

U.S. Corn Exports to Mexico and the North American Free Trade Agreement

Lesley Ahmed

Abstract

The significant growth of U.S. corn exports to Mexico following the implementation of the North American Free Trade Agreement (NAFTA) provides an appealing case study to demonstrate how multiple, interacting factors, including tariff reductions from free trade agreements (FTAs) affect trade flows. The literature identifies a number of factors which likely contributed to the growth in U.S. corn exports to Mexico between 1990 and 2008. These factors are summarized into three categories and discussed—changes to Mexican trade policy (including NAFTA), changes to domestic corn policy (both Mexican and U.S.), and macroeconomic and structural changes and shocks in Mexico. Separating the impact of NAFTA from these sometimes related factors in explaining growth of U.S. corn exports to Mexico is challenging, and the results of the literature are mixed. Despite this, there is compelling evidence that the NAFTA corn provisions provided an environment that encouraged growth in exports, to some extent, by creating a more transparent marketplace.

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Introduction

The significant growth of U.S. corn exports to Mexico following the implementation of the North American Free Trade Agreement (NAFTA) provides an appealing case study to demonstrate how multiple, interacting factors, including tariff reductions from free trade agreements (FTAs) affect trade flows. NAFTA included significant new market-oriented provisions for U.S.–Mexico corn trade that replaced Mexico’s previous opaque import license system. The liberalization was gradual, beginning with a duty-free tariff-rate quota (TRQ) for the United States in 1994, and with completely free trade beginning January 1, 2008. These provisions created a much more transparent and predictable trading environment for Mexican importers and U.S. corn exporters. In addition to trade liberalization under NAFTA, there were a number of other policy, economic, and structural changes in both Mexico and the United States, some of which were tied to plans for liberalization under NAFTA, which affected U.S.-Mexico corn trade during the NAFTA implementation period. Although U.S. grain and Mexican livestock industry representatives and some of the economic literature credit much of the expansion in U.S. corn exports to Mexico to NAFTA, it is difficult to control for the other factors, and findings are not conclusive.

While concessions negotiated under NAFTA significantly lowered trade restrictions to U.S. corn in the Mexican market, analyzing NAFTA’s actual contribution to export growth is difficult because there were a number of additional factors that affected U.S. and Mexican corn markets between 1990 and 2008. For example, Mexico implemented a number of domestic agricultural policy reforms that likely affected domestic production and import demand. Some of these reforms, while not part of the NAFTA agreement itself, were linked to broader Mexican efforts to transition to liberalized trade.¹ Mexico’s demand for U.S. corn was also affected by Mexican economic and structural changes during this period, particularly income and population growth, greater domestic meat and dairy consumption, and fluctuations in global corn prices and supplies.² Furthermore, U.S. corn exports to Mexico during this time period may have been influenced by U.S. policy reforms under the 1996 Freedom to Farm Bill (1996 U.S. Farm Bill) that allowed U.S. farmers new flexibility in crop planting decisions, which, in turn, expanded exportable supplies of corn.³

¹ Nadal, *Corn in NAFTA*, May 2002, 4-5; Yunez-Naude and Taylor, “The Effects of NAFTA,” 2006, 163; Zahniser, *NAFTA at 13*, March 2007, 17.

² Yunez-Naude and Taylor, “The Effects of NAFTA,” 2006, 163; Nadal, *Corn in NAFTA: Eight Years After*, May 2002, 3–5, 7; Yunez-Naude, “Small-Scale Corn and Livestock Mexican Farmers,” February 1998, 210; World Bank, Open Data: Population, total (accessed June 14, 2016); World Bank, Open Data: GNI per Capita, Atlas method (current US\$) (accessed June 14, 2016).

³ USDA, ERS, “1996 Farm Bill,” April 1996, 1.

In order to explore the extent to which NAFTA affected U.S. corn exports to Mexico, this paper will consider three factors that may have contributed to growth in U.S.-Mexico corn trade: (1) Mexican trade policy including pre-NAFTA policies and the accelerated implementation of corn market liberalization under NAFTA, (2) domestic agricultural policy reforms in both Mexico and the United States, and (3) macroeconomic and structural changes in Mexico, including population and GDP growth. The analysis draws upon the literature analyzing the effects of NAFTA and other factors on U.S.-Mexico corn trade.

This paper is organized as follows: (1) a description of the trends and dynamics of U.S. and Mexican corn production and trade during 1990–2016, (2) an analysis of the three aforementioned categories of factors contributing to the expansion of U.S. corn exports to Mexico, (3) insights from the literature, and (4) a conclusion on the impacts of NAFTA on U.S. corn exports to Mexico.

