



# Intra-Industry Trade with Mexico May Aid U.S. Global Competitiveness

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**ABSTRACT:** Since the enactment of NAFTA, U.S.–Mexico trade and manufacturing processes have become increasingly integrated through cross-border production linkages. A new Banco de México economic model finds that U.S. imports from Mexico can be explained by taking into account the level of U.S. exports—suggesting that trade with Mexico may have contributed to enhanced U.S. global competitiveness.

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**T**he U.S.–Mexico commercial relationship reflects decades of production integration, starting with Mexico’s border industrialization program that established the maquiladora industry in the 1960s.

Expansion of trade between Mexico and the United States—a large portion of it coming through Texas—accelerated in the late 1980s, shortly after Mexico joined the General Agreement on Tariffs and Trade. U.S.–Mexico trade grew 108 percent in inflation-adjusted terms between 1986 and 1993 (*Chart 1*).<sup>1</sup>

Trade flows further expanded following implementation of the North American Free Trade Agreement (NAFTA) in 1994. U.S.–Mexico trade rose 283 percent between 1993 and 2016, from \$137 billion to \$525 billion. Mexico today is the U.S.’s third-largest trading partner (behind China and Canada) and Texas’ No. 1 foreign market.

Studies suggest that perhaps half of U.S.–Mexico trade volume is made up of intermediate goods—items used to produce finished products. Given the large volume of intra-industry trade, it may not be surprising that a recent Banco de México analysis found it is necessary to explicitly consider the performance of U.S. exports to the rest of the world.<sup>2</sup>

This analysis is groundbreaking because it suggests that U.S. export competitiveness depends partly on Mexican imports. While it has been long known that Mexican imports benefit domestic consumption and production destined for sale *inside* the U.S., little has been known about how

Mexican imports may be boosting U.S. companies’ ability to export globally. The linkage underscores how production processes increasingly straddle the 1,954-mile border and how Texas plays an important role as a trade participant and principal gateway.

## U.S.–Mexico Manufacturing

When countries trade, they tend to specialize in the types of goods they are most efficient in producing. In the U.S.–Mexico context, Mexico tends to specialize in relatively labor-intensive production, while the U.S. specializes in more capital-intensive manufacturing. This specialization takes place not only across different industries, but also at very fine levels within the same industry.

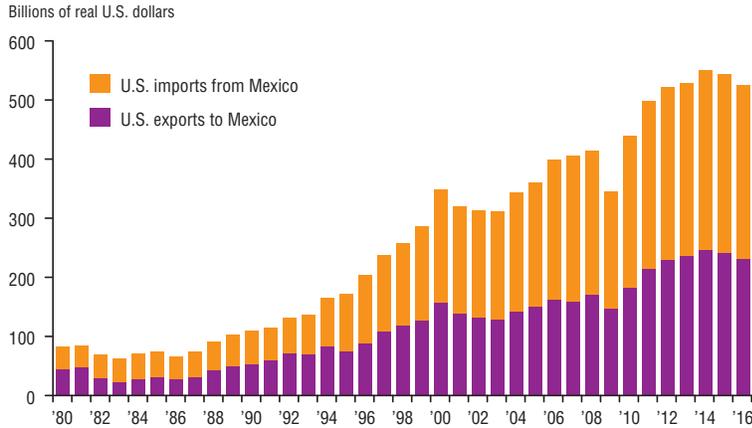
In fact, the most significant deepening of U.S.–Mexico trade has occurred within large, specialized industries common to both countries. The automotive industry provides the best example of this kind of integration.

