

## Chapter 2: Trade and Welfare Effects of NAFTA

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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.

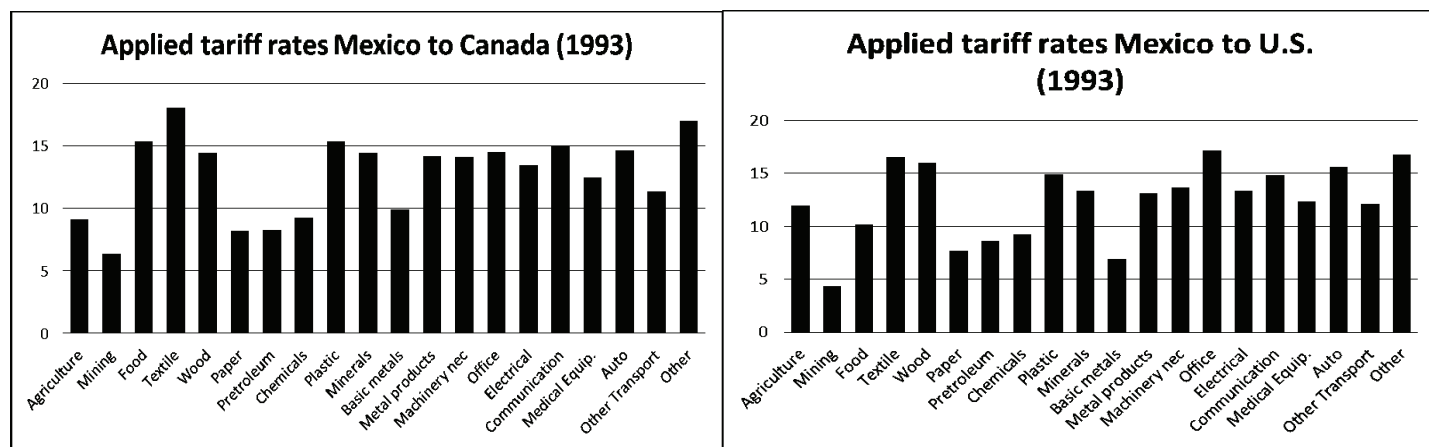
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<sup>8</sup> The views expressed herein are those of the authors and not necessarily those of the Board of Governors of the Federal Reserve System or the Federal Reserve System.

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.<sup>9</sup> 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.<sup>10</sup> In quantifying these effects, their measures show

<sup>9</sup> 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.

<sup>10</sup> 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**

Country	Terms of Trade		Volume of Trade	
	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."

## **References**

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