incentives that are linked to sourcing EV battery components and critical minerals from North America or countries with which the U.S. is in trade agreements. It also unleashes a major new suite of incentives linked to manufacturing EVs and components inside America.

Fortunately for Canada, critical minerals and vehicles produced in Canada will be part of the EV supply chain the IRA establishes. But seizing the opportunity requires urgency. Here is how Canada should respond.

Priority one is ensuring our regulations and trade rules with the U.S. continue to be aligned so we are full participants in the transition to EVs.

Canada has reaped significant economic and social benefits by being part of an integrated auto sector in North America. Through common regulations and competitive supports, we manufacture and sell into a market accounting for annual sales of nearly 20 million vehicles. This remains an essential pillar of Canada's manufacturing economy.

It is this integration that has allowed automakers to announce historic investments in Canada to produce EVs.

Second, Canada must understand, identify, and react to the competitive gaps in our manufacturing sector that are exacerbated by the IRA. These competitive gaps are most obvious in clean energy manufacturing, where the act earmarks over $60 billion to support EV and battery manufacturing, among other technologies.

This means providing opportunities for companies that can be leveraged and compared against the IRA's production tax credit for battery modules, cells, and electrode active materials. It also requires swift government action to deliver on the Critical Minerals Strategy and realize the supply chain opportunities stemming from critical mineral production.

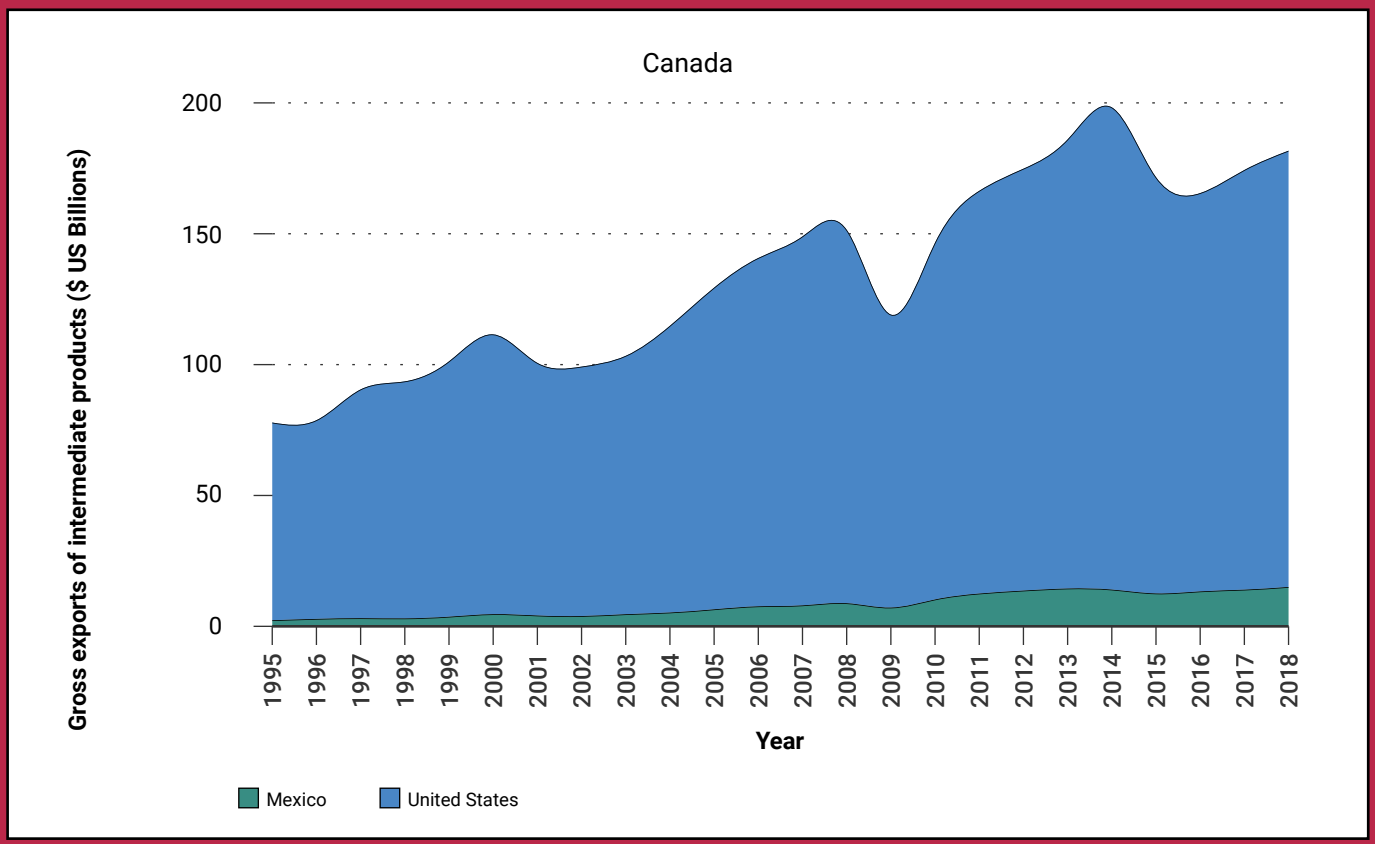
Finally, the North American EV supply chain will not succeed without a greater effort to boost EV adoption.

Canada needs a comprehensive plan to keep up with the U.S. on EV readiness. This means building accessible EV charging, ensuring a reliable national electric grid, and providing competitive purchase incentives to help drivers afford the switch to electric transportation.

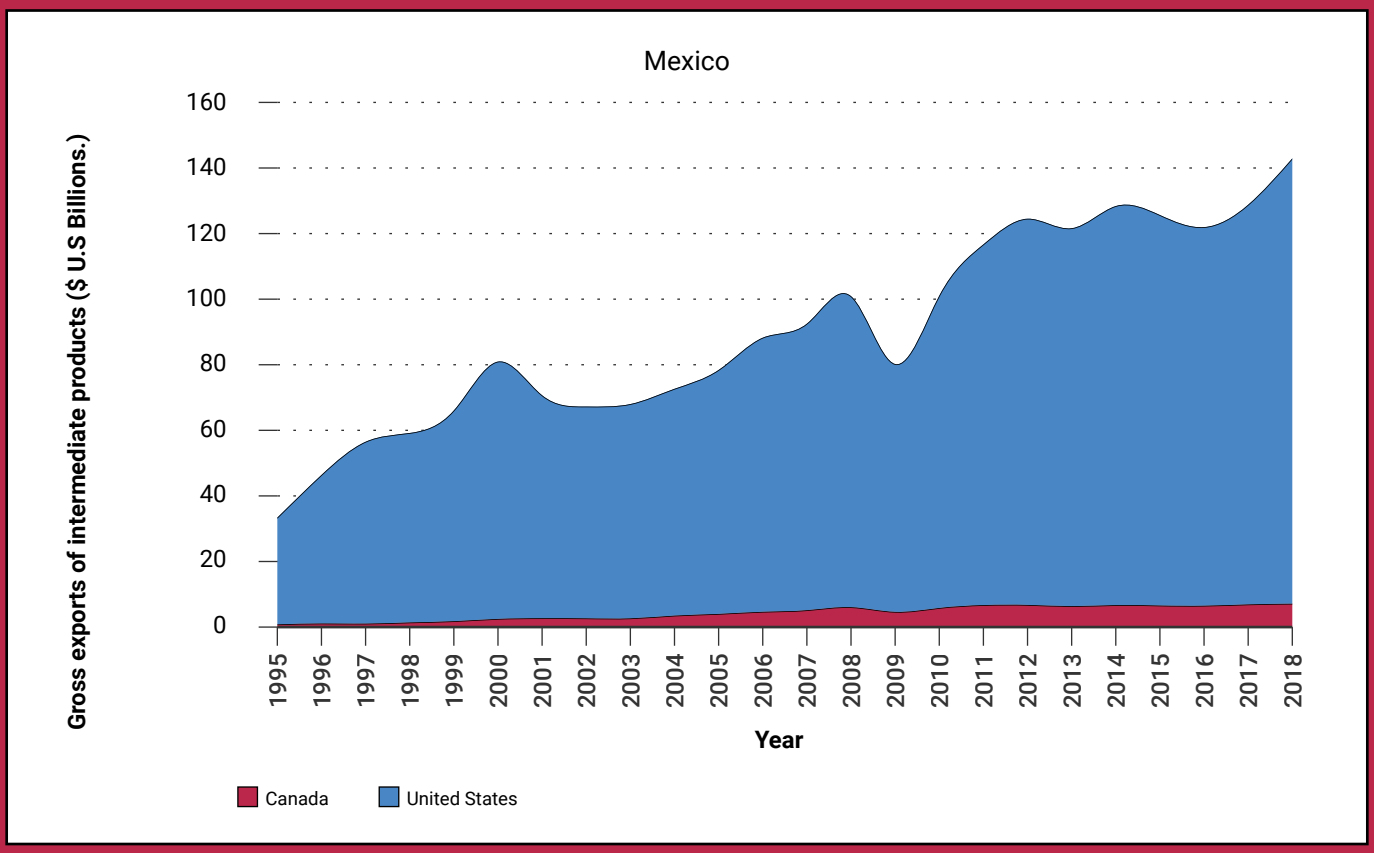
Canada needs to keep pace with the U.S. in the transition to electrification to build an integrated and resilient North American supply chain.

GRAPH 12

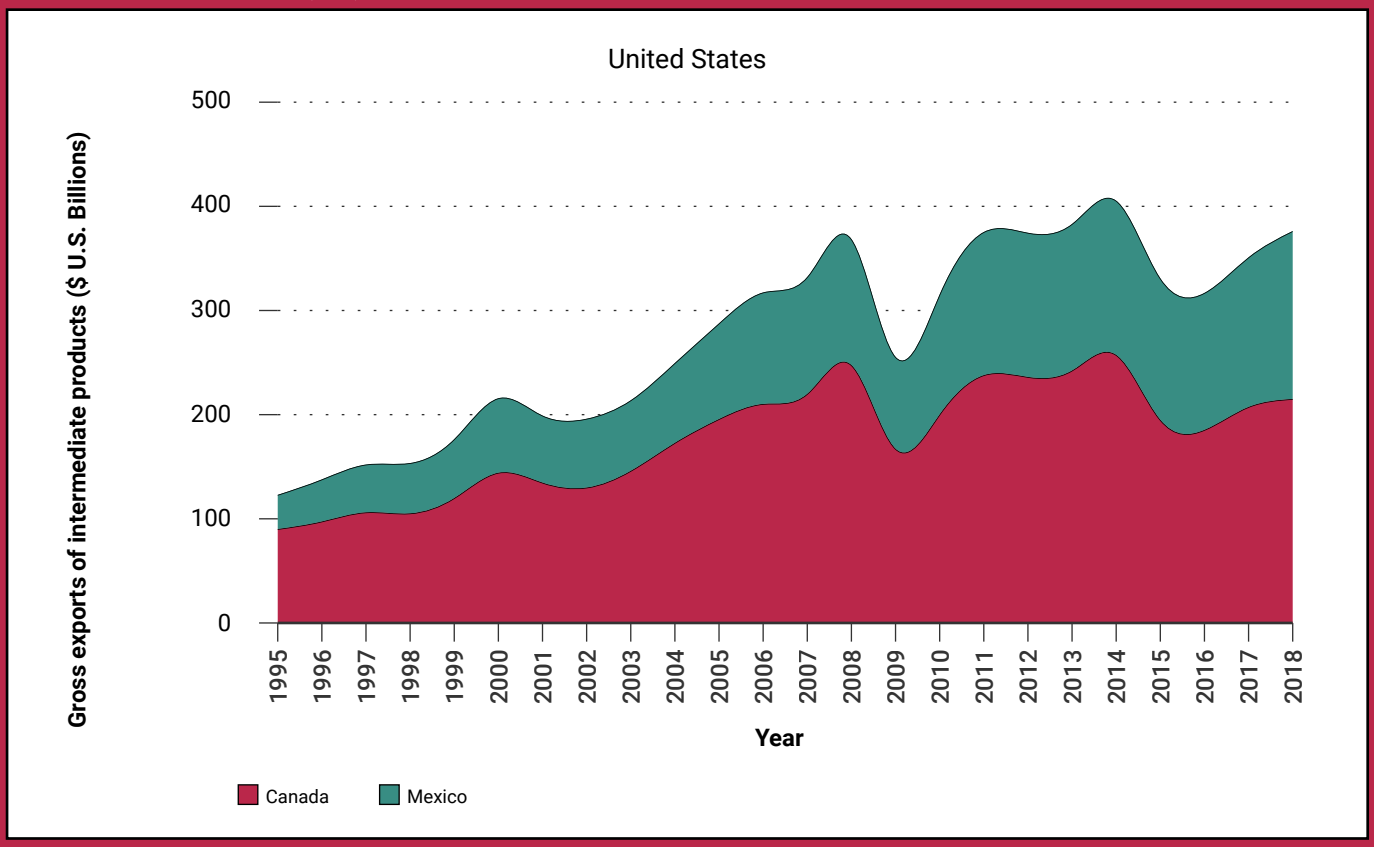
Trend over time of trade in intermediate goods in North America measured by gross exports.
Trade in goods used in North American supply chains continues to grow, with the US as the key export destination for Mexico and Canada.