U.S. and Mexican Corn Production and Trade

The United States and Mexico are significant global corn producers and consumers. The United States is the world's largest producer and exporter of corn. In 2016/17, it accounted for 37 percent of global production by volume, followed by China (21 percent) and Brazil (9 percent); and 37 percent of exports by volume, followed by Brazil (20 percent).⁴ Over the past three decades, the volume of U.S. corn production grew by over 70 percent to 385 million metric tons (mt) in 2016/17.⁵ Mexico, a net corn importer, is the world's second largest importer of corn (10 percent in 2016), behind Japan (11 percent). Mexico is also the sixth largest corn producer, with 3 percent of global production in 2016/17.⁶ Over the past three decades, Mexican corn production grew by approximately 60 percent to 27 million mt in 2016/17, while its consumption more than doubled to reach 33.2 million mt in 2016/17.⁷ This consumption growth was supplied by greater imports, primarily from the United States, which increased fourfold during the same period to reach 11.3 million mt in 2016/17.⁸

The United States produces primarily yellow corn, which is used for livestock feed, ethanol, and industrial derivatives, such as starch, sweeteners, and plastics. There is limited U.S. production of white corn, which is the vast majority of corn grown in Mexico (87 percent in 2016) and is

⁴ Data for 2016 is based on the 2016/17 marketing year (MY). USDA, PSD Online database (accessed March 23, 2017).

⁵ Change in production is based on five year averages for MY 1989/90 to 1993/94 and MY 2011/12 to 2016/17. USDA, PSD Online database (accessed August 10, 2017).

⁶ Data for 2016 is based on MY 2016/17. USDA, PSD Online database (accessed July 13, 2017).

⁷ Changes in production and consumption are based on five year averages for MY 1989/90 to 1993/94 and MY 2011/12 to 2016/17. USDA, PSD Online database (accessed August 10 and 18, 2017).

⁸ Change in imports is based on five year averages for MY 1989/90 to 1993/94 and MY 2011/12 to 2016/17. USDA, PSD Online database (accessed August 18, 2017).

mostly used for tortilla production and other food products for human consumption.⁹ U.S. white corn production is mostly on a contract basis at a premium to yellow corn, and destined for food processing in the United States or export to Mexico.¹⁰ Occasionally, limited substitution can occur between white corn and yellow corn: small amounts of food-grade yellow corn are used to make beer, corn chips, and corn flakes, while white corn can be fed to livestock under certain price and supply conditions.¹¹

The United States was the predominant supplier for Mexican corn imports even prior to NAFTA, because of U.S. production efficiency and proximity to Mexico, which allows for corn to be transported via rail, road, or ship.¹² U.S. corn exports to Mexico trended upward between 1990 and 2015 and accounted for nearly all of Mexican corn imports most years, but also fluctuated somewhat from year to year, which is typical for agricultural commodities such as corn, which experience frequent supply shocks from weather variability (table 1). For example, in 1993, corn exports to Mexico were particularly low because of a large sorghum crop in Mexico and prices favoring sorghum feed use over corn. In 1996 though, U.S. corn exports to Mexico were high because of a drought-induced Mexican production shortage.¹³

Table 1: Mexico's corn imports, by source country (million dollars)

Import source	1990 ^a	1995	2000	2005	2008 ^b	2010	2016
United States	402.3	361.0	539.1	671.8	2,353.2	1,553.7	2,608.5
Argentina	^c	0	0	0	0.5	0.3	19.5
Brazil	^c	0	0	0	0	0	10.1
Canada	^c	0	^d	0	0	0	9.3
Other	^c	^d	^d	0	0	0	0
World	^c	361.0	539.1	671.8	2,353.7	1,554.0	2,647.2

Source: IHS Markit, Global Trade Atlas (accessed March 23, 2017) (imports under HS 1005.90); USDA, PSD Online database (accessed June 15, 2016).

^a Mexican import data are not available for 1990. Imports from the United States for 1990 are based on U.S. export data.

^b The first year of full implementation of Mexico's NAFTA commitments for corn imports from the United States was 2008.

^c Data not available.

^d Less than \$100,000.

⁹ Government of Mexico, FIRA, "Panorama Agroalimentario, Maíz 2017," 16; Sweeney, Steigerwald, Davenport, and Eakin, "Mexican Maiz Production," 2013, 80.

¹⁰ Chowdhury and Allen, "Impact of NAFTA on U.S. Corn Trade," 2005, np.

¹¹ Zahniser and Coyle, *U.S.-Mexico Corn Trade During the NAFTA Era*, 2004, 3.

¹² The United States accounted for at least 98 percent of Mexican corn imports by volume between 1990 and 2016, except from 2010 to 2012, when the U.S. share was between 86 and 91 percent. USDA, PSD Online database (accessed March 23, 2017).

¹³ USDA, ERS, "NAFTA Commodity Supplement," 2000, 23.

Factors Affecting U.S. Corn Exports to Mexico

The literature identifies a number of factors, including NAFTA, which may have contributed to the growth in U.S. corn exports to Mexico between 1990 and 2008. These factors can mostly be summarized into three categories: changes to Mexican trade policy (including NAFTA), changes to domestic corn policy (both Mexican and U.S.), and macroeconomic and structural changes and shocks in Mexico. The literature also draws attention to the difficulty of separating the effects of NAFTA from concurrent policy and macroeconomic changes. Often times trade liberalization and agricultural policy changes are used jointly in order to pursue a broader economic objective, making it difficult to separate the effects of one from another.

Mexican Trade Liberalization

Mexican trade liberalization began in the 1980's and was motivated by macroeconomic, structural, and political conditions within Mexico. Trade liberalization occurring under the GATT and NAFTA were concurrent, and likewise had overlapping effects upon Mexico's trade flows. This section examines Mexican trade liberalization before and during NAFTA, laying out Mexico's NAFTA corn concessions and corn trade liberalization beyond the NAFTA allowances.