In intra-industry trade, products are exported and re-imported at different stages of production. By spreading production costs across borders, firms are able to produce at a lower average unit cost, which leads to greater competitiveness in both global and domestic markets and to lower prices for domestic and foreign consumers. Recent estimates of the volume of U.S.–Mexico intra-industry trade range from 48 percent to 53 percent of total trade, while estimates for U.S.–China intra-industry trade are around 20 percent.<sup>3</sup>

Thanks in part to the growth of intra-industry trade, the U.S. manufacturing sector has been better able to withstand the effects of economic

**Chart 1**

**U.S.–Mexico Trade Jumps After NAFTA in 1994**



NOTE: NAFTA is the North American Free Trade Agreement, a trilateral agreement among the U.S., Mexico and Canada that took effect in 1994.  
SOURCE: Census Bureau.

shocks and volatility, such as China’s entry into the World Trade Organization in 2002 and the Great Recession.<sup>4</sup>

Production-sharing arrangements in the wake of NAFTA have also led to the synchronization of U.S. and Mexican business cycles (*Chart 2*). Industrial production in Mexico is now more affected by shocks to U.S. industrial production than to U.S. domestic demand. This is indicative of the increasing degree to which imports from Mexico

are used as inputs in U.S. industrial production, whose output is dependent on both domestic and foreign markets.<sup>5</sup>

**Texas, the Intermediary**

Trade between Texas and Mexico surged following NAFTA’s implementation 23 years ago; the state’s exports to Mexico rose in the 1990s and accounted for nearly half of exports before falling to around 35 to 40 percent in more recent years. U.S. exports are more

diversified, so while the Mexico share of U.S. exports is increasing, it is much smaller at 16 percent.<sup>6</sup>

Imports from Mexico represented 35 percent of Texas imports in 2016, compared with 13 percent for the U.S. as a whole.

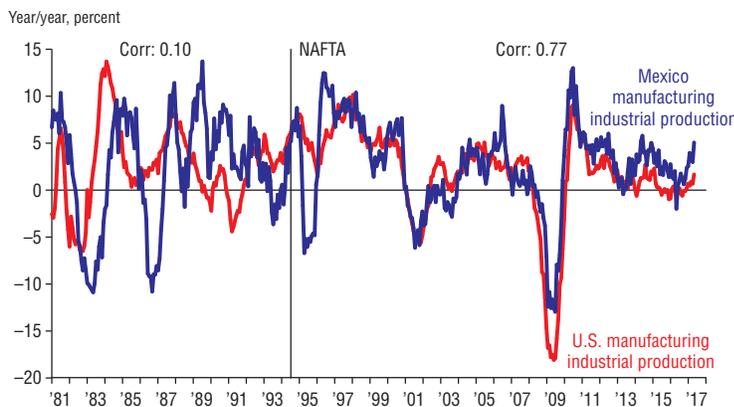
Significantly for Texas, this growing commercial exchange has coincided with diversification of the state economy and a smaller role for the oil and gas extraction industry, whose share of the Texas economy peaked in 1981. In 2016, oil and gas extraction represented less than 8 percent of Texas gross domestic product (GDP), while total trade represented about one-third.<sup>7</sup> Some experts have argued that Texas’ ability to leverage its strengths and benefit from globalization has been key to maintaining its growth premium over the nation.<sup>8</sup>

Texas exports have gained global market share over the past decade despite facing competition from world-class manufacturing powerhouses, including Japan, Korea, the United Kingdom and Germany.

Texas’ comparative advantage in manufacturing markets—likely aided by ties to Mexico—has grown as its manufacturing productivity has increased.<sup>9</sup> Notable examples include rising global market share in petroleum products, chemicals, fabricated metals and transportation equipment. This trend is consistent with the shale oil and gas boom that started in the mid-2000s, but it also reflects the state’s longstanding manufacturing linkages with Mexico.

**Chart 2**

**U.S., Mexico Business Cycles More Correlated Post-NAFTA**



NOTES: NAFTA is the North American Free Trade Agreement, a trilateral agreement among the U.S., Mexico and Canada that took effect in 1994. The chart shows year-over-year changes in the manufacturing component of industrial production. The last data point is April 2017.  
SOURCES: Instituto Nacional de Estadística y Geografía (National Institute of Statistics and Geography); Federal Reserve Board.