Source: OECD Trade in Value Added (2022).



Source: OECD Trade in Value Added (2022).



Source: OECD Trade in Value Added (2022).

CHAPTER 6
OPTIMIZING NORTH AMERICAN SUPPLY CHAINS IN CRITICAL TECHNOLOGIES: THE USMCA DIGITAL ADVANTAGE

DAN CIURIAK

Director and Principal, Ciuriak Consulting Inc. (Ottawa)
Fellow in Residence, C.D. Howe Institute (Toronto)
Senior Fellow, Centre for International Governance Innovation (Waterloo)
Distinguished Fellow, Asia Pacific Foundation of Canada (Vancouver)

Major developments in geopolitical relations since the updating of the North American Free Trade Agreement (NAFTA) through the United States-Mexico-Canada Agreement (USMCA) have put the regional agreement in a new context, magnifying the significance of its new digital trade chapter.

Briefly, the continuing expansion in the scope and quantity of data being captured with the ongoing digital transformation, the steep increase in the power of digital technologies such as artificial intelligence (AI) and machine learning (ML), and the convergence and integration of technologies across use cases (Park, 2019; Wheeler and Simpson, 2022) create new and pervasive governance challenges. Given this, governments worldwide are developing comprehensive and expansive regulatory frameworks—with limited real world experience and the absence of internationally agreed standards—in an area that remains under-theorized and under-developed in practical terms, particularly in regards to national security (see, e.g., Heath, 2021) and personal privacy (Acquisti et al., 2016). This creates uncertainty about the future scope of measures that might impinge on the free flow of data across borders and require some degree of data localization.

This uncertainty is particularly acute when it comes to the nexus of big data, machine learning, and AI. This area is critical to national security given the military advantages of dominating these new general-purpose technologies. It is also important to economic security given the prospects for capturing international economic rents and large social benefits that could potentially flow as these new technologies are deployed at scale bringing economies of scale to human capital-intensive services sectors (Ciuriak and Goff, 2022). Importantly, the scale and hyper-specialization of operations within the supply chain for these technologies is such that only a handful of global firms dominate particular niches, most of them outside of North America. This has sharpened sensitivity to supply chain risks given the current environment of intense geopolitical rivalry and concerted efforts to reduce risks and make supply chains more robust and secure.

The USMCA reforms play a particularly important role in this regard as the digital trade chapter establishes the basis for a strong and integrated information and technology space in North America by reducing regulatory uncertainty and investment risk. **Analysis of the economic impact of the USMCA had already established that the reduction of uncertainty around data flows in the North American space represented the major source of economic gain from the reforms (USITC, 2019; Ciuriak 2020).** The recent technological developments and the flaring of geopolitical rivalry give added—indeed transformative—significance to these aspects.

The altered technological context for the USMCA

The United States has long understood that technological leadership underpins its economic prosperity and security (see, e.g., Eaglen and Pollack, 2012; White House, 2017; 20). This understanding has been reflected in its trade agreements. Thus, the transition from the mature industrial economy to a knowledge-based economy (KBE) signalled by the steep upturn in the pace of patenting in the early 1980s was followed in short order by commitments to intellectual property (IP) standards in trade agreements (starting with the 1989 Canada-U.S. Free Trade Agreement and subsequently the 1995 World Trade Organization Agreement). Similarly, the transition to a data-driven economy (DDE) signalled by the steep upturn in the flow of data at the beginning of the 2010s was followed by the incorporation of data chapters in the 2016 Trans-Pacific Partnership Agreement and shortly thereafter in the USMCA.

By a recent count, the U.S. has 13,398 AI startups to 1,936 in China—tracxn); and for scaling up: The U.S. has

470

Unicorns

to 170 for China, which is, however, second best in the world.

These economic transitions, each of which can be traced to a set of related technological innovations (see Annex), changed the basis for international competitiveness based on dominance of the new forms of capital being created. In each case, the United States had first mover advantages and, in each case, early recognition and policy reaction enabled the United States to extend its global economic leadership even as its dominance in mature technologies was competed away.

Another major transition in technological conditions is now underway. Reflecting quantum leaps in the size and efficiency of specialized AI computer chips, orders of magnitude increases in the scale of the neural nets that train AI systems, and improvements in the training protocols (see Annex 1), AI systems are now routinely breaking through human benchmarks in knowledge-based tasks while demonstration projects such as ChatGPT are turning heads (and creating controversy). The palpable improvement in the quality of AI systems that these technological leaps have enabled is reflected in headlines that recognize 2022 as "The year AI became eerily human" (Verma, 2022).

The breakthroughs in powering up AI systems, however, are only the stage setters. Business innovations such as "Software as a Service" and "Platforms as a Service" have enabled AI development to be conducted on a massively parallel basis by literally hundreds of thousands of firms worldwide. As the myriad yet-unknown applications that are now being developed are deployed in the production of goods and services, they will form a growing stock of capital assets—"machine knowledge capital" or MKC—that will increasingly impact the international competitiveness of advanced economies built on the foundation of *human* knowledge capital.

This looming technological transition has geopolitical ramifications that will transform the context for the USMCA. China entered the KBE only around 2010, some 30 years behind the U.S., and, despite surging into the lead in international patent applications, still trails at a considerable distance in its international receipts for in-force IP.[1] However, it entered the DDE more or less contemporaneously with the U.S. and leveraged the scale of its internal economy and rapid adoption of digital technologies to gain a sizeable lead on indicators such as e-commerce sales

"The contest is clearly on, and U.S. trade policy has been swift to kick into gear—in this case, not through trade agreements but through trade sanctions that leverage U.S. control of a vast stock of technology assets that represents the substrate for the technologies of the MKC era. This has important implications for the USMCA impact."

and mobile traffic data.[2] As we enter the era of MKC, the United States enjoys a clear advantage in recognized AI startups (by a recent count, the U.S. has 13,398 AI startups to 1,936 in China according to Tracxn), but China's Baidu reports some 180,000 firms as users of its AI development platform (Smith, 2022), which indicates considerable depth.

The contest is clearly on, and U.S. trade policy has been swift to kick into gear—in this case, not through trade agreements but through trade sanctions that leverage U.S. control of a vast stock of technology assets that represents the substrate for the technologies of the MKC era. This has important implications for the USMCA impact.

The USMCA digital advantage

The data intensity of the critical digital technologies

The AI sector, which includes computer services and digital platform services firms, is of course extremely data intensive. The same is true of the supporting economic infrastructure of advanced manufacturing, business services, and backbone infrastructure services. In fact, these sectors are close to twice as intensive in data flows as other economic sectors (Table 6).

TABLE 6: Data intensity of traditional and critical sectors

Sector	Medium	High
Traditional Sectors		
Agriculture	0.64	1.94
Traditional Industrial Sectors	1.14	3.42
Other Services and utilities	1.52	4.56
Sectors Supporting Critical Technologies		
Advanced Technology Sectors	1.31	3.94
Backbone Infrastructure Services	2.53	5.82
Business Services	2.21	6.64
Averages		
Data Intensity of Traditional Sectors	1.10	3.31
Data Intensity of Sectors Supporting Critical Technologies	2.02	5.47
Ratio	**1.83**	**1.65**

Source: USITC (2019); calculations by the author.

The USITC attributes a significant and positive impact on U.S. industries from the USMCA's digital trade chapter, which requires the parties to ensure cross-border movement of data and prohibits restrictive data localization measures in the future, protects proprietary source codes and algorithms, and provides intermediary liability protection. These positive impacts derive entirely from a reduction of uncertainty about future regulatory interventions—in effect, the

USMCA represents an insurance policy for industry that data flows within the North American economic space will continue to be unrestricted. This leads to the question of how valuable this insurance policy is.

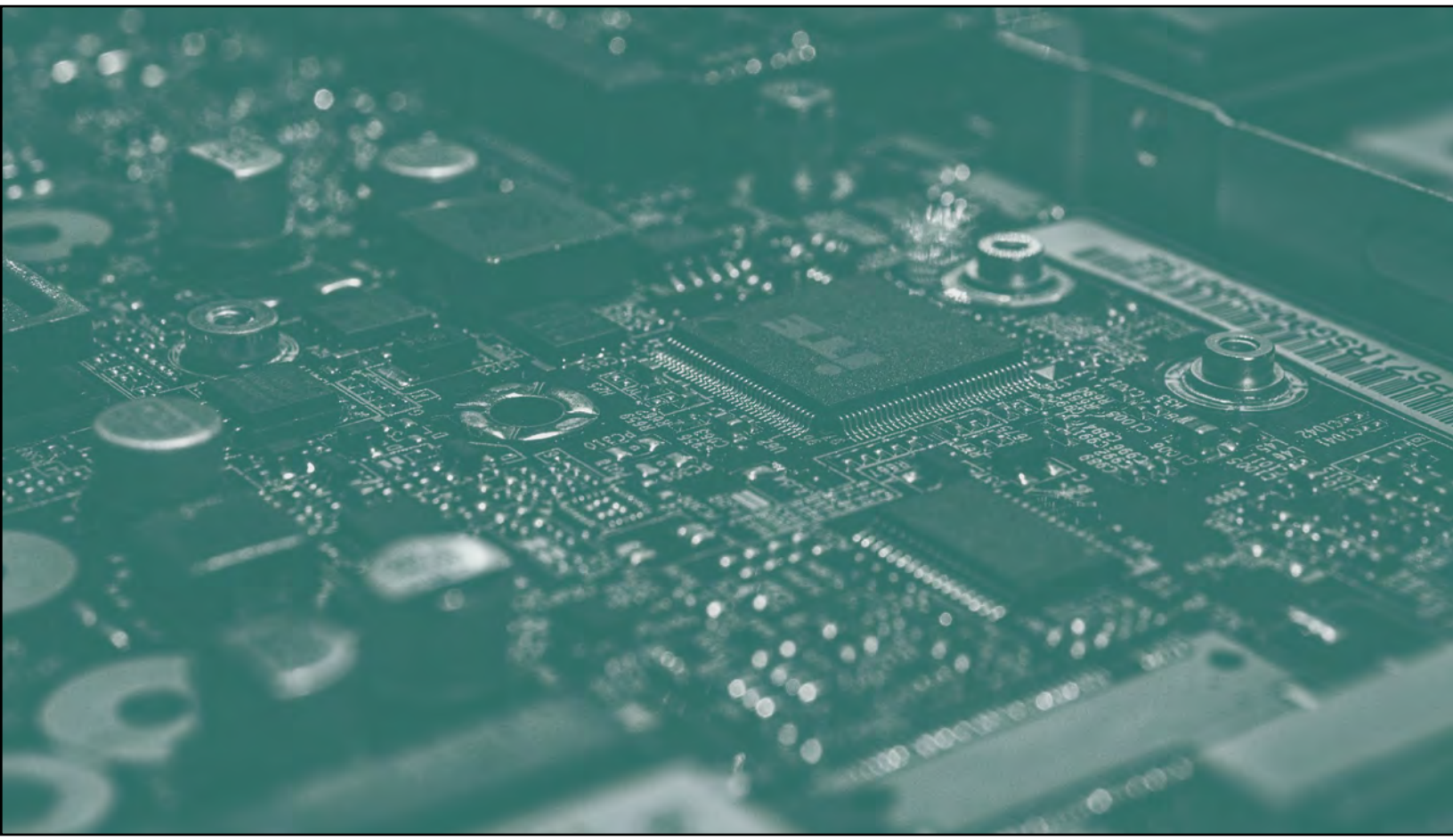
Uncertainty as a preferential non-tariff measure

There is considerable evidence that uncertainty inhibits trade and investment (see e.g., Bloom et al., 2007; Handley and Limão, 2015; Novy and Taylor, 2020). This reality was underscored by recent "natural experiments": the extended period of trade policy uncertainty created by the Brexit referendum, which impacted significantly on firms' entry into cross-channel trade (Graziano et al. 2018, Crowley et al. 2018, and Bloom et al., 2019); and the renegotiation of the NAFTA (see e.g., Baker et al., 2019; Crowley, 2019; Jacks and Novy 2019), when trade policy uncertainty reverberated through supply chains (Blanchard, 2019) and reduced trade and investment (Fritz and Evenett, 2019; Jacks and Novy, 2019).

