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NAFTA at 20

Effects on the North American Market

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Federal Reserve Bank of Dallas, Houston Branch

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A Conference Viewing Two Decades of the North American Free Trade Agreement (NAFTA)

"NAFTA at 20: Effects on the North American Market," held June 5–6, 2014, brought together leading academic and government researchers for a conference that explored the realities of the landmark trade agreement. The gathering was sponsored by the Federal Reserve Bank of Dallas, the U.S. International Trade Commission, Canadian Department of Foreign Affairs, Trade and Development (DFATD), Instituto Nacional de Estadística y Geografía and El Colegio de México. The conference was held at the Houston Branch of the Dallas Fed.

This volume contains summaries of papers and studies presented during the conference. The articles reflect the presentations as they were given during the meeting and the material has not been updated. However, in some cases, subsequent developments provide new context for the presenters' work. Several reference the Trans-Pacific Partnership (TPP), an agreement that was to have included 12 Pacific Ocean-bordering countries, among them Mexico, Canada and the United States. The TPP accord was scuttled in the early days of the Trump administration.

NAFTA remains a subject of intense interest not only to the academic community but also to governments, businesses and the citizens of the three countries who have been most directly affected by it. Many elements of modern trade and technology were not yet established at the time the agreement was concluded. The internet had not become a mainstream tool of commerce along with a range of products, many within the realm of intellectual property. Ongoing negotiations around a new NAFTA may come to include them. This volume seeks to inform discussion about the agreement's salient features and outcomes and to provide a basis for policy making as well as further study and analysis.

Federal Reserve Bank of Dallas, Research Department, September 2017

Preface:
Beyond Winners and Losers: Assessing Impacts

Irving A. Williamson

It is a great pleasure to be here. As Chairman of the U.S. International Trade Commission (USITC), I want to thank the Federal Reserve Bank of Dallas; Canadian Department of Foreign Affairs, Trade and Development (DFATD); Instituto Nacional de Estadística y Geografía; and El Colegio de México, for joining the USITC in organizing this conference. We at the USITC are very happy that we could collaborate to put this conference together. I particularly want to thank Daron D. Peschel, the Vice President of the Dallas Fed's Houston Branch, and Mine K. Yücel, Senior Vice President and Director of Research at the Dallas Fed, for their roles in the conference. I also want to thank Jesús Cañas, an economist at the Dallas Fed, for all the hard work that he put into organizing the conference.

I am especially pleased that major statistical, academic, and policy institutions of North America have organized this conference to address some topics that have needed more detailed examination for a long time. One day in the early 1970s, while I was a junior Foreign Service Officer at the State Department just beginning to focus my career on economic issues, one of my Foreign Service colleagues, who also had aspirations as an economist, came to me and asked if I had heard of this "really cool thing" called the General Agreement on Trade and Tariff (GATT). Can you imagine today any young economist or policy analyst coming to you and saying: Have you heard of this "really cool thing called a free trade agreement?"

Today, while the general public has heard of free trade agreements, their perception of trade agreements is so low that the conversation I had with my friend would be inconceivable. Unfortunately, this public perception stems in large part from the debate about NAFTA. The following story will illustrate how bad the NAFTA debate got for me personally. In the 1990s, I was the Deputy General Counsel at the Office of the United States Trade Representative and was heavily involved in trying to get the NAFTA implementing legislation through Congress. Every time I would prepare a document on NAFTA and do a spell check, the spell check on our computers at USTR would always change NAFTA to NAUGHTY. This, as I said, hit me personally.

Nowadays when economists talk about free trade agreements, they mostly talk about winners and losers. But I am glad that this conference is going to take a much deeper look at the economic impact of NAFTA on the North American economy. In participating in the discussion today, I hope you will go beyond just trying to sort out the impact of NAFTA and ask yourselves these questions: What other economic policy

changes might have allowed NAFTA to have a more beneficial economic impact? Where there were negative impacts, how might they have been moderated or mitigated? I think we also should ask ourselves, have we fully assessed the impact of NAFTA? Have we fully measured the synergies that came from having an integrated North American market, and can our models properly take this into account? There are sometimes synergies within regions of a country as well as cross-border synergies that can come from trade agreements. Have we looked at those as well?

In working on trade policy and trade promotion issues for the past 40 years, I am still amazed at how small and medium-sized firms will see a change in government policy like a free trade agreement and start envisioning ways that they can take advantage of it. However, I am not sure we account for this phenomena in our models. In addition, we should look at the extent to which trade barriers still exist and what new ones have arisen since the agreement was negotiated, and assess their impact.

One of the key functions of the USITC is to provide Congress and the President with all available and relevant information regarding trade matters. We want to make sure that we get our analysis right. So, these questions matter. Fortunately, we have a wonderful group of talented economists at the USITC. You will hear from a number of them in the next couple of days. Here we also have a number of talented and thoughtful economists from the Dallas Fed and other institutions, and a group of recognized scholars from North American universities. So, I am hoping that with all of the talent in this room today, you will be able to increase the body of knowledge about the economic impact of NAFTA and begin to address the questions I asked. With this new knowledge, I hope that we can then educate policymakers and trade negotiators to enable them to produce agreements and policies that yield even greater benefits for our countries.

In sum, we need to have a better understanding of the preconditions and parallel measures that must be taken in order for trade agreements to have their theoretical anticipated impact, and a better understanding of what happens if we don't. We also need to educate policymakers to recognize that if they are going to negotiate a free trade agreement, they must take these preconditions, parallel measures and impacts into account. And so, I am hoping that sometime in the future I'll hear a few more folks say "trade agreements are cool things." Thank you.

Executive Summary:
NAFTA at 20: Effects on the North American Market

Justino De La Cruz[1]

On June 5–6, 2014, the Federal Reserve Bank of Dallas held a conference, "NAFTA at 20: Effects on the North American Market," at its Houston Branch. The conference was sponsored by the Dallas Fed, the U.S. International Trade Commission, Canadian Department of Foreign Affairs, Trade and Development (DFATD), Mexico's Instituto Nacional de Estadística y Geografía, and the Colegio de México. The two-day conference aimed to review the impact of the agreement on the North American economy. Experts from academia, government, and multilateral institutions discussed a wide range of NAFTA-related topics, including growth, trade and welfare, foreign direct investment (FDI) and supply chains, wages and employment, external shocks and trade liberalization, rules of origin, the U.S.-Mexico border region, and the future of NAFTA. The conference began with a discussion on the challenges of predicting the effect of NAFTA using applied general equilibrium models.

Predicting the Effects of NAFTA: Can We Do Better Now?[2]

In his keynote address, **Timothy J. Kehoe** noted that the applied general equilibrium models built to predict the impact of NAFTA failed to foresee the agreement's impact on trade by industry. Kehoe commented, "If we look at the correlations of what we predicted with what happened, they average about zero." Addressing the question of how to improve these types of predictions, Kehoe indicated that those earlier models were based on the Armington elasticities of substitution. They, thus, did not take into account the extensive margin after an agreement entered into force—the huge increase in trade in new goods, or in goods that traded only in small amounts before the agreement.

Kehoe reported that he was able to significantly improve the trade predictions using a model that takes the margin into account. But "this model is atheoretical," he emphasized. To improve this model, Kehoe noted his intention to modify the Eaton-Kortum model to allow flexible comparative advantage and to apply the estimation methodology developed by Berry, Levinsohn, and Pakes (1995), which could

[1] The views in this article are solely the opinions of the author and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System; Federal Reserve Bank of Dallas; Federal Reserve Bank of Minneapolis; U.S. Department of Agriculture; U.S. International Trade Commission or any of its Commissioners; Inter-American Development Bank; Canadian Department of Foreign Affairs, Trade and Development (DFATD); and Mexico's Instituto Nacional de Estadística y Geografía.

[2] Computable general equilibrium (CGE) models make comparative static estimates, not forecasts; although they are different from predictions, simulation estimates should be aligned with future changes in trade to the extent that changes due to trade liberalization are not overwhelmed by other macroeconomic developments.

generate very different cross-elasticities. He explained that this method of estimation allows the productivity of an exporter's factors of production to vary across products due to deterministic differences in their suitability for a particular product. Examples would include the characteristics of an export firm's land and climate, which affect the set of agricultural products in which it has a comparative advantage, or the education and skills of the workforce, which affect the set of manufactured products in which it has a comparative advantage. This will be addressed in Kehoe's forthcoming work with Kari Heerman.

Serge Shikher agreed with Kehoe that the pre-NAFTA forecasts based on computable general equilibrium (CGE) models did a poor job of forecasting the effects of NAFTA, and he proposed an alternative model to improve the predictions. While earlier models used the Armington assumption to explain two-way trade between countries, Shikher's CGE model relies on the Eaton-Kortum framework at the industry level. Within each industry, the model assumes there is a continuum of goods with different productivities. Since heterogeneous producers and perfect competition are the defining characteristics of this model, Shikher calls it the HPPC model.

Shikher used this model to predict changes in post-NAFTA trade flows from the vantage point of 1989. He then compared the performance of the new HPPC model with that of pre-NAFTA models, and analyzed the differences in the forecasts. Shikher's main conclusion is that the new HPPC model is able to predict the effects of NAFTA noticeably better than previous models. He further noted that newly available methods of creating ad valorem tariff equivalents from nontariff barriers also significantly improve the quality of trade forecasts.

U.S. Wages, Employment, and North American Welfare

The two conference presentations dealing with NAFTA's effects on the North American labor markets were in general consistent with the literature: Overall NAFTA has had small but positive effects on wages and welfare in the member countries, while trade has increased substantially, especially for Mexico. In the first presentation, "The Impact of NAFTA on U.S. Labor Markets," **Justino De La Cruz** discussed collaborative research in which he and David Riker asked the question: What would happen to real wages and employment in the United States if U.S. imports from Mexico were imported not at NAFTA rates but rather at most-favored-nation (MFN) rates?

After documenting the decline in NAFTA preference margins (the difference between NAFTA rates and MFN rates), De La Cruz and Riker incorporated these data into a CGE model from the Global Trade Analysis Project (GTAP). Their model simulation results indicate that the NAFTA preference margins increase real wages in the United States of both skilled workers, by 0.008 percent, and unskilled workers, by 0.003 percent. These real wage effects were smaller than the estimates recently obtained by Caliendo

and Parro, discussed next, for at least two reasons. First, De La Cruz and Riker only modeled the NAFTA tariff preference margins on U.S. NAFTA imports from Mexico, which have declined due to the reductions in tariff rates on non-NAFTA imports. Second, De La Cruz and Riker did not model the effect of NAFTA-mandated reductions in the tariffs on U.S. exports to Mexico. Thus, their estimates include the potentially negative shocks to U.S. labor demand due to U.S. imports from relatively labor-abundant Mexico but do not include many of the likely positive shocks to U.S. labor demand (the reductions in tariffs on U.S. exports to Mexico and Canada). The model estimated that the largest positive employment effects were in the nonferrous metal, iron and steel, and machinery sectors (0.4, 0.2, and 0.2 percent increases, respectively), while the largest negative employment effects were in the sugar and apparel sectors (0.7 and 0.3 percent declines, respectively).

In the second presentation, **Fernando Parro** discussed "Estimates of the Trade and Welfare Effects of NAFTA," a paper jointly written with Lorenzo Caliendo. He focused on the effects of reducing NAFTA members' tariffs on trade flows and on welfare changes. In their 2015 paper, Caliendo and Parro used a stochastic Ricardian model with intersectoral linkages to estimate the trade and welfare effects of tariff reductions between 1993 and 2005. The authors estimated sector-level trade elasticities and then used the elasticities to calculate trade and real wage effects of the NAFTA tariff reductions. Their model takes into account intermediate goods in production and input-output linkages.

The authors estimated that NAFTA tariff reductions led to a 10 to 11 percent increase in Mexico's imports and exports, a 4 percent increase in Canada's imports and exports, and a 1 percent increase in U.S. imports and exports. They estimated that NAFTA tariff reductions increased real wages by 1.30 percent in Mexico, by 0.96 percent in Canada, and by 0.17 percent in the United States. They also found that in all three countries, a substantial share of trade effects due to tariff reductions from all sources can be attributed to NAFTA—for the United States, 55 percent; for Canada, 58 percent; and for Mexico, 93 percent.

Peyton Ferrier also discussed the effects of NAFTA on welfare changes, specifically the producer welfare effects of trade liberalization when goods are perishable and habit-forming—for example, in the case of asparagus. Ferrier and his co-author, Chen Zhen, analyzed the effects of lowering or ending tariffs on asparagus in the United States under NAFTA and ATPA (the Andean Trade Preference Act). Their model results for asparagus suggest that when both ATPA and NAFTA were put in place, the effect on U.S. producer welfare ranged from -0.36 percent without the habit effect to positive 0.04 percent with it. Here, the "habit effect" is the tendency of consumers to develop a taste for off-season asparagus once it becomes available at reasonable prices. In this case, once the "habit effects" are factored in, the welfare losses to U.S. asparagus producers decrease or vanish.

NAFTA and Growth in the United States and Mexico

In their presentation, **Peter B. Dixon and Maureen T. Rimmer** discussed their paper "Identifying the Effects of NAFTA on the U.S. Economy between 1992 and 1998: A Decomposition Analysis." Using the USAGE model—a detailed dynamic CGE model of the U.S. economy that has proven effective in analyzing a wide range of policies—they decomposed movements in U.S. macroeconomic and industry-level variables from 1992 to 1998 into the contributions of NAFTA factors and other factors. Dixon and Rimmer estimated that during this period, U.S. GDP grew by 24.40 percent, of which 0.19 percent is attributable to NAFTA factors. They added that growth in U.S. trade greatly exceeded growth in GDP. Their results show that NAFTA factors made a minor but useful contribution to aggregate U.S. economic welfare. They attribute an increase of about 0.4 percent in private and public consumption from 1992 to 1998 to NAFTA factors. In present-day terms, this is an annual welfare gain of about $50 billion.

At the industry level, Dixon and Rimmer focused on whether there were structural adjustment problems in the U.S. economy that developed between 1992 and 1998 and should be attributed to NAFTA. Still working with the USAGE model, which breaks U.S. production down into 502 different industries, they did not find such problems. For industries that suffered negative growth during this period, they found that the major cause in most cases was poor performance in non-NAFTA export markets or in competition with non-NAFTA imports in the U.S. market. For some industries, they found that NAFTA factors mitigated a potential structural adjustment problem by easing access to NAFTA markets in a situation in which there was strong competition in non-NAFTA markets.

José Romero's discussion focused on the effects of FDI on economic growth in Mexico between 1940 and 2013. Romero addressed the question of how FDI affected productivity in Mexico over this time period. He used an aggregate production function that relates aggregate production to labor and to three types of capital: private domestic, foreign, and government. The study divided the analysis into two periods—1940–79 and 1984–2013, excluding the 1982–83 debt crisis and the years immediately preceding it. Using time series analysis, Romero found that in the first period (1940–79), Mexico's growth was led mainly by government investment, and that the impact of foreign investment on labor productivity outweighed that of private domestic investment. However, in the second period (1984–2013), growth was predominantly led by domestic private investment, with foreign capital playing only a secondary role due to the limited spillover effect that foreign capital created in the economy.

In examining the reason for this change, Romero noted that NAFTA helped develop the vertically integrated production network in North America, with its fragmentation of productive processes, and that this significantly altered the composition of FDI. FDI shifted from a focus on internal markets to a focus

on Mexico's export potential and therefore became directed at labor-intensive stages of fragmented production. This process created few linkages to the rest of the economy and few spillover effects, hence limiting the effect of foreign capital on the growth of the Mexican economy.

NAFTA and North American Integration

Peter B. Dixon, Maureen T. Rimmer, Shenjie Chen, and Catherine Milot discussed the North American Integration model (NAIM) that they are developing. They noted that the aim of the NAIM is to give the Canadian Department of Foreign Affairs, Trade and Development (DFATD) a quantitative analytical tool for assessing the effects of changes in trade policies on Canada and its North American trade partners. These policies include proposed efforts such as further streamlining the passage of goods among the NAFTA partner countries and harmonizing the partners' quality and safety standards for sales of goods and services. Their presentation discussed how the NAIM model was constructed and explained challenges that the authors have encountered, along with promising solutions.

After building CANAGE, a one-country model of the Canadian economy whose theoretical structure is identical to the USAGE model for the United States, the authors combined USAGE and CANAGE into a single model. To this model they added equations that allow U.S. exports to Canada to be driven by Canadian demands for imports from the United States and allow Canadian exports to the United States to be driven by U.S. demands for imports from Canada. Then they conducted two simulations: first they imposed a 1 percent increase in U.S. absorption via a stimulatory macro policy. The second simulation was the same as the first, except that the stimulatory policy was carried out in Canada rather than in the United States. Dixon et al. found that Canada had a greater sensitivity to improved absorption in the United States than the United States did to improved absorption in Canada. This was the result they expected, given the relative sizes of the two economies.

Addressing the integration of energy markets in North America, **Kenneth B. Medlock III** discussed shifts in energy production in Canada, Mexico, and the United States as well as worldwide over the past 20 years, particularly the development of shale crude oil and natural gas. He also described the obstacles holding back energy sector development and the conditions needed for robust growth in the sector. Medlock's main conclusion was that, despite large shale endowments in the NAFTA countries and the fast-paced development of the industry in the United States, all three member economies still need to undertake reforms to boost production, market development, and energy security in North America.

NAFTA and the Border Region

James Gerber discussed "Income in the Border Region, 1993–2010." His presentation cited his 2008 book, *Fifty Years of Change on the U.S.-Mexico Border: Growth, Development, and the Quality of Life*, co-authored with Joan Anderson. He focused his presentation on trends in income levels and growth rates in the U.S. and Mexican border region over the two decades following NAFTA's entry into force. After examining income levels between neighboring U.S. and Mexican cities and between the two countries at the national levels, Gerber discussed multiple reasons for the income divergence between the two countries.

Gerber's first conclusion is that besides the popular explanation—the differences between the institutions of the two countries—there are political, socioeconomic, and macroeconomic factors behind the marked increase in the income gap between the United States and Mexico in the 2000s. Since many of these factors are largely determined by national-level policies (as opposed to local ones), Gerber's second conclusion suggests that those policies—for instance, vulnerability to U.S. economic cycles and China's entrance into the WTO—could also have an extractive[3] effect on Mexican border municipalities.

André Varella Mollick discussed his research with René Cabral on wage convergence in Mexico. They tried to determine if the increase in the economic integration of Mexico and the United States led to quicker wage convergence at the regional level. To quantify NAFTA's effects on Mexican wages, they analyzed the increase in capital and labor mobility in Mexico as a result of NAFTA. They found that greater integration with the United States has led not only to growth of output in Mexico but also to changes in the supply of labor across regions as well as the regional distribution in Mexican wages. Their analysis indicated that states closer to the U.S.-Mexican border experienced quicker wage convergence than non-border states and that migration appears to be an important factor in this convergence.

NAFTA and Mexican Industry

In his presentation, "NAFTA and Mexican Industrial Development," **Eric A. Verhoogen** discussed the role that NAFTA and international integration have played in Mexico's economic growth. He noted that Mexico's recent performance has been mediocre relative to other middle-income countries, and offered what he called an "old-fashioned idea" as a partial explanation for Mexico's disappointing performance. He argued that integration into the international economy in 1998–2008 led Mexico to specialize in less capital- and skill-intensive activities, which tended to be less innovative. Trade liberalization may not

[3] In this context, the term "extractive" refers to policies that affect one region negatively to the benefit of other regions. For example, a U.S. immigration policy of increased border enforcement could be beneficial to the security of U.S. citizens and residents far from the U.S. border with Mexico, but it could also have adverse effects on Mexican border cities whose economies are oriented toward the U.S. marketplace.

bring about sustained economic growth if it leads to specialization in sectors with little innovation. "This argument relies on the idea that innovation generates positive externalities," added Verhoogen.

Focusing on the Mexican maquiladora industry facing competition from China, **Luis Bernardo Torres Ruiz** discussed the results of his joint research with Hale Utar. Their study addressed the question of how intensified competition from China in the period 1990–2006 affected Mexican export assembly plants, or maquiladoras—their entry, growth, productivity, and exit. They conclude that all responded negatively to Chinese competition. Torres also noted that Chinese competition led to downsizing or exit of firms in low-skill, labor-intensive sectors, leading their former employees to find work in other sectors. But Torres also pointed out that there is strong evidence that heightened competition from China improved maquiladoras' within-plant productivity.

NAFTA and the Transformation of Canadian Patterns of Trade and Specialization

Richard Harris and Nicolas Schmitt reviewed a variety of evidence on the changes in Canadian merchandise trade patterns in the pre- and post-NAFTA periods. They noted that Canada's integration into a common North American market occurred in two steps: first as a result of the 1988 Canada-U.S. free trade agreement (FTA), and then with the implementation of NAFTA in 1994, which also covered Mexico.

Harris and Schmitt noted that the 1990–2000 decade is referred to as the NAFTA decade, since this was the period in which the full impact of the two trade agreements on the Canadian economy would have been realized. Overall, Harris and Schmitt found that NAFTA led to substantially higher volumes of trade in all types of goods during this period. Canada's integration with the United States and Mexico increased, but so did its trade with non-NAFTA trading partners. Canada's NAFTA trade generally showed less specialization, with more trade in primary commodities and intermediate goods. By contrast, Canada's non-NAFTA trade showed increased specialization, especially in imports of finished goods. At the sector level, Canada's trade volume rose across almost all sectors under NAFTA, with very large increases in the transportation and electrical machinery sectors. Generally, the changes observed in the NAFTA decade essentially accelerated many of the trade patterns that were evolving from 1965 to 1990.

However, the decade 2000–2012 led to a strong reversal in many of these trends. Notably, Harris and Schmitt found that Canada's trade in manufactured goods with its NAFTA partners declined relative to GDP. In the same period, resource exports—particularly energy—increased, in tandem with significant increases in resource prices, driven by growth in developing countries such as China. The authors examined several possible explanations for the NAFTA trade reversal. Of these, two stand out as leading candidates. First, the large real exchange rate appreciation which occurred in 2000–2012 is consistent

with the observed decline in manufacturing exports and increase in resource exports. The second explanation often given is that increased competition from China and other low-cost exporters is pushing Canada out of its NAFTA partners' markets for manufactured goods. Harris and Schmitt found some evidence of such a trend when viewed in the appropriate context.

Remaining Barriers and Greenhouse Gas Emissions

Border Crossing for Trucks

Pilar Londoño-Kent and Alan K. Fox explained that, despite the liberalization achieved by NAFTA as well as substantial investments in infrastructure, technology, and equipment, significant barriers to efficient truck transport remain between the United States and Mexico. They also discussed the practical and economic implications of changes to the NAFTA border crossing system put in place after the terrorist events of September 11, 2001, and described the border procedures in place today. They concluded that the new security measures have "thickened" NAFTA's borders, increasing costs and delays associated with border crossings.

Londoño-Kent and Fox presented the institutional context in which barriers exist and border authorities' rationale for establishing new barriers or continuing preexisting ones. Using this information and the time and costs associated with cross-border freight movements, they used a CGE framework to estimate the welfare effect of these measures on the NAFTA economies. Their counterfactual assumes the implementation of a "seamless freight flow" system similar to Europe's *transport international routier* (international road transport) system, and they calculated the time and cost differentials between such a system and the border status quo. They estimated that the annual welfare gains for Mexico and the United States accruing from a seamless cross-border processing system would be about $8 billion for each country.

NAFTA Rules of Origin: Adaptation in North America and Emulation Abroad

In his presentation, "NAFTA Rules of Origin: Adaptation in North America and Emulation Abroad," **Jeremy T. Harris** discussed his and Antoni Estevadeodal's research findings that NAFTA set the default "template" for the product-specific rules of origin (PSROs) of subsequent FTAs of NAFTA partners, and also heavily influenced other FTAs globally. He noted that NAFTA has introduced a new model for designing, negotiating, and implementing rules of origin. In his joint research with Estevadeordal, Harris has addressed the question of how the rules of origin in NAFTA have become more flexible and how this flexibility has affected the trade flows between the United States, Canada, and Mexico. In closing, Harris stated that NAFTA's institutional mechanisms for adapting PSROs to evolving market structures have had a small but significant positive effect on regional trade.

Designing a Greenhouse Emission Market for Mexico

Jaime Sempere presented "Designing a Greenhouse Gas Emission Market for Mexico," a paper written with David Cantala and Stephen McKnight. Sempere focused on the creation of a cap-and-trade system that would allow "a cap on greenhouse gases emissions for a set of firms" to be divided into permits and then traded among firms. He also discusses the potential integration of this system with other similar North American programs. The main conclusion of this paper is that while cap-and-trade systems are effective in reducing greenhouse gas emissions, they are complicated to design. In the case of Mexico, Sempere suggested that the government work with other NAFTA members to agree on homogeneous environmental regulations and proper regional integration to foster efficient design, proper implementation, and ultimately effective greenhouse gas reduction.

NAFTA: Retrospect and Prospect

Anne O. Krueger began her presentation by outlining three topics she would examine: (1) the debates over NAFTA at the time of its formation; (2) the current state of NAFTA affairs; and (3) key issues for NAFTA's next 20 years. She noted that her discussion would be mainly from the U.S. point of view. Krueger highlighted some lessons we can learn from the NAFTA experiment moving forward: (1) preferential trade agreements (PTAs) are susceptible to lobbying and other third-party pressures; (2) to succeed, future PTAs must operate under the multilateral trade system or the World Trade Organization (WTO), given the growth in importance of global value chains; and (3) NAFTA needs to be strengthened by enabling faster transit of goods, facilitating great labor mobility, increasing regulatory uniformity, and adopting policies for energy and agriculture. Energy and agriculture are areas with huge potential gains. The main conclusion that she drew from her examination was that, while NAFTA's effects are very hard to isolate and measure, initial estimates of these effects seem to have been pessimistic as a whole, overstating NAFTA's negative consequences while understating its benefits.

The Future of NAFTA: A Policy Perspective

In the final session of the conference, a panel of economists that included Justino De La Cruz, Alan V. Deardorff, Richard G. Harris, Timothy J. Kehoe, and José Romero discussed its views on the future of NAFTA.

Justino De La Cruz noted that his comments, built around two points, would be from Mexico's perspective. The first point regards Mexico's trade policy: De La Cruz suggested that for Mexico, NAFTA's primary objectives were to promote and encourage trade and FDI with Canada and the United States. The second point is that NAFTA is only one growth-promoting policy instrument among many at Mexico's disposal. Thus, if Mexico's goals are to achieve high rates of economic growth, employment,

real wages, and productivity, as well as balance of payments equilibrium and low rates of inflation, policymakers must use several policy instruments, not just NAFTA. Returning to his first point, De La Cruz observed that since NAFTA's implementation, trade flows and FDI between Mexico, the United States, and Canada have grown substantially. In that sense, NAFTA has successfully achieved Mexico's objectives for it.

As to the future: First, efforts by NAFTA's Free Trade Commission to facilitate trade and investment will likely continue to encourage trade and investment expansion, supported by the eventual successful completion and implementation of the Trans-Pacific Partnership (TPP) agreement and the Trans-Atlantic Trade and Investment Partnership (TTIP). However, Mexico's gains from these agreements will be limited, given that the country has already free trade agreements with Japan and the European Union. Given the second point—that trade is only one among many instruments available in the policy toolbox—one may consider that for Mexico to promote its own development, it could undertake other policy initiatives as well. For example, there are the reforms that Mexico is currently adopting—education reform, energy reform, and others. These will certainly help trade and investment, but more importantly, they will support development of the entire Mexican economy. However, one reform that is essential for development but is missing is the "strengthening of the rule of law." De La Cruz concluded that the future of NAFTA will be affected indirectly by what happens with the other policy reforms Mexico has been undertaking. But, even if there were a super NAFTA, Mexico will not develop without the rule of law.

Alan Deardorff said he feels that if the TPP is agreed upon and enacted in what appears to be its current form, it would simply replace NAFTA. If, however, the TPP were to include some provisions that are weaker than those of NAFTA, then the NAFTA countries would still be obliged to follow the NAFTA rules, and the TPP would not replace it. But this would seem to be the less likely outcome: Apparently, the negotiations for the TPP are aimed at making the TPP stronger than NAFTA in many ways. If that were the case, then the future of NAFTA, in some sense, could turn out to be whatever the TPP does. Deardorff noted that there are some features of the TPP that he is concerned about, including the TPP rules of origin, the closed nature of the TPP, NAFTA's Chapter 11 and its equivalent under the TPP, and the stronger versions of NAFTA's labor and environment agreements.

Richard G. Harris noted that his comments would focus on issues other than trade, with an emphasis on the Canadian perspective. To begin, he noted that border issues are and will continue to be at the front and center of the agenda in all three countries. Second, an issue of enormous importance is the lack of regulatory harmonization. For instance, in two of the biggest sectors, services and telecom, there has been absolutely no progress toward free trade and integration. A third issue involves labor mobility, specifically the temporary visas offered under NAFTA. Harris noted that the program has been very

successful and that some companies are in favor of further liberalization of the NAFTA labor provisions, but there has been little progress in this area. Finally, Chapter 11, the dispute settlement mechanism under NAFTA, is problematic for both Canada and the United States.

Harris commented in conclusion that all these examples are about economic integration and asked the question: is North America going to become more deeply integrated economically? The answer is yes, he said—that is going to happen. But it is unlikely that NAFTA will be the mechanism by which this will be carried out. Harris believes that, as outlined by Deardorff, the future of NAFTA will be subject to the future of the TPP.

Timothy J. Kehoe focused his comments on the future of Mexico. He stated that the United States has grown at about 2 percent per year on a per capita basis—it has done so for the past 113 years, with the exception of the Great Depression and its aftermath. Kehoe said he believed that every country could grow 2 percent per year by just following the United States. "When you are behind, though, you can play catch-up," said Kehoe, "and that's what Mexico was doing in the fifties, sixties, and seventies, with high-growth policies that eventually caused the later problems. But then you get to a point in the development of a country in which institutions matter."