Pre-NAFTA Mexican Trade Liberalization

Well before NAFTA was negotiated or implemented, the 1982 economic crisis prompted the Mexican government to undertake structural adjustment of the Mexican economy, including trade liberalization.¹⁴ When the Mexican fiscal crisis worsened in the mid-1980's, the International Monetary Fund (IMF) and the World Bank became major creditors and Mexico imposed austerity measures, divesting from state-run agencies and increasing trade liberalization efforts, which is also reflected in Mexican corn policy discussed below.¹⁵ By pursuing market liberalization, the Mexican government allowed for more productive use of land, labor, and capital. Trade policy liberalization was one part of a wider set of policy changes in an effort to recover from the economic crisis.

Beginning in 1986, when Mexico joined GATT, trade between Mexico and the United States expanded rapidly. Under the GATT, Mexico lowered its tariffs from a trade-weight average of 25 percent to 10 percent in 1986.¹⁶ Mexico also implemented domestic reforms before NAFTA

¹⁴ Nadal, "The Environmental & Social Impacts of Economic Liberalization on Corn Production in Mexico," September 2000, 14; GAO, *U.S. International Trade: Agencies Need Greater Focus*, 2005, 17; Sweeney, Steigerwald, Davenport, and Eakin, "Mexican Maize Production," 2013, 79.

¹⁵ Sweeney, Steigerwald, Davenport, and Eakin, "Mexican Maize Production," 2013, 79; Aggarwal, "History Rhymes in the Greek Debt Crisis," May 24, 2012.

¹⁶ De Janvry, Sadoulet, and Davis, "NAFTA and Agriculture," 1997 3.

took effect in order to help sectors prepare for NAFTA by easing the change to free trade and reducing government involvement.¹⁷

NAFTA

NAFTA further expanded trade liberalization between the United States and Mexico, with Mexico's overall average trade-weighted import tariffs falling from 10 percent in 1986 to 5 percent in 1994.¹⁸ NAFTA also locked in Mexico's previous unilateral liberalization to foreign investment and trade policy changes.¹⁹

NAFTA was clearly an important agreement for the U.S. corn industry, setting up a policy environment that encouraged greater U.S. exports of corn to Mexico after 1994.²⁰ Under NAFTA, Mexico agreed to establish a TRQ, with a duty-free quota of 2.5 million mt that grew over time, and a 200 percent over-quota duty rate that fell to zero over 15 years (table 2). The TRQ meant that Mexican imports of U.S. corn were no longer subject to the previous opaque import licenses system, thereby creating a much more transparent and predictable trading environment for Mexican importers and U.S. corn exporters. Prior to NAFTA, Mexican imports of corn were regulated through a state trading enterprise.²¹ Mexico used tariffs and import licenses that functioned as import quotas, to limit imports of U.S. agricultural goods—in many years, corn import licenses were not issued until the entire Mexican crop was utilized.²²

¹⁷ Prina, "Who Benefited More from NAFTA," 2013, 597.

¹⁸ De Janvry, Sadoulet, and Davis, "NAFTA and Agriculture," 1997, 3.

¹⁹ De Janvry, Sadoulet, and Davis, "NAFTA and Agriculture," 1997, 11; Hanson "What Has Happened to Wages in Mexico since NAFTA?" 2003, 1; Krueger, "Trade Creation and Trade Diversion under NAFTA," 1999, 4; Salinas-León, "A Mexican View of North American Free Trade," May 21, 1991, 2.

²⁰ Zahniser, *NAFTA at 13*, March 2007, 4; Sleight, "Statement of the U.S. Grains Council to the U.S. International Trade Commission," November 17, 2015, 7; UNCTAD, "Mexico's Agricultural Development," 2013, 2; Zahniser, et. al., *NAFTA at 20*, February 2015, 23; Hoffman, et al., *Feed Grains Background*, March 2007, 41; McMillan, Zwane, and Ashraf, "My Policy or Yours," March 2007, 208.

²¹ Zahniser and Link, *The Effects of NAFTA*, July 2002, 70; Yunez-Naude, *The Dismantling of CONASUPO*, January 2003, 8–10.

²² Barkema "The North American Free Trade Agreement," 1992, 8.

Table 2: NAFTA: Mexico’s concession on U.S. corn imports

Product	Concessions	Proportion of Mexican imports, 1995–2015
Seed corn	Duty free at entry into force (1994)	2%
Popcorn, corn on cob	Duty free year 10 (2003)	2%
Other corn ^a	TRQ established year 1, free trade year 15 (2008) -Initial duty-free quota 2.5 million mt, rose 3% annually; - Over-quota duty: greater of 206.4% or \$197/mt in 1994, reduced at accelerating rate until its elimination in 2008	96% (90% of which was yellow corn ^b)