In the context in which the USMCA was negotiated, it was not initially clear how much benefit would come from the measures aimed at reducing data uncertainty. This was due to the fact that Canada and Mexico had already signed onto comparable measures in the Comprehensive and Progressive Partnership for Trans-Pacific Trade and commitments on regulatory frameworks tend to be applied multilaterally (Ciuriak, 2020). Arguably, the main impact of the USMCA measures was thus on the U.S. itself, which was the world's leading proponent for unrestricted data flows. However, in the new multipolar context, in which the free flow of data is conditioned by trust, and in which the U.S. has powerful motivations to control the flow of certain data and technology, vis-à-vis China in particular, the USMCA takes on much greater significance and arguably makes North America a favored investment location.

Nowhere is policy uncertainty more acute than around digital technology where virtually every area of international interaction is under review (see, e.g., Kerry et al., 2023). Yet, this uncertainty for investors is not uniformly distributed.

Investment will clearly continue to flow to where the development talent is located but will also be influenced by considerations of diversification of sourcing, geopolitical risk, and regulatory risk. Clearly the risks of making investments in China for technology aimed at global markets have risen enormously, with spillover effects for countries more dependent on China economically. This includes Northeast Asia, which is geopolitically aligned with the U.S. but increasingly economically dependent on trade with China. This also includes Southeast Asia, which overtly balances this push and pull. India, which has absorptive capacity and has figured prominently in diversification discussions, will certainly attract supply chain diversification investment; however, its pursuit of strategic autonomy through an "internationalist" foreign policy that at times aligns with the West but at other times with the BRICS vision of multipolarity (Upadhyay, 2022) add to the various challenges of doing business that have historically limited inward flows of investment. In Europe, the combination of regulatory risk and the EU's pursuit of its own version of strategic autonomy (Michel, 2020), which is partly manifested in its attempt to shape an independent policy towards China (see, e.g., Scholz, 2022; and von der Leyen, 2023, who described the approach to China as "de-risking" rather



than "de-coupling"), will also inevitably influence investment decisions.

By comparison, policy uncertainty and its attendant costs for digital technology investment are much less in North America. In the first instance, this reflects the role that USMCA commitments play in creating a stable policy environment for data flows and digital technology investments as a result of the agreement's digital trade chapter but also through other USMCA commitments, including on services, investment, telecommunications, and good regulatory practices, and its functioning dispute settlement mechanism. Secondly, the still-evolving U.S. response to geopolitical tensions with China (e.g., restrictions on U.S. nationals working in specified Chinese technology firms and export controls on a range of key technologies)—which create uncertainty for investments in China and related countries about ongoing access to U.S. technology assets due to national security concerns—do not apply to investments in North America.

Policy recommendations

In the context of the multipolar geopolitical landscape and its implications for

The USMCA's strong commitments on digital governance will support the development of an integrated North American digital realm, which will be essential for continued prosperity and security of the region.

trade in advanced technologies and the flow of data within the data-intensive innovation systems, the North American space promises to be the lowest risk zone for assured access to U.S. technology. Therefore, all else being equal, North America would become a prime destination for private investment in geopolitically sensitive sectors. The USMCA's strong commitments on digital governance will support the development of an integrated North American digital realm, which will be essential for continued prosperity and security of the region.

There are several important policy recommendations for the future development of the USMCA. Insofar as North America becomes a low-risk investment destination for digital technologies and innovation poses geopolitical risks, the agreement could be enhanced in three ways.

First, explicit removal of Section 232 national security tariffs being applied to Canada and Mexico would enhance investment prospects for both countries and thus leverage the geopolitical risk premium.

Second, given the importance of governments as customers for new technologies, the attraction of supply chain investment into North America in the critical new technologies would benefit from the expansion of the North American procurement space. Buy American is a disadvantage in this context.

Third, the attraction of supply chain investment into North America in the critical new technologies space will inevitably require policies that attract important complementary assets, namely, skilled workers and clearly defined terms of engagement in research partnerships. Furthermore, North America needs a Sino-Pacific strategy in this regard that all three parties can buy into.

The context for the USMCA has changed since the agreement was negotiated, placing a new premium on the development of an integrated North American digital economy. This places the USMCA's digital economy chapter in a new light and suggests the need for complementary policy reforms to enhance its impact in making North America a low-risk zone for critical new technologies.

John Maynard Keynes is known to have said, "When the facts change, I change my mind. What do you do, Sir?" The facts have indeed changed, and our policies and the narratives that build support for them need to change as well.

Annex: Technological transitions define new economic eras

This annex describes the historical transitions from the mature industrial era to a knowledge-based economy (KBE) and then to a data-driven economy (DDE) and identifies the technological breakthroughs that triggered these transitions. It then sketches out the technological developments that augur a new era of machine knowledge capital (MKC), and the implications for U.S.-China competition (for elaborations of these transitions see Ciuriak, 2022).

Knowledge-based economy (1980-2010)

- Key technological developments:
  - Awareness of importance of innovation and intellectual property for the U.S. economy signaled by Bayh-Dole (1980).
  - IBM personal computer (1981) enables widespread application of computer, especially when coupled with CAD-CAM PC software released by John Walker's Autodesk (1982).
- Key outcome: These innovations enabled the industrialization of R&D, accelerating the pace of innovation.
- Key indicator: The steep upturn in the pace of U.S. and Patent Cooperation Treaty patenting in the early 1980s.
- U.S.-China competition: China entered the knowledge-based era around 2010 some 30 years behind the U.S. through a concerted push to upgrade its innovation system, including explicit strategies targeting the acquisition of IP. Yet, despite impressive progress, China still trails the U.S. by a wide margin on international IP receipts. This reflects the depth of the established asset position of the U.S., which is also the base of its geoeconomic clout in terms of technology sanctions.

Data-driven economy (2010-the present)

- Key technological developments:
  - Deep learning neural nets developed by Geoffrey Hinton (2006) (Kelly, 2014).
  - Release of iPhone (2007) ushers in the mobile era with a steep increase in the amount of data flowing into the cloud (Molla, 2017).
  - Application of GPUs to neural nets by Stanley Ng's team at Stanford (2009) powers the performance of neural nets (Kelly, 2014).
- Key outcome: These innovations enabled the industrialization of learning, further accelerating the pace of innovation.
- Key indicator: The steep upturn in the amount of data captured at the beginning of the 2010.
- U.S.-China competition: China entered the DDE contemporaneously with the U.S. and, despite the U.S. having a lead out of the gate, has lapped it:
  - 52 percent global share of e-commerce vs. U.S.'s 19 percent by one estimate.
  - Shopify estimates China's share at 46.3 percent in 2022 ($2.8 trillion) compared to U.S. 14 percent share ($905 billion).
  - China's data scale advantage is huge: Ericsson reports China mobile data

traffic = 26 exabytes/month compared to 6 in North America.
- Huawei's 5G advance triggered U.S. reaction in 2018 that started the tech war proper.

Machine knowledge capital (the present and forward)

- Key technological developments:
  - Specialized AI computer chip development has witnessed a "Cambrian explosion" in scale and number of alternative designs (Knight, 2021).
  - Cerebras Systems announced its Wafer Scale Engine (WSE) in 2019, accelerating the training speed of neural nets by orders of magnitude (Moore, 2020); in 2021, it announced WSE-2, which features 2.6 trillion transistors and effectively doubled every metric in WSE-1 (Moore, 2021).
  - In February 2020, Microsoft announced a 17 billion parameter language model, claimed to be the largest of its kind (Rosset, 2020); in May 2020, OpenAI published a paper on its 175 billion parameter GPT-3 model (Heaven, 2020); in January 2021, Google announced it had trained a 1.6 trillion parameter large language model (Wiggers, 2021).
  - Months after Alibaba announced its M6 model with 10 billion parameters, it announced the expansion of M6 to 1 trillion and then to 10 trillion parameters while cutting energy requirements to 1 percent of the energy required by OpenAI's 175 billion parameter GPT-3 (Houweling, 2021; Romero, 2021).
  - In 2022, a Chinese team developed a system, BaGuaLu, which it claims can train a 14.5 trillion parameter system and has the capability to train a 174 trillion parameter "brain scale" model (Ma et al., 2022; Wang, 2022).
  - Power requirements to run AI chips are being reduced dramatically through a variety of approaches and design innovations (e.g., Moore, 2020; Dhar, 2022, Hampson, 2022; Yirka, 2022; Romero, 2021).
  - Meanwhile, the power of AI systems is being increased by orders of magnitude. For example, Amazon's 20 billion parameter Alexa Teacher Model, announced in August 2022, is claimed to have matched benchmark performance of systems with hundreds of billions of parameters (Soltan et al., 2022) with its "sequence-to-sequence" training methodology. Similarly, Microsoft's DeepSpeed system announced in January 2022 reported improvements to the "Mixture of Experts (MoE)" models that promise to reduce training costs by a factor of five (DeepSpeed Team et al., 2022).
- Key outcome: Reflecting the multiple dimensions along which gains are being made in terms of scale and efficiency of AI systems, training times are plunging (Moore, 2022). Specialized AI systems are now routinely breaking through human benchmarks (Stanford University, 2022). AI systems have now been awarded patents (Naidoo, 2021). AI-piloted fighter jets have out-dueled human-piloted jets in dogfights (Mizokami, 2020). The Beijing Winter Olympics showcased a suite of service robots deployed to address pandemic-related concerns (Ma, 2022). And OpenAI's recently released ChatGPT (OpenAI, 2022) is turning heads with its ability to respond with plausible intelligence to questions in conversational mode.

- Key indicator: To be determined.

- U.S.-China competition: At the dawn of the era of MKC, U.S.-China competition is highly asymmetric. The U.S. has the world's leading supporting environment for startups in general and in AI in particular: By a recent count, the U.S. has 13,398 AI startups to 1,936 in China—tracxn); and for scaling up: The U.S. has 470 Unicorns to 170 for China, which is, however, second best in the world. The U.S. controls key technologies in the development ecosystem and has moved to deny them to China. China, on the other hand, has unparalleled infrastructure for deployment of AI in productive capacities, especially in services, where China has major societal needs:

- In the past decade, China has filed 389,571 patents in the area of AI, or 74.7 percent of the world total WIPO.

- China has about 50 percent of the world total of installed industrial robots (44 percent growth in 2021—IFR) — this positions China to deploy smart robots into an existing robot-using production system.

- China has 2.2 million 5G base stations as of 2022, 60 percent of the world total– RCRWireless.

- DJI holds approximately 70 percent of the global drone market share—this positions China in the deployment of low-level autonomous devices.

- 180,000 companies are using Baidu AI development platform—presumably mostly Chinese.

- China displayed its ability to deploy service robot capabilities at the Beijing Winter Olympics.

ENDNOTES

1 In 2021, China's international earnings on its stock of in-force IP assets amounted to less than US$ 12 billion in 2021 compared to US$ 124 for the United States (which is understated as it does not include the $14 billion in IP earnings allocated to Ireland, which mostly represent receipts by US firms that domicile their IP assets in Ireland for tax advantages). Source: World Bank Indicators, Charges for the use of intellectual property.