At this point Kehoe's remarks turned to institutions in Mexico. "What are the barriers to growth to Mexico?" he asked. In Mexico, he said, the big monopolies and the bureaucracy are holding the economy back. The financial institutions in Mexico could function more efficiently as well, while contract enforcement, the rule of law, and labor markets are all in need of reform. Mexico has to start growing again. And while reforms of the financial institutions, labor markets, and rule of law are all difficult, he is hopeful that Mexico can get rid of these inefficiencies.

In the final presentation of the panel and of the conference, **José Romero** addressed the current state of Mexico's economy and its policies of liberalizing trade and fully opening its capital markets. Romero first stated that the predicted convergence of U.S. and Mexican per capita GDP has not happened: Mexico's per capita GDP is about 33 percent of U.S. per capita GDP. Second, Mexico's export growth strategy has not produced economic growth in rural areas. Romero added that full opening of the Mexican capital markets also made monetary policy ineffective at promoting growth, since interest rates in Mexico and the United States are practically the same. Similarly, the exchange rate cannot be used to make the economy more competitive. Thus, according to Romero, Mexico lacks effectiveness in its trade policy, industrial policy, fiscal policy, monetary policy, and exchange rate policy. "We are in a canoe without any control, going into rapids," Romero stated.

Romero went on to state that looking at industrial production trends, we see that Mexico's index almost mimics that of the United States. That means that the only source of growth for Mexico now is the United States economy. "What worries me the most," Romero concluded, "is that NAFTA does not have a broad strategy as a bloc." He explained that the United States has its own growth strategy that does not include Mexico or Canada.

Chapter 1:
The Challenges of Predicting the Impact of Trade Reforms

Timothy J. Kehoe[4]

In his keynote address, "The Challenge of Predicting the Impact of Trade Reform," Timothy J. Kehoe, University of Minnesota professor and advisor to the Federal Reserve Bank of Minneapolis, declared that applied general equilibrium models that had been built to predict the impact of the North American Free Trade Agreement (NAFTA) "failed in predicting the agreement's impact on trade by industry." During his speech, Kehoe addressed the question of how to make such predictions better. He started by showing that applied general equilibrium models, an area in which he's been working for a long time, can do a good job, but noted that it is international trade that we don't understand well. To illustrate this, he compared some model predictions with actual data, using Spain's entry into the European Union as an example (Kehoe, Polo, and Sancho 1994). Next, he evaluated the performance of applied general equilibrium models of the impact of NAFTA (Kehoe 2005 and Kehoe, Rossbach, and Ruhl 2014). Finally, Kehoe discussed some of his recent findings (Kehoe and Ruhl 2013 and Kehoe, Rossbach, and Ruhl 2014), described lessons learned, and provided some insights into his forthcoming work.

Applied General Equilibrium Models Predicting NAFTA's Impact: How Did They Perform?

To evaluate the performance of applied general equilibrium models, Kehoe used an atheoretical approach (described below) to predict the impact of NAFTA. He then compared those predictions to the predictions of well-known models, using correlation coefficients and regression analysis to measure their goodness of fit. Looking back at the papers presented at a 1992 conference on NAFTA held by the United States International Trade Commission (USITC),[5] Kehoe commented that "if we look at the correlations of what we predicted with what happened, they average about zero." One of the reasons for this is that the models available at the time were based on the Armington elasticities of substitution. For these models, he said, everything depends on the size of the elasticity and the size of the tariff or trade barrier. But how, then, he asked, do you infer comparative advantage? According to these models, said Kehoe, comparative advantage is revealed by noting which goods are heavily traded while the trade barriers are still in place. Surprisingly, he added, that is not what the data show. Citing a 2013 study he conducted with Kim Ruhl, after a trade agreement enters into force, trade increases disproportionately in goods that were not traded or in goods that traded only in small amounts before the agreement—goods known as being in the

[4] The views in this article are solely the opinions of the author and should not be interpreted as reflecting the views of Federal Reserve Bank of Minneapolis.
[5] USITC, Economy-wide Modeling of the Economic Implications of a FTA with Mexico and a NAFTA with Mexico and Canada, USTC publication 2516, May 1992.

"extensive margin" (Kehoe and Ruhl 2013).[6] And that, he said, just does not fit with the kind of models economists were using at the time, which did not take into account the growth in newly traded goods or goods in the extensive margin. Kehoe explained that, taking Canadian and U.S. exports to Mexico as an illustration, he and Ruhl found that out of 1,855 products that Canada exports to Mexico, 1,326 products make up 10 percent of trade, whereas at the very top only 6 products make up 10 percent of trade.

This picture is typical—in fact, it understates the typical pattern, Kehoe noted. He remarked that every time there's a trade agreement, the biggest jump is always in the first set, and it never consists of just one or two products. "It's always hundreds of products. That is a shocking fact," Kehoe said. Further, Kehoe noted, "We looked at every country we could find data on, every bilateral pair that we could find any decent data on from the period 1980 to 2005, and this was always the pattern we found." So, given that products that were traded very little or not at all account disproportionately for aggregate changes in bilateral trade following trade liberalization, Kehoe modeled the prediction of trade growth as a linear function of the share of exports accounted for by least-traded products (LTPs) in an industry.[7] Next, he hypothesized that industries that trade more heavily in these little-traded products should experience higher growth following trade liberalization (see Kehoe, Rossbach, and Ruhl 2014).

Kehoe decided to compare results from using his new model (the "atheoretical model") with the models discussed at the 1992 USITC conference, focusing on the one he had worked on with Horacio Sobarzo (Kehoe 2005 and Kehoe, Rossbach, and Ruhl 2014). Kehoe said that he scrutinized data on Canadian and U.S. exports to Mexico over the period 1989–2009, comparing these data with the predictions of the Sobarzo model and the atheoretical model. To evaluate the model's predictions, Kehoe used the weighted correlation coefficient between the predictions and the actual data. In addition, he used weighted regression analysis, taking what actually happened and regressing it on what the model predicted. The results are reported in table 1. They show that disproportionally the increases in trade were in the goods that were traded little or not at all before the trade liberalization. The Sobarzo model poorly predicted the growth in Mexican imports from North America, with a negative (-0.12) correlation between its predictions and the data. On the other hand, the correlation between the share of LTPs in an industry before liberalization and the industry's actual growth was positive (about 0.5). "This is not great but it is better than zero. It gives me hope that there's something systematic going on," Kehoe said.

[6] In Kehoe and Ruhl (2013), the authors looked at bilateral trade of panels of 1,900 country pairs over 25 years. They found that trade in goods in the extensive margin accounted for 10 percent of the growth in trade for NAFTA countries and 26 percent of the growth in trade between the United States and Chile, China, and Korea after their respective free trade agreements went into effect.

[7] In Kehoe, Rossbach, and Ruhl (2014), the authors also make predictions for industry-level changes in trade for the United States and Korea following the U.S.-Korea Free Trade Agreement (KORUS).

Table 1. Changes in Mexican Imports from North America Relative to Mexican GDP (percent)

Industry	1989–2009 data	Sobarzo predicted growth rate	LTP-based predicted growth rate
Agriculture	61.0	3.4	77.2
Beverages	189.0	−1.8	143.2
Chemicals	218.5	−2.7	115.9
Electrical machinery	66.3	9.6	53.2
Food	128.8	−5.0	94.7
Iron and steel	92.0	17.7	115.7
Leather	60.0	−0.4	245.5
Metal products	94.8	9.5	90.9
Mining	79.4	13.2	97.3
Nonelectrical machinery	115.8	20.7	76.9
Nonferrous metals	113.9	9.8	84.2
Nonmetallic mineral products	64.3	10.9	215.0
Other manufactures	96.7	4.2	95.3
Paper	49.7	−4.7	70.9
Petroleum	−71.2	−6.8	68.1
Rubber	178.2	−0.1	67.1
Textiles	131.3	−1.2	175.7
Tobacco	575.5	−11.6	340.5
Transportation equipment	97.7	11.2	56.7
Wearing apparel	29.2	4.5	107.9
Wood	2.9	11.7	65.6
Weighted correlation with		−0.12	0.47
Regression coefficient a		104.22	24.08
Regression coefficient b		−0.77	0.94
Sobarzo-LTP weighted			−0.32

Source: Kehoe, Rossbach, and Ruhl (2014) and Kehoe (2014).

This is not to say that every LTP goes up, according to Kehoe. He cautioned that with about 1,300 LTPs in question, naturally some went up and some went down; on average, though, LTPs went up a lot more than non-LTP products. As an example, Kehoe invited participants to look at Mexico's exports of metal products, for which actual growth was 94.8 percent: the atheoretical model predicted 90.9 percent growth, but the Sobarzo model predicted only 9.5 percent growth (table 1). Within the metal products industry, wrenches and spanners actually went down (5.9 percent), while scissors and blades went up a lot (174.8 percent). In fact, the biggest single product increase (1,807.2 percent) in this industry was articles of nickel not elsewhere specified. The latter two products are in the LTP category. This is the pattern that dominates in both Mexican imports and exports. "But I want to insist, it is never one or two goods," Kehoe added. "It is always hundreds of goods."

Kehoe then pointed to the correlations between the LTP predictions and actual data results of the six trade relationships in North American trade (table 2). He noted that while the correlations are not 0.8 or 0.9, they are not zero either, by contrast with the average correlations of the models he and others had built in the 1990s. However, he said, there is much more to be done. He concluded that "a major downside to our method is that as of now it is atheoretical. But I hope our results spur the development of models able to account for the importance of the new product margin in trade."

Table 2. Correlation Results for the LTP Exercise

Exporter	Importer	Correlation
Canada	Mexico	0.55
Canada	United States	0.30
Mexico	Canada	0.33
Mexico	United States	0.19
United States	Canada	0.54
United States	Mexico	0.47
Weighted average		0.39
Pooled regression		0.24

Source: Kehoe (2014).

General Lessons and Future Research

Regarding future research, Kehoe noted some general lessons to consider, which would enable future models to fit the data better:

- Short-run elasticities are very different from long-run elasticities because of fixed costs in the export decision (Ruhl 2008).
- Fixed costs are an increasing function of market penetration (Arkilakis, 2010).
- Eaton-Kortum models with Fréchet distributions for productivities for products within industries and Melitz models with Pareto distributions are not very different from Armington models or models with monopolistic competition and homogenous firms (Arkolakis, Costinot, and Rodriguez-Clare 2012). These models, as presently structured, are unlikely to be more helpful than the ones in use in 1990s.

Finally, Kehoe noted his intention of modifying the Eaton-Kortum model to allow flexible comparative advantage and to apply the estimation methodology developed by Berry, Levinsohn, and Pakes (1995), which will give very difference cross-elasticities. He explained that this method of estimation allows the productivity of an exporter's factors to vary across products due to deterministic differences in their suitability for a particular product. Examples would include the characteristics of an exporter's land and

climate, which affect the set of agricultural products in which it has a comparative advantage, or the education and skills of the workforce, which affect the set of manufactured products in which it has a comparative advantage. This will be the subject of Kehoe's forthcoming work with Kari E. Heerman.

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Chapter 2:
Trade and Welfare Effects of NAFTA

Fernando Parro[8]

Fernando Parro, an economist with the Board of Governors of the Federal Reserve System, presented "Estimates of the Trade and Welfare Effects of NAFTA," a paper jointly written with Lorenzo Caliendo from Yale University. In his talk, Parro addressed three questions: Why was NAFTA different from other free trade agreements? Why is it difficult to measure its economic effects? And how can we quantify the economic effects of NAFTA? To answer these questions, Parro focused on the effects of reducing NAFTA members' tariffs on trade flows and welfare changes. He said that his and Caliendo's main conclusions were as follows:

- NAFTA generated large-trade effects, especially for Mexico;
- Mexico became more integrated into the rest of North America, with most of the trade effects it experienced being due to trade in intermediate goods;
- Most of the benefit resulted from trade creation; and
- Real wages increased in all NAFTA members, but Mexico gained the most, followed by Canada and the United States.

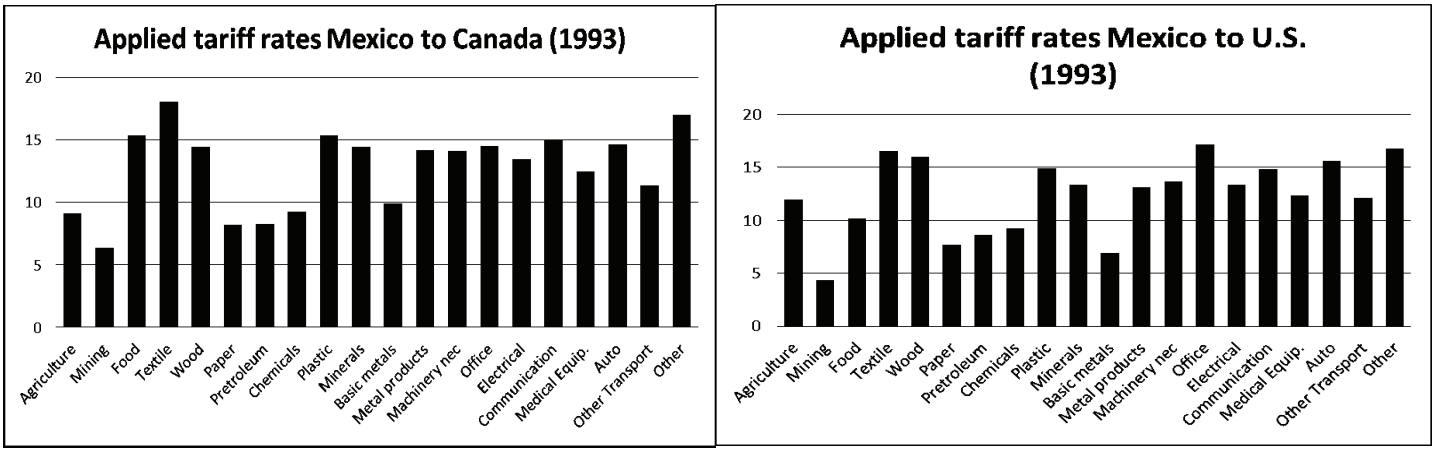
Regarding the first question, Parro stated that NAFTA was different basically because this agreement was between countries at very different stages of development. For instance, in 1994, Mexico's GDP per capita was about one-fourth of that of the United States. He also noted that in terms of GDP, NAFTA was one the largest free trade agreements in the world, with its member countries accounting for about 25 percent of the world's GDP. Parro noted as well that in 1993 about three-fourths of trade across the NAFTA member countries was in intermediate goods—a higher share than for their trade with the rest of the world. However, these shares varied across countries. For instance, for Mexico, imports of intermediate goods from Canada and the United States outweighed imports of final goods by more than 4 to 1, but for Canada and the United States the ratio of imports of intermediate to final goods from their NAFTA partners was less than 3 to 1. He said that any assessment of the economic effect of NAFTA would have to take into account the predominance of trade in intermediate goods, the different production structures found in the three member countries, and the existence of global value chains in the region.

[8] The views expressed herein are those of the authors and not necessarily those of the Board of Governors of the Federal Reserve System or the Federal Reserve System.

Parro also noted that it is very difficult to identify the economic effects of NAFTA in isolation from several other events not directly related to the agreement, such as the Tequila crisis (1994), the dot-com bubble (2000), and China's accession to the WTO (2001). In addition, the member countries signed several trade agreements after NAFTA—particularly Mexico, which signed more than 10 post-NAFTA FTAs with other countries.

Next, Parro turned to quantifying the economic effects of NAFTA's tariff reductions by building on new developments in international trade literature to construct a quantitative framework that takes a number of elements into account. That is, the framework allows for multiple countries (Canada, Mexico, United States, and 28 additional countries); the different production structures found in each country; and trade in intermediate goods.[9] Also, to isolate the effects of NAFTA's tariff reductions, the Caliendo-Parro methodology controlled for non-NAFTA changes, which happened at the same time. The quantification methodology looks at what happens when NAFTA tariffs that are different across countries and sectors are reduced. He noted that before NAFTA, Mexican tariffs applied to Canada and the United States were relatively high (figure 1). This was true because by 1993 the Canadian-U.S. free trade agreement was already into force, and tariffs between those countries were much lower.

Figure 1. Applied Mexican Tariffs on Goods from Canada and the United States, 1993



Source: Caliendo and Parro (2014).

In lowering the NAFTA tariffs, the Caliendo-Parro model makes it possible to break down the change in welfare of a given country into two components: changes in the terms of trade (multilateral and multisectoral), and changes in the volume of trade.[10] In quantifying these effects, their measures show

[9] Specifically, Caliendo and Parro (2015) built three elements—sectoral linkages; trade in intermediate goods, and sectoral heterogeneity in production—into a Ricardian model to quantify the trade and welfare effects from tariff changes.

[10] See equation (16) in Caliendo and Parro (2015) p. 13 for details.

which component contributed more to the change in welfare —the change in the terms of trade or volume of trade—and which country of the three NAFTA signatories experienced the largest changes in welfare (table 1).

Mexico was the biggest winner. Its welfare increased by 1.3 percent as a result of reductions in NAFTA tariffs, while welfare for Canada and the United States changed little. The third column of table 1 also shows that the major source of gains in welfare is the increase in the volume of trade, reflecting mainly net trade creation. On the other hand, the effect on the terms of trade is mixed: it shows deterioration for Mexico and Canada, mainly due to a decline in prices. Parro noted that "to understand the decline in the price effects in Mexico and Canada, it is absolutely key to keep in mind the role of intermediate goods." That is, when tariffs are reduced, Mexico has access to cheaper intermediate goods, which lowers the cost of producing goods and the price of Mexican exports—the average Mexican export price across fell by 2 percent. At the same time, while real wages increased for all NAFTA members, Mexico gained the most, followed by Canada and the United States.

Table 1. Mexico, Canada and the United States Welfare Changes from NAFTA's Tariff Reductions

Country	Total	Terms of Trade	Volume of Trade	Real Wages
Mexico	1.31%	-0.41%	1.72%	1.72%
Canada	-0.06%	-0.11%	0.04%	0.32%
United States	0.08%	0.04%	0.04%	0.11%

Source: Caliendo and Parro (2014).

Next, Parro discussed the breakdown of the changes in the terms of trade and the volume of trade with respect to the NAFTA members and the rest of the world (table 2). For Mexico, the biggest deterioration in the terms of trade was that with respect to its NAFTA partners, while the United States made small gains, also with respect to its NAFTA partners. The U.S. gains were mostly due to the decline in the price of Mexican exports. The last two columns show that the single most important contributor to the positive welfare effect is the change in the volume of trade with respect to NAFTA members. This reflects net trade creation. But NAFTA also diverted trade as the volume of trade from the rest of the world declined.

Table 2. Mexico, Canada and the United States Welfare Changes from NAFTA's Tariff Reductions

	Terms of Trade		Volume of Trade	
Country	**NAFTA**	**RoW**	**NAFTA**	**RoW**
Mexico	-0.39%	-0.02%	1.80%	-0.08%
Canada	-0.09%	-0.02%	0.08%	-0.04%
United States	0.03%	-0.01%	0.04%	0.00%

Source: Caliendo and Parro (2014).

Parro also noted that the methodology Caliendo and he developed also allows them to break down the welfare effects of NAFTA's tariff changes into measures of multilateral and multisectoral terms of trade and volume of trade effects. In this way, they can detect which sector contributed more to the changes in terms of trade, in volume of trade, and in welfare. At the sectoral level, the aggregated change in the terms of trade in each country is explained by a handful of sectors. For instance, 76 percent of the deterioration in Mexico's terms of trade is derived from three sectors: electrical machinery, communication equipment, and motor vehicles. These three sectors are also responsible for 51 percent of the U.S. improvement in its terms of trade, while 52.5 percent of Canada's terms-of-trade deterioration derives from auto, other transport, and basic metals. Parro noted that the importance of a sector in explaining its impact on the terms of trade depends on three main elements: the size of the reduction in import tariffs; the share of materials used in production; and how strongly a sector is linked to the rest of the economy through input-output linkages.

Regarding the effect of lower NAFTA tariffs on the volume of trade, Caliendo and Parro found that the sectors that experienced more trade creation included electrical equipment and textiles for Mexico, vehicles and textiles for Canada, and electrical equipment and textiles for the United States. Here again, these findings are related to three sources: the initial level of tariffs, the share of materials used in the production in the sector, and the input-output linkages.

Finally, Parro analyzed to what extent these three economies became more integrated after NAFTA by looking at imports and exports between the three countries. He found that Canadian imports from Mexico increased 60 percent, while those from the United States rose only 9 percent. Mexican imports from both Canada and the United States increased by around 118 percent. Finally, U. S. imports increased 7 percent from Canada and 110 percent from Mexico. Exports between the NAFTA members observed a similar pattern. Parro and Caliendo's interpretation is that NAFTA substantially increased Mexico's integration with the other two countries of North America. NAFTA did less to integrate the United States and Canada, as the Canadian-U.S. free trade agreement had already entered into force.

To conclude, Parro noted that the results of Caliendo and his work show that, "Accounting for sectoral interrelations is quantitatively and economically meaningful" and that "intermediates and sectoral linkages play an important role in welfare analysis."

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Chapter 3:
Predicting the Effects of NAFTA: Now We Can Do It Better!

Serge Shikher[11]

In his presentation, Serge Shikher, international economist at the United States International Trade Commission, reviews the pre-NAFTA forecasts of the effects of NAFTA on trade and compares them to the actual post-NAFTA changes in trade. He then describes a new model of international trade, based on the Eaton and Kortum (2002) methodology. He uses this model to predict changes in post-NAFTA trade from the point of view of 1989. He compares the performance of the new trade model and pre-NAFTA models, and analyzes the differences in forecasts. Shikher's main conclusion is that the new model is able to predict the effects of NAFTA noticeably better than previous models.

Most of the pre-NAFTA forecasts were made using computable general equilibrium (CGE) models that relied on the Armington (1969) assumption to explain two-way trade between countries and home bias in consumption. The models were generally similar, with the type of competition in the goods market being the biggest difference. Their predictions anticipated little effect on trade, output, and employment in the United States, and moderate effects on trade, output, and employment in Mexico.

It turns out that the CGE models significantly underpredicted the effect of NAFTA on trade. In addition, the industry-level changes in bilateral trade that they forecast correlated poorly with the actual post-NAFTA changes.

1. New Model of Trade

Shikher proposes a new model for forecasting the effects of trade liberalizations. The model is based on the neoclassical assumptions of multiple industries, constant returns to scale, perfectly competitive markets, and several factors that are mobile across industries. Countries differ in their factor endowments. In all of these aspects, the model is similar to the currently available computable models of trade.

However, while other models use the Armington assumption to explain two-way trade between countries, this model relies on the Eaton-Kortum (EK) framework at the industry level. Within each industry, there is a continuum of goods produced with different productivities. Production of each good has constant

[11] The views in this article are solely the opinions of the author and should not be interpreted as reflecting the views of the U.S. International Trade Commission or any of its Commissioners.

returns to scale, and goods are priced at marginal cost. Since heterogeneous producers and perfect competition are the defining characteristics of this model, it will be referred to here as the HPPC model.

The use of the Eaton and Kortum (2002) framework instead of the Armington (1969) approach has several key implications. The goods are differentiated by their features, not by their country of origin. The home bias in consumption and cross-country price differentials are explained by trade costs rather than demand-side parameters. Productivity differences across countries and industries play a big role in determining the pattern of trade.

The model has 19 countries, eight manufacturing industries, and two factors of production: capital and labor. The trade cost takes the Samuelson's "iceberg" (ad valorem) form and is separated into policy-related trade costs and non-policy-related trade costs. The policy-related trade barriers (tariffs and tariff equivalents of nontariff barriers) are assumed to be imposed on the f.o.b. values of goods, which corresponds to the practice in the United States, Canada, and Mexico (for NAFTA countries).

Table 1. Pre-NAFTA Tariffs and Ad Valorem Equivalents of Nontariff Barriers (Percent)

Canada	12.06	25.60	21.44	3.46	9.49	7.78	16.65	6.50	11.84
Mexico	42.61	40.37	23.41	16.96	29.44	33.37	13.89	32.95	31.42
United States	13.21	16.45	5.10	1.29	7.76	7.94	3.04	7.42	8.78

Source: Nicita and Olarreaga (2007)

The model is parametrized using 1989 data. Total bilateral trade costs are estimated by applying the Eaton-Kortum approach at the industry level, which makes it possible to derive a gravity-like equation. The equation uses a trade cost function to relate the unobservable trade cost to the observable country-pair characteristics, such as physical distance, common border, common language, and membership in a free trade area. The average estimated transport cost (across country pairs and industries) is 2.27. To simulate NAFTA, total trade costs are reduced by the amount of pre-NAFTA tariffs and ad valorem equivalents of nontariff barriers, obtained from Nicita and Olarreaga (2007) and shown in table 1.

2. Evaluating the Predictions of the Model

The following analysis will compare the forecasts of the HPPC model with data from 1989 to 2008, as well as with the forecasts of the Brown-Deardorff-Stern (BDS) and Roland-Holst-Reinert-Shiells (RRS) models. Table 2 shows that the HPPC model accurately predicts the overall effect of NAFTA.

Table 2. Actual vs. Predicted Percent Changes in NAFTA Trade

	Predicted	Actual
Measure	HPPC	1989–2008

NAFTA trade relative to the total trade of the NAFTA countries	25.9	24.8
NAFTA trade relative to the total income of the NAFTA countries	62.2	66.5

Note: NAFTA trade is the sum of all bilateral trade flows between the NAFTA countries. The total trade of the NAFTA countries is the sum of their exports and imports. The total income of the NAFTA countries is the sum of their GDPs.
Sources: Author's calculations.

Table 3 gives a more detailed look at the changes in trade of the NAFTA countries. It shows the actual and predicted percentage changes in the total exports and imports of Canada, Mexico, and the United States, relative to their respective GDPs.

Table 3. Actual vs. Predicted Percentage Changes in Total Exports and Imports

	Actual	Predicted			
Variable	1989–2008	RRS (CRS)	RRS (IRS)	BDS	HPPC
Canadian exports	66.7	17.1	26.0	4.3	45.4
Canadian imports	58.2	10.5	12.3	4.2	37.1
Mexican exports	120.3	11.1	14.0	50.8	130.4
Mexican imports	64.2	12.4	13.9	34.0	58.3
U.S. exports	39.2	6.0	7.8	2.9	24.0
U.S. imports	46.2	7.7	10.1	2.3	17.5
Correlation with data		0.4	0.3	0.9	1.0

Note: Exports and imports are measured relative to GDP. The model of Ronald-Holst, Reinert, and Shiells (RRS) has two versions: one with constant returns to scale (CRS) and another with increasing returns to scale (IRS). The Brown-Deardorff-Stern (BDS) model has increasing returns to scale. The model with heterogeneous producers (HPPC) described in this paper has constant returns to scale.
Sources: Author's calculations; Roland-Holst, Reinert, and Shiells (1994); Brown, Deardorff, and Stern (1992).

The changes predicted by the RRS and BDS models are many times smaller than the actual changes. The RRS model, whether with constant or increasing returns to scale, performs the worst in terms of correlation with data. The BDS model performs better, but its predicted changes in Canadian and Mexican exports and imports are smaller than the actual changes by an order of magnitude. The HPPC model performs the best: its predicted changes are the closest to the actual.

Figure 1 plots the actual vs. predicted percentage changes in the industry import shares for the U.S.-Canada and U.S.-Mexico trade, which together constitute about 99 percent of NAFTA trade. The share of country i in industry j imports of country n is X_{nij} / IM_{nj}, where IM_{nj} are the total imports of industry j goods in country n. The BDS model is chosen because it seems to be the better-performing of the three previous NAFTA simulations and because of the availability of the detailed simulation results.

Figure 1. Actual vs. Predicted Percentage Changes in Import Shares by Industry

Figure 1a HPPC model

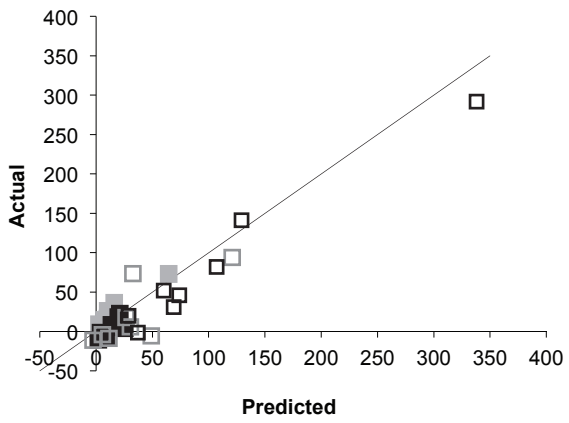
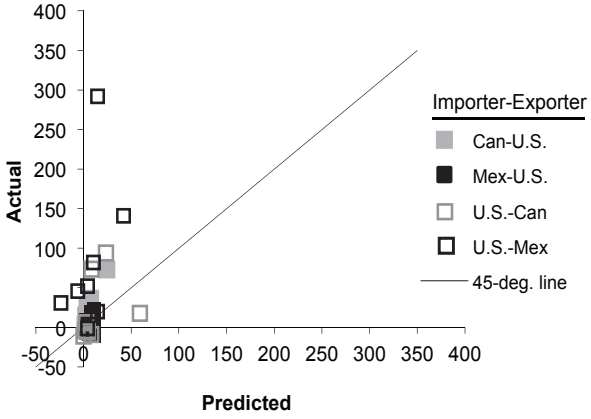


Figure 1b BDS model



Note: Each observation is a share of country *i* in country *n*'s imports of industry *j*. The correlation between the predicted and actual changes is 0.95 for the HPPC and 0.31 for the BDS model.
Sources: Author's calculations and Brown, Deardorff, and Stern (1992).

It can be seen from these figures that the predictions of the HPPC model are generally close to the actual values, while the BDS model tends to significantly underpredict trade changes. The HPPC model is also better able to explain the variation of changes in trade across industries: the correlation of its predictions with data is 0.95, while for the BDS model it is 0.31.

Table 4 shows the correlations between the actual and predicted changes in import shares for each pair of countries. It also shows the estimated intercepts and slopes for the regressions of actual on predicted changes. Ideally, we would like the intercept to be zero and the slope, one. The correlation is a measure of how much of the variation in the data is explained by the model.