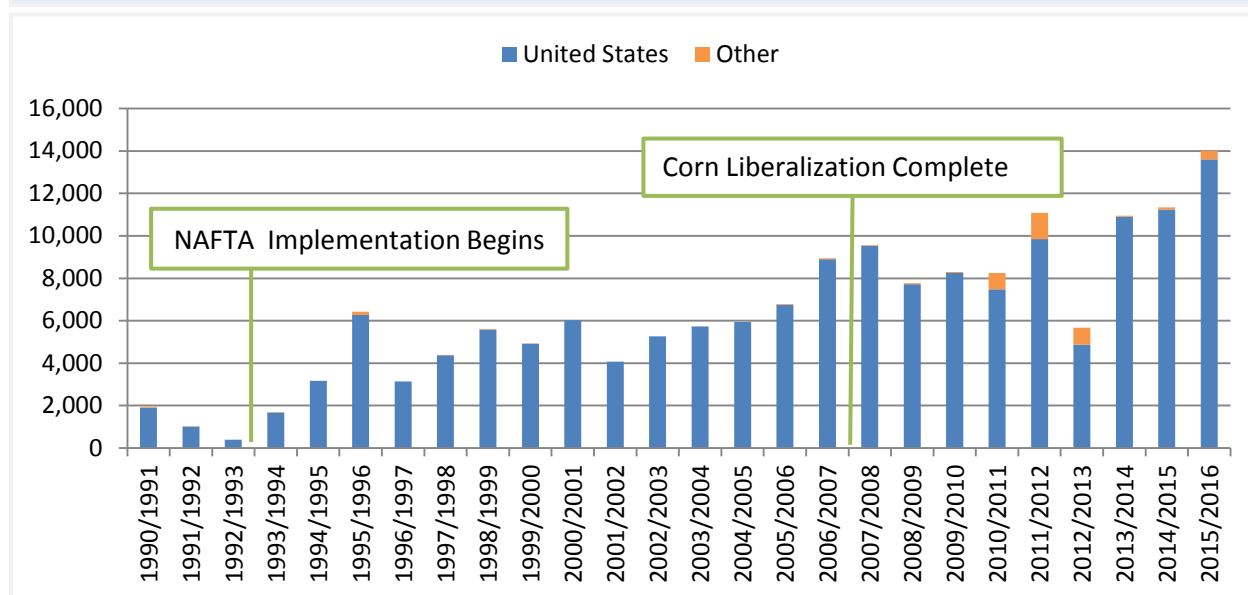
Source: NAFTA, Annex 302.2, “Schedule of Mexico,” Chapter 10, 2; IHS Markit, GTA database (accessed April 17, 2018).

^a Other corn includes yellow corn and white corn, which were broken out in Mexico’s tariff schedule effective 2001.

^b Based on data from 2001 to 2017.

Rapid growth of U.S. corn exports to Mexico coincided with NAFTA implementation, which included significant Mexican concessions for imports of U.S. corn. In the two decades since NAFTA came into force, U.S. corn exports to Mexico had the greatest absolute increase in both volume and value of any agricultural sector subject to NAFTA. Comparing average U.S. corn exports to Mexico for 1991–93 with 2011–13, the value increased from \$104 million to \$2.3 billion, while the volume increased from 913,000 mt to 7.9 million mt. By 2016, U.S. exports of corn to Mexico reached 14.0 million mt (figure 1).

Figure 1: Mexico: Corn imports by source 1990/91 to 2015/16 (1,000 mt)



Source: USDA, PSD Online database (accessed March 23, 2017).

Mexican Corn Market Liberalization beyond NAFTA Commitments

During the years of NAFTA implementation when the Mexican corn TRQ was in effect, Mexican authorities viewed the application of the prohibitive over-quota tariff as a discretionary power rather than obligatory.²³ In most years, the Mexican government issued additional import permits for yellow corn above the NAFTA TRQ volume at zero or very low duty.²⁴ This allowed the Mexican government to manage corn imports to make up for a short crop caused by a drought and to lower prices and reduce inflationary pressures.²⁵ Mexican authorities did not levy the NAFTA out-of-quota tariff mainly in an effort to prevent tortilla prices from rising.²⁶ As a result, the Mexican government afforded additional duty-free access to imports of yellow corn in every year of the transitional TRQ except 1997, by issuing additional import permits (figure 2).²⁷ This further complicates analysis on the effect of NAFTA on corn trade, since actual trade was more liberal than the NAFTA provisions.²⁸

Even though imports above the NAFTA TRQ volume were allowed at zero or low duty,²⁹ Mexico's NAFTA TRQs appear to have still limited corn trade until full NAFTA implementation in 2008. This is demonstrated by the practice of U.S. exporters shipping cracked corn to circumvent Mexican import license requirements.³⁰ This practice virtually ended when Mexico's import quota on U.S. corn was phased out in 2008 and import licenses were eliminated, which

²³ Fox and Haight, *Subsidizing Inequality*, 2010, 30; Burfisher, Robinson, and Theirfelder, "The Impact of NAFTA on the United States," 2001, 135.

²⁴ Nadal, *Corn in NAFTA: Eight Years After*, May 2002, 8-9; Wise, *Agricultural Dumping Under NAFTA*, December 2009, 28.

²⁵ Rosson et al., "North American Free Trade and U.S. Agriculture," May 1998, 3; Ramirez, "Mexico Under NAFTA: A Critical Assessment," May 16, 2003, 885; Chowdhury and Allen, 2003, np; Ramirez, "Mexico under NAFTA: A Critical Assessment," 2003, 885.

²⁶ Nadal, *Corn in NAFTA: Eight Years After*, 2002, 8.