2 Ericsson (2022) reports China mobile data traffic at about 26 exabytes/month in 2022 compared to 6.0 in North America.

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Valeria Moy

General Director, IMCO (Mexican Institute for Competitiveness)

RELIABLE AND EFFICIENT CLEAN ENERGY SUPPLY IS KEY TO NORTH AMERICAN INTEGRATION[1]

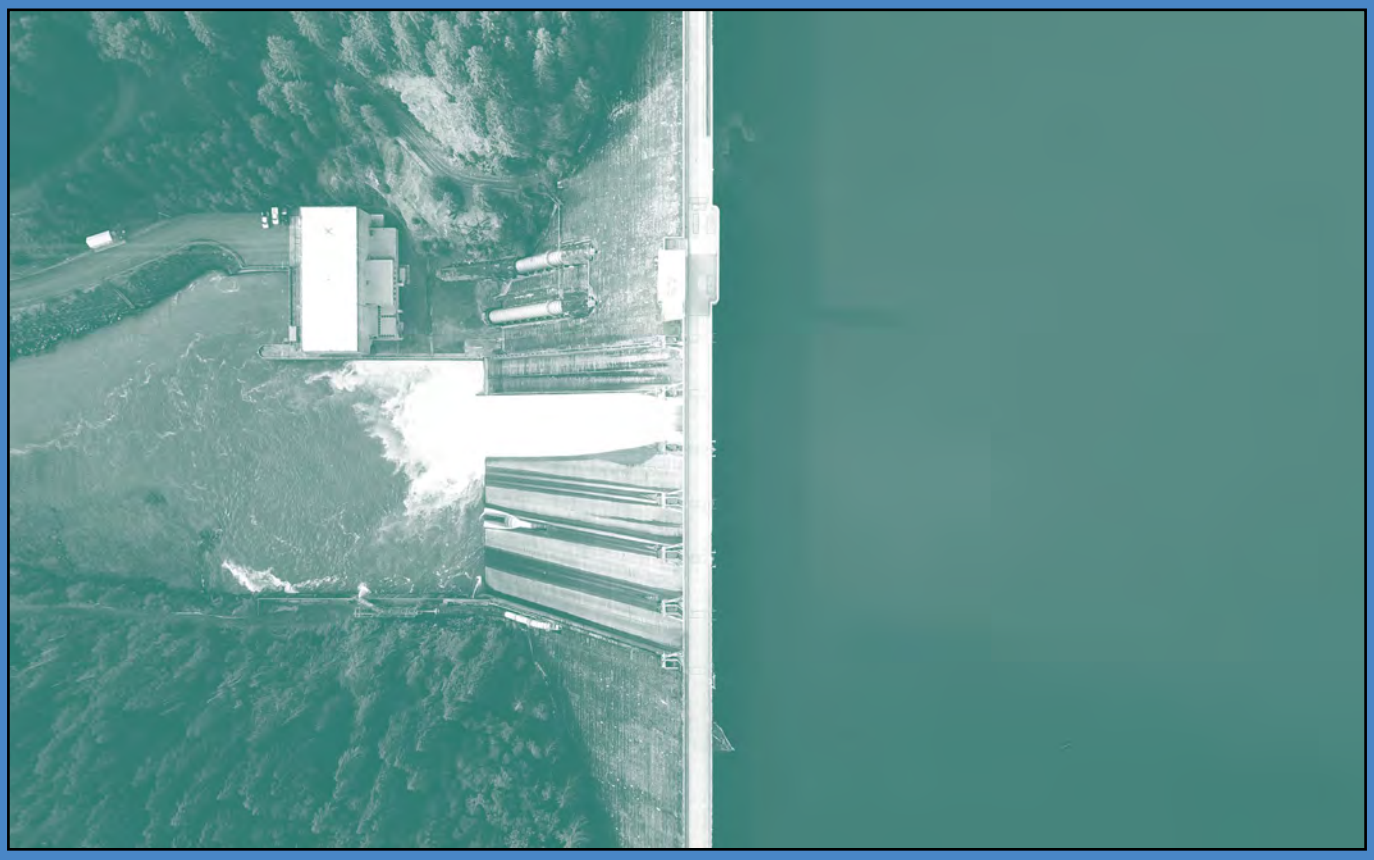
Regionalization will be the name of the game in 2023, and North America should emerge as the main winner. Disruptions in global supply chains after the COVID-19 pandemic, battle for technology leadership between the United States and China, and energy crisis in Europe caused by the conflict in Ukraine are all drivers of increased investment in high value-added sectors within the United States, Mexico, and Canada.

Much has been said about trade and the integration that it fosters. As one businessman once said, "trade is like scrambled eggs, you can´t unscramble them." The message is that North American integration is here to stay and will only deepen. In fact, North America should not be seen as three individual countries but increasingly as a single economy.

However, as Shannon O'Neil accurately highlights in her most recent book, *The Globalization Myth,* North America is the least integrated of the three main global trade regions. While the European Union's intra-regional trade represents approximately two-thirds of their total trade, and half of Asian trade takes place within Asian countries, North America lags with only 40 percent of trade from the three countries being in North America. There are two key takeaways: First, there is room for growth within the region, and second—-most importantly—the regionalization of supply chains and nearshoring offer a historic opportunity to materialize this opportunity.

Regional supply chain integration will deepen in time, but it will not be without challenges. Ensuring access to a reliable and efficient clean energy supply will be one of them.

The success of the original North American Free Trade Agreement (NAFTA) was the way it led to integrated supply chains across the manufacturing sector, from automobiles and auto parts—probably the agreement's landmark achievement—to the aerospace industry. Now, the United States-Mexico-Canada Agreement (USMCA) needs to harness the digital revolution so that it is truly successful and lives up to its potential. North America is ideally suited to attract investment in the industries of the future, including electric mobility, 5G telecommunications, robotics, artificial intelligence, and the Internet



of Things, among others. But developing these digital economic opportunities in North America will require access to clean and reliable sources of energy.

The digital economy is energy intensive. Countries and regions that fail to acknowledge this reality and prepare for it will fail in developing their digital economies. We need to approach the development of energy systems from a North American perspective despite the dispute between the U.S. and Canada over Mexico's energy reform that attempts to close energy markets to private investors and its preference for public investment in the hydrocarbon industry. However, there are reasons to be cautiously optimistic that a North American approach to energy can emerge. The Biden administration's Inflation Reduction Act includes unprecedented investments for the clean energy transition, including tax credits, $40 billion in loans and $27 billion in grants for clean energy projects. On the other side of the border, Mexico's Plan Sonora aims to attract $48 billion in solar photovoltaic and wind farms between 2023 and 2030.

Despite these important investments into clean energy across North America, more is needed. Importantly, the three countries need to develop an integrated North American energy plan. North America also needs to invest in transnational energy infrastructure, specifically expanding the region's natural gas pipeline network. The region has one of the most competitive natural gas markets worldwide in production and price. So, the projects to guarantee access to natural gas in Mexico's south-southeast states have the potential to trigger development in the country's least developed entities.

We must also take advantage of North America's geographic and climate diversity to accelerate the deployment of low-emission energies. There should be no trade-offs between expanding renewable energies and the reliability of the electricity grid due to the variability of solar photovoltaic and wind energies. Nonetheless, investment is required. Mexico is the weakest link regarding energy transmission infrastructure. The country has historically underinvested in the

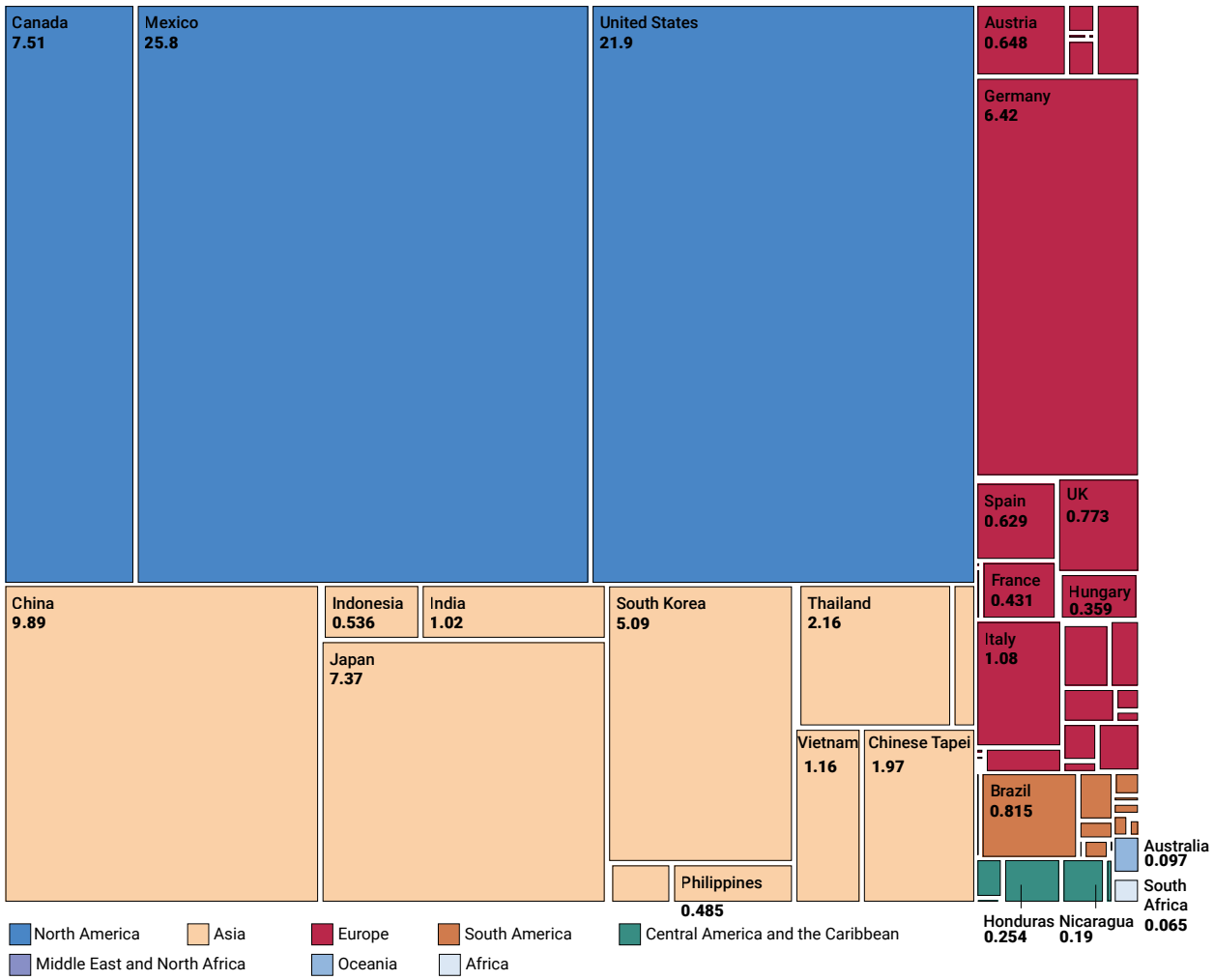
power grid. As a legal and natural monopoly, the Federal Electricity Commission needs to urgently reinforce and expand the grid to increase uptake of solar and wind energy that will also strengthen the country's energy security by reducing its exposure to power cuts.

None of this will be possible if any of the three North American allies fail to abide by their USMCA commitments. Ultimately, failure to comply with USMCA may be the main challenge toward the development of more integrated energy markets. It is urgent to look beyond current disagreements over energy policy to diagnose the region's energy needs with a long-term view and design transnational funding mechanisms for energy infrastructure.

Without competitive energy, the regionalization of supply chains, and development of digital economies, nearshoring in North America will remain an idea, not a reality.

GRAPH 13 **Shares of sources of imports into North American auto sector supply chains in 2020.**

While North American production dominates the automotive supply chain, inputs from the rest of the world are significant.



Source: Observatory of Economic Complexity (2022).

ENDNOTES

1 I would like to thank Oscar Ocampo for his help in the drafting of this article.

CHAPTER 7
LABOR CHAPTERS IMPROVE SUPPLY CHAIN RESILIENCE: THE CASE OF THE USMCA

KEVIN KOLBEN

Associate Professor and Department Vice Chair, Department of Supply Chain Management, Rutgers Business School

Labor provisions are increasingly becoming standard features of contemporary free trade agreements.[1] Their inclusion has several drivers, including, for example, concerns about unfair wage competition, human rights, and growing demands from consumers and citizens for goods made in ways that do not violate the conscience or implicate oneself in human rights abuses.

Less attention has been paid, however, to the business and policy case for trade-based labor standards as a tool to improve supply chain resilience and disruption. This piece briefly surveys the justifications for labor provisions in trade agreements, describes some of the components and institutions negotiated into the USMCA's labor chapter, and offers some arguments for why addressing labor issues in trade agreements through state-to-state and state-to-firm mechanisms, as the USMCA does, is part of increasing supply chain resilience and reducing risk.

Background: Labor provisions in free trade agreements

Most countries, with the notable exception of India which has long standing objections to such provisions,[2] are party to at least one trade agreement with labor provision and language. Indeed, no country has been more aggressive in that effort than the United States, with Canada arguably a close second. It should thus come as little surprise that the USMCA would contain the most developed and forward leaning labor provisions of any free trade agreement (FTA) to date. The European Union is undergoing a reevaluation of its own trade, sustainability, and development chapters, which include labor provisions, and appears to be moving closer to the North American model, including the possible introduction of trade remedies for material breaches of international labor standards.[3]

The purpose of including labor provisions is multifaceted. One oft cited historical driver has been protectionism. That is, certain constituencies have hoped to mitigate incentives for firms to relocate or source from abroad based on wage differentials. The hope would be that creating labor standard baselines would even the so-called "playing field." But this explanation is of limited explanatory value. Labor standards, to the extent they have been implemented, almost never require comparable wage levels in trading partners despite the historical efforts of some American unions and legislators to do so. As such, they have done little to raise the costs of outsourcing enough to impact a firm's make or buy, or sourcing decisions. However, it should be noted that the USMCA's provisions on minimum average wages for workers in auto manufacturing are one of the few trade provisions that directly address substantive wage levels. Rather, labor provisions across FTAs generally require some mixture of adherence to the principles of the International Labour Organization (ILO) core conventions and enforcement of, and non-derogation from, a country's own labor laws, while leaving a fair amount of discretion on wage setting.