Table 4. Relationships Between Atual and Predicted Changes

		HPPC model			BDS model		
Importer	Exporter	Correlation	Intercept*	Slope	Correlation	Intercept*	Slope
Canada	Mexico	-0.15	423.10	-1.31	0.41	111.09	23.89
Canada	U.S.	0.91	5.71	1.04	0.95	5.54	2.88
Mexico	Canada	-0.57	-185.64	-12.53	-0.14	93.82	-0.81
Mexico	U.S.	0.72	-9.46	1.00	0.10	2.54	0.31
U.S.	Canada	0.77	-7.59	0.81	0.28	12.26	0.58
U.S.	Mexico	0.98	-15.70	0.93	0.44	65.84	2.23

*Note: R^2 for these regressions is correlation.
Source: Author's calculations.

The table shows, for example, that on average the HPPC's estimates of changes in Mexican import shares in the United States have to be multiplied by 0.93 and the product reduced by 15.70 percentage points to

match the actual changes in those import shares. By comparison, the BDS model's predicted changes have to be multiplied by 2.23 and the product increased by 65.84 percentage points to match the actual changes. The correlation between the actual and predicted changes is 0.98 for the HPPC model and 0.44 for the BDS model.

3. Analysis of the Results

The HPPC and Armington models use similar equations to predict changes in trade after liberalization. The role of Armington elasticity, which is key to determining the magnitude of trade change after liberalization, is played by the technology dispersion parameter in the Eaton-Kortum framework. The HPPC model sets the technology dispersion parameter equal to 8.28 while the BDS model sets the Armington elasticity at around 3. Holding everything else equal, using elasticity of 8.28 instead of 3 should result in about 2.76 times greater predicted change in trade flows. To check the effects of this difference in parameter values on NAFTA forecasts, Shikher sets the technology dispersion parameter equal to 3 and re-simulates the effects of NAFTA. The results are shown in table 5. The columns present various measures of the relationship between the actual and predicted changes in industry-level import shares (excluding Canada-Mexico trade).

Table 5. Relationships Between Predicted and Actual Changes In Industry-Level Import Shares (excluding Canada-Mexico trade)

	HPPC				BDS			
	Correl.	Intercept	Slope	Av(abs)*	Correl.	Intercept	Slope	Av(abs)*
Original	0.95	-4.6	0.87	42.8	0.31	21.23	1.33	10.4
$\theta = \sigma = 3$	0.87	-13.6	4.75	9.9				
$\theta = \sigma = 3$ and c.i.f. barriers	0.93	-16.5	2.2	22.8				
All of the above and BDS tariffs	0.88	-17.1	2.61	19.2				
All of the above and NTBs	0.74	-0.52	2.82	7.8	0.44	13.8	1.1	9.6

Note: Av(abs) is the average absolute percent change in import shares. Its value in the data is 35.9 percent. θ is the technology dispersion parameter, σ is the Armington elasticity. NTBs = nontariff barriers.
Source: Author's calculations.

The first line of the table shows the results for the original model configurations and parameter values. The second line shows that setting technology dispersion parameter $\theta = 3$ results in much smaller predicted changes in trade. The overall magnitudes of the forecasted changes in trade in this case are similar to those of the BDS model, but the correlation between the predicted and actual changes is much higher at 0.87 (vs. 0.32 for the BDS model). The third row assumes that tariffs are imposed on c.i.f. values, as in the BDS model. The fourth row uses BDS data on pre-NAFTA tariffs. The fifth row uses BDS data on tariffs and nontariff barriers. The correlation between the predicted and actual changes for

the 30 trade flows falls to 0.74, as shown on the last line of table 5. This is not as good as using HPPC's own parameter values (0.95), but still substantially better than the BDS's result of 0.44.

Table 5 shows that of all parameter values, the BDS model's treatment of nontariff barriers contributes the most to the poor quality of its forecasts (it explains more than 3/4 of the change in the correlation gap). More recent estimates of nontariff barriers, used by the HPPC model, produce better results. The rest of the difference in the performance of the HPPC and BDS models must be explained by the values of other parameters, such as the input-output shares. Unfortunately, the values of these parameters are not published by the authors of the BDS model. Therefore, a comparison of their values in the BDS and HPPC models is not possible.

In summary, NAFTA is a natural experiment that is useful for evaluating models of trade. Unfortunately, the pre-NAFTA forecasts using computable general equilibrium models did not do a good job forecasting the effects of NAFTA. The results described in this paper show that if a CGE model based on the Eaton-Kortum methodology (such as the one described in this study) had existed when NAFTA was being deliberated, it would have much more accurately forecast the changes in industry-level trade flows following NAFTA. In addition, newly available methods of creating ad valorem equivalents of nontariff barriers also significantly improve the quality of trade forecasts.

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Chapter 4:
Identifying the Effects of NAFTA on the U.S. Economy Between 1992 and 1998: A Decomposition Analysis

Peter B. Dixon and Maureen T. Rimmer*

1. Introduction

Peter B. Dixon and Maureen T. Rimmer, Victoria University, Melbourne, Australia professors, stated that the aim of their presentation was to identify the effects on the U.S. economy of the North American Free Trade Agreement (NAFTA) in the early years of its implementation. To this end, they provided a decomposition of U.S. growth in macro variables and industry outputs between 1992 and 1998.

To show what is involved, Dixon and Rimmer referred to tables 1 and 2. The first row of table 1 shows that between 1992 and 1998 real GDP for the United States grew by 24.40 percent (row 1, column 1). Of this, 0.19 percent (row 1, column 2) is attributable to what they refer to as NAFTA factors. Within this 0.19 percent, columns 3 to 6 identify the contributions specific to Canada and Mexico. Column 7 of row 1 shows that growth of 24.20 percent in U.S. GDP was attributable to factors such as technical change (column 8), growth in aggregate employment (column 9) and developments in international trade not specific to Canada and Mexico (column 10).

The methodology underlying the results in Tables 1 and 2 is explained in Dixon and Rimmer (2004). It relies on historical and decomposition simulations with USAGE, a detailed model of the U.S. economy. In this paper, Dixon and Rimmer describe the results in a way they hope is understandable to readers who are not interested in methodological issues. Dixon and Rimmer started by describing what they meant by NAFTA factors.

Defining NAFTA Factors

Dixon and Rimmer noted that NAFTA factors have two components:

a. *Movements in U.S. tariffs on imports from Canada and Mexico beyond those applying to imports from the rest of the world (ROW).* To clarify what this means, they take the example of ice cream from Canada. In 1992 the U.S. tariff rates on imports of ice cream from Canada and ROW were 27.4 and 25.8 percent. Between 1992 and 1998, the ROW rate dropped by 1.1 percentage points, from 25.8 percent to 24.7 percent. They assume that in the absence of a special relationship with

* We thank Alan K. Fox who supplied the trade data that we used in our analysis and helped us to interpret it.

Canada such as NAFTA, the tariff on ice cream imports from Canada would also have fallen by 1.1 percentage points, from 27.4 percent to 26.3 percent. In fact, by 1998 the tariff rate on ice cream from Canada was only 12.1 percent. In their decomposition analysis, what they attribute to NAFTA is the effects of the extra movement in the tariff rate beyond the ROW movement, a fall of 14.2 percentage points, from 26.3 percent to 12.1 percent.

b. *Other NAFTA effects: changes in U.S. trading conditions with Canada and Mexico beyond those applying to ROW*. By trading conditions, Dixon and Rimmer mean c.i.f. (cost, insurance and freight) import prices (in U.S. dollars) and the positions of foreign demand curves for U.S. products. Trading conditions for the United States on both the import and export sides are affected by many factors, including growth in the world economy, changes in technologies and preferences in U.S. trade-partner countries, and changes in the taxes and tariffs imposed by trade partners. For 1992 to 1998, they measure changes in trading conditions with regard to both exports and imports for Canada, Mexico, and ROW. Then in their decomposition analysis, what they attribute to NAFTA factors are the effects of the extra movements in trading conditions for Canada and Mexico beyond those for ROW. To clarify, they consider the case of motor vehicle parts. For 1992 to 1998 they estimate that the c.i.f. price of imports of motor vehicle parts from ROW increased by 1.5 percent, while the corresponding price for imports from Mexico decreased by 4.5 percent (perhaps reflecting cost reductions in Mexico associated with increased shipments to the United States). At the same time, the ROW demand curve for exports of motor vehicle parts from the United States moved out by 23 percent, whereas the Mexican demand curve moved out by only 11 percent (perhaps reflecting an increased ability of Mexican producers to supply their own market). In the authors' decomposition analysis, the change in trading conditions with Mexico for motor vehicle parts that they attribute to NAFTA is the joint effect of a 6 percent reduction in the c.i.f. price of imports from Mexico (= 4.5 + 1.5) and a 12 percent inward movement in the Mexican demand curve for U.S. exports (= 23 - 11).

Dixon and Rimmer noted that while they refer to the factors measured by (a) and (b) as NAFTA factors, it should be recognized that they are not exclusively associated with NAFTA. For example, they estimate that the ROW demand curve for U.S. steel springs shifted out relative to the Mexican demand curve. It is possible that this relative shift was partly caused by developments outside NAFTA related to a shift in Mexican demand towards manufactured products from China that was stronger than the shift in ROW demand towards these products from China. In tables 1and 2, NAFTA effects embrace the effects of all differences between changes in U.S. tariffs and trading conditions with ROW and those with Mexico and Canada. However, it is reasonable to suppose that NAFTA was a major part of these differences.

2. Macroeconomic NAFTA Effects: U.S. GDP and U.S. Trade

Column 1 of table 1 shows observed movements in U.S. macro variables for 1992 to 1998. Over this period, U.S. GDP grew by 24.40 percent (row 1). Growth in U.S. trade greatly exceeded growth in GDP, with imports expanding by 73.59 percent and exports by 48.32 percent (rows 9 and 5). Growth of trade with Mexico was particularly rapid. U.S. imports from Mexico grew by 240.90 percent, while U.S. exports to Mexico grew by 77.64 percent (rows 11 and 7).

Contribution of NAFTA Factors

Column 2 implies that NAFTA's effects on the U.S. macro economy were small, though generally favourable: a 0.19 percent increase in GDP and 0.42 and 0.38 percent increases in private and public consumption. The effects on U.S. trade were more noticeable but still moderate: 5.77 and 3.25 percent increases in imports and exports. By contrast, NAFTA factors had a major effect on the composition of U.S. imports by source and U.S. exports by destination. Of the 240.90 percent increase in imports from Mexico, NAFTA factors accounted for 143.91 percent, and of the 77.64 percent increase in exports to Mexico, NAFTA factors accounted for 27.88 percent. Columns 3 to 6 of table 1 break the NAFTA contributions into four component parts.

Column 3: Effect of NAFTA-related reductions in U.S. tariffs on imports from Canada

On average, the shocks in column 3 are a reduction in the power of the U.S. tariffs on Canadian imports of 0.34 percent. That is, between 1992 and 1998 NAFTA had the effect of reducing U.S. tariffs rates on imports from Canada by only 0.34 percentage points relative the rates applying to U.S. imports from ROW. This tiny average reduction reflects the fact that U.S. tariff rates on imports from Canada were very low in 1992, averaging only about 0.5 percent. They had already been reduced by the earlier Canada-U.S. free trade agreement signed in 1988. With the shocks in column 3 being so small in average terms, it is not surprising that the macro outcomes are negligible. The only noticeable effects are on the composition of imports by source. Imports from Canada increased by 2.74 percent, largely replacing imports from Mexico (-1.10 percent) and ROW (-0.37 percent). The overall effect on imports is an increase of 0.10 percent.

Column 4: Effect of NAFTA-related reductions in U.S. tariffs on imports from Mexico

On average, the shocks in column 4 are a reduction in the power of the U.S. tariffs on Mexican imports of 0.78 percent. This has the effect of increasing imports from Mexico by 11.81 percent, largely at the expense of imports from Canada (-0.94 percent) and ROW (-0.63 percent). The overall increase in imports is 0.08 percent, slightly less than that in column 3. This is true even though the reduction in the power of the tariffs on imports from Mexico in column 4 (0.78 percent) is greater than that on imports

from Canada (0.34 percent) in column 3. This paradox is explained by the data for 1992, which show the value of U.S. imports from Canada at about 2.5 times those from Mexico.

Columns 5 and 6: Other NAFTA effects

Dixon and Rimmer expected to find that NAFTA reduced the c.i.f. prices of U.S. imports from the NAFTA partners, particularly imports from Mexico. Their reasoning was that closer economic integration with the United States would allow firms in NAFTA partner countries to achieve cost-reducing economies of scale by improving the suitability of their products for the U.S. market, thereby increasing export volumes. Their estimates for 1992 to 1998 support this story strongly for some commodities. For example, they show the c.i.f. price of U.S. imports from Mexico falling by more than 20 percent relative to the c.i.f. price of imports from ROW for 37 of the 500 USAGE commodities. Averaging over all commodities, the c.i.f. price of U.S. imports from Mexico fell by about 7.5 percent relative to the price of imports from ROW. This was responsible for a 134.04 percent increase in U.S. imports from Mexico (row 11, column 6). By contrast, the c.i.f. prices of imports from Canada showed almost no movement relative to prices of imports from ROW.

On the export side, NAFTA-related changes in trading conditions in Canada boosted U.S. exports to Canada by 18.63 percent (row 6, column 5), while NAFTA-related changes in trading conditions in Mexico boosted U.S. exports to Mexico by 30.97 percent (row 7, column 6). In both cases there were small diversions of U.S. exports away from other markets (rows 7 and 8, column 5 and rows 6 and 8, column 6).

Relative to the effects shown in columns 3 and 4 for NAFTA-related U.S. tariff changes, the effects shown in columns 5 and 6 for NAFTA-related shifts in trading conditions are large. Reductions in c.i.f. import prices (especially for imports from Mexico) and easier access to NAFTA markets allowed the U.S. to improve its terms of trade. NAFTA factors relating to Canada generated a terms-of-trade improvement of 1.25 percent (column 5, row 20), while those relating to Mexico generated an improvement of 1.57 percent (column 6).

Because terms-of-trade improvements allow a country to obtain more imports for any given volume of exports, they allow an increase in real consumption. Columns 5 and 6 show increases in U.S. private consumption of 0.19 and 0.24 percent (row 2), with slightly smaller increases in public consumption (row 4). Favorable terms-of-trade movements also generate increases in real wage rates. This effect can be seen in row 15 of columns 5 and 6: real wage increases of 0.32 and 0.44 percent.

Contribution of Other Factors

GDP growth is driven primarily by improvements in technology and increases in employment. These are the dominant factors taken into account in columns 8 and 9 of table 1. Together these two columns explain 23.59 percentage points (= 14.69 + 8.90) of U.S. GDP growth of 24.40 percent between 1992 and 1998. In generating these two columns, Dixon and Rimmer treat technology and employment as exogenous—that is, determined independently of trading conditions and other factors mentioned in the column headings of table 1. By exogenizing technology, they rule out trade-related technology effects of the type hypothesized in the literature associated with Melitz (2003). Dixon and Rimmer noted that these effects are not important for the United States, although they may be important for its NAFTA partners, particularly Mexico. By exogenizing aggregate employment they assume that over a six-year period, trade shocks affect wages rather than aggregate employment. For the medium term they assume that favorable (unfavorable) economic developments mean that a given level of employment is achieved with higher (lower) real wages. The "given level of employment" is determined by demographic factors and the state of the business cycle, factors that are independent of trade policies.

Non-NAFTA trade factors (column 10 of table 1) include shifts in ROW demand curves for U.S. products and shifts in Canadian and Mexican demand curves by the same percentages as those in the ROW demand curves.[12] Similarly, non-NAFTA trade factors include (1) changes in c.i.f. prices of imports from ROW, and (2) changes in c.i.f. prices of imports from Canada and Mexico by the same percentages as those for imports from ROW. Also included as non-NAFTA trade factors are twists in U.S. import/domestic preferences. These caused changes in import shares in U.S. domestic markets beyond those that can be explained by changes in relative prices of imported and domestic products. As in many other countries, in the 1990s U.S. preferences shifted towards imported products, possibly reflecting easier access to information about foreign products.

For 1992 to 1998, twists in import/domestic preferences, movements in export demand curves, and other non-NAFTA trade factors generated a 28.20 percent increase in U.S. imports (row 9, column 10) and a 19.99 percent increase in U.S. exports (row 5). While non-NAFTA trade factors were strongly trade creating, they made only a minor contribution to GDP growth (0.61 percentage points, row 1, column 10).

Returning to column 8 of table 1, we see that technology improvements were also strongly trade creating, generating export growth of 36.68 percent and import growth of 12.88 percent (rows 5 and 9, column 8). Technology improvements facilitated U.S. exports by improving their competitiveness while increasing U.S. economic growth, thereby stimulating imports.

[12] Recall that shifts in Canadian and Mexican demand curves beyond those for ROW have already been taken into account as NAFTA factors.

Column 9 shows that macro factors stimulated imports but retarded exports (26.75 percent growth for imports but 11.61 percent contraction for exports). Column 9 not only contains the effects of employment growth but also the effects of changes in business confidence. In 1998 business confidence, reflected in investment/capital ratios for industries, was considerably higher than in 1992. Consequently, column 9 shows strong growth in investment relative to GDP (38.01 percent for investment compared with 8.90 percent for GDP, rows 3 and 1). Strong investment growth leads to real appreciation and associated stimulation of imports and retardation of exports.

3. Industry NAFTA Effects

Dixon and Rimmer decomposition calculations produce results for 502 industries, the number of industries in the USAGE model. Table 2 presents results for a manageable number of selected industries. It shows the 11 industries for which NAFTA factors had the largest negative impacts on output; the 16 industries for which NAFTA factors had the largest positive impacts; and 5 industries between these groups that are included in the table to illustrate a point of interest.

Consistent with the small size of the macro impacts of NAFTA factors, the industry impacts are approximately balanced between negative and positive. Out of the 502 USAGE industries, 236 suffered a negative impact from NAFTA factors, while 266 benefited from a positive impact. However, while many critics of free-trade agreements such as NAFTA can believe that the macro effects are benign, they are concerned about the structural effects.

In looking for structural problems, we started by examining industries for which the NAFTA factors had a negative impact of more than 5 percent over the period 1992 to 1998. There are 26 such industries. However, this does not indicate NAFTA-related structural problems. Most of the 26 industries had positive growth despite the negative impact of NAFTA. For example, industry 277 (steel springs, row 1)—the industry worst affected by NAFTA factors—showed strong positive growth (34.39 percent, row 1, column 1). Steel springs benefited from exceptionally strong export growth outside NAFTA, giving the industry a large positive entry in column 10 of table 2. The positive entry offsets the *relative* [13] decline of its exports to NAFTA partners (the main contributor to the large negative entry in column 2). Industries 356 (motor vehicle parts, row 9) and 374 (watches, row 11) are broadly similar cases. While their exports were relatively subdued in NAFTA markets, they exported strongly to ROW. This was facilitated not only by large outward movements of the ROW demand curves for U.S. motor vehicle parts and watches, but also by rapid technical improvements in these U.S. industries. Consequently, both columns 10 and 8

[13] Steel spring exports to NAFTA partners grew quite strongly between 1992 and 1998, but not nearly as strongly as exports to ROW. Thus NAFTA factors for this industry include negative shifts of Canadian and Mexican demand curves for U.S. steel springs relative to the shift in the ROW demand curve.

in table 2 show large positive entries for motor vehicle parts and watches, overwhelming the negative entries in column 2.

Another way of looking for NAFTA-related structural problems is to examine industries that did poorly between 1992 and 1998 and ask whether their problems were seriously exacerbated by NAFTA factors. Of the 502 USAGE industries, 37 had negative growth over this period. Of these, NAFTA factors contributed more than half of the negative result in 7 cases (see rows 3, 6, 12, 13, 14, 15 and 16 of table 2). Even for these seven industries, NAFTA factors were not the major cause of their decline. The major negative contribution for small arms ammunition (row 13), earthenware (row 6), luggage (row 15) and flavour syrups (row 16) occurs in column 10, indicating that these industries competed poorly either against non-NAFTA imports in the U.S. market or against competitors in non-NAFTA export markets. For nonferrous ores (row 3), ordnance (row 12), and primary smelting (row 14) the major negative contribution is in column 9. This column includes the effects of cuts between 1992 and 1998 in military investment, explaining the ordnance result. It also includes the effects of adjustments in rates of return. In 1992, rates of return in nonferrous ores and primary smelting were low, causing reductions in their capital stocks across the period and reducing their ability to produce.

Rather than causing structural problems, NAFTA factors may have mitigated such problems. Of the 16 industries (listed at the bottom of table 2) for which NAFTA factors made the largest positive contributions to output, 14 have negative entries in column 10. These industries were not performing well in non-NAFTA export markets or in competition with non-NAFTA imports in the U.S. market. For them, improved access to NAFTA export markets and availability of cheaper inputs from NAFTA countries made a useful contribution to output growth in what was otherwise an unfavorable international situation.

4. Concluding Remarks

Trade policies often get a bad rap. They get blamed for a multitude of economic evils. To many people, it seems a matter of common sense that a policy which encourages imports will cost U.S. jobs. But of course this is not right. Boosting imports also boosts exports. Nevertheless, it is often difficult to pinpoint the causes of poor economic outcomes, and trade policies become a convenient scapegoat.

Even within the economics profession there is confusion about what should be attributed to what. For example, in a much-quoted article, Kehoe (2005) criticizes CGE modelers for underestimating the trade-stimulating effects of NAFTA. His evidence is that in the 10 years following the signing of NAFTA, trade volumes for the NAFTA countries grew more quickly than was shown *ex ante* in the CGE results. However, properly interpreted, the CGE results were not about how fast trade would grow in these 10

years. Rather, they were about how NAFTA would affect growth in trade. Put another way, the CGE modelers were making projections of how much trade growth should be *attributed* to NAFTA.

In this paper, Dixon and Rimmer addressed the attribution issue. Using a detailed CGE model, they have decomposed movements in U.S. macro and industry variables from 1992 to 1998 into the contributions of NAFTA factors and other factors. At the macro level, their results show that NAFTA factors made a minor but useful contribution to aggregate U.S. economic welfare. They attribute an increase of about 0.4 percent in private and public consumption from 1992 to 1998 to NAFTA factors. In present-day terms this is an annual welfare gain of about $50 billion. At the industry level, they focused on whether there were structural adjustment problems in the U.S. economy that developed between 1992 and 1998 and should be attributed to NAFTA. Working at the 502-industry level, they did not find such problems. For industries that suffered negative growth during this period, they found that the major cause in most cases was poor performance in non-NAFTA export markets or in competition with non-NAFTA imports in the U.S. market. For some industries they found that NAFTA factors mitigated a potential structural adjustment problem by easing access to NAFTA markets in a situation in which there was strong competition in non-NAFTA markets.

With regard to trade, their results show that NAFTA factors greatly stimulated U.S. trade with Mexico. For 1992 to 1998, they attribute to NAFTA factors growth of 143.91 percent in U.S. imports from Mexico and growth of 27.88 percent in U.S. exports to Mexico. But other factors also played a major role, stimulating U.S. imports from Mexico by a further 97.00 percent and exports to Mexico by a further 49.76 percent. While U.S. trade with Canada also grew rapidly between 1992 and 1998, their decomposition analysis shows that this was predominantly for non-NAFTA reasons.

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Table 1. Decomposition of Movements in Macro Variables Between 1992 and 1998: Contributions of Driving Factors

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Total observed movement 1992–98	Total effects of NAFTA factors	Decomposition of NAFTA factors				Total other effects (excludes NAFTA factors)	Decomposition of other effects		
				Tariff on imports from Canada	Tariff on imports from Mexico	Other Canada trade effects	Other Mexico trade effects		Technology and tastes	Aggregate employment and other macro factors	Trade effects (excludes NAFTA factors)
	Percentage changes										
1	Real GDP (Y)	**24.40**	**0.19**	-0.01	0.00	0.07	0.13	**24.20**	14.69	8.90	0.61
2	Real private consumption (C)	**24.23**	**0.42**	-0.01	-0.01	0.19	0.24	**23.81**	11.17	11.13	1.51
3	Real investment (I)	**60.93**	**0.76**	-0.02	0.00	0.26	0.52	**60.16**	20.50	38.01	1.65
4	Real public consumption (G)	**4.07**	**0.38**	-0.01	-0.01	0.18	0.21	**3.69**	10.02	-7.70	1.38
5	Real exports (X)	**48.32**	**3.25**	0.14	0.11	1.49	1.51	**45.06**	36.68	-11.61	19.99
6	*to Canada*	***63.39***	***16.86***	*0.14*	*0.12*	*18.63*	*-2.03*	***46.53***	*34.87*	*-13.96*	*25.62*
7	*to Mexico*	***77.64***	***27.88***	*0.17*	*0.13*	*-3.39*	*30.97*	***49.76***	*39.61*	*-13.34*	*23.49*
8	*to ROW*	***39.67***	***-4.30***	*0.13*	*0.10*	*-2.83*	*-1.70*	***43.97***	*36.80*	*-10.67*	*17.84*
9	Real imports (M)	**73.59**	**5.77**	0.10	0.08	2.69	2.90	**67.83**	12.88	26.75	28.20
10	*from Canada*	***67.81***	***4.77***	*2.74*	*-0.94*	*10.01*	*-7.03*	***63.04***	*5.15*	*29.64*	*28.25*
11	*from Mexico*	***240.90***	***143.91***	*-1.10*	*11.81*	*-0.84*	*134.04*	***97.00***	*19.03*	*36.59*	*41.37*
12	*from ROW*	***61.68***	***-4.86***	*-0.37*	*-0.63*	*1.39*	*-5.25*	***66.54***	*14.05*	*25.36*	*27.13*
13	Aggregate employment (L)	**11.92**	**0.00**	0.00	0.00	0.00	0.00	**11.92**	0.00	11.92	0.00
14	Aggregate capital (K)	**17.47**	**0.56**	-0.01	0.00	0.19	0.39	**16.91**	14.44	1.35	1.12
15	Real wage (W/P_c)	**10.43**	**0.77**	0.00	0.01	0.32	0.44	**9.66**	14.89	-8.23	2.99
16	Real exchange rate	**16.02**	**3.45**	-0.06	-0.05	1.59	1.96	**12.57**	-6.52	6.25	12.84
17	Price deflator for C (P_c)	**11.83**	**0.00**	0.00	0.00	0.00	0.00	**11.83**	0.00	11.83	0.00
18	Price deflator for I (P_I)	**2.95**	**-0.39**	0.01	0.01	-0.09	-0.32	**3.35**	-4.23	8.87	-1.28
19	Price deflator for G (Pg)	**15.26**	**0.45**	0.01	0.01	0.19	0.25	**14.80**	8.27	5.15	1.39
20	Terms of trade	**6.49**	**2.75**	-0.04	-0.03	1.25	1.57	**3.75**	-10.09	4.26	9.58
21	Price deflator for GDP (Py)	**11.69**	**0.36**	0.00	0.00	0.17	0.19	**11.33**	-0.80	10.90	1.24
	Percentage point changes										
22	Trade balance, % of GDP	**-1.29**	**0.10**	0.00	0.00	0.04	0.07	**-1.40**	1.11	-2.87	0.37
23	Net f'gn liabilities, % of GDP	**5.22**	**1.49**	-0.03	-0.01	0.60	0.92	**3.74**	27.14	-26.46	3.06

Table 2. Decomposition of Movements in Selected Industry Outputs Between 1992 and 1998: Contributions of Driving Factors

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Total observed movement 1992-98	Total effects of NAFTA factors	Decomposition of NAFTA factors				Total other effects (excludes NAFTA factors)	Decomposition of other effects		
	Percentage changes			Tariff on imports from Canada	Tariff on imports from Mexico	Other Canada trade effects	Other Mexico trade effects		Technology and tastes	Employment & other macro factors	Non-NAFTA trade effects
1	277 Steel springs	**34.39**	**-52.66**	0.19	0.01	-37.97	-14.89	**87.05**	26.79	9.67	50.59
2	255 Metal barrels	**11.59**	**-15.34**	0.03	0.03	-8.60	-6.80	**26.93**	18.48	9.49	-1.04
3	23 Nonferrous ores	**-2.94**	**-15.07**	0.06	0.07	-14.23	-0.97	**12.13**	3.80	-20.98	29.31
4	350 Elect equip for cars	**25.34**	**-13.88**	0.05	-0.01	-3.90	-10.02	**39.22**	34.03	8.68	-3.48
5	206 Boot cut stock	**8.34**	**-10.31**	0.18	0.11	-2.88	-7.73	**17.34**	23.81	-12.06	5.59
6	223 Earthenware	**-10.42**	**-9.22**	-0.28	0.04	-2.44	-6.55	**-1.19**	14.32	-1.47	-14.04
7	124 Fabric textile prods	**21.75**	**-9.19**	0.01	-0.11	-2.04	-7.06	**30.94**	17.53	9.99	3.42
8	304 Print machinery	**49.25**	**-9.07**	0.11	0.09	-6.10	-3.16	**58.32**	23.76	32.77	1.79
9	356 Motor vehicle parts	**39.54**	**-9.05**	0.09	-0.04	-5.10	-4.00	**48.59**	23.28	7.78	17.53
10	329 Relays & ind. controls	**39.19**	**-8.82**	0.06	0.00	-8.89	0.00	**48.01**	41.45	12.10	-5.54
11	374 Watches	**80.35**	**-8.48**	0.03	0.02	-4.70	-3.83	**88.83**	50.10	-5.18	43.91
12	52 Ordnance	**-3.39**	**-3.12**	0.02	0.02	-2.48	-0.68	**-0.27**	32.78	-34.17	1.11
13	51 Small arms ammunition	**-2.90**	**-2.45**	0.05	0.03	-1.58	-0.96	**-0.45**	9.65	2.72	-12.83
14	245 Primary smelting	**-2.25**	**-2.06**	-0.16	-0.03	-0.90	-0.97	**-0.19**	11.26	-9.63	-1.82
15	210 Luggage	**-1.73**	**-2.03**	0.04	-0.23	-1.14	-0.70	**0.30**	23.25	19.74	-42.69
16	88 Flavor syrups	**-2.58**	**-2.02**	0.03	0.14	-1.34	-0.85	**-0.56**	24.48	2.05	-27.08
17	355 Motor vehicles	**38.93**	**6.99**	-0.05	-0.03	5.97	1.11	**31.94**	16.12	18.32	-2.50
18	354 Truck trailer	**64.37**	**7.51**	-0.01	-0.03	7.45	0.10	**56.86**	-1.53	59.34	-0.95
19	362 Railroad equipment	**72.91**	**7.66**	-0.11	0.05	7.64	0.08	**65.25**	23.98	52.69	-11.42
20	106 Thread mills	**28.63**	**7.68**	0.05	-0.03	-1.68	9.33	**20.95**	20.70	4.29	-4.04
21	56 Butter	**-0.25**	**7.91**	0.04	-0.01	4.91	2.97	**-8.16**	7.04	4.28	-19.48
22	293 Machinery tools	**27.80**	**8.47**	0.00	0.09	7.08	1.30	**19.33**	22.05	25.57	-28.28
23	5 Cotton	**23.78**	**8.49**	0.06	-0.01	0.36	8.09	**15.29**	28.05	-0.80	-11.95
24	196 Petroleum & coal prods	**11.28**	**8.75**	0.05	0.04	4.06	4.60	**2.53**	8.53	-9.92	3.92
25	298 Industrial patterns	**34.96**	**9.75**	0.03	0.02	9.55	0.14	**25.22**	16.08	15.72	-6.59
26	353 Truck & bus body	**60.46**	**11.25**	0.02	-0.01	8.72	2.51	**49.21**	5.09	50.64	-6.52
27	22 Copper ores	**-9.27**	**12.06**	-0.07	0.00	12.22	-0.10	**-21.33**	21.75	-19.99	-23.09
28	246 Primary aluminum	**-2.88**	**13.71**	0.05	0.02	11.41	2.23	**-16.60**	12.60	1.01	-30.20
29	318 Computers	**344.86**	**15.35**	0.12	0.11	14.32	0.81	**329.50**	358.61	77.42	-106.52
30	108 Coated fabric	**32.12**	**16.64**	-0.04	-0.01	8.20	8.48	**15.49**	25.82	12.53	-22.87
31	345 Electronic tubes	**159.44**	**27.52**	0.13	-0.02	-5.32	32.73	**131.92**	116.22	6.15	9.56
32	148 Public building furniture	**45.12**	**38.45**	0.10	0.07	20.83	17.46	**6.66**	27.46	22.71	-43.51
Ave. across 502 inds (output wgts)		**26.56**	**0.32**	0.00	0.00	0.16	0.17	**26.24**	16.66	9.31	0.27

Chapter 5:
Foreign Direct Investment and Economic Growth in Mexico: 1940–2013

José Romero

In his presentation, "Foreign Direct Investment and Economic Growth in Mexico: 1940–2013," José Romero, director of the Center for the Study of Economics of the Colegio de México, addressed the question of how foreign direct investment (FDI) affected productivity in Mexico for the 73-year period ended in 2013. He said that the study uses an aggregate production function that relates aggregate production with labor and with three types of capital: private domestic, foreign, and government. The study is also divided into two periods—1940–79 and 1984–2013. Romero concluded that in the first period, the impact of foreign capital on productivity exceeded that of private domestic capital, while in the second period , or the NAFTA period, the impact of private domestic capital on productivity exceeded that of foreign capital, which had only a minor (though positive) effect on growth.