²⁷ In 1997, larger Mexican domestic production of corn and sorghum (a feed ingredient that can be used in place of corn) likely replaced additional corn imports. USDA, FAS, *Grain and Feed: Mexican Corn Import Allocations Update*, July 1, 1997, 1; Interview with U.S. government representative, June 13, 2016; Zahniser, *NAFTA at 13*, March 2007, 12; USDA, ERS, *NAFTA Commodity Supplement*, March 2000, 22-23; Zahniser, et al., *NAFTA at 20*, February 2015, 24; Burfisher, Robinson, and Theirfelder, "The Impact of NAFTA on the United States, 2001, 135.

²⁸ For example, Prina used trade restrictions as per the NAFTA texts in analysis. Prina, "Who Benefited More from NAFTA," 2013, 598.

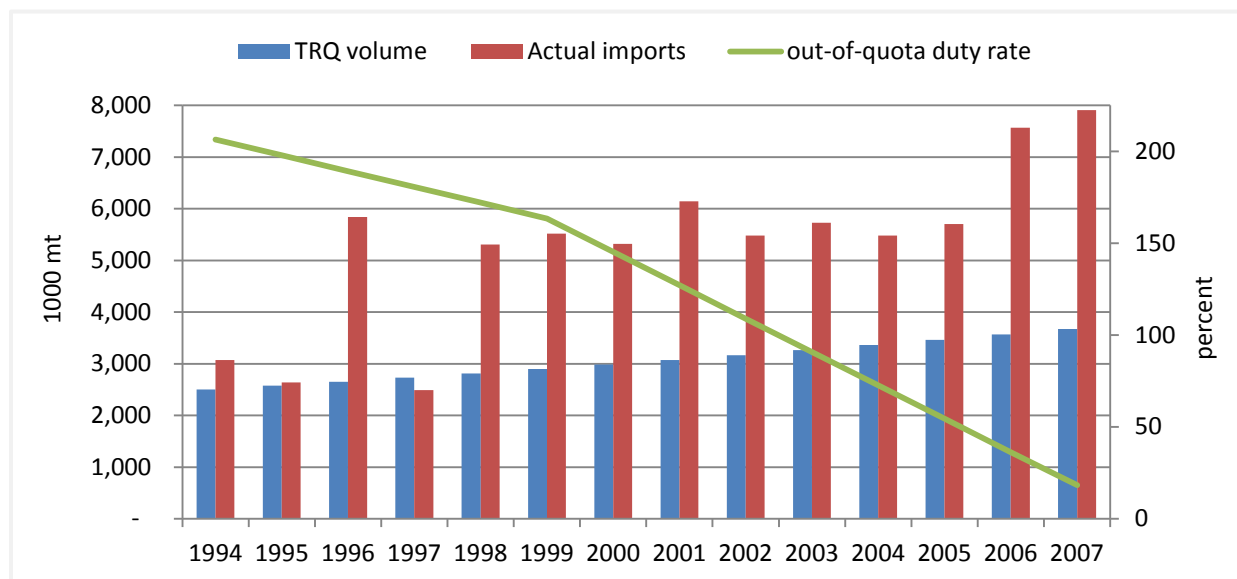
²⁹ Additional TRQ volumes were decided by Mexico's Ministry of Economy and the Ministry of Agriculture at duties between 0 and 2 percent. USDA, FAS, *Mexico: Grain and Feed Annual Report 2007*, March 28, 2007, 12-13.

Although these additional import permits were for corn from any country with MFN status with Mexico, the vast majority of these imports were from the United States. Zahniser, *NAFTA at 13*, March 2007, 5.

³⁰ Cracked corn consists of broken or ground field corn kernels used to feed livestock. Mexican imports of U.S. cracked corn were significant during NAFTA implementation as they received unrestricted access beginning in 2003 and were not regulated by the Mexican government's corn import system. Once corn trade was fully liberalized and licenses were eliminated, U.S. exports of cracked corn to Mexico all but disappeared. Zahniser, *NAFTA at 13*, March 2007, 12-14.

resulted in completely liberalized trade, creating an even more transparent and predictable trading environment for U.S. corn exporters.³¹

Figure 2: Corn: Mexico’s annual TRQ import volume, actual imports, and out-of-quota duty rate, 1994–2007



Source: NAFTA, Annex 302.2, “Schedule of Mexico,” Chapter 10, 2; IHS Markit, GTA database (accessed June 16, 2016).

Note: Actual imports based on U.S. exports to Mexico of HS 1005.90 for 1995; Mexican imports under HS1005.90.99 for 1994–2000; the sum of Mexican imports of HS1005.90.99, HS1005.90.03, and HS 1005.90.04 for 2001–07. Mexico’s over-quota duties were the greater of a duty rate based on percent (shown in chart), or a set dollar amount which fell from \$197/mt in 1994 to \$17/mt in 2007.

Agricultural Policy Reforms

The effects of NAFTA on U.S. corn exports to Mexico are difficult to separate from domestic agricultural policy environments in the United States and Mexico when NAFTA was negotiated and implemented. During the phase-in period of corn market liberalization under NAFTA, there were significant changes to policies on both sides of the border that influenced corn production, demand, and trade. Mexican policy changes reformed the corn support system, and U.S. policy changed to encourage producers to make more market-based planting decisions.