A more nuanced approach to drivers of labor provisions in trade agreements must therefore consider the fact that ILO conventions address broadly accepted standards that derive from universal human rights law and norms. These include rights to freedom of association and collective bargaining, bans on forced labor, non-discrimination in the workplace, and minimum work ages for different kinds of work. These are what scholars have referred to as "non-cash standards," because they do not directly prescribe increased costs to supplier, lead firms, or governments through wages or benefits.[4] Rather, they require enforcement of procedural guarantees that workers participate in the labor market as freely consenting individuals who are treated equally, and who retain the right to act collectively in relation to their employer.

The USMCA's labor provisions

Like most labor chapters, the USMCA's are born from a variety of objectives. Previous labor provisions were largely the result of advocacy from Democratic legislators and their union constituencies. When President Bill Clinton negotiated the NAALC, he did so in part as an effort to increase Democratic support for NAFTA and for free trade more generally. The Republican party in the U.S. had been firmly pro-trade and opposed to the inclusion of labor conditionality in NAFTA. However, unlike in NAFTA, newly trade-skeptical and working class-aligned Republican legislators, along with union backed Democrats, supported strong labor provisions in the USMCA that went beyond any previously negotiated U.S. labor provisions.[5]

The USMCA's labor provisions reflect the standard North American approach to labor provisions but also include several innovations from previous FTAs. The first set involve state obligations, including strengthening certain labor rights guarantees such as bans on forced labor and increased protections for migrant works.[6] It also adds clarifying language that could make it easier to prevail in a state-to-state dispute. But perhaps more politically significant was an annex provision entitled "Worker Representation in Collective Bargaining in Mexico" that specified what labor law reforms Mexico had to make to implement its 2017 constitutional reforms. The reforms included creating labor courts in place of Mexico's compromised arbitration boards, ensuring verification processes for fair elections of union leaders, and addressing so-called protection contracts by requiring a majority showing of support for newly negotiated collective bargaining agreements.

A second significant evolution in the USMCA's labor regime is the new Facility-Specific Rapid Response Mechanism (RRM). The RRM is the result of advocacy by U.S. unions and labor advocates who had long hoped to create the ability to address violations for freedom of association and collective bargaining at the factory level in real time. State-to-state mechanisms of resolving labor law enforcement problems took too long and historically had little to show in terms of results. The RRM addresses this problem by granting governments the right to embargo goods from a specific facility if there is a credible allegation of violation of freedom of association and collective bargaining rights. Notably, the U.S. and Canada are only subject to this provision if their respective labor law agencies have

"There is a strong argument that FTA labor chapters should be viewed positively as a tool to mitigate supply chain risk and increase resiliency, which are important economic and political objectives."

issued a finding of labor law violations in a domestic facility. Each country has chosen a list of potential panelists, who were selected based on their backgrounds, to engage in verification of a factory's compliance or determine whether there has been a "denial of rights" in that facility.[7]

As of this writing, there have been five known complaints brought using the RRM, none of which thus far have involved a rapid response labor panel. Two were resolved through negotiated agreements between the U.S. government and the facilities,[8] two cases were resolved when the Mexican government acted to the satisfaction of the U.S. government,[9] and the fifth petition was resolved without the U.S. resorting to an official RRM dispute process.[10] Some of the companies in question were wholly owned subsidiaries of American companies, such as GM, Cardone, and Panasonic Automotive Systems. The rapid pace of factory-specific disputes signals a new aggressiveness by the U.S. to address labor rights violations in supply chains, and specifically those concerning freedom of association and collective bargaining rights.

Supply chain resilience and labor

But to what ends does aggressive inclusion of enforcement of trade and labor conditionality serve generally, and specifically in the USMCA? Some might dismiss the U.S. efforts as misguided concessions to protectionist constituencies that reduce trade and hurt consumers and the economies of trade partners. The protectionist effects of labor conditions are arguable. But regardless, there is a strong argument that FTA labor chapters should be viewed positively as a tool to mitigate supply chain risk and increase resiliency, which are important economic and political objectives.

The COVID-19 pandemic brought to policymakers' attention a problem that had previously occupied mostly supply chain managers and researchers: How do you manage disruptions to the supply chain and ensure that it is resilient? Supply chain resilience can be defined in many ways, but from a firm's perspective it concerns its ability to "prepare for and/or respond to disruptions, to make a timely and cost effective recovery, and therefore progress to a post-disruption state of operations – ideally, a better state than prior to the disruption."[11] Just-in-time logistics and lean supply chains were for many years the operating principles of supply chain managers who sought to shake out inefficiencies in their supply, logistics, and warehousing operations. But such an approach leaves little room for error or exogenous shocks like natural disasters, wars, political instability, or global pandemics.

While businesses might make individual and even concerted efforts to plan around these contingencies, broken and unreliable supply chains also have implications for national security, political stability, and meeting citizen consumer demands for the goods they need and desire. Accordingly, governments, including the U.S. executive branch, have focused their attention on forming policies to address supply chain resiliency as it relates to national security and policy aims. The White House's 2021 report on supply chains highlights risks, vulnerabilities, and resilience in four critical sectors: semiconductors, large capacity batteries, critical minerals and materials, and pharmaceuticals.[12] Among those sectors, Mexico has capacity in some mineral production, and is currently among the top three suppliers of 14 of the 58 import-reliant minerals that the U.S. Department of Defense has designated as critical.[13]

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import-reliant minerals that the U.S. Department of Defense has designated as critical.

But supply chain resilience and risk mitigation are important not just for national security issues and the four sectors identified by the Biden administration, but also for firms and the national economy more generally. Therefore, there needs to be more analysis of how different elements of trade agreements, including labor chapters, might serve to promote supply chain resilience.

The White House report emphasizes increasing resiliency by strengthening domestic supply chains and ensuring American workers earn high wages and are allowed union representation. These are worthy goals, and such a workforce would theoretically be more stable and less likely to cause disruptions, and workers would be eager to join a well-paid workforce thus increasing workforce participation rates. But as the White House report notes, it is highly unrealistic to think that supply chains will be completely reshored or even "friend-shored." That means we need to examine how poor labor standards and weak union rights in global supply chains might be detrimental to supply chain resiliency and ask what institutions or tools would serve to strengthen it.

First, the most evident labor risk in supply chains is labor disputes that disrupt production. This is one of the few domains that researchers have explicitly identified as a risk factor.[14] There is little data to show that labor provisions themselves have been effective in reducing strikes or increasing labor stability. But as a precondition of entering into a trade agreement, the U.S. often requires extensive changes to domestic labor laws and enforcement that bring it into conformance with international and/or U.S. standards. These changes will often provide for clearer procedures for conducting legal strikes and stronger protections to organize unions. By creating stronger institutions, clear rules, and better enforcement, workers will have less reason to organize strikes, especially wildcat strikes, to realize their demands or, in the case of Mexico, to protest the imposition of a union or collective bargaining agreement that they did not choose to have.

Second, labor provisions are intended in part to reduce domestic anti-trade political risk. Many voters are not supportive of free trade. Opposition to trade originates not only from workers that will be affected by job losses and significant readjustments. Researchers have also shown that citizens will oppose trade out of sympathy with one's compatriots who might be economically harmed by moving to a free trade regime. The inclusion of labor and human rights provisions to make free trade appear more like "fair trade" is intended to lessen the opposition to the negotiation of FTAs. Moreover, consumers—who are also citizens and therefore vote—have increasingly voiced their desire to have their goods produced in ways that are consistent with international labor rights. If liberalizing trade and facilitating global supply chains are associated with exploitative and abusive working conditions, conscientious consumers will oppose free trade expansion and possibly support supply chain retrenchment, leading to more uncertainty and consumer pressure on firms with established global supply chains.

Third, the U.S. used the USMCA negotiations as leverage to pressure Mexico to reform its labor laws that implement changes already made in its 2017 constitutional reforms. Accordingly, Mexico has changed its rules on union recognition procedures, implemented laws to guarantee union democracy, and improved the institutional framework for resolving disputes through the creation of labor courts. The principles of free voting, choosing one's own union leadership, voting

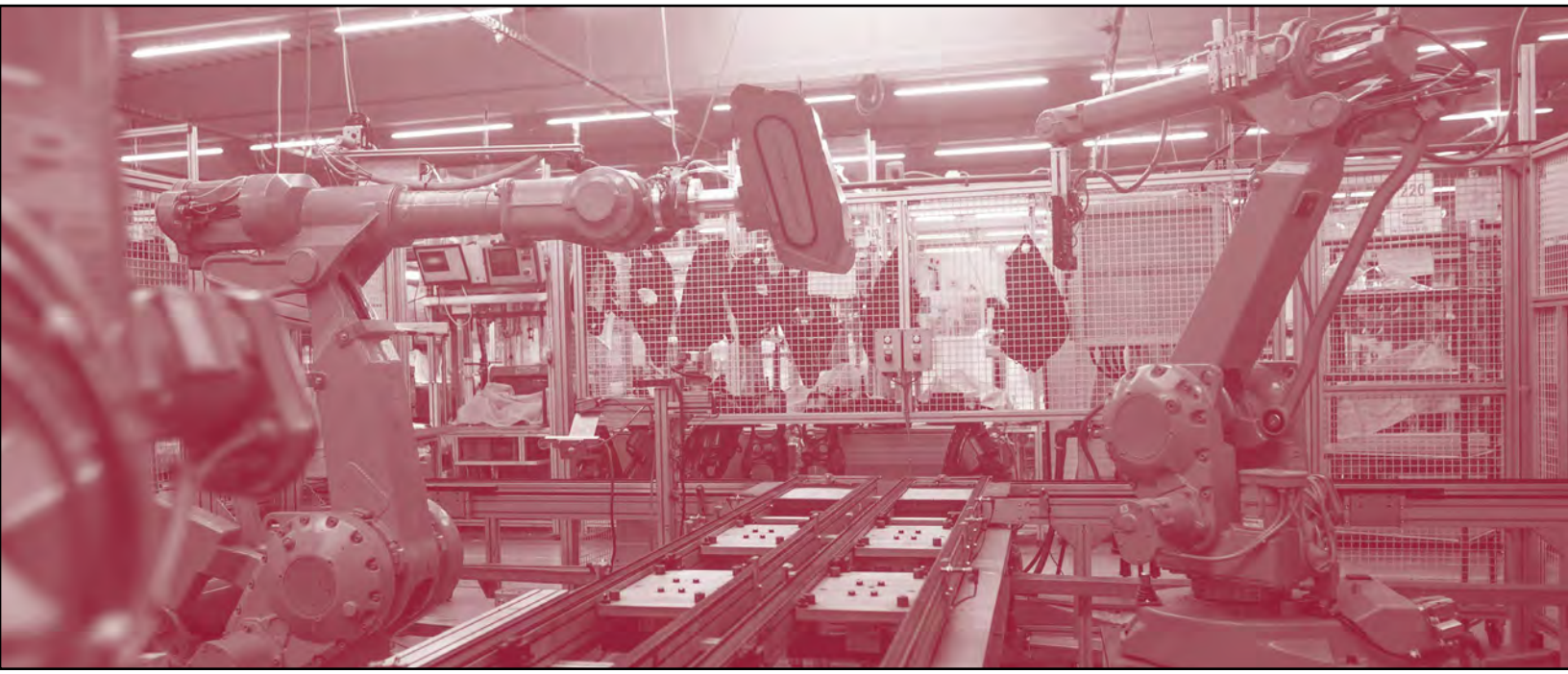
on contracts, and union independence are now consistent with the U.S. and with international labor law norms.

On the one hand, this process might raise questions of sovereignty and colonial-type relationships whereby the U.S. imposes legal reform on a less powerful trading partner.

But on the other hand, improving industrial relations systems and creating responsive and effective institutions to resolve disputes might lead to less conflict between employers and employees. This could in turn mitigate supply chain risks by potentially reducing the number of work stoppages and workplace actions.

Fourth, there are increasing supply chain risks because of the passage and greater enforcement of import restrictions on goods made with forced labor. The U.S. has some of the strictest rules on forced labor imports, and it also recently passed the Uyghur Forced Labor Prevention Act, which bans from entry into the U.S. any goods that are suspected of originating wholly or in part from the Xinjiang Uyghur Autonomous Region of the People's Republic of China, unless an importer can show otherwise. The ban includes goods that might be entering through a country other than China, or intermediate goods that emanate from Xinjiang. While the USMCA does not require that a similar law be implemented in partner countries, the USMCA bans the importation of goods made with forced labor into any of the USMCA countries, thus creating one more regulatory assurance for firms that goods coming in through Mexico will not contain components made through forced labor, reducing the risk of impoundment by U.S. Customs.