Romero first introduced the empirical model he developed to test the impact of FDI on productivity, including the dependent and key independent variables. Next, he explained why the empirical model estimation is divided into two periods. Finally, he discussed his research findings and explained why foreign capital's impact on productivity is limited in the second period.

Data and Methodology

Romero first explained how he developed his empirical model. In his model, the dependent variable "labor productivity" is derived based on the following production function:

$$Y = AL^a K_p^b K_f^c K_g^d$$

where Y represents GDP, or total real production; L is total labor force; K_P is the domestic private capital stock; K_f is foreign capital, and K_g is government capital; b, c, and d are parameters; and A represents the efficiency in production.

Romero noted that he took logs of the equation and found that:

$$y = \ln(A) + al + bk_p + ck_f + dk_g$$

where the small letters indicate the variables' natural logarithms.

Romero further stated that the next step was to take differences to obtain the growth rate of the equation, and he obtained:

$$g_Y = g_A + ag_l + bg_{k_p} + cg_{k_f} + dg_{k_g}$$

where g_i is the growth rate of variable *i = Y, A, L,* K_p, K_f and K_g.

Finally, to obtain the expression for the growth of labor productivity, Romero subtracted the expression g_l from each side of the above equation and found that:

$$g_Y - g_l = g_A + (a-1)g_l + bg_{k_p} + cg_{k_f} + dg_{k_g}$$

The empirical model was therefore rewritten based on the above derivation:

$$\Delta y_t - \Delta l_t = \Delta \ln (Y/L)_t = \beta_0 + \beta_1 \Delta l_t + \beta_2 \Delta k_{p,t} + \beta_3 \Delta k_{f,t} + \beta_4 \Delta k_{g,t} + \beta_5 \Delta tcr_t + \varepsilon_t$$

Where $\Delta ln(Y/L)_t$ is the growth rate of labor productivity, $\Delta k_{p,t}$ is the growth rate of domestic private capital investment, $\Delta k_{f,t}$ is the growth rate of foreign capital investment, and $\Delta k_{g,t}$ is the growth rate of government capital investment. Romero noted that the regression also includes the percentage variation of the real exchange rate [Δrer_t = $ln(RER_t)$ - $ln(RER_{t-1})$] as an explanatory variable. According to Romero, it is introduced as a control variable for estimates of aggregate production functions in the case of small and open economies like Mexico.

Romero further noted that stationarity tests suggest that variables in levels are cointegrated. Hence, error-correction models were used to estimate the coefficients. Meanwhile, Romero also stated that he calculated the structural change, and found that the structural change happened in 1979 (at the start of the oil boom and before the debt crisis and the opening of the economy)**.** He therefore established two error-correction models to estimate the coefficients in two different time periods: 1940 to 1979 and 1984 to 2013.

Major Research Findings

According to Romero, in the first period, the coefficients for $\Delta k_{p,t}$ $\Delta k_{f,t}$ and $\Delta k_{g,t}$ are 0.049, 0.082, and 0.393, respectively, indicating that during the first period, the driver of growth (of labor productivity) is government capital. Meanwhile, foreign capital shows an elasticity 1.7 times greater than domestic private capital. Romero noted that the reason foreign capital impacted productivity more heavily than domestic private capital during the period could be structural externalities, such as local-content requirements, export commitments, and the mandate that no more than 49 percent of its capital may be

foreign-sourced. These requirements allegedly lead to more technological spillovers, both vertical and horizontal.

Romero then explained the regression results for the second period. The results demonstrate that domestic private investment has the biggest impact over productivity in the second period, with a regression coefficient of 0.245. By contrast, foreign capital only plays a secondary role, with a regression coefficient of 0.116. Romero noted that it is surprising that the effect of accumulated foreign investment on labor productivity is much smaller than that of domestic private investment in the second period. He stated that it could be explained by the structural change itself, which allowed companies to be totally foreign owned. Therefore, domestic capital could no longer benefit from an association with foreign capital. The new model also did not require national content, discouraging any possible linkages or spillovers.

Conclusions

Using time series analysis, Romero found that in the first period (1940–79), Mexico's growth was led mainly by government investment, and that the impact of foreign investment on labor productivity outweighing that of private domestic investment. However, in the second period (1984–2013), growth was predominately led by domestic private investment, with foreign capital playing only a secondary role. Romero stated that foreign capital's minor effect on growth was mainly due to the limited spillover effect foreign capital created in the economy during the second stage. He explained that when NAFTA took effect in 1994, it helped develop a vertically integrated production network in North America, involving the fragmentation of productive processes. According to Romero, this action significantly altered the composition of FDI. From being targeted mainly at internal markets, FDI changed to take advantage of Mexico's comparative advantages and therefore became directed at labor-intensive stages of fragmented production. This process created few linkages to the rest of the economy and few spillover effects, hence limiting the effect of foreign capital on growth.

References

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Chapter 6:
Gone To Texas: Immigration and the Transformation of the Texas Economy

Pia M. Orrenius[14]

Pia M. Orrenius, Senior Economist and Vice President of the Federal Reserve Bank of Dallas, discussed how immigration had helped to transform the Texas economy, based on a 2013 report she co-authored with Madeline Zavodny and Melissa LoPalo. Making use of the American Community Survey, the Current Population Surveys, and census data, she focused the presentation on demographic and economic trends seen in the immigrant and migrant population in Texas over the past 40 years.

Orrenius began by discussing the history of immigration in Texas and its correlation to state economic cycles. She noted that large-scale immigration to Texas is a relatively recent phenomenon, beginning in the 1970s. It was not until the 1980s that the share of immigrants in Texas' population surpassed the national share—and since then, booms in low- and high-skilled immigration have correlated with booms in low- and high-skill jobs. For example, during the1980s, as Texas's economy diversified due to a bust in oil prices and the banking sector, low-skilled immigrants began to migrate to Texas. In the following decade, a boom in high-tech jobs saw a wave of high-skilled immigration.

She then pointed to characteristics of Texas immigrants today. She showed that the majority of immigrants are from Mexico, followed by Asia and the rest of Latin America. On average, they are more likely to be of working age than are U.S. natives. They are also more concentrated at the top and bottom of the education spectrum and, on average, lag U.S. natives in schooling. Despite lower average educational attainment, they have both higher labor force participation rates and higher rates of employment than natives and than immigrants in the rest of the United States.

Turning to illegal immigration, Orrenius recapped the history of immigration policy in Texas as both a Mexican and U.S. territory, as well as the public's attitude toward unauthorized immigrants. She pointed out that some historians observe that Americans were the first unauthorized immigrants to Texas when it was a Mexican territory. Later, Chinese and Europeans became targets of immigration bans. Exemptions to immigration laws, involving Mexican citizens, were introduced in the 1920s and again in the1940s to

[14] The views in this article are solely the opinions of the author and should not be interpreted as reflecting the views of the Federal Reserve Bank of Dallas.

allow Mexican immigrants to take mostly seasonal agricultural jobs. Changes to immigration law in the 1970s and as part of the Immigration Reform and Control Act of 1986 ended Western Hemisphere exemptions and made it illegal to hire unauthorized immigrants. Today, unauthorized immigrants (about 1.8 million people) make up about 43 percent of the foreign-born population in Texas. Even with such a large number, Orrenius pointed out that for most of the 1990s and 2000s, political and public attitudes vis-à-vis unauthorized immigrants in Texas have been more tolerant than in many other states.

The economic effects of immigration, she showed, have been largely positive for Texas. Immigration has increased the labor force, helping to accommodate rapid growth and offset the aging of the native population. This immigrant increase benefits the native population through lower prices and higher returns on capital and land; as immigrants specialize in their sector or industry, they also become more productive. What's more, she said, the wellbeing of migrants "does not appear to have come at the natives' expense."

This is not to say that immigration has not posed challenges for Texas. Immigrants, on average, are poorer than U.S. natives—especially in Texas.[15] According to survey statistics, immigrants in Texas also do not speak English as well as those in the rest of the country. Immigrants also make use of already sparse social services and public education, presenting fiscal costs for local and state governments.

Orrenius also discussed the demographics of migration into Texas from other states. Since 2006, Texas has become the No. 1 destination for domestic migrants, who are both U.S.- and foreign-born. Migrants from other states have skewed the state population to the higher end of the education distribution; they are more likely to have bachelor's, graduate, or professional degrees than native Texans. The largest share (23 percent) of these migrants comes from California.

To summarize, Orrenius discussed the lessons that Texas has learned from its decades of immigration and migration. The diversification brought on by the booms and busts of the energy sector has provided robust job opportunities for immigrants. This, coupled with Texas' low cost of living and relatively low tax rates, has spurred relocation to Texas for all, even for low-skilled and low-income workers, despite its "skimpy" safety net and lower levels of public services.

[15] Orrenius pointed out, however, that these statistics do not adjust for Texas' cost of living, which is lower than the national average.

References

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Chapter 7:
International Competition and Industrial Evolution: Evidence from the Impact of Chinese Competition on Mexican Maquiladoras

Hale Utar and Luis Bernardo Torres Ruiz

In this presentation, Luis Bernardo Torres Ruiz, research economist at the Real Estate Center at Texas A&M University, discussed the results of his joint research with Hale Utar. Their study addressed the question of how intensified competition from China affects Mexican export assembly plants, or *maquiladoras*—in particular, their entry, growth, productivity, and exit. Utar and Torres concluded that maquiladoras' entry, employment, plant growth, and survival probabilities all respond negatively to Chinese competition. In presenting these findings, Torres first introduced the dataset and research methodology used in the analysis, then explained in detail the type of regression models used and the variables included in each regression. Finally, he discussed the study's major findings and its contribution to the direction of future research.

Data and Methodology

The data used in the analysis comes from surveys carried out from 1990 to 2006 by the Instituto Nacional de Estadística, Geografía e Informática (INEGI), Mexico's National Institute of Statistics and Geography. The INEGI surveys, which consisted of 27,548 plant-year observations, included 3,769 plants and 1,455 firms in 11 maquiladora industries. Torres noted that the unique value of using this resource is that it is a plant-level dataset.

Torres explained that in the Utar-Torres study, the key independent variable is the measure of Chinese competition with maquiladoras, denoted as IMPCH_{jt} ,

$$\mathrm{IMPCH}_{jt} = \frac{M_{jt}^{CH}}{\mathrm{M}_{jt} + \mathrm{Q}_{jt} - \mathrm{X}_{jt}}$$

where M_{jt}^{CH} denotes the value of imports of industry *j* products coming from China to the United States at period *t*. *M, Q,* and *X* denote total U.S. imports, U.S. production, and U.S. exports, respectively. The dependent variables are plant-level sales, employment, employment growth, entry and exit, and productivity (all for maquiladoras only), for each regression model. Torres stated that the model also uses other control variables. These include time-varying plant-level controls (such as multi-plant dummy variables and age dummy variables) and time-varying industry controls (such as U.S. import penetration with China and Mexico, U.S. industry hourly wages, and U.S. industry production).

According to Torres, the regression models also include interaction terms IMPCHjt*productivity, IMPCHjt*skill intensity, and IMPCHjt*capital-labor ratio. Torres noted that the idea behind including these interaction terms is to look at the effects of Chinese competition with maquiladoras that weigh most heavily on low-skilled, low-capital maquiladoras. The regression model also controls for state-by-year fixed effects.

Torres further noted that in order to correct for the endogeneity problem of the regression models—that is, unobserved factors that affect the dependent variables of interest and the Chinese share of import penetration for the matched U.S. industry— they used two different instrumental variables for robustness checks. The first instrument was Chinese worldwide imports entered as a share in total world imports interacted with 1999 Chinese import penetration rate in the corresponding U.S. NAICS for each maquiladora sector. The idea behind using this instrument is that the worldwide Chinese import share must be exogenous from the perspective of Mexican/U.S. plants, as it is expected to be driven by supply-side factors within China itself.

Torres explained that while this instrument should be free from most of the endogeneity concerns by extracting the exogenously driven growth component in world Chinese imports in the wake of its WTO accession, this instrument could still be sensitive to possible correlation between the initial conditions of U.S. industries and future technology or demand shocks. To address this, Torres introduced a second version of the instrumental variable—used as the default instrument in the analysis, which was constructed using the 1999 shares of Chinese imports in eight other advanced/high-income countries—,Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain and Switzerland**.** The instrument is denoted as

$$\frac{OAdvCHIMP_{j99}}{OAdvTOTIMP_{j99}} * \frac{CHIMP_t}{WIMP_t},$$

where $OAdvCHIMP_{j99}$ is the total imports into eight high-income countries from China (excluding the United States) in the corresponding industry *j* at year 1999, and $OAdvTOTIMP_{j99}$ denotes the total imports in the corresponding industry *j* at year 1999. $\frac{CHIMP_t}{WIMP_t}$ is the worldwide merchandise imports from China as a percentage of total worldwide merchandise imports.

Major Research Findings

When the natural logarithm of plant employment rate is the dependent variable, the regression model, without using the instrumental variable, shows that an increase of 1 standard deviation in the Chinese share of import penetration for the matched U.S. industry is associated with a decrease of 25 percentage

points in the logarithm of employment. Torres emphasized that this result is statistically significant at the 1 percent significance level, and remains large and robust when using the two above mentioned instrumental variables.

Another regression model uses the log of employment growth as the dependent variable, with the same independent variables. Torres stated that the results show that an increase of 1 standard deviation in the Chinese share of import penetration for the matched US industry (a 6.4 percentage point increase) is associated with a decrease of 12 percentage points in annual plant employment growth. Moreover, instrumental variable regression results confirm the finding that higher Chinese imports in the U.S. market lead to lower employment growth in maquiladora industries. Moreover, when using the dummy variable plant exit as the dependent variable, the probit model shows that a marginal increase (6 percent) in the average import penetration rate leads to a 27 percent increase in the probability of plant exits. When productivity is the dependent variable, the regression result shows that a 1 standard deviation increase in the Chinese share of import penetration for the matched U.S. industry increases the logarithm of plant productivity by 3 percentage points.

In the case of plant entry, Torres noted that the analysis is done on the industrial level rather than the plant level, since INEGI's maquiladora survey doesn't give extra information about a plant's decision to enter or not to enter. The regression results demonstrate that impact of Chinese competition, as well as labor cost savings and demand in U.S. markets, are important factors affecting entry.

Torres finally stated that none of the interactive terms in different regression models are significant, which means that there is no indication that intensified Chinese competition causes a disproportionate decrease in employment growth, especially in low-productivity, low-skill, and low-capital plants. However, when using skill intensity as the dependent variable, the regular ordinary least squares (OLS) regression as well as the regressions using instrumental variables both indicate that an increase in the share of Chinese import penetration rate triggers an increase in skill intensities.

Conclusions

Torres summarized the research findings by stating that in Mexican maquiladoras, probabilities of entry, employment, plant growth, and survival are found to respond negatively to Chinese competition. Moreover, competition led to shrinkage or exit of firms in low-skill labor-intensive sectors, leading their former employees to find work in other sectors. Torres also concluded that there is strong evidence that heightened competition from China improved maquiladoras' within-plant productivity. All the major research findings indicated that competition from China has played a substantial role in the recent

slowdown of the Mexican maquiladora industry. Specifically, competition affected the most unskilled labor-intensive sectors being the most threatened by Chinese competition, which led to significant sectoral reallocation. Torres finally noted that the results open the discussion to whether and how competition from lower-wage locations can compel traditionally labor-intensive industries in low-wage countries to move up in the global production chain.

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Chapter 8:
NAFTA: Retrospect and Prospect

Anne O. Krueger

Anne O. Krueger, Senior Research Professor of Economics of the School of Advanced International Studies at Johns Hopkins University, began her plenary presentation by outlining three topics she would be examining: (1) The debates over NAFTA at the time of its formation: how accurate were they in retrospect?; (2) The current state of NAFTA affairs; and (3) Key issues for NAFTA's next 20 years. She noted that her discussion would be mainly from the U.S. point of view, not only because that's what she knows best, but also because the United States' economy is so much larger than the other two. The main conclusion that she drew from her examination was that, while NAFTA's effects are very hard to isolate and measure, initial estimates of these effects seem to have been pessimistic as a whole overstating NAFTA's negative consequences while understating its benefits.

Krueger highlighted some lessons we can learn from the NAFTA experiment moving forward, including: (1) PTAs (preferential trade agreements) are susceptible to lobbying and other third-party pressures; (2) To succeed, future PTAs must operate under the multilateral trade system or the World Trade Organization (WTO), given the growth in importance of global value chains; and (3) NAFTA needs to be strengthened by enabling faster transit of goods, facilitating great labor mobility, increasing regulatory uniformity, and adopting policies for energy and agriculture. Energy and agriculture are areas with huge potential gains.

Krueger began by pointing out that, at the time NAFTA was being negotiated, most of the world had embraced the open, multilateral trading system that existed under the General Agreement on Tariffs and Trade (GATT). PTAs were few, and even fewer were successful. The success of the multilateral system was highlighted by the changes in average tariff rates on manufactured goods globally. These had fallen from 45-48 percent in 1956 to about 5 percent in the early 1990s, the time at which NAFTA was being negotiated. The main preferential agreement at that time—the customs union between EU members—improved even more on this global system (i.e., the customs union dropped tariff rates from 45 percent to 0 percent instead of to 5 percent).

The first stage of NAFTA, the Canada–U.S. Free Trade Agreement (CUSTFA) between the United States and Canada, went relatively unnoticed by the U.S. populace. Canada was a relatively large and industrial economy that was already one of the United States' largest trading partners. However, Mexico was still a

closed economy (relatively speaking) when a PTA between it and the United States was first proposed and political debate sprung up about the merit of a PTA between the two countries from a U.S. standpoint. There was less debate over the prospect of a Mexico-Canada PTA since trade between Mexico and Canada was quite small at the time of NAFTA's negotiations and, in relative terms, is still fairly small today (albeit much bigger than 20 years ago). Krueger also mentioned that the nature of Canada-U.S. trade was quite similar to that of Mexico-U.S. trade; the United States received mainly primary commodities and intermediate goods from both partners and shipped out mainly processed goods to them.

Although it was not the focus of her presentation, Krueger briefly mentioned her objection to the early-1990s argument that NAFTA would spur Mexican immigration into the United States, costing many U.S. workers their jobs. She simply pointed to the implausibility of seeing more immigrants entering at a time when U.S. domestic employment was falling. While Mexican immigration did rise after NAFTA entered into force, it was because Mexican growth rates of employment and real wages were slower than hoped due to the Tequila Crisis (the Mexican Peso Crisis) around the same period, which caused inflation rates of over 100 percent.

Complexity of Examining the Effects of NAFTA

Krueger argued that there are many factors complicating the examination of the effects of NAFTA. The first is that NAFTA occurred at a time in history when many other facets of the world economy were changing simultaneously. Tariff reductions were going into effect across the industrial world, and the Uruguay Round (eventually leading to the founding of the WTO) was ongoing. Within Mexico, besides the Tequila Crisis, there was the Mexican current-account deficit, the stagnation of Mexican economic growth in the 1990s, and the impact of China's emergence as a major trading competitor with Mexico (which became even more noticeable following China's accession to the WTO).

What Effects Did We Expect from NAFTA—and What Effects Can We Observe?

So what did we expect to happen? Krueger pointed out that many analysts believed NAFTA would lead to job losses in the United States as Mexico shifted to a current-account surplus. These people argued that NAFTA would help the Mexican manufacturing sector so much that capital inflows into Mexico would surge while U.S. firms would be wiped out, causing U.S. business to relocate to Mexico. In reality, U.S. FDI had already been directed towards Mexico in the years before NAFTA in the form of intermediate parts and goods that would eventually be shipped to the United States. Krueger then discussed how the concerns over U.S. job losses also proved unfounded, since unemployment reached a low of 4 percent in 2000 and rose only during and after the dot-com recession of 2001–2002. Krueger cited Congressional

Budget Office (CBO) numbers to predict a gain of 150,000 net jobs over five years. Another noticeable effect of NAFTA lay in wages. Contrary to some of the pre-NAFTA fears that U.S. wages would fall, Krueger added, the only real noticeable effect of NAFTA on wages was the one highlighted in a previous presentation by Caliendo and Parro (2014).[16] Caliendo and Parro found that real wages actually rose in all three countries, albeit the increase was relatively small—especially in Canada and the United States, due to the relative sizes of the respective economies.

On the other hand, the tariff reductions (and other trade liberalizations) affected under NAFTA were much larger for Mexico than the other two countries. Krueger pointed out that Mexico still imposed various import restrictions as late as 1994, and did not join GATT until 1986. She went on to state that the average production-weighted tariff in Mexico fell from about 25 percent pre-NAFTA to about 12 percent post-NAFTA—and to 0 percent in trade with its NAFTA partners. Mexico also had a system of import licensing during this time, and the last piece of it was not disbanded until 2000.

Krueger noted that other researchers have found that export growth has been the largest contributor to Mexican growth since 1993, with non-oil exports from Mexico to the U.S. increasing by almost 600 percent between 1993 and 2012. Over the same time period, FDI has increased 10-fold, which is reflected partly in the current-account deficits Mexico displayed. As others have already noted, the largest gains in trade were in parts and components that were eventually shipped elsewhere for final production. Krueger then pointed out how Mexico's decision to fit itself into global value chains may have indirectly aided the United States in maintaining a competitive advantage relative to Asia. This was due to Mexico providing the United States with unskilled labor-intensive parts and components.

Lessons Learned from NAFTA, and Future Opportunities

In concluding, Krueger highlighted some lessons she feels we can draw from the first 20 years of NAFTA:

1. A FTA is more susceptible to lobbying pressures (and other third-party forces) than are multilateral trade negotiations.
2. The lower the preexisting external trade barriers are, the smaller the trade diversion and welfare losses from PTAs will be.
3. The agreement needs to be strengthened by enabling faster transit of goods, facilitating great labor mobility, increasing regulatory uniformity, and adopting policies for energy and agriculture.

[16] See the presentation by Fernando Parro in this volume for details.

Moving forward, Krueger noted that it's important to understand and acknowledge that no geographic region can function in isolation. Worldwide, countries are entering into deeper agreements with their trading partners, while we are generally not seeing any erecting of new trade barriers (or adding to existing ones) towards nonmembers of agreements. Successful future PTAs will be those that operate under the aegis of the open, multilateral trade system we know as the World Trade Organization (WTO). The growth in importance of global value chains makes this multilateral system all the more important, and the WTO controls rules of origin among other facets of this system.

Speaking to the latter point, Krueger noted that the multilateral system (i.e., the WTO) needs to become the focus for policymakers again. She pointed out that PTAs (and their success) have distracted policymakers away from the global system, and the WTO, coming out of the Bali ministerial, should be given renewed attention. Moreover, a global economy full of smaller regional PTAs and a weak WTO would not be a healthy international economy. That said, steps can certainly also be taken to strengthen NAFTA in a regional sense. Krueger noted that trade facilitation to enable faster transit of goods is one example of this. Another would be policies that facilitate more labor mobility and a more desirable immigration outcome (both permanent and temporary) for workers in particular sectors of the economy. Regulatory uniformity, as well as improved energy and agricultural policies, are other major needs; energy and agriculture are areas with huge potential gains still to be realized. Lastly, working toward a better understanding of NAFTA's place in a global economy—one that soon may have other trade agreements of its size or larger (TPP and/or TTIP)—is also worth exploring.

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Chapter 9:
The Impact of NAFTA on U.S. Labor Markets

Justino De La Cruz and David Riker[17]

In this presentation, Justino De La Cruz discussed the findings of collaborative research with David Riker; both are international economists at the U.S. International Trade Commission. De La Cruz started by pointing out two competing claims about the impact of NAFTA on U.S. labor markets—claims that were debated 20 years ago. One side claimed that NAFTA would have a significant negative effect on U.S. labor markets, as millions of U.S. jobs would be lost to competition from Mexican workers. The other side claimed that while NAFTA would lead to efficiency gains from the expansion of bilateral trade in goods and services, it would have little effect on aggregate labor market outcomes in the United States.

Twenty years later, De La Cruz and Riker reframe this question. They ask: How do the fully phased-in NAFTA preferences affect wages and employment in the United States today? What would happen to real wages and employment in the United States if U.S. imports from Mexico were imported not at NAFTA rates but rather at most-favored-nation (MFN) rates? To answer these questions, they estimated the economic effects of NAFTA preferences using a simulation analysis that increases current tariff rates on U.S. NAFTA imports from Mexico to MFN rates.[18] Their results are consistent with the consensus in the literature that NAFTA has not had significant effects on aggregate outcomes in U.S. labor markets. However, they are also consistent with those of some recent studies that do find significant effects on the U.S. labor market in certain industries.

De La Cruz and Riker first document the decline in the share of NAFTA imports in total U.S. imports from Mexico, as well as the decline in NAFTA preference margins. Next, they incorporate those data into a computable general equilibrium (CGE) model from the Global Trade Analysis Project (GTAP). They then use the CGE model to simulate how real wages and manufacturing employment in the United States would be different absent the recent NAFTA preference margins on U.S. manufacturing imports from Mexico.

[17] The views in this article are solely the opinions of the authors and should not be interpreted as reflecting the views of the U.S. International Trade Commission or any of its Commissioners.
[18] De la Cruz explained that although revoking NAFTA is not a serious policy option, this counterfactual analysis is still useful as a way of quantifying the ongoing impact of NAFTA on U.S. labor markets.

Declining NAFTA Share of Imports in U.S. Total and NAFTA Preference Margin Erosion

The analysis focuses on U.S. imports of nonfood manufactures that are imported from Mexico. De La Cruz and Riker calculated the tariff preference margins, shown in table 1, of products at the 8-digit level in the Harmonized Tariff Schedule of the United States. The tariff preference margin is the percentage difference between the rate that would apply if the goods entered the United States without any preferences (that is, the MFN rate) and the NAFTA rate (usually zero).[19]

The average tariff preference margin first rose, from 1996 to 2004, and then fell for several reasons. First, NAFTA tariff reductions were phased in over the first 15 years of the agreement, and this increased the average preference margin over time. Second, in recent years there has been a rise in the share of imports from Mexico that entered the United States outside of the NAFTA program. This has reduced the average preference margin, since non-NAFTA imports from Mexico do not have NAFTA preference margins. Third, there has been an additional erosion in the average preference margin due to the reductions in U.S. tariff rates on non-NAFTA imports. Finally, there have been shifts in the product mix of U.S. imports from Mexico. The products have different preference margins, and this, too, accounts for some of the changes in the average margin.

Table 1. NAFTA Share of Imports and Preference Margin, 1996, 2004, and 2013 (Percent)

Concept	1996	2004	2013
Average preference margin on all imports from Mexico	3.44	3.63	1.74
Non-NAFTA share of imports from Mexico	23.92	40.51	42.42
Average preference margin on NAFTA imports from Mexico	4.52	6.09	3.03

Source: De La Cruz and Riker (2014).