Mexico

Between 1980 and 2013 there were dramatic changes in Mexico’s domestic corn policy, which moved from protectionism, with goals for self-sufficiency and significant government supports

³¹ Interview with U.S. government representative, June 13, 2016.

and interventions, to liberalization and integration into the global market.³² Some of these changes were related to NAFTA implementation and trade liberalization, and others were in an effort to decrease government outlays by lowering the cost of domestic farm programs and to raise farmer incomes by shifting production to more profitable crops.

In the early 1980s, support programs were designed to benefit small-holder farmers on rain-fed land with mechanisms such as price guarantees, credit, and insurance to protect against crop losses.³³ The government also subsidized corn consumption, mostly in urban areas.³⁴ Mexico's National Company of Popular Subsistence (CONASUPO), a parastatal trading enterprise, carried out many of the government's market programs, including: supporting producer prices for staple agricultural products, including corn; and processing, storing and importing, and distributing crops.³⁵

Liberalization of agricultural policies began in the late 1980s, after Mexico's fiscal crisis and resulting trade liberalization and austerity measures, and accelerated in the 1990s, with additional Mexican liberalization under NAFTA and the Uruguay Round Agreement on Agriculture.³⁶ Mexico joined the GATT in 1986, agreeing to terms of entry that would bring its trade regulations and duties in line with other GATT members, albeit with some exceptions, and Mexico began divesting from state run agencies involved in different aspects of agricultural marketing. CONASUPO became a buyer of last resort and was then dismantled, with price guarantees ended for all but corn and beans in 1991.³⁷ Also in the early 1990's, Mexico lifted a ban on feeding corn to livestock, which boosted demand for imported yellow corn.³⁸ To transition Mexican corn producers to the lower world prices to which NAFTA would expose them as well as to alleviate budgetary pressure, the Mexican government phased out minimum corn prices between 1994 and 1999.³⁹ Mexico also initiated an income transfer program based on area under cultivation that was intended to help Mexican corn farmers unable to compete with imported corn under NAFTA to transition to more competitive crops.⁴⁰ Market liberalization-related changes to Mexico's domestic agricultural policy also drastically reduced government support for corn production. Prior to the implementation of NAFTA, Mexico's

³² Sweeney, Steigerwald, Davenport, and Eakin, "Mexican Maize Production," 2013, 78.

³³ Sweeney, Steigerwald, Davenport, and Eakin, "Mexican Maize Production," 2013, 78; Levy and van Wijnbergen, 1992, 481–482.

³⁴ Levy and van Wijnbergen, 1992, 481–482.

³⁵ Yunez-Naude, "The Dismantling of CONASUPO," 1–3.

³⁶ Sweeney, Steigerwald, Davenport, and Eakin, "Mexican Maize Production," 2013, 79.

³⁷ Sweeney, Steigerwald, Davenport, and Eakin, "Mexican Maize Production," 2013, 79; McMillan, Zwane, and Ashraf, "My Policies or Yours," 2005, 22; De Janvry, Sadoulet, and Gordillo De Anda, "NAFTA and Mexico's Maize Producers," 1995, 1350.

³⁸ GAO, *International Trade: Agencies Need Greater Focus*, 2005, 45.

³⁹ USDA, FAS, *Grain and Feed: New Mexican Producer Price Policy for Corn*, April 3, 1995, 1.

⁴⁰ McMillan, Zwane, and Ashraf, "My Policies or Yours," 2005, 186; Davenport, Steigerwald and Sweeney, "Open Trade Price Supports and Regional Price Behavior in Mexican Maize Markets," 2016, 205.

support price for corn was nearly double the global price, leading to increased corn production and government purchases that peaked at nearly 40 percent of production.⁴¹ The share of agricultural supports received by Mexican corn farmers fell from 77 percent in the 1980s to around 20 percent by 2003.⁴²

United States

A number of changes in U.S. domestic agricultural policy, mainly those from the 1996 U.S. Farm Bill, were implemented at that same time as the phase-in period for the NAFTA corn provisions. These policy changes affected U.S. corn production, international competitiveness, and trade. Growth in export demand for U.S. grains in the mid-1990s, including demand by Mexico, was a key motivation in eliminating supply controls in the 1996 Farm Bill. Additionally, the 1996 Farm Bill was influenced by U.S. budgetary constraints and the desire to increase market orientation. Before 1996, U.S. feed grain policy provided direct support for corn prices and farm incomes (e.g., loans, target prices, and deficiency payments) in exchange for policies that restricted production (e.g., base acres and yields, and acreage set-asides).⁴³ The 1996 Farm Bill removed most restrictions and conditional payments that limited corn acreage and production.⁴⁴ It also removed programs encouraging land set-asides when corn supplies were thought to be too large for market needs. In turn, this legislation set the stage for more U.S. corn production as prices increased with greater ethanol use after 2005.⁴⁵

The 1996 Farm Bill allowed farmers more planting flexibility to respond to market conditions, and farmers, especially in the Western Corn Belt, shifted land from other program crops, including wheat, cotton, peanut, and rice production, to corn and soybean production.⁴⁶ For example, in 1995, approximately 3 percent of the land in North Dakota was in corn and soybeans. By 2014 that figure had increased to 20 percent.⁴⁷

The 1996 Farm Bill and the resulting reformed farm subsidies are credited with boosting U.S. corn supplies, and likely encouraged larger supplies of U.S. corn for export. However, the effect of the 1996 Farm Bill on corn prices in Mexico is unclear. A paper evaluating the effects of the U.S. corn subsidies on the Mexican corn market found that U.S. corn subsidies had a limited

⁴¹ Agricultural support prices are a mechanism used by governments to support farmers through elevated prices. Farmers are able to sell any quantity of product to a government agency at a guaranteed price. Thompson, "Agricultural Price Supports," 1993. USDA, FAS, *Grain and Feed Annual Report*, March 10, 1995, 19–20.