**Imports from Mexico**

When imports consist of final goods, particularly of goods that were once produced domestically, opening to trade may entirely displace domestic production of those goods. However, this is not necessarily the case when imports consist of intermediate goods because such imports may complement rather than substitute for domestic production.

Research suggests firms that import more intermediate inputs also expand the volume of their exports and increase their export scope—that is, the variety of exports and number of markets.<sup>10</sup> On

average from 2003 to 2016, 73 percent of U.S. imports from Mexico were intermediate goods; only 24 percent were final consumer goods.<sup>11</sup> By comparison, 46 percent of imports from China were intermediate goods and 53 percent were final consumer goods.

Finally, imports of intermediate goods from Mexico are highly correlated with total U.S. exports (Chart 3). U.S. exports to the rest of the world are generally made up of finished products, some of which contain Mexican inputs. The U.S., similarly, sends inputs to Mexico that subsequently become intermediate-goods imports from Mexico.

Chart 3 highlights the decline of U.S. exports as well as the flattening of imports from Mexico since 2015. These developments motivated Banco de México to look more closely at whether faltering U.S. exports could explain the stagnation of nonautomotive imports from Mexico.<sup>12</sup>

Previous research by Banco de México showed that nonautomotive U.S. imports from Mexico could be explained relatively well in a traditional econometric model using U.S. manufacturing production and the real (inflation-adjusted) peso-dollar exchange rate.<sup>13</sup> However, that model's ability to explain the recent behavior of those imports weakened in the more recent period. Specifically, the decline in non-automotive imports from Mexico occurred at a time in which U.S. domestic demand grew at a relatively favorable rate and the peso depreciated against the dollar. The traditional model would have predicted an increase rather than a decrease in imports from Mexico.

So what was different this time? External demand for U.S. exports waned due to weak global growth, particularly in advanced economies, and to an appreciating dollar that made U.S. exports more expensive.

U.S. economic growth averaged 2.1 percent per year between 2012 and 2016, while GDP in advanced economies as a whole grew only 1.5 percent. At the same time, the dollar appreciated 33 percent against a basket of other major currencies.<sup>14</sup>

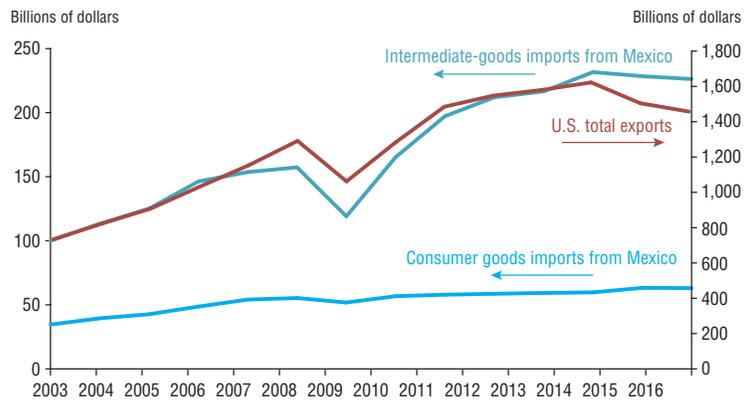
Before 2012, the traditional model (Chart 4, blue line) was sufficient to explain the evolution of U.S. nonautomotive imports from Mexico (Chart 4, red line). However, after 2012, the model based only on U.S. manufacturing production and the peso-dollar exchange rate appears insufficient to explain the performance of those imports.

To capture the effect that external demand for U.S. goods may have had on the performance of U.S. nonautomotive imports from Mexico, the tradi-

tional model was augmented by adding seasonally and inflation-adjusted U.S. nonautomotive exports as an explanatory variable. Controlling for U.S. external demand in addition to the two previous variables (U.S. manufacturing production and the exchange rate) notably improves the model's ability to explain the recent behavior of U.S. nonautomotive imports from Mexico (Chart 4, green line).