Model Simulation, Results, and Further Research

The simulations use a 2011 baseline from version 9 of the GTAP database.[20] They focus on the preference margins on U.S. imports from Mexico in the 21 manufacturing sectors in GTAP. They do not

[19] De La Cruz and Riker take account of incomplete preference utilization by using the tariff rates on NAFTA imports of each 8-digit product rather than an average tariff rate on all imports of the product from Mexico, which would combine the rates on NAFTA and non-NAFTA imports from Mexico.
[20] Additional details about the modeling analysis are provided in De La Cruz and Riker (2014).

model the effect of NAFTA reductions in the tariffs on U.S. exports to Mexico.[21] In this regard, they follow recent econometric work by McLaren and Hakobyan.[22]

Table 2 reports the contributions of the NAFTA preference margins to the real and relative wages of skilled and unskilled workers in the United States. The preferences increase the real wages, and therefore purchasing power, of skilled workers in the United States by 0.008 percent. This is the difference between the percentage decrease in the price of skilled labor and the percentage decrease in the consumer price index. Consumer prices fall by more than the price of skilled labor, so real wages increase. The preferences also increase the real wages of unskilled workers in the United States, but only by 0.003 percent. They thus increase the skill premium in U.S. wages by 0.005 percent.

Table 2. Simulated Effects of NAFTA Preference on U.S. Real and Relative Wages, Percentage Point

Impact on real wage of U.S. Workers	Percentage point increase
Skilled workers in the U.S.	0.008
Unskilled workers in the U.S.	0.003
Impact on skill premium	0.005

Source: De La Cruz and Riker (2014).

The real wage effects are smaller than estimates in the literature, including the 0.20 percent increase in U.S. real wages estimated in Brown, Deardorff, and Stern (1992) and the 0.17 percent increase in U.S. real wages estimated in Caliendo and Parro (2015). This is not surprising, since De La Cruz and Riker simulated the effects of recent NAFTA preference margins, which can be much smaller than the historical tariff reductions that are used as inputs in the models in Brown, Deardorff, and Stern (1992) and Caliendo and Parro (2015). In addition, while the estimates from De La Cruz and Riker include the potentially negative shocks to U.S. labor demand from NAFTA (the reductions in tariffs on U.S. imports from relatively labor-abundant Mexico) , they do not include many of the likely positive shocks to U.S. labor demand from NAFTA (the reductions in tariffs on U.S. exports to Mexico and Canada). In this sense, these estimates could be viewed as a lower bound on the positive effects of NAFTA on aggregate real wages in the United States.

[21] We discuss the possibility of adding these preference margins in the next section.
[22] McLaren and Hakobyan (2010) also focus on the tariff reductions on U.S. imports from Mexico. However, unlike McLaren and Hakobyan, De La Cruz and Riker estimate the effects on average wages in the United States, while McLaren and Hakobyan estimate the effects on wages in especially vulnerable locations within the country. Also, McLaren and Hakobyan model monetary wages, rather than real wages, so their model does not quantify the benefits of reduced consumer prices.

Table 3 reports the impact of the preferences on employment in selected manufacturing sectors. The model assumes that the total labor force is fixed, so there are no net employment changes in the U.S. economy. However, there is a reallocation of employment among the different sectors of the economy.

Table 3. Simulated effect of the NAFTA preferences on U.S. manufacturing employment

GTAP sector	Percentage point increase in sector employment	
	Skilled workers	Unskilled workers
Textiles	0.104	0.112
Apparel	-0.308	-0.305
Leather	0.048	0.054
Chemicals, rubber, and plastic	0.073	0.079
Nonmetallic mineral products	-0.044	-0.038
Iron and steel	0.183	0.192
Nonferrous metal products	0.359	0.370
Electronic products	-0.013	-0.007
Other machinery	0.187	0.195
Motor vehicles	0.006	0.012
Sugar products	-0.735	-0.736

Source: De La Cruz and Riker (2014).

Employment declines in several GTAP sectors as the preference margins increase import competition; employment in other sectors grows even though these sectors experience an increase in import competition, as labor is reallocated away from the contracting sectors. The model estimates that the greatest positive employment effects are in the nonferrous metal, iron and steel, and machinery sectors (0.4, 0.2, and 0.2 percent increases, respectively), while the largest negative employment effects are in the sugar and apparel sectors (0.7 and 0.3 percent declines, respectively).

In his discussion of future research, De La Cruz suggested that it would be interesting to try to estimate NAFTA's effects on local labor markets within the United States, following the recent emphasis in the econometric literature. However, this would require a different modeling framework. He also suggested incorporating the preference margins on imports into Mexico into the analysis. Doing so will increase the simulated positive effects on wages in the United States. Finally, De La Cruz noted that he and Riker would like to extend the analysis to model the labor market effects of the nontariff provisions of the agreement.

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Chapter 10:
NAFTA and the Transformation of Canadian Patterns of Trade and Specialization, 1990–2012

Richard Harris and Nicolas Schmitt, Simon Fraser University

Richard Harris and Nicolas Schmitt, professors at Simon Fraser University, reviewed a variety of evidence on Canada's merchandise trade patterns and the changes in these patterns in both the pre- and post-NAFTA periods. Canada's integration into a common North American Free Trade Area occurred in two steps: first as a result of the 1988 Canada-U.S. free trade agreement (FTA), and then with the implementation of NAFTA in 1994, which covered Mexico as an extension of the 1988 FTA. Harris and Schmitt analyzed the impact of these agreements on the Canadian economy via comparative historical analysis of the changes in trade over the 1965–1990, 1990–2000, and 2000–2012 periods.

The 1990–2000 decade is referred to as *the* NAFTA decade, since this was the period in which the full impact of the two trade agreements on the Canadian economy would have been realized. Overall, Harris and Schmitt found that NAFTA led to substantially higher volumes of trade in all types of goods, increased Canada's integration with the United States and Mexico, and expanded trade with non-NAFTA trading partners. The Canada-NAFTA trade generally showed less specialization, with greater trade in primary commodities and intermediate goods. By contrast, Canada's non-NAFTA trade showed increased specialization, especially in imports of finished goods. Under NAFTA, Canada's trade volume rose across almost all sectors, with very large increases in the transportation and electrical machinery sectors. Generally, the changes observed in the NAFTA decade essentially accelerated many of the trade patterns that were evolving from 1965 to 1990.

However, the period of 2000–2012 led to a strong reversal in many of these trends. Notably, Harris and Schmitt found that Canada's trade in manufactured goods with its NAFTA partners declined as measured against GDP. In the same period, resource exports—particularly energy—increased, and there were also significant increases in resource prices, driven by growth in developing countries such as China. The authors examined several possible explanations for the NAFTA trade reversal. Of these, two stand out as leading candidates. First, the large real exchange rate appreciation that occurred in 2000–2012 is consistent with the observed decline in manufacturing exports and increase in resource exports. One can view this either favorably or negatively, but in either case this trend had little to do with NAFTA per se, except for the fact that since Canada's trade with NAFTA is so large it was most apparent in that trade. The second explanation often given is that increased competition from China and other low-cost exporters

is pushing Canada out of its NAFTA partners' markets for manufactured goods**.** Harris and Schmitt find some evidence of such a trend when viewed in the appropriate context.

The NAFTA Decade 1990–2000

NAFTA had a large impact on Canada's aggregate trade performance relative to the 25 years preceding Canada's entry into a continental FTA. In figure 1, the aggregate import and export trade ratios for Canada are graphed for the years 1965, 1980, 1990, and 2000. One can see the general growth in openness to trade driven by globalization and multilateral trade liberalization: the trade ratios increased from 1965 to 1990, and then both imports and export ratios underwent a substantial acceleration post-1990. From 1990 to 2000, volumes in goods trade basically doubled. The NAFTA decade also saw a decline in Canada's traditional role as an exporter of natural resource products and a shift towards exports of finished and intermediate manufactures. These trends are highlighted in table 1. The significant fall in commodity prices that began with the disinflation of the 1980s led to a substantial decline in primary exports from 1980 to 1990. But between 1990 and 2000, the implementation of the Canada-U.S. FTA and then NAFTA led to substantial increases in exports and imports of both finished and intermediate products. NAFTA was largely a trade-creating event from Canada's perspective, as non-NAFTA trade increased in both exports and imports. By far the bulk of this increase was in Canada-U.S. trade in finished and intermediate products.

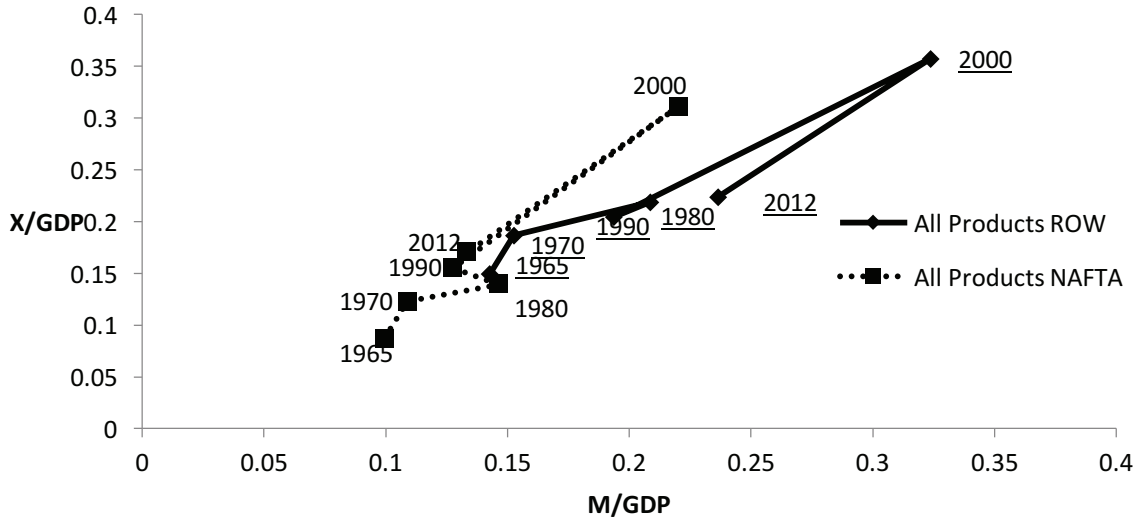
Harris and Schmitt also discussed Canada's trade with Mexico during this period. They noted a substantial increase in trade in both finished and intermediate goods, most of which did not exist before NAFTA. The pattern of specialization across SITC-2-digit sectors[23] remained remarkably stable from 1990 to 2000, as measured by methods employing revealed comparative advantage for analysis. Of particular note is the very important role that the transportation equipment sector played during this decade reflecting Canada's long-standing integration of its automobile sector in the North American market.

Table 1: Exports and Imports with Rest of World (ROW), NAFTA, and Non-NAFTA Countries per Product Type

Based on SITC4-digit data	1980	1990	1995	2000	2005	2012
Exports/GDP_Cdn						
Primary ROW	7.9%	4.9%	6.2%	8%	8.5%	9%
Intermediate ROW	9.1%	8.5%	14.5%	12.8%	10.1%	6.7%
Finished ROW	4.6%	7%	16.8%	14.9%	10.3%	6.7%
Primary NAFTA	4%	2.8%	7.5%	6.6%	6.9%	6.5%
Intermediate NAFTA	6.1%	6.5%	12.3%	10.9%	8.5%	5.2%
Finished NAFTA	3.7%	6.2%	15.4%	13.6%	9%	5.5%
Primary Non-NAFTA	4%	2.1%	1.6%	1.4%	1.6%	2.5%
Intermediate Non-NAFTA	2.9%	2%	2.2%	2%	1.6%	1.5%
Finished Non-NAFTA	1%	.8%	1.4%	1.2%	1.3%	1.2%
Imports/GDP_Cdn						
Primary ROW	5%	2.8%	4.2%	3.7%	3.9%	4%
Intermediate ROW	7.2%	7.3%	14.8%	13.1%	9.7%	7.9%
Finished ROW	8.4%	9.3%	17.6%	15.5%	12.8%	11.5%
Primary NAFTA	2.5%	1.3%	1.9%	1.7%	1.7%	1.8%
Intermediate NAFTA	5.9%	5.6%	11.5%	10.2%	7.2%	5.4%
Finished NAFTA	6.2%	5.9%	11.4%	10.1%	7.3%	6.2%
Primary Non-NAFTA	2.6%	1.5%	2.3%	2%	2.1%	2.3%
Intermediate Non-NAFTA	1.3%	1.7%	3.3%	2.9%	2.6%	2.5%
Finished Non-NAFTA	2.2%	3.4%	6.2%	5.5%	5.5%	5.4%

Source: Harris and Schmitt (2014)

Figure 1. Canada Trade Ratios 1965–2012



Source: Harris and Schmitt (2014)

Canada in NAFTA in the 21st century

Harris and Schmitt discussed three major developments that occurred in Canada's trade patterns after 2000. The most remarkable of these is evident in the aggregate trade ratios graphed in figure 1. By 2012, both the export-to-GDP and import-to-GDP ratios had almost completely reversed their NAFTA-decade trajectories, returning to values seen before NAFTA's implementation. This admittedly dramatic reversal has created considerable alarm among policymakers, and in some cases is simply interpreted as an indication that NAFTA is no longer as important or as beneficial to Canada as during the NAFTA decade. Harris and Schmitt argued that this is incorrect. They stated that these trade-ratio dynamics instead reflect the response of the economy to three larger external shocks that took place from 2000 to 2012: (1) The rise of China as a manufacturing powerhouse, subjecting all three NAFTA partners' home markets to substantial import competition from China; (2) the global financial crisis, which led to a period of subpar growth in most of the developed-country markets in the world, including the U.S. market; and (3) a significant commodity boom in Canada, concentrated in the energy sector and accompanied by a real exchange rate appreciation of unprecedented magnitude from 2000 to 2012. According to Harris and Schmitt, given the overwhelming importance of NAFTA to Canada's overall trade, each of these external developments were necessarily evident in changes in Canada's trade patterns with its NAFTA partners.

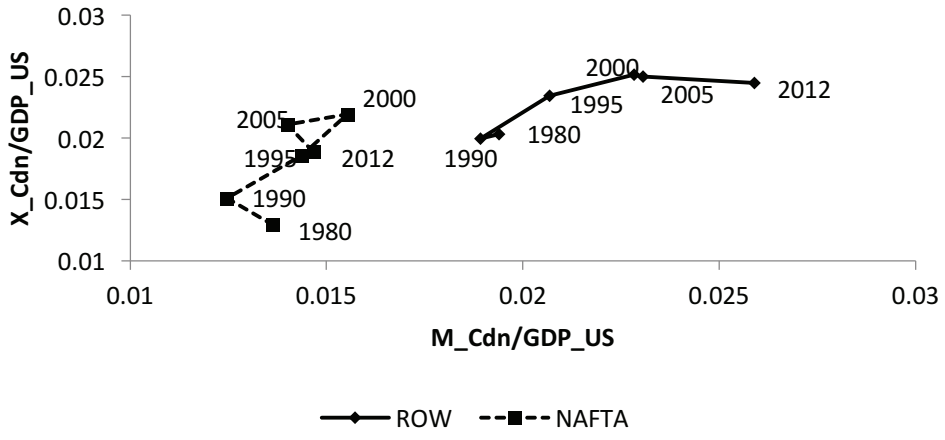
In this connection, Harris and Schmitt also pointed to the growth of non-NAFTA imports, which has been substantial for Canada. In 2000, non-NAFTA imports to Canada as a share of total imports stood at 32

percent; by 2012, that share had grown to 43 percent. This is in sharp contrast to the United States, which had a very stable ratio of non-NAFTA imports to total imports throughout the entire 1990–2012 period.

The second development noted by Harris and Schmitt was the slowdown in growth in the United States over the period from 2000 to 2012, relative to its growth in the NAFTA decade preceding it. This growth slowdown has been widely discussed and is attributable to a number of causes, including the terrorist attacks of 9/11, the Iraq-Afghanistan wars, the financial crisis of 2008–09, and the European sovereign debt crisis. From 1990 to 2000, cumulative U.S. growth was about 40 percent, in contrast with Canadian growth of 33 percent. From 2000 to 2012, however, U.S. growth was only 23 percent and Canadian growth a similar 25 percent.

Harris and Schmitt explained that Canada's strong trade expansion during the NAFTA decade was clearly driven in part by the stronger economic growth of its major trading partner, who at the peak took in excess of 80 percent of Canadian exports. Looking at Canada's trade measured against the U.S. GDP (both measured in a common currency) gives a more natural picture of the shifts in trade patterns, adjusting for changes in the size of the major trading partner within the free trade area. Canada's trade evolution calculated this way is presented in figure 2 for both total trade and NAFTA-only trade. Harris and Schmitt note the contrast with figure 1—in particular, the dotted line showing NAFTA trade ratios, where the reversal is substantially more modest than in figure 1. Thus, correcting just for U.S. growth goes a long way toward eliminating the reversal puzzle. The authors pointed out that looking in the same way at total trade, which includes non-NAFTA trade, shows that Canada in fact had a very modest reduction in exports and an increase in imports, consistent with the authors' previous discussion of the increased role of non-NAFTA imports. Harris and Schmitt stated that if one looks at Canada's trade benchmarked against total NAFTA GDP, the picture is similar.

Figure 2: Canada Trade/US GDP Ratios



Source: Harris and Schmitt (2014)

The third shock during this period was the global commodity boom beginning in 2002 and, in particular, the substantial increase in global energy prices. Much of this boom was driven by the growth in demand for commodities in countries such as India and China. In addition, Canada's total energy reserves, particularly in heavy oil, also increased as new extraction technologies were developed. The energy share of Canada's net exports of natural resources went from 22 percent of the total in 2000 to 63 percent of the total in 2012. This is the single most important development in terms of the internal structure of the Canadian economy during this period.

The commodity boom, together with the disruptions caused by the global financial crisis, led to a remarkable appreciation, both real and nominal, of the Canadian dollar, which rose from 62 cents to the U.S. dollar in 2002 to above par first in 2007–08 and then again in 2011–12. Some measures of real exchange rate appreciation show even more dramatic changes during this era. For example, the ratio of unit labor costs (ULCs) of Canadian to U.S. manufacturing as a measure of the relative competitiveness of Canadian manufacturing to U.S. manufacturing increased by 109 percent from 2000 to 2012. The decline of manufacturing exports, as evident in the reversal and in the simultaneous strong appreciation of the currency, is commonly believed to be evidence that Canada is experiencing a decreased in competitiveness in manufacturing brought on by strong growth in natural resources (the so-called Dutch disease). A decline in the export-to-GDP ratio in non-commodity trade is often interpreted as the primary indicator of Dutch disease. Harris and Schmitt look at this issue using a basic trade-elasticities approach in which relative prices and incomes determine shifts in import and export demand. This approach takes

both of the exchange rate movements as given and assumes full pass-through of the exchange rate changes to demand prices.

Looking first at non-commodity exports, it is apparent that an export demand model with a price elasticity of minus one and an income elasticity of unity comes very close to replicating the observed data. The implication of the model is that Canada's market share in the United States, measured as total export revenue relative to U.S. income, stayed about constant during the period. Thus, while there was a large exchange rate appreciation, demand conditions in the United States were such that movements in export revenues measured in U.S. dollars were parallel to movements in U.S. income. However, export revenues measured in Canadian dollars declined by the full amount of the exchange rate appreciation. Thus, export revenue from manufactures measured relative to Canadian GDP also declined by a similar magnitude. So by this account, "Dutch disease" in Canada's case was not a loss in Canada's relative market share in the U.S. market, but rather a reflection of the role of the exchange rate change in deflating Canada's domestic currency export revenues.

The standard Dutch disease theory would also predict that the exchange rate appreciation would be accompanied by an increase in imports relative to GDP. The trade reversals evident in figure 1 are not consistent with this theory, since both exports and import ratios declined from 2000 to 2012. This remains a major puzzle, Harris and Schmitt concluded.

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Chapter 11:
The Producer Welfare Effects of Trade Liberalization When Goods Are Perishable and Habit-forming: The Case of Asparagus

Peyton Ferrier and Chen Zhen

This presentation by Peyton Ferrier,[24] an economist at the Economic Research Service of the U.S. Department of Agriculture, focuses on how out-of-season imports of asparagus have changed consumer habits in the United States. Ferrier and his co-author, Chen Zhen, used a set of equilibrium displacement models to analyze the effects on producers' surplus of lowering or ending tariffs on asparagus in the United States under NAFTA and the Andean Trade Preference Act, and to quantify the tariff changes' offsetting effects on consumers' habits. They then compared their results with the subsidies asparagus farmers received under the 2008 U.S. Farm Bill to compensate for increased imports due to the tariff changes. Their conclusion suggests that changes in U.S. consumers' eating habits due to increased off-season asparagus imports reinforce in-season demand for domestic asparagus, and as a result, counterweigh U.S. asparagus producers' welfare loss from the imports.

Background

Sales of asparagus in the United States total $451 million annually, with 95 percent of the U.S. supply coming from the United States, Mexico, and Peru. Asparagus is a springtime crop that follows a 10- to 13-year growth cycle. In the United States, its growing season is between February and June; when mature, it is harvested daily by hand for 2–3 months. Asparagus is a highly seasonal, perishable crop, and as figure 1 shows, between 1988 and 1991 fresh asparagus was largely unavailable in the United States outside its harvest season. Reduced consumption due to out-of-season unavailability may have weakened long-term demand.

Twenty years later, imports from Mexico and Peru have made fresh asparagus available almost year-round to U.S. consumers. Figure 2 shows that between 2007 and 2010, imports typically arrived outside of the periods of U.S. production. Hence domestic asparagus producers faced little if any direct competition from imports.

[24] "Disclaimer: Peyton Ferrier's presentation and journal article did not necessarily reflect the views of the USDA or the Economic Research Service."

Figure 1. U.S. Fresh Asparagus Supply by Source: 1988-1991 (Millions of Pounds)

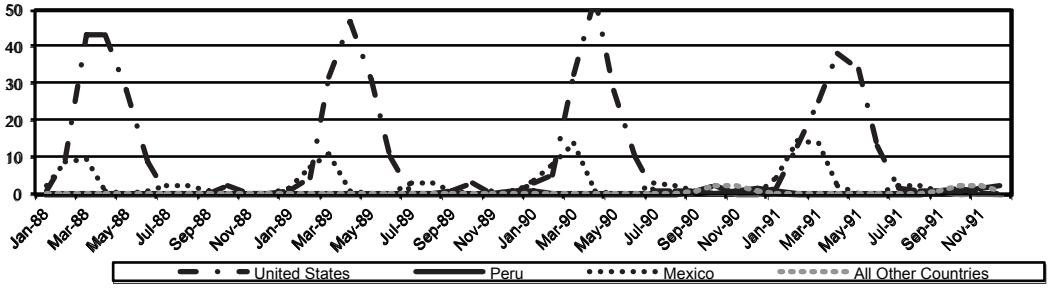
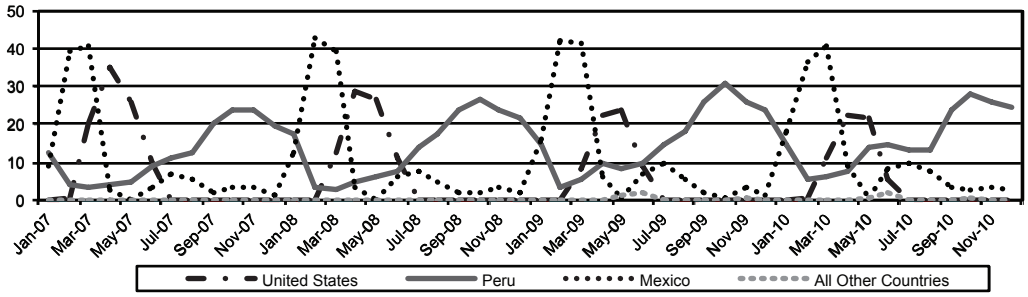


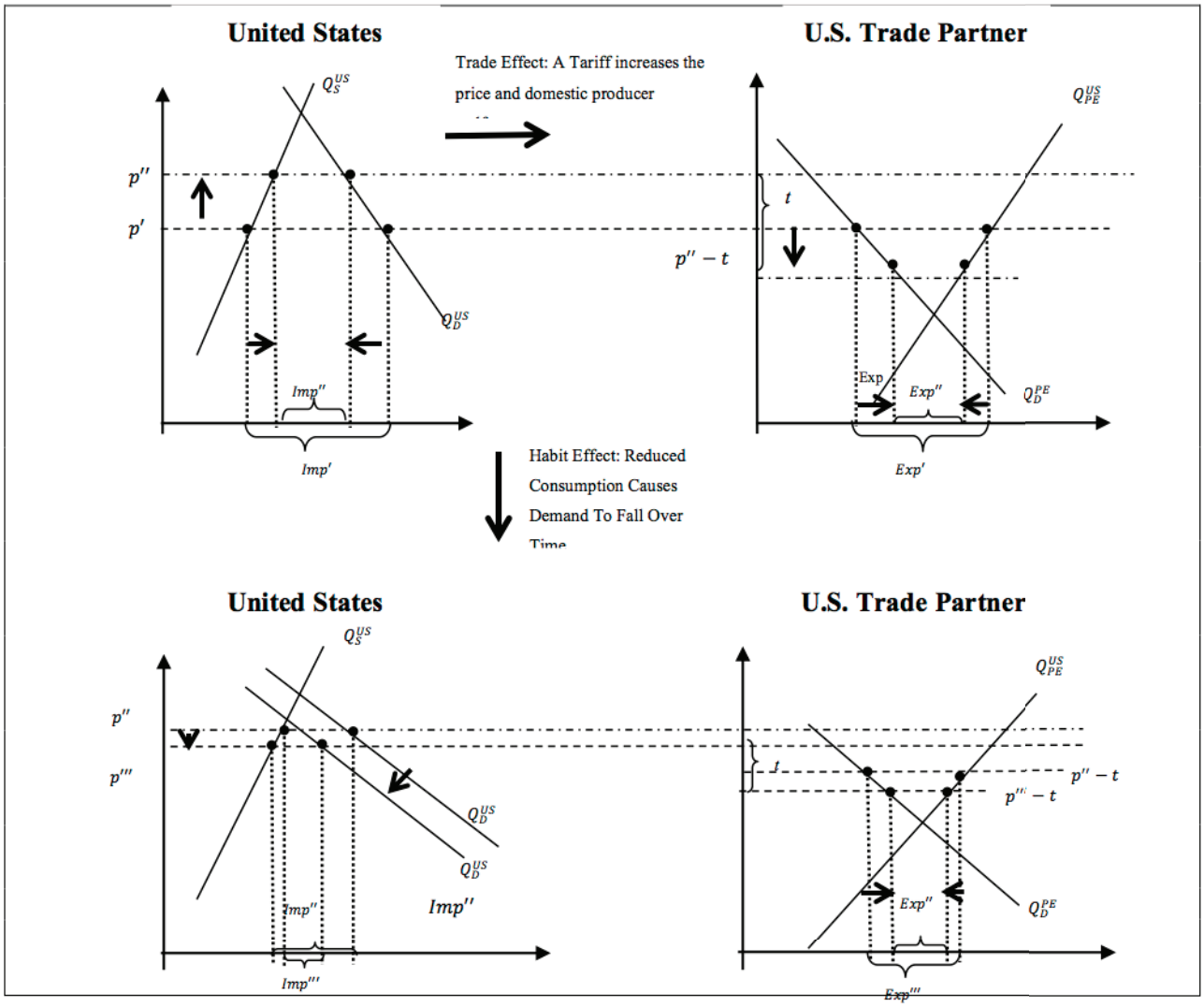
Figure 2. U.S. Fresh Asparagus Supply by Source: 2007-2010 (Millions of Pounds)



Source: Chen and Ferrier (2014)

Nevertheless, until the early 1990s U. S. asparagus imports were subject to a most-favored-nation (MFN) tariff rate of 21.3 percent most of the year and 5 percent during September–November. A tariff that reduces imports is thought to benefit U.S. producers by reducing import competition. The top half of figure 3 shows this classic trade effect, in which prices for U.S. producers rise following imposition of a tariff. However, high prices may short-circuit the process in which consumers develop habits around a good they consume regularly; potentially, the high prices reduce long-term demand. As the bottom of figure 3 shows, over time, persistently lower consumption eventually lowers demand and offsets a portion of the producer surplus loss from the price increase caused by the tariff.

Figure 3: Trade-Competition and Habit Effects of a Tariff Change for the U.S. and Trade Partner



Source: Ferrier and Zhen, 2014

The Andean Trade Preference Act (ATPA) of 1991 and NAFTA (1994), with later updates, changed the described tariff pattern for U.S. asparagus consumers. Updates to ATPA (2009, 2011) eliminated the U.S. tariff on asparagus for Peru; NAFTA phased it out for Mexico over a period of 14 years. Taking the influx of tariff-free asparagus imports into consideration, the 2008 U.S. Farm Bill provided $15 million in market loss assistance (MLA) to U.S. asparagus producers to compensate them for competition from lower-priced asparagus imports from the four prior years (2004 to 2007). This was a direct payment of $1.875 million per year distributed to U.S. fresh asparagus producers collectively.

Growth in tariff-free U.S. imports of asparagus increased both availability and consumption of out-of-season asparagus. U.S. consumers may develop habits around a good they consume regularly by learning its quality characteristics, techniques for cooking it, and how to use it in various dishes. And these new habits for goods such as asparagus can change the tariff pattern described above, because, as Ferrier noted, "availability during off season strengthens and sustains demand" for in-season crops. That is, imports create a consumption "habit" in U.S. consumers, which creates an overall positive effect for domestic as well as foreign producers. But how strong is this "habit effect" for asparagus? Specifically, Ferrier wanted to know which was more beneficial to U.S. producers: the "habit effects" or the MLA subsidies.