Fifth, one might argue that supply chain resilience is improved when supply chains



are located in democratic countries that are responsive to its citizens. As the contemporary examples of China and Russia demonstrate, autocratic regimes can be unreliable economic partners, and the benefits of investing in, and sourcing from, authoritarian economies are being called into question.[15] Autocratic states and democratic states are beginning to economically segregate, increasing the incentives for firms to build supply chains in politically similar countries.[16] Moreover, non-democratic regimes often prioritize nationalism and social control over economic prosperity and global integration, which does not result in stable and predictable supply chains. It is for this reason that many Western companies are seeking to diversify their supply chains, and anecdotal evidence suggests that even Chinese contract manufacturers working with Western firms are looking to source outside of China to reduce their own exposure to the country's political risk.[17] It should also be noted that institutions like the USMCA's RRM can help facilitate the creation of independent unions and help develop genuine trade union leaders. Democratic unions can be training grounds for participation, advocacy, and leadership of democratic institutions in supplier countries.[18]

Finally, some might argue that firms have sufficient incentives to enforce labor provisions in their own supply chains without the help of state-to-state labor provisions. But this is not true. Firms are mostly concerned with avoiding bad news, and most are not concerned about generating good publicity about their supply chains. This is because firms are more likely to be punished by consumers and the media for their sins, but not necessarily rewarded for their good deeds.[19] Thus, there needs to be a variety of policy tools at work at both the firm and state levels to make progress in labor conditions and governance. The labor chapter in the USMCA uniquely contributes to these efforts by targeting both state action and firm-level conduct. Doing so also helps solve collective action problems for lead firms that might not want to engage too aggressively with their suppliers if competing firms are not doing so as well.

The USMCA labor chapter and institutions are the most developed and multifaceted of any thus far. With institutions that address state failure and firm-level labor violations, and a strong pre-ratification process that helped move Mexico to implement important labor law reforms, the agreement might very well serve the broader policy goals of building supply chain resilience, benefitting both the nation, as well as individual firms. Policymakers should view labor chapters not only in the frame of fair or ethical trade, or in terms of human rights promotion, but also in economic and political context of supply chain resilience.

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Jennifer Gordon

Professor of Law, Fordham University School of Law

UNFAIR COMPETITION UNDER THE USMCA: THE CASE OF MIGRANT WORKERS ON US FARMS

The protection of labor rights is central to sustainable and inclusive supply chains under the USMCA—wherever the work takes place. The USMCA offers new mechanisms to address the unfair competition created by the suppression of workers' rights, so long as the abuses occur in Mexico. Yet there are serious violations of labor standards in the United States as well, and nowhere more than with the employment of migrants in U.S. agriculture exports. For the U.S. fairly and credibly to insist that firms in Mexico comply with basic labor standards, it must demand the same regarding the treatment of workers in its own traded industries.

The supply chains for fruits and vegetables in USMCA countries cross and recross borders. Mexico and Canada are by far the largest importers of U.S. produce, to the tune of $4.7 billion in 2021. U.S. fruits and vegetables for export are harvested by migrants under conditions that violate core labor standards. Migrants work in the aspects of agriculture that are too difficult or too expensive to automate. They are paid wages below the minimum, exposed to pesticides and relentless heat, crowded in housing not fit for humans, and subjected to sexual harassment and violence. Most are from Mexico, either undocumented or— in numbers that have tripled in the past three years—present on H-2A temporary agricultural visas.

Critically, U.S. immigration law is structured in ways that coerce migrants into continuing to work

despite these violations of their rights, creating a climate ripe for forced labor. Undocumented workers can be deported at any time. Migrants on temporary visas can only remain in the country as long as they are working for the firm that sponsored them. If they are fired for reporting abuse, they are instantly deportable. Many carry crushing debt from the recruitment process, and are well aware that those who protest will be blacklisted from future opportunities. It is little surprise that few speak up.

In the past year, the U.S. has seen six labor contractors sentenced in Georgia and Florida for forced labor and human trafficking of migrant farm workers in the H-2A program. These cases shine a spotlight on the mechanisms of control used to keep migrants

from coming forward when their rights are violated. The convicted labor contractors took the workers' passports and their wages, deploying everything from threats of deportation to kidnapping and rape to keep them silent. This is only the leading edge of the cases in the pipeline, which in turn barely scratch the surface of the problem. Between 2015-2020, the U.S. National Human Trafficking Hotline identified over 3,200 H-2A visa holders in agriculture who suffered labor trafficking, defined as the "use of force, fraud or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage or slavery."

The prevalence of migrant abuse in United States' agriculture is a national shame. In practical terms, it should also worry the United States's trading partners under the USMCA. Workers in these circumstances are much cheaper than workers who are free, underwriting the cost of the produce the U.S. exports. This is unfair competition. Yet while the USMCA's most powerful and innovative tools for enforcing workers' rights are trilateral on paper, in practice they point only south. For example, the Facility-Specific Rapid Response Labor Mechanism is designed in a way that makes it extremely difficult to trigger in the U.S., and in any case it excludes agriculture entirely.

The USMCA offers ways to address this issue—if only they are taken seriously. Article 23.8 requires that all three countries enforce migrants' labor rights. Yet the U.S. government's failure to take public action in the year and a half following the filing of a USMCA complaint about rampant sex discrimination in the H-2 visa program does not raise high hopes that the requirement will have teeth.

There is one more aspect of the USMCA that could apply here, so far unexplored. Article 26.3 requires all three governments to enact import bans on goods made with forced labor. The U.S. has already done so, as has Canada. Under its forced labor import ban, Canada could seize produce harvested by migrant workers in the U.S. under conditions of forced labor. When Mexico adopts a ban, it could do the same.

If this idea sends shudders through the U.S. government, there is much it could do to address the underlying problem. The U.S. could legalize undocumented farm workers and eliminate the requirement that ties H-2A migrants to a single sponsor. It could expand and enforce rules holding growers responsible for the exploitation that occurs during recruitment, which accounts for the debt migrants carry into the field. It could follow in Canada's tracks and mandate that growers use the Mexican National Employment Service as their sole recruiter, not a perfect solution but surely better than the current system.

One way or another, it is time for USMCA partners to take the treatment of migrant workers seriously. In the U.S., just as in Mexico, labor costs that are artificially suppressed by worker abuse should have no place in trade.

CHAPTER 8
TECHNOLOGY CAN ADDRESS SUPPLY CHAIN VISIBILITY TO BOLSTER HUMAN RIGHTS, RESILIENCE, AND SUSTAINABILITY

ALAN BERSIN

Chairman of the Altana AI advisory board; Senior Fellow, Harvard Belfer Center; Inaugural North America Fellow, Wilson Center; and former Commissioner, U.S. Customs and Border Protection

THOMAS EWING

Director of Research, Altana AI

Nowhere is the economic integration of North America more apparent than in its supply chains. These intertwining manufacturing and logistical connections cross the continent with all the complexity and economic significance of the railroads that began binding the North American continent two centuries ago.

In terms of gross volume, the three North American nations are one another's most important trading partners: Upwards of 70 percent of exports from Mexico[1] and Canada[2] are imported into the U.S. Moreover, of the total U.S. intermediate good imports in 2020, almost one-fourth came from Mexico and Canada, with the two countries as the leading export destinations of intermediate goods coming from the U.S.[3] Today, supply chains bring auto parts from Guanajuato to Detroit, Iowa corn to Edmonton markets, and aircraft engines made in Ontario to Mexican assembly plants, to name a few examples. The three North American nations constitute a shared production platform on a continental scale.

Supply chains bind North America together, but they have also become a focal point for substantial concern. Three areas deserve special attention:

First, forced labor and other **human rights abuses** are embedded in global supply chains, including in North America. The International Labour Organization estimates that upwards of 40 million workers are subject to some form of involuntary labor worldwide.[4] The goods these workers produce find their way into global supply chains—becoming part of North Americans' diets,[5] clothes,[6] cars,[7] and more. Without shared visibility, however, it has often been impossible for the public and private sectors to look into opaque supply chains and identify forced labor or other human right abuses.

Second, modern supply chains are geographically dispersed and imbalanced. Productive capacity is often far removed from end markets, and products are subject to disruption at multiple points along the journey from raw input to final good. The COVID-19 pandemic painfully revealed how the widespread adoption of low-inventory, decentralized, "just in time" supply chains has introduced systemic risk to the entire global economy.[8] Policymakers, motivated by national security as well as economic concerns, are now seeking to **reshore manufacturing capability**.[9]

Finally, supply chains obscure **environmental harm** due to a failure to account for the full scope of external costs, including carbon emissions. Supply chains of consumer companies generate far greater social and environmental costs than the company's own operations, accounting for more than 80 percent of greenhouse-gas emissions and more than 90 percent of the impact on air, land, water, biodiversity, and geological resources.[10] However, these externalities are not captured or assigned to participants in economic exchanges.[11]

Central to all of these challenges is a lack of visibility into supply chains. Without this visibility, governments and firms cannot anticipate or mitigate potential problems, or allocate carbon costs in the supply chains. However, advances in information technology are playing a key role in bringing about the visibility needed for supply chains to move from being points of weakness to points of strength.

Technological advances are bringing opaque supply chains into the light.

Supply chains have been the locus of abuses in large part because they are so difficult to understand, and therefore appropriately regulate and manage. Fundamentally, neither the public or private sector has ever been able to view the entire supply chain because vital supply chain data has been

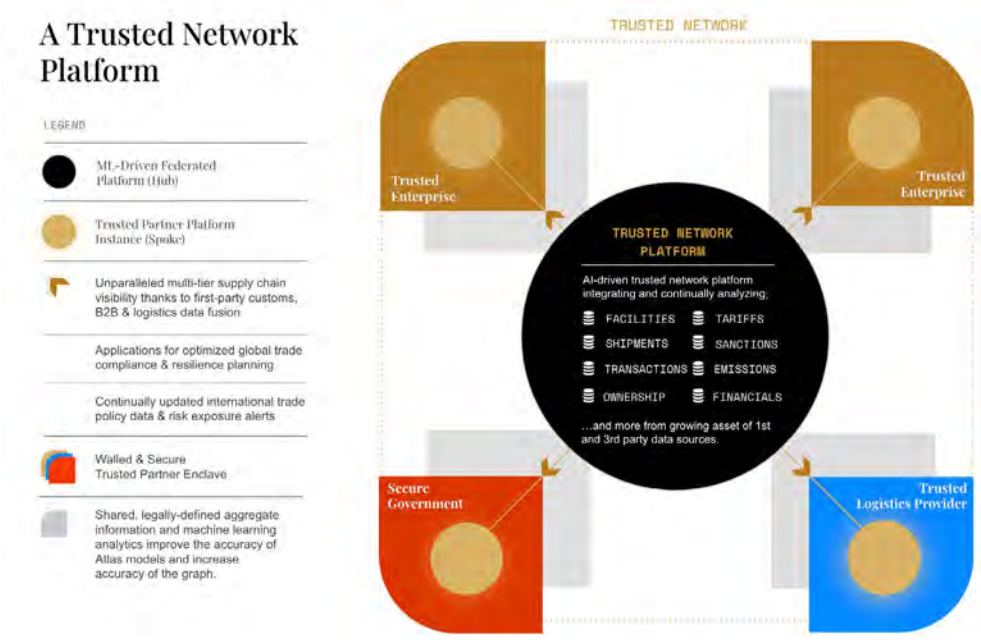
dispersed and decentralized. Valid concerns about privacy, intellectual property, and sovereignty have until now prevented supply chain data from being assembled in one place. This means that even if one actor can identify a potential harm, it can't trace that harm through the supply chain—and therefore can't address it systematically.

Today, federated learning offers a solution. With federated learning, it is possible to bring machine learning computation directly to siloed data and extract valuable information without compromising security or privacy.

Federated learning works by training centralized machine learning models on decentralized data. Much as autocorrect algorithms on modern cell phones work by training the same models on users' cell phones without pooling data, it is possible to train algorithms to recognize patterns in trade data without actually comingling sensitive datasets,[12] thus improving the models' performance without violating data sovereignty, confidentiality, or intellectual property concerns.

This privacy-preserving approach enables learning across previously inaccessible data to create a dynamic, intelligent model of the world's supply chain network that is accessible to regulators, logistics companies, and private enterprise. Federated learning creates the potential to transform the world's public and non-public supply chain information into an intelligent map through which stakeholders across the supply chain gain visibility, set rules, collaborate, and build trusted networks.