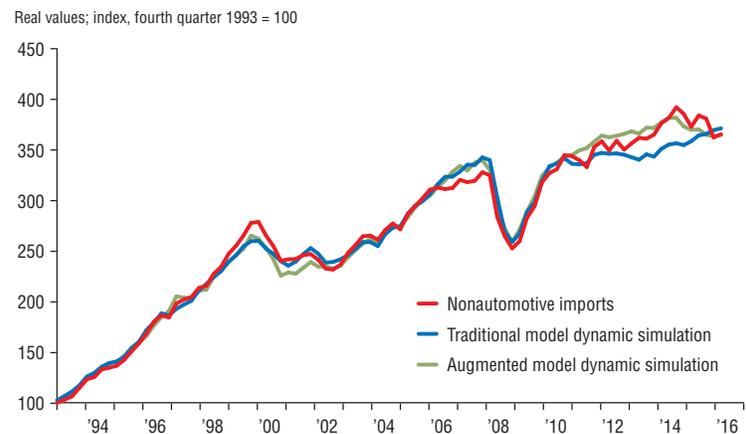
Simulations using Banco de México's augmented model indicate

**Chart 3** U.S. Exports Highly Correlated with Intermediate Imports from Mexico



SOURCES: Bureau of Economic Analysis; Haver Analytics.

**Chart 4** U.S. Exports Help Explain Changes in Mexican Imports



NOTES: Mean squared forecast error (RMSFE) indicates better forecasting performance. Traditional model RMSFE = 21.15; augmented model RMSFE = 6.90.

SOURCE: "Recuadro 2: Importancia del Desempeño del Sector Exportador Estadounidense como Determinante de las Exportaciones Manufactureras No Automotrices de México a Estados Unidos (Box 2: The Importance of the Performance of the U.S. Export Sector as a Determinant of Mexican Nonautomotive Manufacturing Exports to the U.S.)," Informe Trimestral, Banco de México, April–June 2016.

that global economic weakness outside the U.S. has negatively affected U.S. imports from Mexico. These effects are consistent with an intra-industry trade dynamic in which Mexican imports are used as inputs in the production process of U.S. output sold abroad.

Texas imports from Mexico demonstrate this U.S.–Mexico trade dynamic. Computer and electronic products, transportation equipment and machinery were among the top 10 Texas imports from Mexico in 2016 and among the top 10 Texas exports to the world.

### Complementary Processes

Along with its geographic proximity, Mexico's maquiladora industry, trade openness and NAFTA participation have all deepened intra-industry ties with the U.S. While the implications of U.S.–Mexico intra-industry trade for the U.S. domestic market have been relatively well-understood, this analysis suggests these linkages extend even further and may have bolstered the competitiveness of U.S. exports to the rest of the world.

Plans to renegotiate NAFTA might therefore have repercussions not only for U.S.–Mexico trade, but also for trade with the rest of the world. Could a more restrictive NAFTA reduce the trade deficit with Mexico, only to widen it with the rest of the world? It is possible that placing more limits on North American trade may harm rather than improve the U.S.'s trade balance by making its companies less competitive abroad. Texas, whose top trading partners are Mexico and Canada, would also likely be harmed by restrictions on North American trade.

If, instead, NAFTA is redrawn to exploit new areas of opportunity and broaden its coverage, all three trading partners stand to benefit. The expansion could include energy, digital trade and e-commerce and related services—sectors that didn't exist when the agreement took effect—as well as provisions for more North American immigration to make better use of resources across the region.

Further economic integration could boost each country's competi-

tiveness, allowing the North American region to be in a better position to face increased global competition.

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### Notes

<sup>1</sup> The General Agreement on Tariffs and Trade, or GATT, was the predecessor to the World Trade Organization.