Measuring the Offset Effects of New Habits vs. Total Net Benefits of Re-imposing the MFN Tariff

To measure the effects of offsetting asparagus habits, and see what happens if one decreases a tariff rate for a time period, Ferrier and Zhen used a two-step analysis employing demand estimation and equilibrium displacement models. They first estimated a flexible Translog Demand System, gathered quantity data for asparagus, carrots, broccoli, and cauliflower from USDA's Agricultural Marketing Service, and used lagged consumption as a demand shifter. They calculated a lag quantity term that consists of the discounted sum of 12 months' previous consumption of each of the vegetables and estimated a discount rate of 55.89 percent; this rate discounts the estimated effect of the previous month's consumption by about one-half. Then, they estimated the elasticity for demand with respect to lagged consumption. Next, they computed a pair of equilibrium displacement models (A and B) which used estimated demand elasticities as consumption patterns. Ferrier and Zhen also assumed that quality is homogenous (due to well-established quality grades for asparagus) and that the cross-commodity supply elasticities of other vegetables with asparagus are zero. As a result, Equilibrium Displacement Model A simulates the positive effect of re-establishing MFN tariffs on U.S. producers and assumes no effects on consumer habits, while Equilibrium Displacement Model B simulates the losses associated with reduced consumption habits on U.S. producers.[25]

Welfare Effects

The effects examined show that U.S. producers initially lose when this tariff is removed or lowered. In the model without the "habit effects," U.S. producers' welfare drops by 0.28 percent. When the tariff reduction rate (a 21.3 percent or a 5 percent tariff reduction, depending on the month it is applied) is multiplied by the total revenue of the asparagus industry, this calculated figure is the approximate total

[25] For additional details and actual equations of the model, please refer to paper.

effect of tariff reduction on U.S. consumers and producers. As mentioned, the initial effect is not always positive for all parties. When NAFTA was enacted and Mexico lowered its tariffs, the loss to Peruvian producers due to increased competition from Mexican asparagus was 0.1 percent. When ATPA was put in place, reducing the tariffs on Peruvian asparagus, the loss to Mexico due to increased competition from Peru was 0.13 percent, slightly more than the United States' 0.09 percent losses. Then when both NAFTA and ATPA went into effect, the United States lost 0.36 percent of its potential producer revenue. Nonetheless, the results show that when no "habit effects" are taken in to account, the MLA's cost was higher than the welfare loss from the tariff reduction.

Moreover, as previously mentioned, having out-of-season asparagus imports also causes consumers to take advantage of asparagus's increased availability. Regular availability results in newly acquired tastes, and after consumers have formed new habits, consumption increases. In these circumstances, the tariff reduction may become a benefit to U.S. producers as well as consumers. As Ferrier noted, "When we liberalize trade by reducing tariffs, the quantity supplied increases. That creates a positive habit for U.S. goods that will actually offset a good bit of the harm." In this case, when NAFTA is in place, the effect on U.S. producer welfare goes from -0.28 percent without the habit effect to -0.1 percent with it. When both ATPA and NAFTA are put in place, the effect on U.S. producer welfare goes from -0.36 percent without the habit effect to positive 0.04 percent with it. In this case, once the "habit effects" are factored in, the welfare losses to U.S. producers decrease or vanish. These results show that under NAFTA, as Ferrier explained, "seasonality and habit formation offset some of the harm to producers from trade liberalization by about 64 percent" of the welfare losses to U.S. asparagus producers from increased Mexican imports. Furthermore, when both NAFTA and ATPA are in place, the "habit effects" offset 100 percent of the U.S. producer welfare losses from increased Peruvian imports under ATPA.

Asparagus may be the prime example of off-season habit formation's potential for offsetting some or all of the harm to agricultural producers from trade liberalization, but it is probably not the only one. For example, the approach used in this presentation may well be applicable to Chilean agricultural goods that are widely sold in the United States, including grapes, berries, and stone fruits (peaches, plums, and nectarines); all of these, like asparagus, are highly perishable. It would also be interesting to learn whether U.S. producers of preserved (canned and frozen) asparagus have been harmed by liberalization, but getting enough data to study these goods, unfortunately, is very difficult.

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Chapter 12:
North American Energy: A Clear Path Forward?

Kenneth B. Medlock III

In his presentation, Kenneth B. Medlock III, professor of economics at Rice University, discussed shifts in global energy production and in North American energy markets over the past 20 years, particularly as regards the development of shale crude oil and natural gas. He also described the obstacles holding back energy sector development and the conditions needed for robust growth in the sector. Medlock's main conclusion was that, despite large-shale endowments in the NAFTA countries and the fast-paced development of the industry in the United States, all three member economies still need to undertake reforms to boost production, market development, and energy security in North America.

Medlock stated that North America—particularly the United States—has undergone a remarkable transformation in energy terms over the past 10 years due to its natural shale endowments, as well as the investment into and development of the technologies that make it possible to extract shale gas and oil. He pointed out that while geologists have been aware of North America's shale basins for some time, high natural gas prices in the early 2000s created investment and production incentives that triggered the boom in the industry.

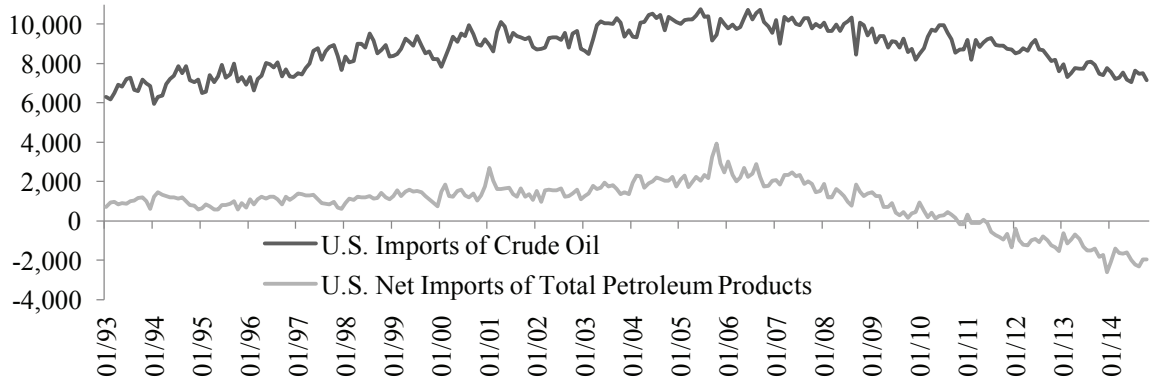
Favorable geological conditions and market structure, Medlock argued, are only two of the ingredients necessary for the successful development of a shale gas and oil industry. A host of other factors—largely regulatory, infrastructural, and legal—are vital to achieving robust development. For the United States, these factors have included:

- Upstream firms that negotiate directly with landowners for access to mineral rights.
- A market in which liquid pricing locations, or hubs, exist and are easily accessed due to liberalized transportation services being unbundled from pipeline ownership.
- A well-developed pipeline network that can accommodate new production volumes.
- A market in which interstate pipeline development is relatively seamless due to a well-established governing body—the Federal Energy Regulatory Commission—and a comparatively straightforward regulatory approval process.
- A market in which demand pull is sufficient and can materialize with few regulatory impediments, thus allowing new supplies to compete for market share.

- A market where a well-developed service sector exists that can facilitate fast-paced drilling activity and provide rapid response to demands in the field.
- A competitive service sector that strives to lower costs and advance technologies in order to gain a commercial advantage.
- A rig fleet that is capable of responding to upstream demands without constraint.
- A deep set of upstream actors—independent producers—that can behave as "entrepreneurs," thereby facilitating a flow of capital into the field toward smaller-scale, riskier ventures than those typically engaged by vertically integrated majors.

Under these conditions, the United States has experienced a boost in both natural gas and crude oil production. The year 2006 marked the beginning of the resulting downturn in U.S. crude oil imports; by 2011, the U.S. had become a net exporter of petroleum products (figure 1).

Figure 1. U.S. Petroleum Net Imports and Crude Oil Imports, 1993–2014, Thousands of Barrels per Day



Source: U.S. Energy Information Administration

Despite the U.S. success, there are some potential barriers that are limiting or have limited further industry growth. Most notably, Medlock pointed to regulations banning exports of crude oil that may hinder demand for U.S.-produced shale oil unless changes in legislation are made. Also, as sectors that consume petroleum products become more energy-efficient, the demand for these products may also decrease over time.

In Mexico, Medlock pointed out, other impediments have held back the development of its energy industry relative to the U.S. industry, despite the existence of large endowments. First, local-content requirements have created the need for local entities to be involved in the development of the industry. He argued that Mexico already has a large offshore oil industry that could more easily participate in onshore

energy development—because of the infrastructure and service industry that has developed around it—if strict local-content requirements were not an issue. Medlock also noted concerns about shortfalls in infrastructure, services, and security:

> "When you talk about onshore activities, there's a lack of infrastructure, there's a lack of a well-developed service industry south of the border to support the activity, and there are real concerns about security . . . really, all of those things have to be addressed if you're going to see rapid movement on that space as well."

Medlock said that these impediments have had considerable effects on Mexican industry's ability to attract capital and develop market structure. He noted that there is a need for energy policy reform to "try to invite or entice capital into Mexico so that we can revitalize the upstream sector there."

Canada's gas and oil development has also been hindered relative to the U.S. boom, despite Canada's large natural endowments. Medlock stated that the impediments in Canada largely involve policy-related demand constraints and infrastructure. The U.S. failure to approve the completion of the Keystone Pipeline XL has dampened demand for Canadian shale resources. Furthermore, Canada's natural gas and oil also suffer from a lack of transportation infrastructure, due to geographic isolation and the cost of building a pipeline network in some areas where it is virtually nonexistent.

In summary, Medlock reaffirmed that much needed to be done to unlock North America's shale resources. He argued that impediments—both on the supply side, including infrastructure, and the demand side—need to be addressed and resolved in order for greater energy security to be achieved in North America.

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Chapter 13:
NAFTA and Mexican Industrial Development

Eric A. Verhoogen

In his presentation, "NAFTA and Mexican Industrial Development," Eric A. Verhoogen, Associate Professor and Co-Director of the Center for Development Economics and Policy (CDEP) at Columbia University, discussed the role that NAFTA and international integration have played in Mexico's recent growth. He noted that Mexico's recent performance has been mediocre relative to other middle-income countries, and offered what he called an "old-fashioned idea" as a potential partial explanation for Mexico's disappointing performance. He argued that integration into the international economy led Mexico to specialize in less capital- and skill-intensive activities, which tended to be less innovative. The sectoral shifts within the Mexican economy, tended to lower Mexico's rate of innovation overall, and may well have caused some of the economic stagnation we have witnessed.

Mexico's Growth Relative to its Peers and Possible Explanations

Referring to Hanson (2010), Verhoogen put Mexican growth in the context of comparable countries from various parts of the world, focusing on GDP per capita growth since 1980. In Latin America, Chile has vastly outperformed Mexico. Mexico compares more favorably with Argentina and Brazil, but Verhoogen noted that both of those governments have had much more heterodox policy regimes. Venezuela is the only country of the five Latin American countries listed (Mexico, Brazil, Venezuela, Argentina, and Chile) that Mexico has clearly outperformed.

When one looks at middle-income countries in other regions in Hanson's analysis, Mexico fares even worse. Examining some Asian countries, Mexico's growth rate has been substantially less than those of Thailand, Indonesia, and Malaysia, and lines up much more closely with the Philippines. Turning to Eastern Europe, Mexico trails considerably behind Turkey, Bulgaria, and Hungary; in recent years, even Romania has surpassed Mexico. Taking all of these together, it's a fair question whether or not NAFTA and, more generally, integration with the other two NAFTA countries has played some role in this—and if so, is that role a positive or negative one?

There are a number of possible alternative explanations as to why Mexico has underperformed in recent decades. Verhoogen cites a few previously mentioned at the conference: Arias et al's discussion of monopolies and inefficient regulation in Mexico, Haber's discussion of Mexico's underdeveloped credit markets, and Levy's focus on informality and tax evasion. Another major issue that Verhoogen

acknowledged is corruption in Mexico. He goes on to concede that all of these may be contributing, but he instead wants to explore the role (if any) that trade and integration might be playing in Mexico's lackluster economic growth.

Evaluation of NAFTA: Two Approaches to Analyzing Mexican Growth

Verhoogen conceded that evaluating NAFTA is extremely difficult because so many things were changing simultaneously. For example, many steps toward trade liberalization in Mexico actually occurred in the 1980s, and their effects might have been delayed. Moreover, the 1995 peso crisis in Mexico might have overwhelmed any positive NAFTA effects, since the devaluation was much larger than the tariff changes (Krueger 2000). Verhoogen then discussed two different approaches that several studies have taken to evaluate NAFTA: applied general equilibrium modeling, and reduced-form methods (difference-in-difference, most commonly).

For the former, Verhoogen cited Tim Kehoe's paper of 2005. He reiterated that the main advantage of applied general equilibrium (GE) modeling is that it allows us to make theoretically well-grounded statements about general-equilibrium effects as well as about welfare effects.

The main drawback is that the model has to be right in order for these statements to be valid, and that's often not an easy thing to be certain about. In the case of NAFTA, applied GE models did not perform particularly well in predicting the effects of NAFTA that are now observed. One reason for this is the new-goods margin—the growth of new goods or of goods that weren't previously exported much.[26] Another is that the aggregate changes seem to be often driven by total factor productivity (TFP) changes, but applied GE models do not normally endogenize TFP. That is, the models show sectoral shifts central to the analysis, but pay relatively little attention to productivity changes that are endogenous to trade liberalization.

In discussing the reduced-form approach, Verhoogen began by summarizing a USITC piece (De La Cruz et al. 2013). The main advantage of the reduced-form approach, according to Verhoogen, is that it requires weaker assumptions than applied GE modeling does. On the other hand, though, studies using the reduced-form approach are unable to make statements about GE and welfare effects. This approach is best equipped to document productivity changes. Verhoogen then discussed four other papers, López-Córdova (2003), De Hoyos and Iacovone (2013), Iacovone (2012), and Verhoogen (2008), that all look at this from different perspectives.

[26] See Tim Kehoe's presentation for a discussion of the new-goods margin.

Verhoogen next explored the "old-fashioned idea" he previously mentioned. The idea is that different activities are associated with different inherent rates of innovation and productivity growth. Essentially, some industries tend to generate more innovation, more new ideas, and more productivity growth than others. Moreover, liberalization changes the patterns of specialization that may lead to specialization in non-dynamic activities. To demonstrate this, he first looked at broad sectoral shifts, using figures from Verhoogen (2008). He noted that the sectors with the lowest share of workers having 12 years of education grew the fastest in Mexico from 1988 to 1998. Similarly, he showed that over the same time span, industries with a lower capital-labor ratio grew faster. From 1998 to 2008 the trend reverses, but overall growth is much lower and flatter across sectors in both cases. He went on to show that this expansion of the low-skill and low-capital-intensive sectors from 1988 to 1998 was driven by an increase in maquiladora employment. Verhoogen argued that this is part of the reason why Mexico has not been faring as well as most expected.

Possible Explanations of Why Mexico Hasn't Grown

So why did this happen? The first explanation Verhoogen explored was one that is commonly cited; Mexico just had bad luck with regard to the emergence of China. The argument is essentially that China entered the metaphorical arena just as Mexico was poised to grow, and this hurt Mexico's stance tremendously because China specialized in similar types of exports to the United States. Verhoogen went on to cite numerous pieces of research giving evidence in support of this notion: Utar and Torres-Ruiz (2013); Kumler (2014); López-Córdova, Micco, and Molina (2008); Hanson and Robertson (2010); and Hsieh and Ossa (2011). However, Verhoogen felt Mexico would have had significant problems even if China had not emerged. He explored these problems in the next section of his presentation.

Verhoogen looked at a research and development (R&D) survey from Mexico's National Survey of Employment, Wages, Technology and Training in the Manufacturing Sector (ENESTyC), which shows that innovation was correlated to both high-skill and capital-intensive sectors in Mexico, which is what one would expect to see. By contrast, while the maquiladora industry shows more specialization, it simply isn't innovative. Knowing that Mexico's specialization was not occurring where innovation was highest may serve as an explanation for Mexico's stagnation. He furthered this point by showing Mexico's decline over time (and extremely low world ranking) with regard to patents per million workers in 1960–2000 (data from Lederman, Maloney, and Serven 2005). Moreover, Verhoogen used an alternative metric of innovation and, on a macro level, showed that Mexico spends less than half as much on R&D as a percentage of GDP as Chile and China do, and significantly less than Korea, the United States, and Canada. See table 1.

Table 1. A Measure of Innovation: R&D, Percent of GDP, 1998

Country	R&D Spending / GDP (%) in 1998
United States	2.59%
South Korea	2.34%
Canada	1.76%
Chile	.65%
China	.65%
Mexico	.38%

Source: Data from World Bank World Development Indicators for 1998.

Conclusion and Areas of Future Research

In conclusion, Verhoogen argued that this period of integration (1998–2008) led Mexico to specialize in less capital- and skill-intensive activities, and these sectors are the ones that are normally less innovative in relative terms. Had China not entered the U.S. import market, Verhoogen hypothesized that another country would have eventually, and Mexico's lack of innovation would have still been a problem that created stagnation. He claimed that, while future research on this is certainly needed, it appears that there may be some tradeoff between static allocative efficiency and long-term productivity growth. Trade liberalization may not bring about sustained economic growth if it leads to specialization in sectors with little innovation. He suggested that policymakers should consider some mechanisms of economic intervention that promote activities that generate innovation and productivity growth. "This argument relies on the idea that innovation generates positive externalities," he added, noting that this question is the subject of his forthcoming research.

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Chapter 14:
NAFTA Rules of Origin:
Adaptation in North America and Emulation Abroad

Antoni Estevadeordal and Jeremy T. Harris[27]

In his presentation, "NAFTA Rules of Origin: Adaptation in North America and Emulation Abroad," Jeremy T. Harris, an economist at the Inter-American Development Bank, noted that NAFTA has introduced a new model for designing, negotiating, and implementing rules of origin. Harris said that in so doing, NAFTA has set up a model of success for ensuing free trade agreements (FTAs). In his joint research with Antoni Estevadeordal, manager of the Integration and Trade Sector at the Inter-American Development Bank, Harris has addressed the question of how the rules of origin in NAFTA have become more flexible and how this flexibility has affected the trade flows between the United States, Canada, and Mexico. According to Harris, his and Estevadeordal's research also indicates that NAFTA set the default "template" for the product-specific rules of origin (PSROs) of subsequent FTAs of NAFTA partners, and also heavily influenced other FTAs globally.

To outline the results of his and Estevadeordal's findings, Harris first described the evolution of NAFTA's rules of origin. Next, he introduced the five liberalizations of PSROs in NAFTA, and showed their impacts on the trade flows between the United States, Canada, and Mexico. Finally, he compared the PSROs found in NAFTA with those found in other FTAs via an examination of four different dimensions of these rules.

Evolution and Liberalization of Product-Specific Rules of Origin in NAFTA

In the first part of his presentation, Harris explained the reasons for using PSROs in NAFTA, as well as the reasons why default positions of PSROs in NAFTA tend to be restrictive. According to Harris, countries with a diverse export supply (i.e., large countries) would favor regimes with rules that vary across products. Therefore, when negotiating FTAs, negotiators from such countries usually use PSROs. Meanwhile, supporting evidence comes from the results of a simple regression comparing the combined gross domestic product (GDP) and the size of the economies covered by an FTA with the level of restrictiveness of the FTA's rules of origin. The results showed that FTAs with higher combined GDPs have more restrictive PSROs, which reflects the greater availability of material inputs within the partner

[27] The views in this article are solely the opinions of the authors and should not be interpreted as reflecting the views of the Inter-American Development Bank.

countries. A second factor, according to Harris, is uncertainty about eventual FTA effects; this may have led to conservative default positions and, therefore, to more restrictive PSROs than strictly necessary. These two factors probably explain why the default positions of PSROs in NAFTA have been restrictive. However, as Harris pointed out, NAFTA does include mechanisms for modifying the rules of origin.

Next, Harris introduced two ways to modify PSROs in NAFTA. The first is "technical rectifications"—updates of existing rules so they will accord with new versions of the international Harmonized System. According to Harris, in principle this leaves the effects of the rules unchanged. The second approach is liberalization of PSROs, which changes the rules to allow greater use of non-originating materials.

Harris then briefly described the five PSRO liberalizations NAFTA has made. Not all were suitable for further analysis. Since the first liberalization only covered the chemical sector and the 2009 one overlapped with the financial crisis, which could result in outside factors swamping any visible effects of the liberalization, Harris only analyzed and demonstrated the effects of the three other liberalizations on trade flows of NAFTA partner countries. The three liberalizations occurred in 2003, 2005, and 2006, and liberalized 76, 112, and 120 subheadings, respectively. Harris then showed the figures for the intra-NAFTA bilateral trade flows—between Canada and Mexico, Canada and the United States, and Mexico and the United States—in 2004, 2006 and 2007, respectively. He found that all bilateral trade flows in these three years experienced more growth in some liberalized products than in comparable products without PSRO changes. He also noted that changes that resulted in greater access to U.S. or Canadian markets were twice as common as changes that resulted in greater access to the Mexican market. Finally, the growth rates of some liberalized products were high enough to argue that trade in those products was not economical without the liberalization of PSROs. Hence, Harris concluded that overall the NAFTA mechanism for liberalizing PSROs does work well and should be used more frequently in other FTAs.

Global Influence of the NAFTA Rules of Origin

In the second part of his presentation, Harris discussed the global influence of the NAFTA PSROs. Harris stated that looking at a sample of FTAs signed after NAFTA took effect had shown him that NAFTA PSROs have served as a template for subsequent negotiations. To further illustrate this, Harris introduced a database that he and his colleagues developed. The database, which overall has 433,409 specific rules, includes information on 85 FTAs, coded at the six-digit level. Each PSRO was compared with those in other FTAs using the following four dimensions: (1) "level of classification change," which is the level (chapter, heading, subheading, or item) at which a PSRO imposes a tariff shift on a given item; (2) specific products excepted from the level of classification change; (3) value requirements, varying by percentage required and method of calculation; and (4) uniquely identified processing requirements.

By comparing NAFTA PSROs and the PSROs in other FTAs, Harris found that pre-NAFTA agreements, including that of the European Union (EU), follow a model of PSRO completely different from the PSROs in NAFTA. By contrast, Harris found that 36 post-NAFTA FTAs apply the NAFTA criteria for at least 50 percent of their products when only the level of classification change (dimension 1) was taken into account. When dimensions 2 and 3 are also taken into account, the number of post-NAFTA FTAs that apply the NAFTA criteria falls a bit, but there is still a remarkable similarity.

According to Harris, when looking only at Mexico's FTAs with three Central American countries, almost 80 percent of the PSROs are exactly the same as NAFTA's. Mexico's agreement with Japan, signed 11 years after NAFTA, has over 55 percent similarity with NAFTA. Looking at the PSROs found in U.S. FTAs with other countries also shows a high similarity to PSROs in NAFTA, except in U.S. FTAs with partners in the Middle East. Harris noted that the latter FTAs followed the model of the U.S.–Israel FTA, which has very simple, across-the-board rules overall. The exception is the area of textiles and apparel, where the U.S. essentially used the NAFTA model.

Harris also touched on post-NAFTA FTAs outside the Western Hemisphere, which echoed NAFTA PSROs as well. He stated that eight of these FTAs—four of which are wholly within Asia—match NAFTA PSROs' "level of classification change" dimension more than half of the time. Finally, Harris introduced the results of comparisons on a sectoral level, which showed that similarities between PSROs in different FTAs do not correlate with the sophistication of the products they cover. There are high levels of similarity in animal and vegetable oils and in footwear, as well as a fairly high level of similarity in transport equipment. On the other hand, precious metals and stones, minerals, and some other products have a low level of similarity.

Conclusions

In closing, Harris stated that NAFTA's institutional mechanisms for adapting PSROs to evolving market structures have had a small but significant positive effect on regional trade. Such mechanisms exist in most FTAs, and should be used aggressively to encourage regional trade. He also noted that NAFTA set the default "template" for PSROs of subsequent FTAs of NAFTA partners, and also heavily influenced FTAs globally. Hence, NAFTA has provided a common global language for the rules of origin.

Harris anticipated that the ongoing mega-regional negotiations (the Trans-Pacific Partnership, the Transatlantic Trade and Investment Partnership) would likely update the NAFTA template for the next two decades, and he noted that systemic effects of these negotiations with respect to PSROs should be

considered. The final point he made is that multilateral discipline on the rules of origin could be very helpful.

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Chapter 15:
Border Crossing for Trucks Twenty Years after NAFTA

Pilar Londoño-Kent and Alan K. Fox[28]

In their presentation, Pilar Londoño-Kent (Londoño-Kent Associates) and Alan K. Fox (U.S. International Trade Commission) claimed that despite the liberalization achieved by the North American Free Trade Agreement (NAFTA) and substantial investments in infrastructure, technology, and equipment, significant barriers to efficient truck transport remain between the United States and Mexico. They also discussed the practical and economic implications of changes to the NAFTA border crossing system put in place after the terrorist events of September 11, 2001. They asserted that the new security measures have "thickened" NAFTA's borders, increasing costs and delays associated with border crossings.

Londoño-Kent and Fox laid out procedures used today and noted changes that have occurred to border processing since their earlier work on the U.S.-Mexico border (2013). They presented the institutional context in which barriers exist and border authorities' rationale for establishing new barriers or continuing preexisting ones. Drawing upon this information and the time and costs associated with cross-border freight movements, they used a CGE framework to estimate the welfare effect of these measures on the NAFTA economies. Their counterfactual assumes the implementation of a "seamless freight flow" system similar to Europe's *Transport International Routier* (international road transport) system, and calculated the time and cost differentials between such a system and the border status quo. They estimated the annual welfare gains for Mexico and the United States accruing from a seamless cross-border processing system to be approximately $8 billion for each country.

The Economics of Border Crossing by Truck

Border crossings are an important component of the global logistic chain. A logistic system, however, is only as efficient as its most inefficient link. Border crossings are the equivalent of a dam in the river: both delay the flow. Border crossings can cause, among other things, excessive stops, interrupting transport movement and making the cargo more susceptible to damage, loss, and tampering. In addition, excessive pollution is generated from diesel engines accelerating, stopping, idling, and starting under heavy loads. And security risks are greater in congested environments such as those created at a border crossing.

[28] The views in this article are solely the opinions of the authors and should not be interpreted as reflecting the views of the U.S. International Trade Commission or any of its Commissioners.

Moreover, manufactures often cross the border several times during the production process, creating a multiplier effect for gains and losses in border efficiency.

The NAFTA treaty did not specify how trade should be administered by the agencies of the NAFTA governments. Specifically, it assumed seamless border crossing—without detailing, however, how this would be achieved. This omission is a particular problem in the case of trucking, the most important mode of transportation among the NAFTA partners. Indeed, trucking is one of the most heavily disputed elements of the agreement. The treaty's implicit assumption was that it takes only one truck and minimum time to go from point A in the United States to point B in Mexico and vice-versa. In reality, however, it takes two days merely to go from Chicago to Laredo, Texas, a 1,600-mile trip. Crossing the border from Laredo, Texas, to Nuevo Laredo, Mexico—just across the Rio Grande—requires three to five days, at least four pieces of transportation equipment, and three or four drivers. Obviously, there is a large gap between the vision and the reality of NAFTA border crossing.

Despite the agreement, a complex border crossing system continues to prevail, introducing uncertainty and creating delays and extra costs that are nontariff barriers to trade. Uncertainty is the enemy of trust, investment, job creation, economic prosperity, and supply chain security.

Nature of the U.S.-Mexican Border Crossings

Under NAFTA, interregional trade flows have grown significantly over the last 20 years, from roughly $290 billion in 1993 to more than $1.1 trillion in 2012. The United States trades more goods and services with Mexico and Canada than it does with Japan, South Korea, Brazil, Russia, India, and China combined. Much of this growth has been due to increased trade between the United States and Mexico.

Trade between United States and Mexico nearly tripled in value from $27 billion in 1986—the year Mexico joined GATT—to an estimated $76 billion in December 1993, the year before NAFTA was signed. Since then, growth has been even more remarkable, multiplying sixfold since the agreement went into effect in 1994 to $461 billion in 2011, or over $1 billion per day. Meanwhile, bilateral trade with Canada has grown threefold, from $210 billion in 1993 to $620 billion in 2011.

The U.S.-Mexican border is the world's longest between a highly industrialized country and a developing one: it stretches 1,933 miles, traversing four U.S. and six Mexican states. And though it is still a developing country, Mexico is an economic player to be reckoned with. Its total population is over 120 million people, with 50 percent under 30 years of age. Mexico City, with a population of 28 million, has almost as many inhabitants as the whole of Canada. Optimizing transport movements and associated logistics of cross-border trade would substantially benefit both countries.

However, this border foregrounds sharp differences in economic development, political and legal systems, language, culture, and race. The diversity in culture, language and race, together with armed conflicts in the past—including a war in which Mexico lost half its territory to the United States—differentiates this border from that between the United States and Canada. These issues have presented serious challenges to Mexican and U.S. negotiators in their efforts to harmonize trade facilitation policies across borders.

Trucking is the primary form of transportation in the trade between the two countries, representing over 70 percent of the freight bill and 85 percent of the merchandise traded by value. Trucking is, thus, vital to these countries' prosperity. In fact, the trucking provisions of NAFTA, if implemented, would have the equivalent economic effect of moving Mexico northward by shrinking the economic distance of the Rio Grande to something nearer its actual physical dimension[29].

The development of road facilities to handle the sharp increase in U.S.-Mexican trade has been impressive. In particular, the border crossing between Laredo, Texas, and Nuevo Laredo, Mexico, handles more trade than all other U.S.-Mexican border crossings combined. Laredo's World Trade Bridge alone carries 45 percent of Mexico's exports to the United States and 64 percent of Mexico's imports from the United States and Canada.

In spite of this state-of-the-art infrastructure, many barriers to efficient border crossing persist. One reason for this is that a number of government institutions and other interest groups benefit from the border crossing inefficiencies. These include: the Mexican brokers, the Laredo-Nuevo Laredo drayage industry, the U.S. banks that finance the construction of warehouses, state and municipal governments on both sides who receive a share of toll payments, the Mexican states that receive a share of customs tax collections, and the entire regional economy that provides jobs, goods and services. Nonetheless, U.S. trade with Mexico will continue to increase and truck transportation will dominate the transport of high-value commodities.