FIGURE 1



Federated learning and a hub and spoke architecture enable knowledge sharing between the public and private sectors - without the underlying data trading hands. Source: Altana.

Since the beginning of 2016, shipments to North American supply chains of products made using Uyghur forced labor have a total value of

$350 million

This technology can enable the multi-user collaboration necessary to bring much needed visibility and resilience to supply chains not only in North America, but globally. With this type of visibility, users across governments, logistics companies, and enterprises can work together to identify abuses plaguing supply chains.

North America can be free of forced labor with integrated supply chain visibility.

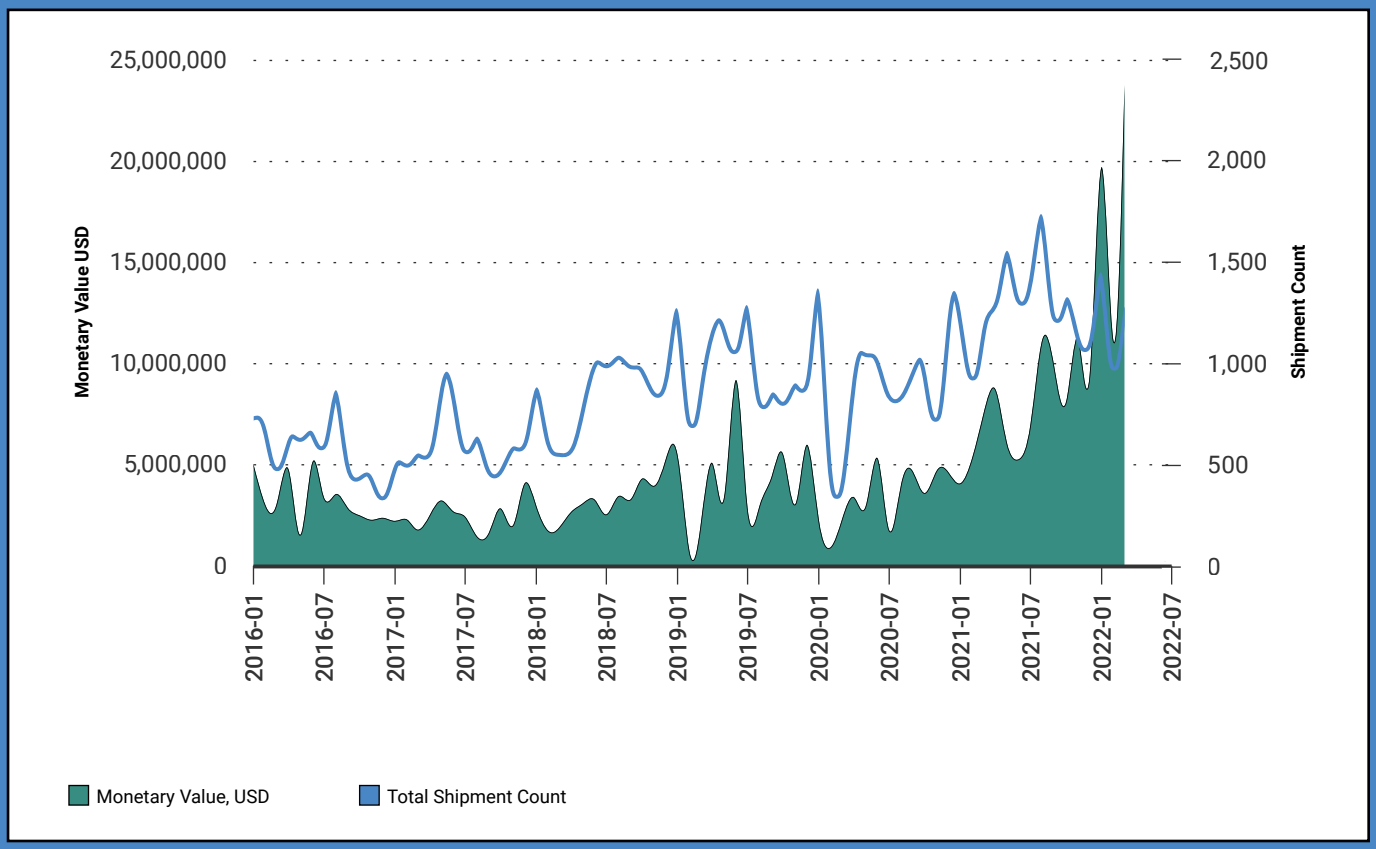
Abuses such as forced and child labor have been documented around the world in many industries, but nowhere are these abuses more prevalent than in China. For example, the government's system of Uyghur forced labor has placed more than 1 million individuals of minority background in as many as 1,200 state-run internment camps throughout Xinjiang.[13]

These internment camps produce goods that make their way into global supply chains. Research has revealed more than 785,000 first-tier trading relationships between Chinese entities tied to forced labor and the rest of the global economy.[14] At the next tier of trade, this figure balloons to more than 6.8 million trading relationships.[15]

Goods derived from Uyghur forced labor continue to enter North American supply chains. Since the beginning of 2016, 253 companies associated with forced labor in Xinjiang sent 68,413 shipments to 1,117 trading partners in the U.S., Mexico, and Canada.[16] These shipments have a total value of approximately $350 million, and were sent to 1,117 companies operating across 326 distinct industries—including hotels, medical devices, wholesale of chemical products, animal food manufacturing, and farming.[17] Once shipments enter one part of the North American supply chain, the goods they bring can rapidly spread throughout the entire region.

GRAPH 14 **Shipment count and monetary value of entities linked to forced labor from China by month**

Significant growth in Chinese exports of goods using forced labor highlights the challenges of removing such goods from supply chains.



Source: Altana AI

For instance, data show that since the beginning of 2021, a Xinjiang-based producer of food-grade additives, made nearly 700 shipments to 83 separate importers in North America.[18] These 83 firms in turn shipped their goods to a combined 82,962 immediate trading partners in North America.[19]

By building a common operating picture for government and private sector actors alike, regulators can pinpoint transactions from entities potentially involved in forced labor, stopping these goods at the continental border.

Supply chain visibility can help North America reshore key industries and minimize risks.

For the last several decades, North America has offshored much electronics manufacturing to Asia driven by considerations of low cost and working capital optimization. Today, this trend is reversing as business leaders and policymakers look to reshore manufacturing. But unless these plans account for the extended supply chain, moves to reshore production may simply shift dependence.

Today, supply chain visibility can help North America reshore key elements of this manufacturing value chain back into the region without creating additional risk elsewhere.

Take, for instance, a particular U.S. company's manufacturing facilities in Mexico. The company operates manufacturing facilities in three Mexican states; these facilities are key suppliers of household appliances to markets in Canada and the U.S. While on the surface level this production chain appears local to North America, in fact, the Mexican factories rely on second- and third-tier suppliers located in China. With supply chain mapping technology, we can use pooled trade data to better understand the extended supply chain of these facilities, and chart steps that this U.S. company could take to minimize its operational, trade, and compliance risk.

FIGURE 2

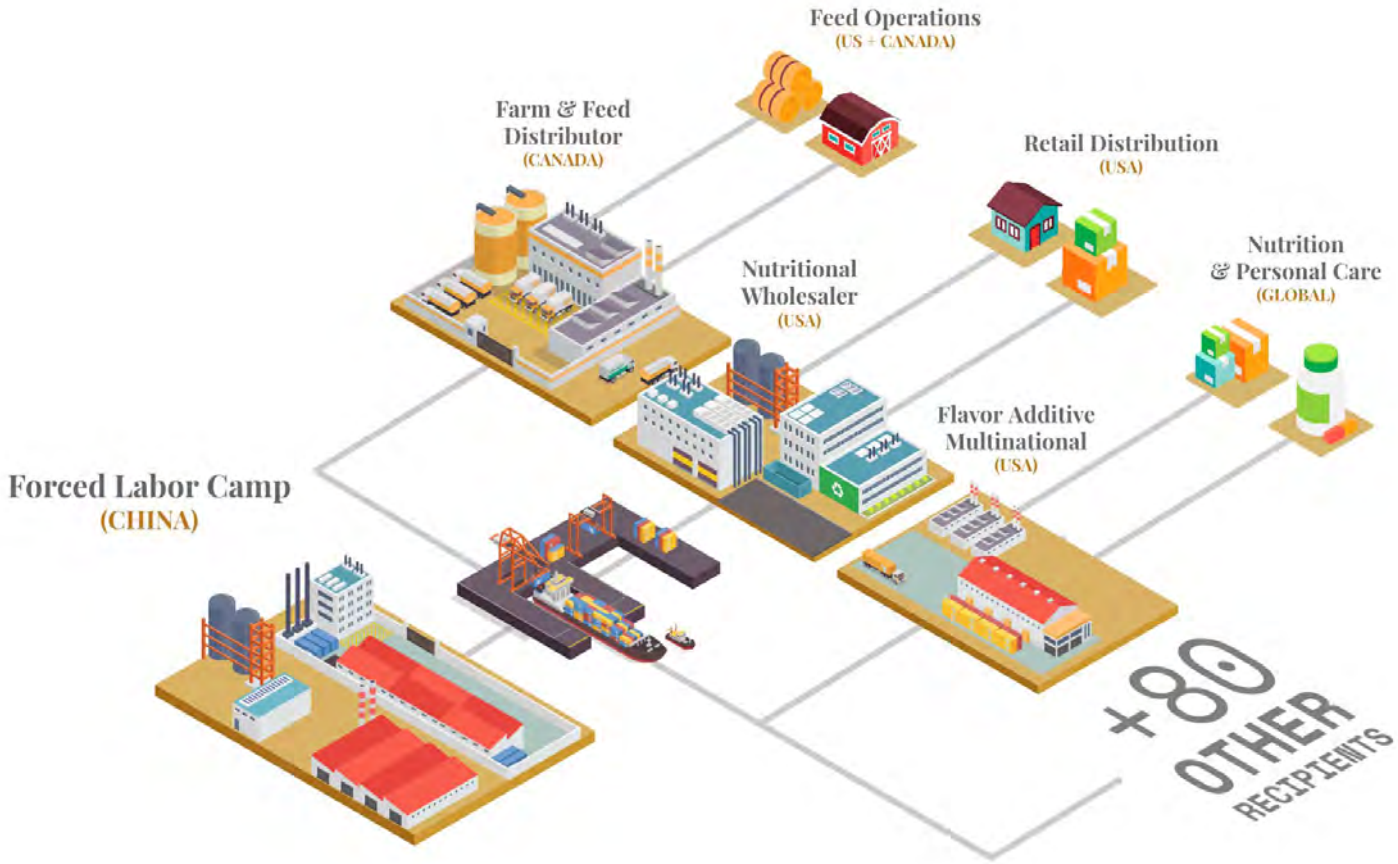
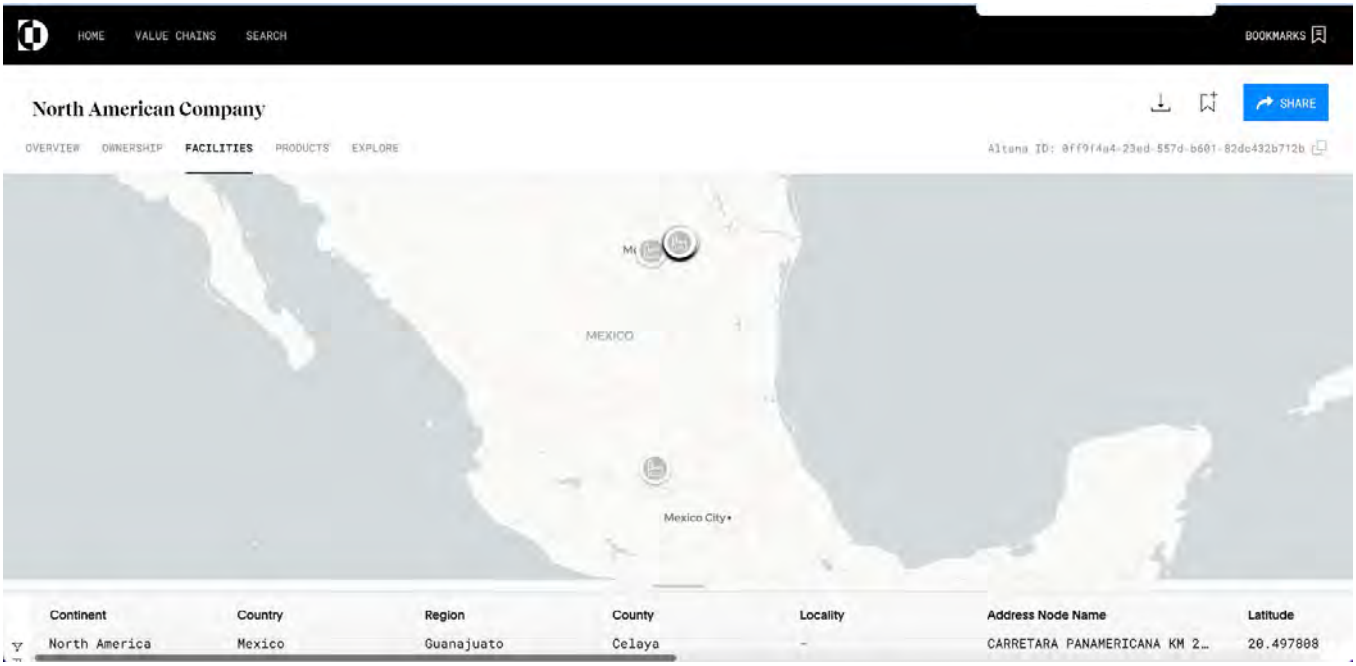