⁴² Ávalos-Sartorio, "What Can We Learn from Past Price Stabilization Policies and Market Reform in Mexico?" 2006, 314, 317.

⁴³ Erdman and Runge, "Review American Agricultural Policy and the 1990 Farm Bill," December 1990, 109–126.

⁴⁴ USDA, ERS, "1996 Farm Bill," April 1996, 1.

⁴⁵ Riley, "Interaction Between Ethanol, Crop, and Livestock Markets," 2015, 10.

⁴⁶ Newton and Kuethe, "Changing Landscape of Corn and Soybean Production," March 6, 2015, np.

⁴⁷ Newton and Kuethe, "Changing Landscape of Corn and Soybean Production," March 6, 2015, np.

impact on the Mexican producer price for corn, suggesting that effects on U.S. corn trade with Mexico were small compared to other factors.⁴⁸

Mexican Macroeconomic and Structural Changes

In the years immediately before and during NAFTA implementation, Mexico experienced macroeconomic changes, structural changes, and an economic shock that likely affected Mexican demand for imports of U.S. corn. Mexico experienced significant income and population growth between when NAFTA went into effect and when it was fully implemented, 15 years later. Mexico also experienced a large economic shock, the 1994-95 Mexican peso crisis, in the first couple of years of NAFTA.

Population and income growth positively influenced Mexican corn demand, owing to its use as the main input into meat production. Between 1990 and 2008, Mexico's population expanded by one-third.⁴⁹ At the same time, average income rose by 250 percent.⁵⁰ The combination of population and income growth contributed to greater Mexican meat consumption, and between 1990 and 2008, combined Mexican consumption of beef, pork, and poultry rose 141, with per capita consumption growth of 81 percent.⁵¹ To match demand, Mexican meat production increased, with poultry production more than doubling and pork and beef production each increasing by around 50 percent.⁵² This increased production required greater imports of U.S. corn for animal feed.⁵³

Unlike population and income growth, the 1994-95 Mexican peso crisis likely reduced Mexican demand somewhat for U.S. corn. At the end of 1994, the Mexican government devalued the peso, and the financial crisis that followed cut the value of the peso in half, set off rising inflation, and sparked a recession in Mexico.⁵⁴ The peso devaluation and resulting financial crisis were triggered by many factors that are thoroughly examined in the literature, including: social unrest, an overvalued peso and currency peg, and a sharp drop in Mexico's international reserves.⁵⁵ The devaluation of the peso made imports from the United States more expensive,

⁴⁸ McMillan, Zwane, and Ashraf, "My Policies or Yours," 2005, 213–214.

⁴⁹ Based on growth in population between 1990 and 2008. World Bank, Open Data: Population, total (accessed September 11, 2017).

⁵⁰ Based on gross national income between 1990 and 2008. World Bank, Open Data: GNI per capita, Atlas method (current US\$) (accessed September 11, 2017).

⁵¹ FAOSTAT, Food Balances – Livestock and Fish Primary Equivalent: 1990 and 2008 (accessed September 11, 2017); World Bank, Open Data: Population, total (accessed September 11, 2017).

⁵² FAOSTAT, Food Balances – Livestock and Fish Primary Equivalent: 1990 and 2008 (accessed September 11, 2017).

⁵³ Mexico's imports of pork and poultry meat, mostly sourced from the United States, also grew substantially during the period. USDA, PSD Online database (accessed June 14, 2016).

⁵⁴ Whitt, "The Mexican Peso Crisis," January/February 1996, 1.

⁵⁵ Whitt, "The Mexican Peso Crisis," January/February 1996, 2; Van der Molen, "The Tequila Crisis in 1994," 2013, 4–5.

and the recession dampened consumer demand for meat and dairy products, hence lowering demand for livestock feed, including corn.

Corn Trade Growth from NAFTA, Findings from the Literature

Much of the literature cautions about attributing trade growth to NAFTA that may actually be the result of other factors discussed above (pre-NAFTA trade liberalization by Mexico, changes to Mexican agricultural policy, and macroeconomic and demographic changes and shocks in Mexico).⁵⁶ Naanwaab and Yeboah (2014) do not control for these factors and conclude that increased exports of U.S. corn to Mexico reflected both the elimination of tariffs and the removal of import licensing requirements by the Mexican government under the NAFTA agreement.⁵⁷ Other researchers use methods to account for non-NAFTA factors in order to better evaluate trade effects attributable to NAFTA, with mixed findings. Prina (2013) examined NAFTA effects on Mexican border prices for corn and found that a 1 percent reduction in the Mexican tariff on imports of U.S. corn causes a 0.20 percent decrease in Mexican border prices that is statistically significant after controlling for price level and GDP.⁵⁸ De Janvry, Sadoulet, and Davis (1997) separated the effects from NAFTA from the macroeconomic shocks that took place during the first two and a half years of implementation by constructing a counterfactual equation to estimate what trade would have been in the absence of NAFTA.⁵⁹ The results show that U.S. exports to Mexico would have been significantly lower.⁶⁰ For agriculture, despite the peso crisis, Mexican corn imports grew (0.4 percent). The authors predict that without NAFTA, U.S. agricultural exports to Mexico would have been stagnant in 1994, rather than up by 24 percent, and would have fallen by 46 percent in 1995, rather than the actual drop of 24 percent.⁶¹ Krueger (1999) and De Janvry, Sadoulet, and Davis (1997) also point out that Mexico upheld NAFTA commitments during the peso crisis—the import surcharge put in place in late 1994 until early 1995 covered all countries except for the United States and Canada since NAFTA prohibited such taxes.⁶² Contrary to these findings, Choudhury and Allen (2003) could