<sup>2</sup> "Recuadro 2: Importancia del Desempeño del Sector Exportador Estadounidense como Determinante de las Exportaciones Manufactureras No Automotrices de México a Estados Unidos (Box 2: The Importance of the Performance of the U.S. Export Sector as a Determinant of Mexican Nonautomotive Manufacturing Exports to the U.S.)," Informe Trimestral, Banco de México, April–June 2016.

<sup>3</sup> "La Economía Mexicana en el Contexto Global Actual (The Mexican Economy in the Current Global Context)," by Alejandrina Salcedo Cisneros, Banco de México, November 2016, and "Growing Together: A Regional Manufacturing Platform," by Christopher Wilson, Mexico Institute, Wilson Center, October 2016.

<sup>4</sup> For the impact of China's entry into the World Trade Organization, see "Offshoring and Volatility: Evidence from Mexico's Maquiladora Industry," by Paul R. Bergin, Robert C. Feenstra and Gordon H. Hanson, *American Economic Review*, vol. 99, no. 4, 2009, pp. 1,664–71.

<sup>5</sup> "Macroeconomic Synchronization Between Mexico and its NAFTA Partners," by Alfredo Cuevas, Miguel Messmacher and Alejandro Werner, World Bank, 2002, and "Recuadro 1: Sincronización de la Economía Mexicana con la Estadounidense (Box 1: Synchronization of the Mexican Economy to the U.S. Economy)," Informe Trimestral, Banco de México, January–March 2014.

<sup>6</sup> "Texas Border Cities Illustrate Benefits and Challenges of Trade," by Jesus Cañas, Federal Reserve Bank of Dallas *Southwest Economy*, Fourth Quarter, 2016.

<sup>7</sup> It is worth noting that trade is in terms of gross value, while oil and gas extraction is expressed in terms of value added.

<sup>8</sup> "Without Globalization, Adios 'Texas Miracle,'" by Pia Orrenius and Keith Phillips, *Austin American-Statesman*, April 19, 2017.

<sup>9</sup> "Texas Comparative Advantage and Manufacturing Exports," by Jesus Cañas, Luis Bernardo Torres Ruiz and Christina English, in *Ten-Gallon Economy*, Pia M. Orrenius, Jesus Cañas and Michael Weiss, ed., New York: Palgrave Macmillan, 2015, pp. 159–79.

<sup>10</sup> "The Connection Between Imported Intermediate Inputs and Exports: Evidence from Chinese Firms," by Ling Feng,

Zhiyuan Li and Deborah L. Swenson, National Bureau of Economic Research, NBER Working Paper no. 18260, July 2012, and "Does Importing More Inputs Raise Exports? Firm Level Evidence from France," by Maria Bas and Vanessa Strauss-Kahn, Centre d'Etudes Prospectives et d'Informations Internationales, CEPII Working Paper no. 2011–15, June 2011.

<sup>11</sup> Authors' calculations from Bureau of Economic Analysis and Haver Analytics data for imports from Mexico and China.

<sup>12</sup> Imports of Mexican automotive vehicles, parts and engines were excluded from the analysis because their behavior in the last decade has followed a different pattern. For example, during and after the Great Recession, U.S. automotive companies transferred some of their production to Mexico. Non-U.S. auto manufacturers also invested heavily in Mexico during the same period. Consequently, Mexico's automotive exports have steadily grown and been less sensitive to the business cycle. In addition, U.S. automotive industry imports from Mexico are more responsive to economic growth, consumer preferences and gasoline prices than to real exchange rates or overall industrial production.

<sup>13</sup> Imports from Mexico are also adjusted for seasonality and inflation using an index of U.S. consumer prices. For technical details and a more complete explanation of the dynamic model simulations, see the Banco de México report in note 2.

<sup>14</sup> Trade Weighted U.S. Dollar Index: Major Currencies, FRED database, Federal Reserve Bank of St. Louis, <https://fred.stlouisfed.org/series/DTWEXM>.