FIGURE 3



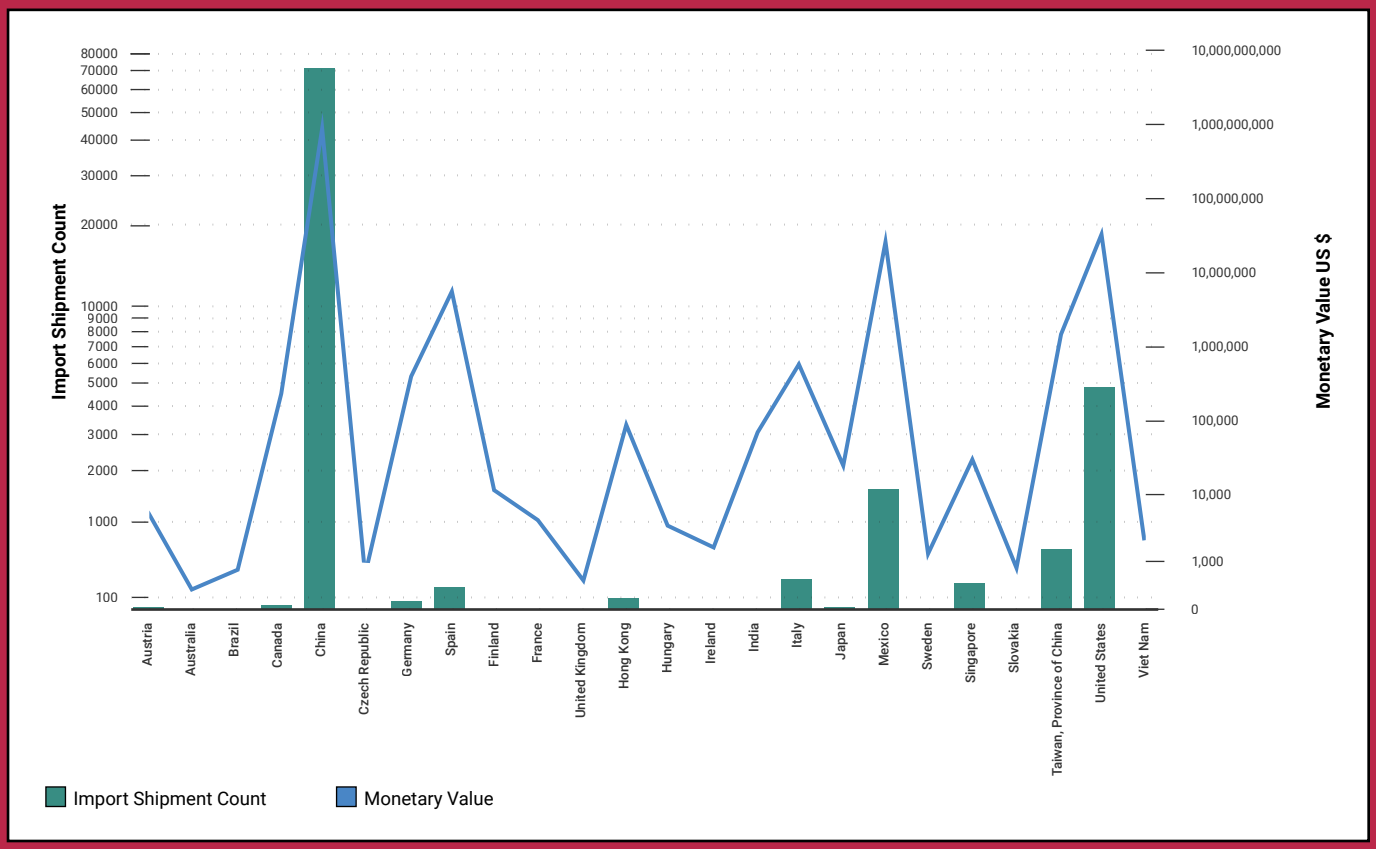
First, we begin by locating the three subsidiary manufacturing facilities.

Second, we use supply chain mapping integrating federated learning to reveal the import and export history of these three facilities.

Next, we can trace the sourcing profile of the American company's Mexican facilities to see its exposure to China, and to potential forced labor issues. The sourcing profile of the Mexican factories reflects that Chinese-origin suppliers account for more than 70 percent of total shipments of parts to the U.S. company's factories in Mexico.

"By building a common operating picture for government and private sector actors alike, regulators can pinpoint transactions from entities potentially involved in forced labor, stopping these goods at the continental border."

GRAPH 15 **Shipment count and aggregated value of imports to a US factory in Mexico by country of origin.**

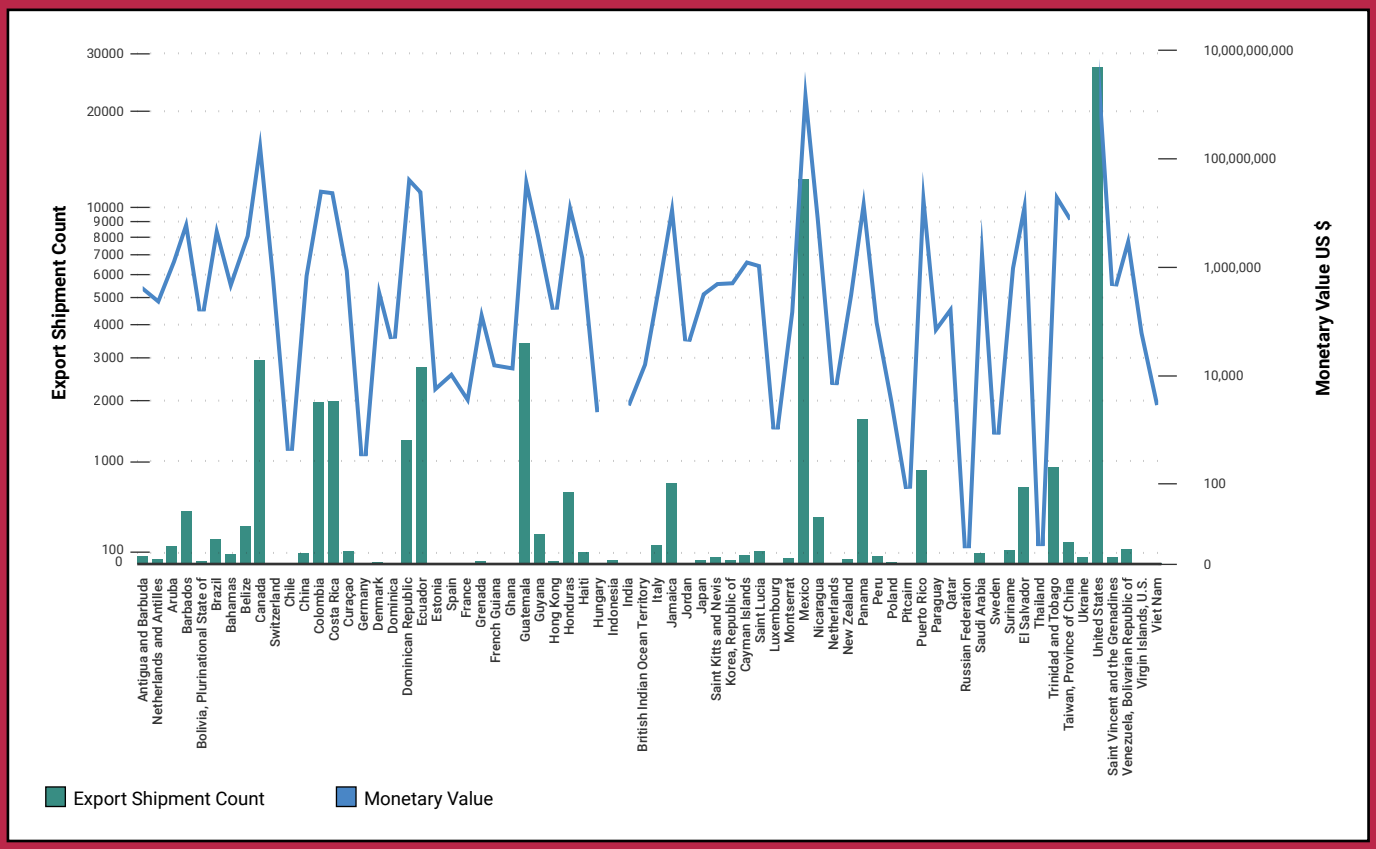


Source: Altana AI

Third, regarding the impact on the North American market, the export activities of the U.S. company's three subsidiary factories in Mexico reveal that the large majority of the refrigerators, stoves, washing machines, and other finished products—nearly 70 percent—are sent to the U.S., with the remainder sent to other countries in the Americas.[20]

Moreover, the data reveals that this supply chain intersects with specific entities now listed by the U.S. government as employing Uyghur forced labor.[21] Data show that the U.S. company maintained a trading relationship with Hefei Meiling Co. Ltd from 2016 to 2020, importing hundreds of horizontal box-type freezers, electrical parts for refrigerators (such as thermostats), and electric cables for appliances. The vast majority of these shipments were made to one specific factory in Mexico, which manufactures refrigerators, washers, components, and plastics for onward export throughout North America.

GRAPH 16 **Shipment count and aggregated value of exports by country of destination for products from a US factory in Mexico.**



Source: Altana AI

Supply chain visibility is essential to combatting climate change.

Supply chains are critical for combating climate change. Depending on the sector, upwards of 90 percent of the carbon footprint of a given product is within supply chains, rather than embodied in the final good itself.[22] Today, the European Union is moving to require disclosures related to carbon emissions[23] and deforestation exposure.[24] The U.S. government is considering similar policies.[25] Multi-tier supply chain visibility can help in these efforts by showing how environmental harms, such as deforestation caused by industrial agriculture,[26] manifest themselves within global supply chains.

Recently, for example, Brazil has identified Porto Velho in Rondônia as a priority municipality for deforestation enforcement and monitoring.[27] With multi-tier trade data visibility, we can track exports from this deforestation hotspot.

Trade records from the Altana Atlas show that exporters from Porto Velho have continued to send large volumes of wood, as well as beef and soybeans, to markets in the U.S., Mexico, and Canada. One large meat company, whose facilities in Porto Velho and elsewhere have been linked to deforestation,[28] has exported thousands of cartons of beef products directly from Porto Velho to the U.S. since the beginning of 2021.[29]

Trade data shows that this company also has sent cowhides to a facility owned by a large leather processing company in Guanajuato, Mexico as recently as June 2022. This Mexican facility, in turn, has sent leather goods to a significant number of companies around the U.S. and Canada, including those operating in New Jersey, North Carolina, and Texas.

These supply chains often feature complex transshipment patterns. For instance, in this case, the first Guanajuato facility also sent leather goods to another factory in Guanajuato, which then supplies products to large-scale retail customers throughout the U.S.

The foregoing pertains to just one example of an extended, multinational value chain linked to deforestation.

With extended visibility over supply chains, the three nations of North America can better monitor their exposure to climate change, and over time, implement more rigorous standards for Scope 3 emissions tracking.

Conclusion

Supply chains are the places where our continent connects—but they can be so much more. Rather than shrouding problems like forced labor, fragile production capabilities, or sources of unaccounted for carbon, they can be transparent, reliable, and sustainable avenues of trade. This is the promise of visible supply chains—which can power further success for North America. Realizing the full potential of the North American shared production platform will require understanding and action not only from the continent's political leaders, but also from those that directly build its supply chains: business leaders, manufacturers, freight forwarders, builders, and businesspeople who manage and maintain the continental economy. With technology, we can bring these disparate actors into view, making our supply chains more secure, more sustainable, and more equitable.

ENDNOTES

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