It is interesting to note that the nature of the U.S.-Canada border used to be quite different, thanks to mostly shared language, cultural heritage, legal and political systems, and level of economic development. Important U.S.-Canada trade agreements such as the Auto Pact predate NAFTA. Before the events of 9/11, the U.S.-Canada border was a good example of seamless border crossing, with shippers covered by a bond or insurance. After 9/11, though, there is evidence of median border delays rising from

[29] Thanks to a much simpler border crossing system, rail has increased its participation in land freight transportation from 4 percent to 17 percent, mostly to serve the automotive industry.

30 minutes to 4 hours and costs rising 1-3 percent; others have concluded even these cost increases have been greatly underestimated. The reality is that today the U.S.-Canada border looks more like the U.S.-Mexico border in terms of delays and extra costs.

Macroeconomic Effect of Border Crossing Inefficiencies

Londoño-Kent and Fox estimated the costs of the current border crossing system using the Global Trade Analysis Project (GTAP) economic model to quantify the effects of reducing identified border frictions among the NAFTA partners. The discussion here focuses principally on border frictions between the United States and Mexico.

Barriers at the border take two forms: wait times and broker expenses. In the analysis, time lost waiting at the border is treated as a deadweight loss, while the additional burden of paying Mexican brokers at the border—especially for southbound trade—is modeled as an import tariff for U.S. goods transiting into Mexico or an export tax on Mexican goods headed to the United States. The policies are applied to the sectors where trucking dominates. The southbound deadweight loss is 3 percent and the northbound loss 0.25 percent. The southbound tariff equivalent of the Mexican brokers is an additional 2 percent, while the northbound broker effect is 0.25 percent.

In addition to the Mexican broker effects, the analysis also considered the higher security costs induced by 9/11. Following the literature, Londoño-Kent and Fox considered a low estimate of 1 percent and a high estimate of 2 percent. These are treated as deadweight losses and are applied to intra-NAFTA trade on most goods and services, with the exception of fossil fuels and electricity. Welfare effects of friction removal are shown in table 1, and table 2 shows the associated change in imports.

Table 1: Welfare Effect of Border Friction Removal (millions $2011)

Sim	Description	USA	Mexico	Canada	Non-NAFTA	World
1	Broker effect, no security	2,764	4,513	-272	-2,310	4,695
2	Broker effect, baseline security	8,066	7,956	4,177	-5,663	14,537
3	Broker effect, high security	12,999	11,312	8,251	-8,837	23,725

Source: Authors' calculations from GTAP model.

Table 2: Import Effect of Border Friction Removal (percent)

Sim	Description	USA	Mexico	Canada
1	Broker effect, no security	0.2	0.6	-0.1
2	Broker effect, baseline security	0.5	1.6	1.0
3	Broker effect, high security	0.8	2.6	2.0

Source: Authors' calculations from GTAP model.

The cost of the Mexican brokerage system alone is $4.5 billion annually for Mexico and over $2.7 billion for the United States. Broader security expenses raise costs for the United States and Mexico to about $8 billion and for Canada to $4 billion. Assuming higher security costs annually adds another $5 billion to U.S. costs, $3 billion to Canada's costs, and $4 billion to Mexico's. Removing frictions associated with the Mexican brokerage system and streamlining border security systems to reduce time lost at the border offers substantial gains to all three NAFTA partners.

In concluding, Londoño-Kent and Fox noted that reducing border frictions from Mexican brokerage systems and streamlining security offers substantial benefits to the NAFTA partners. Mexican brokerage reform could be worth $2.7 billion annually for the United States and $4.5 billion for Mexico. Security streamlining is estimated to yield at least $4 billion annually for each of the NAFTA partners. Reducing frictions promotes better utilization of transport equipment and savings on other capital investments, infrastructure construction, maintenance, and pollution.

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Chapter 16:
Designing a Greenhouse Gas Emission Market for Mexico

Jaime Sempere

In this presentation Jaime Sempere, professor at the Colegio de México, discussed "Designing a Greenhouse Gas Emission Market for Mexico," a paper written with David Cantala and Stephen McKnight. A few years ago, the Felipe Calderón administration passed the *Programa Especial de Cambios Climáticos* (PECC**)**, a special program to assess and mitigate climate change in Mexico. Among the many ideas discussed for this program was a proposal to create a cap-and-trade system, which allows "a cap on greenhouse gases emissions for a set of firms" to be divided into permits and then traded among firms. Moreover, the plan discusses the potential integration of this system with other similar North American programs. In addition to discussing these matters, Sempere spoke about how viable and visible this plan might be, as well as addressed some of the potential challenges that the cap-and-trade system might encounter.

The main conclusion of this paper is that while cap-and-trade systems are effective in reducing greenhouse gas emissions, they are complicated to design. In the case of Mexico, the government should work with other NAFTA members to agree on homogeneous environmental regulations and proper regional integration to foster efficient design, proper implementation, and ultimately effective greenhouse gas reduction.

Sempere asserted that there is no relationship between trade creation and pollution. It is true that some academics argue foreign trade possibilities can lead governments to relax environmental standards to make themselves more acceptable to their trading partners. According to Sempere, however, it is unfair to compare no-trade situations with free trade circumstances. Sempere attested that under cap-and-trade conditions, "firms would face greater product competition in the domestic market and would enjoy a better competitive position in the foreign market, resulting in stronger environmental protection." This idea prompted Sempere to focus the discussion on the need to create a viable plan for Mexico's cap and trade.

To expand on this idea, table 1 reports data on greenhouse gas emissions from countries belonging to the Organization for Economic Cooperation and Development (OECD) for the latest year available to each country. Mexico shows 748 GHG emissions for 2010; and according to Sempere's statements at the NAFTA conference in Dallas, during the stated period, Mexico faced yearly increases of 33 percent—a significant increase compared to the numbers for the European Union (-18 percent) and major European

countries (Germany, -36 percent; the UK, -27 percent; and France,-12 percent). Sempere stated that these data, along with the Copenhagen Accord, where these countries agreed to reduce gas emissions, showed progress: Mexico planned to reduce its emissions 30 percent, and the United States and Canada 17 percent by 2020. To achieve Mexico's goal, PECC proposed to devise a cap-and-trade plan that would initially include state-owned energy producers only, and then extend the program to other industrial sectors until all North American greenhouse gas emissions are eliminated. This plan requires experienced design and implementation.

Table 1.Total Greenhouse Gas Emissions: Rankings in the OECD

Country	**Latest Year Available**	**Total GHG Emissions[1]:**
United States	2011	6665.7
Japan	2011	1307.72
Germany	2011	943.51
Mexico	2010	748.25
Canada	2011	701.79
United Kingdom	2011	556.45
Australia	2011	552.28
France	2011	491.49
Italy	2011	488.79
Turkey	2011	422.41

[1] Million tonnes of CO2 equivalent
Source: Cantala, McKnight, and Sempere 2013.

According to Sempere, cap-and-trade systems are not new to Mexicans: In 2001, Petróleos Mexicanos (PEMEX) established a viable system that worked in Mexico until 2005. The PEMEX system was the first in Mexico to have an internal emissions market aiming on carbon trade. This scheme worked like a standard capital trade system; there were 25 business units of firms participating. Prices were negotiated through an automated structured plan and transactions were carried out anonymously to prevent price manipulation. But the system needed improvement.

For Mexicans to successfully implement the proposed PECC plan, there needs to be a transparent, uncorrupt, and efficient system to administer the law—a system that measures the emissions and enforces firms to comply with regulations. Permits would need to allow trade, especially trade that allows two-sided exchanges in the exchange market. The blueprint for this plan would need to include specific directions for the initial allocation of permits, for setting a timeline, and for identifying potential participants, as well as specifying the type of permit exchange allowed.

In theory, the design of this system includes two elements: institutional and market design. Governments establish the cap, and officials ensure that firms abide by it. There are two ways in which permits can be initially distributed: grandfathering and auctioning permits. Both approaches have a significant number of tradeoffs. Grandfathered permits are first given and distributed for free through a regulated process, but there are political costs and no tax revenue. Auctioning permits, on the other hand, provides tax revenue; however, it imposes a cost on the firms and increases political costs. In terms of value, Sempere noted that the value of a cap or permit is related to abatement costs, and these costs depend on the "placement of the cost function—meaning where one is producing, political influences affecting institutional settings, the implementation of the law, how governments enforce compliance, and also on the specific industries responsible for the emissions." Not all industries have the same abatement-costs function, and these costs can depend on how restrictive the cap on gas emissions is.

In Sempere's opinion, for any emission market in Mexico to succeed, it would need to be integrated into a larger system, because it would need more participants to be competitive. Sempere noted that "the market has to be competitive; otherwise, the price will not be the right signal and then we will not get the efficiency. The initial market should be open to many participants, making the market structure competitive." Exchange markets are essential because they can signal proper prices. For example, although in the European cap-and-trade system most trade is bilateral, there are centralized exchange markets; this allows the market to signal the correct price and lower the costs. The latter point is a vital one, because if it is too costly to comply with Mexico's cap-and-trade regulations, countries can look for alternatives, costing Mexico's system potential participants. With enough participants, it would be cost-effective to incorporate exchange markets that can ease bilateral transactions.

On the other hand, there are challenges to having a large number of participants and the larger the number of participants, the greater amount of challenges that can arise. One challenge for the design of this North American market is that the three countries participating may have many diverse regulations that can create distortions. Each country can choose how each sector is regulated and can choose how the cap that is enforced in each industry. In each country, the value of the cost of abatement and the marginal cost of abatement differs, meaning that each country can be trading permits that are not the same or that do not cost the same. For instance, as Sempere said, if one country imposes a very strict cap, that country's permit is not the same as the permit of other countries where the cap is less strict. To at least partly avoid this challenge, there needs to be a comprehensive agreement on environmental regulations that would ensure compliance with the standards in all regions involved.

Furthermore, besides unanimous policy agreement, there is also the challenge of the uncertainty of the cost: one does not know what the market equilibrium price will be. It is clear that it is a volatile market. Unless, as Sempere notes, one country "is grandfathering 100 percent of permits to every firm and will not be receiving any tax revenue from these schemes," this plan has unpredictable costs and is of uncertain value. Also, to function well, the cap-and-trade scheme would have to use a common currency.

Other challenges must also be considered. One is that the United States is a large country with a large energy market. This might cause a problem because the United States might have an advantage when distributing permits. Also, in Mexico, the program includes state-owned industries, and this might also cause distortions. Finally, keeping environmental policies the same in all countries involved is important for cap free-trade agreements because a difference in regulations could become an incentive to relax regulation standards. For example, a country might distribute too many permits in order to increase the competitive advantage of the firms. Sempere said that in a regional emissions market, such incentive could be stronger, because firms are able to transfer caps to other firms due to lower marginal abatement costs. If firms in one country are able to sell these permits to foreign firms, the firms which are able to sell the permits will have a competitive advantage. Conversely, integrating Mexican plans with well-functioning regional initiatives already implemented in the United States and Canada could ensure greater success in implementing these ideas in Mexico.

Finally, the cap-and-trade scheme should be thought of as a complement to a carbon tax. According to Sempere, "The carbon tax can be used to regulate the economy as a whole, which can be a way of liberating the energy sectors." A comprehensive system with a cap-and-trade method and a carbon tax is more enticing because one can have more control over the regulations pertaining to greenhouse gas emissions. The cap-and-trade establishes the cap, and then the carbon tax controls emissions, creating complementary value. This was a clear advantage in the successful regional initiatives that took off in California and British Columbia, which both combined cap-and-trade with a carbon tax. And, said Sempere, with successful "regional integration," perhaps it "can expand to a national framework." Nonetheless, designing and implementing a cap-and-trade system still requires considering a large number of elements and confronting numerous challenges.

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Chapter 17:
Income in the Border Region, 1993–2010

James Gerber

James Gerber, professor of economics at San Diego State University, discussed "Income in the Border Region, 1993–2010." His presentation cited his 2008 book, *Fifty Years of Change on the U.S.-Mexico Border: Growth, Development, and the Quality of Life,* co-authored with Joan Anderson. He focused the presentation on trends in income levels and growth in the U.S. and Mexican border region over the two decades following NAFTA's entry into force. After examining income levels both between neighboring U.S. and Mexican cities and between the two countries at the national levels, Gerber discussed multiple reasons for the income divergence seen between the two countries.

Gerber's first conclusion is that besides the popular explanation, which points to differences between institutions across the two countries, diverse other reasons—such as political, socioeconomic and macroeconomic factors—underlie the marked increase in income gaps between the United States and Mexico in the 2000s. Since many of these factors are largely determined by national-level policies (as opposed to local ones), Gerber's second conclusion suggests that those policies—for instance, vulnerability to U.S. economic cycles and China's entrance into the WTO—could also have an extractive effect on Mexican border municipalities, which saw a decline in income growth in the 2000s.

Gerber first pointed to the failure of an assumption seen in the Heckscher-Ohlin model[30] for international trade to explain why Mexican and U.S. income levels were unable to converge after NAFTA entered into force. The Heckscher-Ohlin Model assumes that wages and returns to capital should equalize in the U.S. and Mexico because the process of trading goods and services is equivalent to trading factors. This process should drive returns to capital and wages to equivalence, if all goes according to theory. Gerber commented:

> We know that doesn't happen, but the interesting question is, really, why doesn't that happen? What the factor proportion theory and the factor price equalization theorem tell us is that we assume that Mexico and the United States had the same technologies. I think that's the key assumption that's not at work in this case.

[30] The Heckscher-Ohlin Model and its corollary of factor price equalization assumes that wages and returns to capital should equalize in the U.S. and Mexico because of process of trading goods and services is equivalent to trading factors. This process should drive returns to capital and wages to equivalence, if all goes according to theory.

To explore the idea of differences in technologies, he cited Acemoglu and Robinson's 2012 book, *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. The book examines the importance of institutions—which in turn govern technological development via education, regulatory environment, access to capital, rule of law, etc.—in determining national income levels.

However, Gerber contended that only some of the divergence seen between the United States and Mexico is attributable to differences in institutions. He noted that although there was a brief period of income convergence between certain U.S. and Mexican neighboring municipalities between 1993 and 2000, all major neighboring Mexican and U.S. border municipalities witnessed a marked increase in income disparities between them by 2010 (table 1). But the income discrepancy between many neighboring border municipalities equals only one-third of the U.S.-Mexico income level discrepancy overall. Gerber argued that, given the cultural, linguistic, and geographical similarities between these neighboring cities, the sole characteristic separating the cities—institutions—accounts for only a part of the difference between U.S. and Mexico income levels.

Table 1. Income Differences Between U.S. and Mexican Neighboring Municipalities, 2005 U.S. dollars

Neighboring Municipalities (U.S.–Mexico)	1993	2000	2010
San Diego-Tijuana	23,499	30,375	36,090
Imperial-Mexicali	16,874	11,822	18,482
Santa Cruz-Nogales	8,619	10,356	10,364
El Paso-Juárez	12,918	13,390	20,326
Val Verde-Acuña	6,150	7,382	16,759
Maverick-Piedras Negras	920	2,354	7,898
Webb-Nuevo Laredo	8,081	7,497	14,798
Hidalgo-Reynosa	6,887	5,888	10,206
Cameron-Matamoros	8,428	8,155	13,132
U.S.-Mexico	**24,155**	**28,640**	**29,985**

Source: Gerber (2014)

Turning to growth rates in income on the U.S. and Mexican sides of the border, he drew on some other hypotheses for the divergence. He first showed that growth on the Mexican side of the border was higher in the 1990s than in the 2000s (Figure 1). Gerber suggests that factors such as the drug wars, long wait times to cross the border, deportations by the United States, the flight of skilled and middle-class Mexicans to the United States, vulnerability to U.S. economic cycles, and China's entrance into the WTO could all be to blame for the slowdown in growth in Mexican border cities in the 2000s.

Figure 1. Growth on the Mexican Side of the Border, 1993–2010,
Average Annual Compound Growth, Percent

Source: Gerber, 2014.

Other factors explain the increase in growth in the 2000s for U.S. border cities, after they generally had already experienced positive growth in the 1990s (figure 2). Texan border cities' escaping the subprime loan crisis, the shale gas boom, the lack of dependency on cross-border traffic for retail sales, and the relocation of the Mexican middle class, Gerber said, are all likely contributors to the boost in income growth seen in the 2000s.

Figure. 2 Growth on the U.S. Side of the Border, 1993–2010, Average Annual Compound Growth, Percent

Source: Gerber, 2014.

For both U.S. and Mexican border municipalities, Gerber pointed out that many of the factors that determine income are decided outside of the border region itself. So, he suggested looking at the border as "almost as a bi-national institution." He noted:

> There are things like U.S. migration policy, like drug policy, these are outside the hands of people that live in the border region. But, and this is key, these things have a disproportionally large impact in terms of the spillover effects and in terms of the externalities they generate on residents of the border region. That this has a very decided impact on people that live in Laredo in a way that it does not have on people that live in Des Moines, Iowa, or that live in Spokane, Washington. It just simply isn't a symmetry or a uniformity in these types of impacts. So, many of the policies that the U.S., in particular, has implemented, I think, have had disproportionally large impacts."

In conclusion, referring again to Acemoglu and Robinson's book, Gerber posed the question whether or not the U.S.-Mexican border is an extractive institution. In considering the question, Gerber pointed out that in the 1980s and 1990s, Mexican border cities had a trading advantage —and saw growth in income—because of their close proximity to the U.S. marketplace. However, as a result of changes in U.S. domestic policy in the 2000s, those advantages Mexico enjoyed became disadvantages—because of the presence of the border itself.

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Chapter 18:
Wage Convergence in Mexico

André Varella Mollick and René Cabral

André V. Mollick, professor at the University of Texas–Pan American, discussed "Wage Convergence in Mexico." He explained that he had been working with René Cabral from the EGADE Business School to analyze the increase in capital and labor mobility in Mexico as a result of NAFTA, in order to quantify NAFTA's effects on Mexican wages. In addition, they had tried to determine if the increased economic integration between Mexico and the United States led to quicker wage convergence at the regional level. The authors found that greater integration with the United States has not just led to growth of output in Mexico, but also has changed the supply of labor across regions as well as the regional distribution of Mexican wages. Their analysis indicate that states closer to the U.S-Mexican border experienced quicker wage convergence than non-border states and that migration appears to be an important force in this convergence.

Mollick noted that this study builds on work by Robertson (2000) on wage convergence. Using data from 1987–97, Robertson looked at how local wages in Mexico responded to U.S. wages, and found that after wage shocks, wages in Mexican border cities converged to U.S. wages more frequently than wages did in Mexico's interior. Additionally, within the Mexican border regions, cities that had higher capital and migration flows experienced larger wage shocks and more rapid wage convergence to U.S. wages than other Mexican border cities. Robertson suggested that "of forces that could integrate labor markets—goods flows, capital movements, and migration—migration may be the dominant mechanism."[31] Mollick added that the authors also sought quantitative evidence that this is the case and found a small but statistically significant effect.

In describing their approach, Mollick referred to his and Cabral's previous work in this area, especially Mollick and Cabral (2015), but also Cabral, Mollick, and Faria (2010) for wages and Cabral and Mollick (2012) for output. In these studies, the authors analyzed real wages and looked at partitions according to migration rates and foreign direct investment (FDI) by states. In doing so, they found some effects on real wages. Yet Cabral, Mollick, and Faria (2010) did not include years of education, which may have been an issue in the specification of their models.

[31] Robertson (2000), p. 743.

In his presentation, Mollick focused on Mexico post-NAFTA, beginning in 1995. He noted that after the initial shock with the 6 percent contraction of GDP and the high inflation rate, there were no further negative shocks in this period, as there were in 1982, 1987, and 1994. He then compared the economic importance of flows of people and capital, showing how he and Cabral had employed dynamic panels to estimate wage equations, emphasizing reverse causation from not only the fundamentals to wages, but also from wages to the fundamentals**,** such as education and productivity.

The data used for the estimations below come from Mollick and Cabral (2015), who examined state-level series for Mexico and calculated labor productivity (GDP per capita), population growth and migration flows, FDI, and real wages. The real exchange rate is available at the national level. They used real GDP per capita in 1993 prices in Mexican pesos; real social security wages rather than minimum wages in Mexico, which vary by state; and maquiladora wages, although data for these are sometimes lacking at the state level. Average years of schooling were obtained from Mexico's Ministry of Education. The migration rate is the difference between outflows and inflows of people over the total population—a positive number signifies a net outflow of people from the state. The data indicate a difference between border and non-border states. Real wages are highest in the federal district, as is per capita output. Nonetheless, some border states have higher real wages than average. FDI is also higher in the federal district, at 9 percent of GDP, and is followed by two border states, Baja California and Nuevo León.

Following Chiquiar (2008), Mollick and Cabral (2015) merged border states with other northern states, dividing the country into two regions—Border-North and South-Center. Mollick and Cabral look at real wage equations for all 32 states relative to a panel of the non-border states (25 states plus the Federal District, therefore excluding the six states that border on the United States), since a panel of the six border states with the United States would have had only a limited number of observations.

As descriptive statistics, Mollick and Cabral (2015) compared the values of the panel of six border states versus the panel of non-border states from 1997 to 2006. Looking at an average daily wage of 34 pesos at 1993 prices, they observe a 10 percent variation in wages in border states compared to non-border states, from 36.53 pesos to 33.33 pesos. Schooling also varies, with border states having an average of 8.47 years, compared to 7.43 years in non-border states, a 14 percent variation. Labor productivity is also higher in border states compared to non-border states. The FDI-GDP ratio is approximately three times higher in border states, and the annual population growth rate is higher in border states, at 1.8 percent compared to 1.2 percent. Following Mollick and Cabral (2015), the authors used two fundamentals for the empirical estimations below: years of schooling and GDP per capita, which both correlate highly with real wages. A more educated and productive workforce would be expected to earn higher wages.

Testing for Wage Convergence

To look at convergence, Mollick and Cabral (2015) initially tested for absolute convergence—i.e., wages as a function of state-specific effects and lagged wages. They employed two basic models for (conditional) wage convergence: years of education and real output per capita (labor productivity), though these are not used together. The shift factors are shocks to labor demand (FDI to capture foreign capital inflows) and shocks to the labor supply (state migration flows or population growth). They controlled for the competitiveness of the Mexican peso by using the real exchange rate, following Verhoogen (2008) and Robertson (2003).

The authors estimate the following two equations for conditional convergence below:

$$w_{it} = \mu_i + \gamma_1 w_{it-1} + \gamma_2 EDU_{it} + \sum \beta_j x_{it}^j + v_{it} \qquad (1)$$

$$w_{it} = \mu_i + \gamma_1 w_{it-1} + \gamma_2 \left(\frac{Y}{L}\right)_{it} + \sum \beta_j x_{it}^j + v_{it} \qquad (2),$$

where i is from 1 to k states and x_{it} is the group of m shift or control variables. The first equation has years of education as the fundamental and the second has labor productivity, as used by Mollick and Cabral (2015) for four panels of Mexican states. The endogenous explanatory variables are instrumented with suitable lags of their own (the authors use 2 and 3 lags).

The data used in the estimation were for 32 Mexican states over 10 years consisting of 260 observations for non-border states and a total of 320 observations for the panel of all states. There is also an endogeneity problem. With the model using years of education, for example, education will affect wages but wages will also affect education. Wages may also have an impact on migration flows, because an increase in wages may lead to a population inflow into a state. The same applies to capital flows as well. As argued by Mollick and Cabral (2015), system-generalized methods of moments (SGMM) estimators are better suited to deal with these reverse-causation patterns in the data.

The results of schooling show very significant education effects that are higher for all states. The observed coefficient is 0.330 (or 0.403 with three lags). Without border states, this drops to 0.194 (or 0.211 with three lags). Contrary to what might have been expected based on results from previous work that shows wages increase with an increase in FDI, there were no FDI effects on wages. The migration coefficients were only significant for international migration across the full sample (0.021 or 0.023).

The results of the productivity equation show significant productivity effects that are higher for all states (0.038 or 0.055). These figures are lower without border states (0.025 and 0.044). As before, there is no

FDI effect on wages. The migration effects are always statistically significant for international migration (0.023 or 0.022), similar to those effects without border states (0.024 or 0.022).

For the education model, the implied λ's (speed of adjustment to the steady state) tend to be higher with all states, with similar results from the labor productivity model. The rate of convergence in this model varies from 26 to 30 percent per year, dropping to 17 or 18 percent per year without border states. Results from the labor productivity model show rates of convergence of 9 to 11 percent per year, dropping to 8 or 10 percent without border states.

With population growth rates (instead of migration flows) and education, the results show that the estimated lagging wage is between 0.56 and 0.68, which is respectable but not very high. Convergence rates across all states are between 44 and 59 percent, which would indicate that within two years there could be convergence for all states. In terms of shocks, the FDI-to-GDP ratio has no effect, but the population growth rate has a negative effect that is not very strong. Here, however, while the sign of the effect is correct, there is only significance in one instance.

At the close of his presentation, Mollick stated that the results suggest that during the post-NAFTA Mexican experience, states closer to the U.S.-Mexico border have converged more rapidly toward the steady state. These convergence results are stronger for the education model than the labor productivity model. Finally, with respect to Robertson's conjecture that migration forces seem to be the main force behind the adjustment in the model with labor productivity, Mollick and Cabral found statistically significant support for this claim, although with small effects, with some stronger results for the labor productivity model. It appears that FDI flows have no impact on real wages in any of the models studied.

Further work along these lines should consider additional data in order to increase the size of the panel of Mexican states sharing a border with the United States and allow for factors such as the reduction in migration from Mexico to the United States observed after the global financial crisis. If a longer time span is available, a more direct approach with panels of border versus non-border states should shed light on the results reported in this study.

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Chapter 19:
The North American Integration Model

Peter B. Dixon, Maureen T. Rimmer, Shenjie Chen, and Catherine Milot

1. Introduction

Peter B. Dixon and Maureen T. Rimmer, professors at Victoria University, Melbourne, Australia, together with Shenjie Chen and Catherine Milot from the Department of Foreign Affairs, Trade and Development, Ottawa, Canada, discussed their paper on the North American Integration model (NAIM). NAIM is being developed in a cooperative research project between the Centre of Policy Studies (CoPS) at Victoria University and the Canadian Department of Foreign Affairs, Trade and Development (DFATD).

The aim of the project is to give DFATD a quantitative analytical tool for assessing the effects on Canada and its North American trade partners of changes in trade policies. These include proposed efforts that are sometimes grouped under the heading NAFTA2 and that are limited to the NAFTA partners, such as further streamlining the passage of goods and harmonizing the quality and safety standards for sales of goods and services. This presentation discusses how the NAIM model was constructed and explains challenges the authors encountered in ensuring that the model reflected reality, along with promising solutions.

2. Constructing the NAIM Model

The starting point for constructing NAIM was USAGE (U.S. Applied General Equilibrium), a dynamic CGE model of the U.S. economy that has proved effective in analyses of a wide range of policies. The first step was to build a one-country model for Canada, CANAGE, which in its theoretical structure is identical to USAGE:

CANAGE = USAGE computer code implemented with Canadian data.

Second, USAGE and CANAGE were combined into a single model containing two unconnected countries by adding a country subscript to every variable and coefficient in the USAGE code. For example, the coefficient

V1BAS(*c,s,j*) became V1BAS(*c,s,j,k*)

where V1BAS(*c,s,j*) refers to the basic value of commodity *c* from source *s*—the United States, Canada, or the rest of world (ROW) in the present version of NAIM—that is used as an intermediate input in industry *j*, and *k* identifies the location of industry *j* (Canada or the United States). Thus, at this stage:

NAIM-1 = USAGE code + country subscript implemented with U.S. and Canadian data

This is an unconnected model in the sense that shocks to Canadian variables have no effect on U.S. variables and vice versa. Dixon et al. were able to check NAIM-1 by making sure that it generated results for the effects of shocks to the U.S. economy that were identical to those from stand-alone USAGE and results for the effects of shocks to the Canadian economy that were identical to those from stand-alone CANAGE.

The third step was to iron out the inevitable differences in the NAIM-1 database between Canadian imports from the United States and U.S. exports to Canada, and between U.S. imports from Canada and Canadian exports to the United States. It was convenient to believe the import data for both countries.

The fourth step, and theoretically the most interesting, was to add equations to the USAGE code that allow U.S. exports to Canada to be driven by Canadian demands for imports from the United States and Canadian exports to the United States to be driven by U.S. demands for imports from Canada. With these connections Dixon et al. obtained:

NAIM-2 = USAGE code + country subscript + Canada/U.S. connecting equations

implemented with U.S. and Canadian data.

3. Test Application

For an initial application of NAIM-2, the authors conducted two simulations concerned with the short-run effects of stimulating absorption (private and public consumption and investment) in the United States and Canada. In the first simulation they imposed a 1 percent increase in U.S. absorption. The idea was to show a stimulatory macroeconomic policy. In keeping with a short-run focus, they assumed that there was no effect on capital stocks by industry or on real wage rates in either the United States or Canada. The second simulation was the same as the first, except that the stimulatory macro policy was carried out in Canada rather than the United States.

Macro results from the two simulations are in table 1. Industry results are given in Dixon et al. (2014). The results in table 1 are percentage differences. For example, in the northwest quadrant we see entries of 1.00 for C (consumption), I (private investment), and G (government spending) in the United States,

reflecting the imposed 1 percent increase in absorption. The table reveals several assumptions besides the ones about capital and wages that have already been mentioned. First, the authors assume that each country manages its monetary policy so that a stimulus has no effect on the price level measured by the price deflator for GDP (line 14 in the north and south halves of table 1). Second, they assume that public and private consumption are locked together (lines 1 and 3 in the north and south halves). This assumption is obvious for the stimulated country: they simply impose 1 percent increases in both real public and private consumption. For the other country, they assume that real public consumption adjusts in line with real private consumption, which in turn moves with real GDP. Third, they assume that a stimulus has an effect on investment-to-capital ratios that is uniform across industries: a 1 percent increase in the stimulated country and no change in the other country. With no change in capital stocks, table 1 shows zero effect for aggregate investment in the non-stimulated country (line 2 northeast and southwest).