⁵⁶ Barkema, “The North American Free Trade Agreement,” 1992, 9; Romalis, “NAFTA’s and CUSFTA’s Impact on International Trade,” 2005, 1–2; and Krueger, “Trade Creation and Trade Diversion under NAFTA,” 1999, np-3.

⁵⁷ Naanwaab and Yeboah, “A Partial Equilibrium Analysis of NAFTA’s Impact on U.S. Bilateral Trade,” April 2014, 95 and 102.

⁵⁸ Prina, “Who Benefited More from NAFTA,” 2013, 598.

⁵⁹ De Janvry, Sadoulet, and Davis, “NAFTA and Agriculture,” 1997, 4-5.

⁶⁰ De Janvry, Sadoulet, and Davis, “NAFTA and Agriculture,” 1997, 4-5.

⁶¹ De Janvry, Sadoulet, and Davis, “NAFTA and Agriculture,” 1997, 6.

⁶² Krueger “Trade Creation and Trade Diversion under NAFTA,” 1999, 6; De Janvry, Sadoulet, and Davis, “NAFTA and Agriculture,” 1997, 11.

not find conclusive evidence that an increase in corn trade could solely be attributed to NAFTA.⁶³

Other studies examined the effects of NAFTA by looking at corn market convergence as indicated by Mexican corn prices. One study suggests that Mexican corn prices were already influenced by global signals even pre-NAFTA, with little change after NAFTA went into effect and with regional differences within Mexico.⁶⁴ However, a study by the United Nations found that Mexican and U.S. producer corn price data support the case that greater U.S. corn exports to Mexico were a result of NAFTA. Prior to NAFTA, in 1994, Mexican prices were double U.S. prices, and then prices appear to have converged somewhat the first year, and since then prices have generally moved in the same direction.⁶⁵ McMillan, Zwane, and Ashraf (2005) also found greater market integration following NAFTA, with regression analysis indicating that NAFTA reduced the price wedge between the Mexican producer price and the border price (Mexican producer price 1.62 times the border price prior to NAFTA and 1.18 times after NAFTA).⁶⁶ Similarly, A World Bank study shows support through a decomposition of changes in domestic agricultural prices of imports, with Mexican intervention going away in the mid-1990s, concluding that domestic real prices fell and more closely followed international prices after NAFTA went into effect.⁶⁷ Nadal (2002) found that Mexican corn prices began falling prior to NAFTA as a direct result of a reduction to the price guarantee subsidies, falling 20 percent in real terms between 1990 and 1993.⁶⁸ This study noted that trade liberalization under NAFTA contributed to further price reductions, with prices falling an additional 44 percent in real terms between 1994 and 2000.⁶⁹

⁶³ Chowdhury and Allen, "Impact of NAFTA on U.S. Corn Trade," 2005, np, 77–85.

⁶⁴ Davenport, Steigerwald, and Sweeney, "Open Trade Price Supports and Regional Price Behavior in Mexican Maize Markets," 2016, 218.

⁶⁵ UNCTAD, *Mexico's Agriculture Development*, 2013, 18–19.

⁶⁶ McMillan, Zwane, and Ashraf, "My Policies or Yours," 2005, 212.

⁶⁷ Yunez-Naude and Barceinas Paredes, *Lessons from NAFTA*, December, 2002, 27, 37.

⁶⁸ Nadal, *Corn in NAFTA: Eight Years After*, May 2002, 18.

⁶⁹ Nadal, *Corn in NAFTA: Eight Years After*, May 2002, 18.

Conclusion

As noted above, several factors, including Mexican trade liberalization, tariff concessions under NAFTA, Mexican and U.S. agricultural policy reforms, and Mexican macroeconomic and structural changes and economic shocks likely played a role in the expansion of U.S. corn exports to Mexico since the early 1990s.⁷⁰ Separating the impact of NAFTA from these sometimes related factors in explaining U.S. corn exports to Mexico is challenging, and the literature is mixed. Despite this, there is compelling evidence that the NAFTA corn provisions provided an environment that encouraged growth in exports to some extent, by creating a more transparent marketplace.

⁷⁰ The Commission's 2003 retrospective report that addresses the impact of NAFTA on U.S. exports of corn to Mexico noted that, "Although NAFTA contributed to the growth in trade between the 3 NAFTA partners, much of this growth might have occurred without NAFTA as a result of unusual weather conditions, population growth, changes in exchange rates, and macroeconomic performance." USITC, *The Impact of Trade Agreements*, 2003, 177.

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