Table 1. Macro Effects of U.S. and Canadian Stimulation, Percentage

		Stimulation of US absorption		Stimulation of Canadian absorption	
	US macro				
1	C	1.000		-0.003	
2	I	1.000		0.000	
3	G	1.000		-0.003	
4	X	-4.641		-0.028	
5	to Can		-2.002		0.993
6	to ROW		-5.080		-0.197
7	M	1.889		-0.018	
8	from Can		0.597		-0.978
9	from ROW		2.128		0.160
10	GDP	0.148		-0.003	
11	K	0.000		0.000	
12	L	0.360		-0.002	
13	Pc	-0.346		0.001	
14	Pgdp	0.000		0.000	
15	TofT	1.611		0.000	
16	with Can	1.002	1.002		-0.358
17	with ROW	1.720	1.720		0.066
	Canada macro				
1	C	0.028		1.000	
2	I	0.000		1.000	
3	G	0.028		1.000	
4	X	-0.008		-1.100	
5	to US		0.597		-0.978
6	to ROW		-1.843		-1.467
7	M	-0.029		1.060	
8	from US		-2.002		0.993
9	from ROW		1.920		1.126
10	GDP	0.028		0.373	
11	K	0.000		0.000	
12	L	0.033		0.502	
13	Pc	0.056		-0.161	
14	Pgdp	0.000		0.000	
15	TofT	-0.206		0.409	
16	with US		-1.002		0.358
17	with ROW		0.614		0.489

Note: C=Consumption, I=Investment, G=Government spending, X=Exports, M=Imports, GDP= Gross Domestic Product, TofT=Terms of trade, K=Capital stock, L=Labor force, Pc=Price deflator for Consumption, and P= GDP deflator.

The headline results in table 1 are for aggregate employment. In the United States, 1 percent absorption stimulation increases employment by 0.360 percent (line 12, northwest), while in Canada, 1 percent absorption stimulation increases employment by 0.502 percent (line 12, southeast).

A useful starting point for explaining the results for aggregate employment is the labour market equilibrium condition:

$$W = P_{gdp} * MPL\left(\frac{K}{L}\right) \quad (1)$$

where W is the wage rate; P_{gdp} is the price deflator for GDP and represents the price of goods and services produced in the economy; and MPL is the marginal product of labour, which is an increasing function of the capital-to-labor ratio, K/L. Equation (1) can be rewritten as

$$\frac{W}{P_c} = \frac{P_{gdp}}{P_c} * MPL\left(\frac{K}{L}\right) \quad (2)$$

where P_c is the price deflator for consumption and represents the price of goods and services purchased by households. In the stimulus simulations, the authors assume that real consumer wages (W/P_c) are fixed. Thus, the left-hand side of (2) is unchanged by stimulus. On the right-hand side, P_{gdp}/P_c increases in the stimulated country. This can be seen from lines 13 and 14 in the northwest and southeast quadrants of table 1. P_{gdp}/P_c increases because stimulus improves a country's terms of trade (line 15 northwest and southeast), defined as the price of exports divided by the price of imports. An improvement in the terms of trade usually generates an increase in P_{gdp} relative to P_c because P_{gdp} includes the price of exports, but not imports, whereas P_c includes the price of imports but not exports.[32] Terms-of-trade improvement arises mainly because stimulus restricts a country's ability to supply exports, thereby allowing their price to increase. With an increase in P_{gdp}/P_c and no change in W/P_c, MPL must fall. With no change in K, L must rise. Thus, we see that the stimulus increases aggregate employment.

However, P_{gdp}/P_c and equation (14) can't be the whole story. In the northwest quadrant of table 1, the increase in P_{gdp}/P_c is more pronounced than in the southeast quadrant (0.346 percent compared with 0.161 percent), yet the percentage employment increase in the northwest quadrant is less than in the southeast quadrant (0.360 percent compared with 0.502 percent). This raises two questions. Why is P_{gdp}/P_c larger in the northwest quadrant than in the southeast quadrant? And what is the extra employment effect in Canada relative to the United States beyond that which can be explained by P_{gdp}/P_c and equation (14)?

[32] More accurately, an improvement in the terms of trade generates an increase in P_{gdp}/P_{gne} where P_{gne} is the price deflator for gross national expenditure (C + I + G). Because C is the dominant component of GNE, an improvement in the terms of trade *usually* generates an increase in P_{gdp}/P_c.

The key to the first question is trade shares. Trade shares for Canada are larger than those for the United States (29 percent of Canadian GDP is exported, whereas only 12 percent of U.S. GDP is exported). Thus, larger percentage changes in trade volumes are required in the United States than in Canada to facilitate a given percentage expansion in non-traded production. This explains why the movements in trade volumes in the northwest quadrant of table 1 involve larger percentages than those in the southeast quadrant (-4.641 and 1.889, compared with -1.100 and 1.060). The larger percentage changes in trade flows explain the larger terms-of-trade gain for the United States relative to Canada (1.611 percent compared with 0.409 percent). Even though the U.S. terms-of-trade effect is four times that for Canada, the P_{gdp}/P_c effect is only about twice that for Canada. Broadly, terms-of-trade effects are translated into effects on the P_{gdp}/P_c ratio via the share of exports in GDP.

The key to the second question about employment effects is factor intensities. In Dixon et al. (2014), the authors showed for a two-sector model that if the expanding sector (non-traded production) is more labor intensive than the contracting sector (traded production), then stimulus produces positive employment effects beyond those that can be explained by movements in P_{gdp}/P_c. In view of this finding, they looked at labor intensities implied by the NAIM-2 database. Dixon et al. defined the non-traded sector as the set of industries for which the share of exports in output and the share of imports in sales on the domestic market are less than 0.1 for both the United States and Canada. All other industries are in the traded sector. Under these definitions, NAIM-2 data imply that Canada's non-traded sector is more labor intensive than the traded sector: the labor share in returns to primary factors in the non-traded sector is 72.1 percent, compared with 55.5 percent in the traded sector (table 2). By contrast, the U.S. traded sector is more labor intensive than the non-traded sector (72.9 percent compared with 58.6 percent, table 2). Thus, differences in factor intensities between the non-traded and traded sectors contribute positively to the employment effect of stimulus in Canada and negatively in the United States. As described in Dixon et al. (2014), the authors established the validity of the factor intensity explanation by conducting simulations with the database adjusted to eliminate both differences in factor intensities across U.S. industries and differences in factor intensities across Canadian industries.

The off-diagonal panels in table 1 show that stimulation of the U.S. economy is more important to Canada than stimulation of the Canadian economy is to the United States. For example, the Canadian employment effect in the southwest quadrant is an increase of 0.033 percent, while the U.S. employment effect in the northeast quadrant is a decrease of 0.002 percent.

Table 2. Factor Shares in 2010, NAIM-2 Database

	USA			Canada		
	Labor	**Capital**	**Share in GDP**	**Labor**	**Capital**	**Share in GDP**
Non-traded	0.586	0.414	0.669	0.721	0.279	0.583
Traded	0.729	0.271	0.331	0.555	0.445	0.417
Total	0.633	0.367	1.000	0.652	0.348	1.000

The greater sensitivity of Canada to the United States than of the United States to Canada was to be expected, given the relative sizes of the two economies. Perhaps a more interesting point is that the off-diagonal results are generally very small relative to the diagonal results. Thus, NAIM-2 implies that stimulus policy in the two countries can be conducted in relative isolation. While the business cycles in Canada and the United States are closely correlated, NAIM-2 implies that this correlation does not reflect strong causal links between the two economies. Rather, the shocks that drive the business cycle in one economy must simultaneously drive the business cycle in the other.

4. Learning from the Test Applications: Improving the Compatibility Between the Input-Output Data for Canada and the United States by the Common-Technology Assumption

The most interesting aspect of NAIM simulations is the comparison between results for Canada and those for the United States. Whenever NAIM results are produced, this comparison will inevitably be the main focus of attention. In the macro test simulations reported in section 3 and in a further test simulation of the effects of reductions in wholesaling requirements for Canadian and U.S. exports (see Dixon et al., 2014), the authors explained differences between results for the two countries in terms of five features of their data:

1) a larger share of imports and exports in GDP for Canada than for the United States;
2) a greater dependence of Canada on trade with the United States than vice versa;
3) a higher labor intensity of non-traded production in Canada than in the United States;
4) higher wholesale margins per unit of export in the United States than in Canada; and
5) higher capital intensity of the Canadian wholesale industry than the U.S. industry.

While features 1) and 2) seem reflections of reality, the authors doubt that the same can be said for features 3), 4) and 5). They suspect that 3), 4) and 5) reflect data incompatibilities.

When Dixon et al. started the NAIM project, they thought that Canadian input-output data would be closely comparable to that for the United States. Both countries use the North American Industrial Classification System (NAICS), and they hoped that differences in production technologies implied by their input-output data could be interpreted as genuine differences. However, the differences that they

found are too great to be plausibly interpreted as real-world technological differences between two adjacent countries at similar stages of development. While both countries may adhere to the same statistical conventions, it is clear that there are considerable differences in the way people are interpreting and implementing the conventions governing the compilation of input-output data. It is not possible to conclude that industry *j* and commodity *c* in Canadian statistics are directly comparable with industry *j* and commodity *c* in U.S. statistics.

Problems of input-output incompatibilities similar to those experienced for Canada and the United States are often encountered in modeling for multiple regions within a single nation. Intuitively, it seems reasonable to build a multi-regional model for a country around input-output tables compiled for each region. However, this approach often fails. The problem is that regional input-output tables are never compiled on quite the same basis. In these circumstances, *real* differences between regions in the technology (input structure) of industry *j* can be swamped in the input-output data by differences in statistical implementation. Rather than persevering with regional input-output tables, our colleagues at the Centre of Policy Studies have found it preferable to make the bold assumption that the technology in industry *j* is the same in all regions throughout a nation.[33] This means that a regional model for a nation can be compiled on the basis of a national input-output table. Of course, an immediate objection is that the technology for generating electricity, for example, in one part of the country might be coal-based whereas in other parts it is hydro-based. Thus, the inputs to electricity generation can vary sharply across regions. But the solution to this problem is not regional input-output tables. The solution is industry disaggregation. The industries in a multi-regional model should include coal-powered electricity, hydroelectricity, and so on. It is reasonable to suppose that the technology for coal-powered electricity is uniform across regions, that the technology for hydroelectricity is uniform across regions, etc.

Given the apparent incompatibilities between Canadian and U.S. input-output data and in view of their experience with multi-regional CGE models, the authors decided to form a new version of NAIM—NAIM-3—under the common-technology assumption. The authors recompiled the data for NAIM so that the input-structure for industry *j* in Canada is the same as that for the United States. Macro differences between the two countries in labor productivity were preserved: That is, the data were set up so that output per worker and real wages differed between the two countries.

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[33] See, for example, Horridge et al. (2005) and Wittwer (2012). For a comprehensive survey of multi-regional CGE modeling see Giesecke and Madden (2013).

Provided that the modeling is done at a high level of industry disaggregation, the authors think that the common-technology assumption for Canada and the United States is a good working hypothesis. Consequently, little is lost by adopting it. The gain is that result interpretation is not bedeviled by spurious differences between Canadian and U.S. simulation responses associated with data incompatibilities rather than real-world differences. Adoption of the common-technology assumption leaves in place many genuine differences between countries. Potentially, a U.S.-Canada model produced under the common-technology assumption can reliably reflect differences between the two countries in their responses to policy changes and other shocks, based on real differences in:

- the industrial composition of their output and employment;
- the commodity composition of their exports and imports;
- the structure of their taxes and tariffs;
- the destinations of their exports and the sources of their imports;
- the size of the public sector and the nature of its activities;
- household preferences (the commodity composition of household expenditures);
- wage-fixing systems; and
- natural resource endowments.

As reported in Dixon et al. (2014), NAIM-3 produced results for their test simulations in which the effects on the results of spurious intercountry data differences were eliminated. By adopting the common-technology assumption, the authors have produced a model in which differences between the results for Canada and the United States reflect believable differences in the characteristics listed in the bullet points above.

5. Concluding Remarks

Building an economic model that can make a lasting contribution to policy analysis requires a journey along a difficult road. Only a small percentage of projects that start along that road reach the desired destination. In this paper, Dixon et al. have documented the journey so far for NAIM. The milestones that the NAIM project has passed are as follows: (1) development of a methodology for converting a well-established single-country model into a multi-country model; (2) analysis of test simulations; and (3) resolution of data incompatibilities by implementing the common-technology assumption.

There are many more milestones to pass. Perhaps the most important milestone for NAIM is the performance of a live policy simulation. It is only when the results matter that they are given critical scrutiny by people outside the modeling group. At that stage, the model will take a major step along the

road to becoming a tool for practical policy analysis. Consequently, Dixon et al. hope that the NAIM team will soon be tasked with contributing to the analysis of emerging issues of importance to the NAFTA partners.

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Chapter 20:
The Future of NAFTA: A Policy Perspective

Justino De La Cruz, Alan V. Deardorff, Richard G. Harris, Timothy J. Kehoe, and José Romero[34]

In the final session of the conference, a panel of economists, including Justino De La Cruz, Alan V. Deardorff, Richard G. Harris, Timothy J. Kehoe, and José Romero, discussed their views on NAFTA's future. In his remarks, Justino De La Cruz noted that his comments, built around two basic points, would be from Mexico's perspective. The first point regards Mexico's trade policy: De La Cruz suggested that for Mexico, NAFTA's primary objectives were to promote and encourage trade and foreign direct investment (FDI) with Canada and the United States. The second point is that NAFTA is only one growth-promoting policy instrument among many at Mexico's disposal—and it is one with limited influence. Other, more powerful policy instruments that Mexico uses to promote economic growth are monetary and fiscal policies. De La Cruz noted that according to an important rule of economic policy theory, to achieve various policy targets there must be at least an equal number of policy instruments.[35] Thus, if Mexico's goals are to achieve high rates of economic growth, employment, real wages, and productivity, as well as balance of payments equilibrium and low rates of inflation, policymakers must use several policy instruments, not just NAFTA. NAFTA alone should not be expected to achieve more than one policy goal.

Has Mexico achieved its goal for NAFTA? Returning to his first point, De La Cruz observed that since NAFTA's implementation, trade flows and FDI between Mexico, the United States, and Canada have grown substantially. In that sense, NAFTA has successfully achieved Mexico's objectives for it. As to the future: First, efforts by NAFTA's Free Trade Commission to facilitate trade and investment—in areas such as harmonization of standards and norms, mutual recognition agreements, and rules of origin—will likely continue to encourage trade and investment expansion. Furthermore, these upward trends will be supported by the eventual successful completion and implementation of the Trans-Pacific Partnership (TPP) agreement and the Trans-Atlantic Trade and Investment Partnership (TTIP). However, Mexico's gains from these agreements will be limited, given that the country has already free trade agreements with Japan and the European Union. Finally, the effect of NAFTA preferences will continue to erode, due to the free trade agreements that Mexico, the United States, and Canada have individually signed and will continue to sign with non-NAFTA countries. Thus, although it is likely that the upward trend in trade and

[34] The views in this article are solely the opinions of the authors and should not be interpreted as reflecting the views of Federal Reserve Bank of Minneapolis; and U.S. International Trade Commission or any of its Commissioners.
[35] See, for instance, Robert A. Mundell, *International Economics*, New York, Macmillan, 1968.

investment will continue, it will do so at a slower pace. And this upward trend will be due less to NAFTA than to the geographic location of the three member countries and their economic integration, in which supply chains play a significant role.

Given the second point—that trade is only one among many instruments available in the toolbox of policy making—one may consider that for Mexico to promote its own development, it could undertake other policies as well. And these other policies go beyond the fiscal and monetary policies referred to above. For example, there are the reforms that Mexico is currently adopting— education reform, energy reform, and others. These will certainly help trade and investment, but more importantly, they will support development of the entire Mexican economy.

However, one key reform that plays a key role in development—not only for Mexico, but for any country—is the "rule of law." And that is not even being considered at the present time. "It is crucial for Mexico to implement the rule of law," said De La Cruz. "And by that I mean adopting and executing it, not just having laws on the books." He added, "My own feeling is that Mexico's strongest limitations stem from the weakness of its enforcement of the rule of law: ensuring the security of its people, guaranteeing property rights, and eliminating or moderating the abuse of power, both political and economic."

De La Cruz stated in conclusion that the future of NAFTA will be affected indirectly by what happens with the other policies Mexico has been applying. But, even if there were a 'super NAFTA', Mexico will not fully develop without the rule of law.

Alan V. Deardorff focused his comments on the future of NAFTA. He noted that the Democratic Party's base, to which its leaders must cater, for years has been very negative about international trade in general and NAFTA in particular, adding, "I think the public perception of NAFTA is still problematic." However, the Trans-Pacific Partnership (TTP) agreement, a free trade agreement that includes the NAFTA countries, among others, may make a huge difference. Deardorff said he feels that if the TPP is agreed upon and enacted in what appears to be its current form, it would simply replace NAFTA. If, however, the TPP were to include some provisions that are weaker than those of NAFTA, then the NAFTA countries would still be obliged to follow the NAFTA rules, and the TPP would not replace it. But this would seem to be the less likely outcome: Apparently, the negotiations for the TPP are aimed at making the TPP stronger than NAFTA in many ways, as discussed further below. If that were the case, then the future of NAFTA, in some sense, could turn out to be whatever the TPP does.

Deardorff noted that there are some features of the TTP that he is concerned about. The first has to do with its rules of origin. He hopes that the TPP, if it goes into effect, will not only have broad and generous rules of origin but also include cumulation across the different member countries. Second is the closed nature of the TPP. As envisioned by the handful of countries that started the TPP negotiations, the TPP was to be open to accession by other countries that accepted its set of rules, without causing much difficulty or having to negotiate a whole new agreement. In Deardorff's view, the TPP would be far better if it could expand by adding countries over time. But "I doubt very much that that will actually happen," he said. And yet, Deardorff believes that in some ways the TPP would still be better than NAFTA, because it would include a bigger group of countries with zero barriers. As it is, NAFTA was not designed for any other country to join easily.

The third problematic feature is NAFTA's Chapter 11 and its equivalent under the TPP. This provision established the investor-state dispute mechanism, by which companies can file complaints against host country governments that they feel have breached their investment obligations and then have a case decided not in the national courts but using the trade agreement's mechanism. "My perception is that Chapter 11 has not been a good thing," said Deardorff, "and what is unfortunate is that the TPP will expand it and strengthen it." The last feature of concern is the role of side agreements, similar to the labor and environment side agreements included in NAFTA. The TPP negotiators are considering including not only stronger versions of NAFTA's labor and environment agreements but also an agreement on intellectual property. And yet, it is exactly in those dimensions, according to Deardorff, that NAFTA has, to some extent, been problematic. These agreements, he concluded, are likely to become a problem for the TPP as well.

Richard G. Harris noted that although most of the discussion of NAFTA had focused on trade, his comments would focus on other issues from the Canadian perspective. To begin, he noted that border issues are and will continue to be at the front and center of the agenda for discussion of all three countries. This has been exacerbated since 9/11 and will continue to be a major concern. Second, an issue of enormous importance is the lack of regulatory harmonization. For instance, in two of the biggest sectors, services and telecom, there has been absolutely no progress toward free trade and integration. Another important sector, energy, is of joint interest because of the close integration of the industry between the United States and Canada. However, the industry's regulatory mechanisms across the two countries are dramatically different. In contrast, the e-commerce sector has seen a lot of progress and is growing very rapidly within the existing framework of rules.

A third issue involves labor mobility, specifically via the temporary visas offered under NAFTA. Harris noted that the program has been very successful and has made a significant difference to Canadian companies. Some of these companies are in favor of further liberalization of the NAFTA labor provisions, but there has been little progress in this area. Finally, Chapter 11, or the dispute settlement mechanism under NAFTA, is problematic for both Canada and the United States. Harris commented in conclusion that all these examples are about economic integration and asked the question: is North America going to become more deeply integrated economically? The answer is yes, he said—that is going to happen. But it is unlikely that NAFTA will be the mechanism by which this will be carried out; Harris believes that, as outlined by Deardorff, the future of NAFTA will be subject to the future of the TPP.

Timothy J. Kehoe focused his comments on the future of Mexico. He stated that the United States has grown at about 2 percent per year per capita—at least, it has done so for the last 113 years, with the exception of the Great Depression and its aftermath. Kehoe said he believed that every country could grow 2 percent per year by just following the United States. "When you are behind, though, you can play catch-up," said Kehoe, "and that's what Mexico was doing in the fifties, sixties, and seventies, with high-growth policies that eventually caused the later problems. But then you get to the point that your institutions matter," he said. Kehoe emphasized that institutions matter, so his remarks would pay particular attention to institutions in Mexico.

Mexico's growth has hit a plateau. According to Kehoe, the country therefore has to do something to increase productivity—which, by the way, has been disappointingly low. Why? Kehoe stated that he believes the work of Acemoglu and Robinson (2012) offers a general explanation, but that his response would focus on an earlier work by Douglass North (1968).[36] In a study of European ocean shipping between 1600 and 1850, North found that productivity in the industry went up by a factor of four. He also found that technology did not play a significant role in that increase, so what was the cause? According to North, it was getting rid of the pirates that had plagued shipping lanes for centuries. Getting rid of them meant that ships could be better designed—to carry cargo rather than defend themselves against pirates—and that ships didn't have to go in convoys all the time.

So, what are the barriers to growth to Mexico? "In Mexico, too, we have to identify the pirates," Kehoe stressed. The pirates are the drug traffickers and the big monopolies. Bureaucrats, he said, are pirates as

[36] Daron Acemoglu and James A. Robinson, *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*, Crown Publishing Group, Random House, Inc, New York, 2012; Douglass C. North, "Sources of Productivity Change in Ocean Shipping, 1600–1850," *Journal of Political Economy* 76, no. 5 (September/October 1968): 953–70. As discussed below, North's main conclusion was that most of the productivity change observed was caused by a decline in piracy and an improvement in economic organization, rather than being due to technological change.

well: When we look at doing business in Mexico, it becomes clear how much those bureaucratic pirates are holding the economy back. The financial institutions in Mexico could function more efficiently as well, as shown by the total loan amount that the banking system makes to entrepreneurs—which, Kehoe pointed out, are at the African level. Contract enforcement, rule of law, labor markets are all in need of reform. But Mexico is not the worst country out there, according to Kehoe. "Just think about Mexico versus China, for instance," he said. "China is probably worse on every single one of those dimensions."

Why, then, is Mexico not growing, while China is? It is because they are at different levels of development, Kehoe said. Mexico grew between 1950 and 1980 for the same reason China is growing now: It's getting people off the farm, giving them basic education, and doing some kind of industrial development. Now, China is doing better than Mexico did because China is further behind than Mexico was, and playing catch-up, according to Kehoe, is easier the farther you are behind. He added that China is an open economy, but that of Mexico wasn't, so economic development in Mexico was hindered by things that are not now hindering China. But when are the barriers that are stopping Mexico going to start binding China as well? It will be when China develops, in Kehoe's view. Citing Kehoe and Ruhl (2010), Kehoe predicted that China will slow down to about 2 percent growth—but it is difficult to say how soon, because the available data are difficult to trust. However, Mexico has to start growing again. And while reforms of the financial institutions, labor markets, and rule of law are all difficult, "I am hopeful that Mexico can get rid of the pirates," Kehoe concluded.

In the final presentation of the panel and of the conference, José Romero addressed the current state of Mexico's economy, as related to its policies of liberalizing trade and fully opening its capital markets. Romero started by looking at Mexico's income per capita. He first stated that the predicted convergence of U.S.-Mexican GDP per capita has not happened: Mexico's per capita GDP is about 33 percent of that of the United States. Second, Mexico's export growth strategy has not produced economic growth in the country. Comparing Mexico with South Korea—which also has a trade liberalization strategy—Romero noted that Mexico's per capita GDP is about half of that of Korea.

Next, Romero discussed Mexico's trade and investment policies and their harmful consequences to the Mexican economy. His argument focused on the following points: (1) When trade liberalization started in 1983, it was aimed at fighting inflation, not at achieving free trade. But the inclusion of agriculture in trade liberalization helped to impoverish the Mexican population and increase emigration. (2) When Mexico signed trade agreements granting national treatment to FDI, this made it impossible to implement any industrialization policy. (3) Trade liberalization, trade agreements, and oil exports have caused an overvaluation of the Mexican currency that has made investment in the tradable sector unprofitable.

Without investment or the accumulation of capital, labor productivity cannot increase. (4) Mexico is a very open economy with a propensity to import of around 0.4. As a result, Mexico's fiscal policy is highly ineffective as a source of growth.

Romero added that full opening of the Mexican capital markets also made monetary policy to promote growth ineffective, since interest rates in Mexico and the United States are practically the same. According to Romero, Mexico does not have an independent monetary policy. Similarly, the exchange rate cannot be used to make the economy more competitive. Thus, said Romero, Mexico lacks effectiveness in its trade policy, industrial policy, fiscal policy, monetary policy, and exchange rate policy. "We are in a canoe without any control, going into rapids," Romero stated.

How does growth in Mexico relate to that of the United States? Romero noted that from 1962 to 1982, GDP in the United States grew at about 3.3 percent, while GDP in Mexico grew at 6.2 percent. During the NAFTA period (1994–2013), both the U.S. and the Mexican GDP grew at the same rate, but with the Mexican GDP varying more widely than that of the United States (table 1).

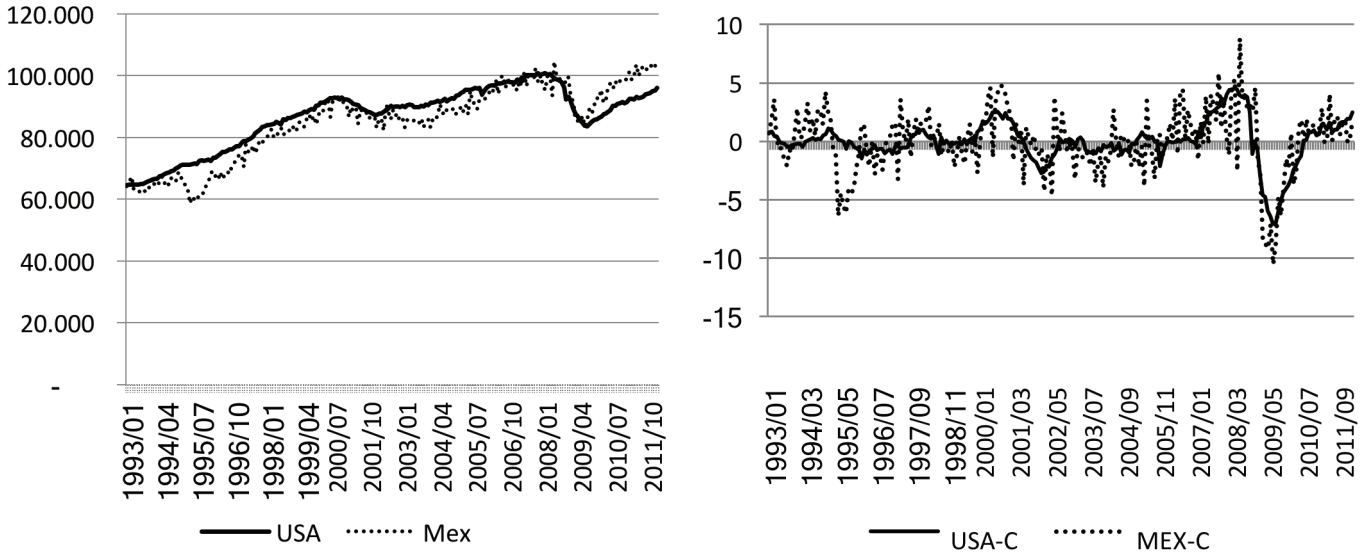
Table 1. Mexico and United States Real GDP Growth, Period Averages

Period	United States	Mexico
1960-1982	3.3	6.2
1983-2013	2.9	2.2
1994-2013	2.5	2.5

Source: Author's calculations with data from INEGI, Banco de Información Económica (BIE), http://www.inegi.org.mx/sistema/bie/; and U.S. Department of Commerce, Bureau of Economic Analysis, http://www.bea.gov/industry/index.htm#annual.

"What does that mean?" Romero asked. "Looking at industrial production, actual and using Prescott decomposition between trends and cycles (figure 1), we see that Mexico's index almost mimics that of the United States. That means that the only source of growth for Mexico now is the United States economy."

Figure 1. Mexico and United States Industrial Production, Actual and Cycles: 1993-2011



Source: Author's calculations.

"What worries me the most," Romero concluded, "is that NAFTA does not have a broad strategy as a bloc." He explained that the United States has its own growth strategy that does not include Mexico or Canada. For Mexico, the United States is almost its entire world, but for the United States, Mexico is only one of many partners—and not one of its priorities. "My own thinking," said Romero, "is that Mexico cannot continue with this economic performance for long." He emphasized that the situation must change before social unrest develops**.**

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Verhoogen is an associate professor of economics and international affairs at Columbia University, with a joint appointment in the School of International and Public Affairs and the Department of Economics. His primary research area is industrial development—empirical microeconomic work on firms in developing countries. A common theme in his work has been the process of quality upgrading by manufacturing firms, both its causes and its consequences. His work has been published in the Quarterly Journal of Economics, American Economic Review, Review of Economic Studies and other journals. He is a co-director of the Center for Development Economics and Policy at Columbia University, as codirector of the Trade Research Program of the International Growth Center and on the board of the Bureau for Research in the Economic Analysis of Development. He holds a PhD in economics from the University of California, Berkeley.

Irving A. Williamson

Chairman, U.S. International Trade Commission

Williamson, chairman of the U.S. International Trade Commission, has more than 40 years of experience in the international and trade policy fields. Prior to his appointment with USITC, Williamson served as president of Williamson International Trade Strategies Inc., working with over 20 U.S. Agency for

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