

**DISTRIBUTIONAL AND WELFARE EFFECTS OF INCLUDING CORN INTO  
NAFTA AND THE SOCIAL, ECONOMIC, POLITICAL AND INTERNATIONAL  
REPERCUSSIONS FOR MEXICO.**

**Has corn inclusion into the NAFTA Agreement exacerbated poverty and inequality in Mexico?**

Master of Arts in Law and Diplomacy Thesis  
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## **Abstract**

This thesis explores the possible causal relationship between an increase in inequality and poverty in Mexico and the inclusion of corn into the North American Free Trade Agreement (NAFTA). Since trade in this crop is mainly between Mexico and the United States, trade with Canada will not be taken into consideration. This analysis uses several economic parameters that determine which groups of the population are affected by maize price drops and supply and demand shifts, such as budget allocations, an Engel curve, the determination of buyers and sellers, and cross-price elasticities of white and yellow corn. The elimination of the Mexican State Trading Enterprise, CONASUPO, is used as a base case in order to determine if NAFTA was indeed what caused these adverse distributional effects. To determine these effects and the different economic parameters used, econometric studies and models by Antonio Yunez-Naude, Alain de Janvry, and Santiago Levy, among others, are described and analyzed. This thesis concludes that NAFTA has caused some but not all of the documented adverse distributional effects. The analysis outlines policy recommendations and briefly describes possibilities for renegotiation.

## **Definition of some Acronyms used in the analysis**

**ASERCA:** Apoyos y Servicios a la Comercialización Agropecuaria (Services and Support to Agricultural Commercialization)

**BANXICO:** Banco de México (Bank of Mexico)

**CEDRSSA:** Centro de Estudios para el Desarrollo Rural Sustentable y la Soberanía Alimentaria (Research Center for Rural Sustainable Development and Food Sovereignty)

**CONASUPO:** Compañía Nacional de Subsistencias Populares (The National Company of Popular Subsistence)

**INEGI:** Instituto Nacional de Estadística, Geografía e Informática (Mexico's Institute for Statistics Geography and Informatics)

**NAFTA:** North American Free Trade Agreement

**PRD:** Partido de la Revolución Democrática (Party of the Democratic Revolution)

**PRI:** Partido Revolucionario Institucional (Party of the Institutional Revolution)

**PROCAMPO:** Programa de Apoyos Directos al Campo (Program of Direct Transfers to Rural Communities)

**SAGARPA:** Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (Secretary of Agriculture, Livestock, Rural Development, Fishing and Food Supply)

**SIAP:** Servicio de Información Agroalimentaria y Pesquera (Information Services on Agricultural and Aquiculture Food Supply)

## **Chapter I: Introduction**

After 13 years of implementation, the benefits of the North American Free Trade Agreement (NAFTA) have been widely debated in both Mexico and the United States; one of the most controversial aspects was the inclusion of sensitive agricultural products in the trade agreement. Agriculture has long been regarded as a difficult and sensitive sector to include in trade agreements because of the importance countries give to food self-sufficiency, the implications that trade liberalizations may have on the capacity for a country to provide its own food supply, and possible cultural attachments that certain countries may have for a particular crop, among other reasons. For example, Japan has a tendency to protect its rice production heavily because it considers it its most important crop for food self-sufficiency and, a culturally and socially sensitive staple food. Multilateral trade agreements such as the Doha Round of the WTO have prioritized agriculture. The failure to reach an agreement in agriculture in the ministerial meeting at Cancún in 2003 was the culprit in the collapse of the talks. Conventional theories and supporters of the Doha Round, state that it is beneficial for a developing country to include agriculture in trade agreements with developed countries.<sup>1</sup> Mexico wished to include agriculture in its economic reform policies because the government thought that liberalizing the agricultural sector would help Mexico become a developed country through increased exports and reduction in the fiscal pressure that price controls and subsidies on staple foods created.

The case for corn as a part of NAFTA has been an even more contentious issue because of the importance of this crop on both sides of the border. For Mexico, especially in this last phase of implementation, corn has become yet more divisive.

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<sup>1</sup> Sandra Polaski, *NAFTA's Promise and Reality: Lessons from Mexico for the Hemisphere* (Washington, D.C.: Carnegie Endowment, 2003), 7 <http://www.carnegieendowment.org/publications/index.cfm?fa=view&id=1390>.

The U.S. is the number one producer of corn in the world and it is its most valuable crop.<sup>2</sup> While for Mexico, it is, among other aspects, an essential crop for the subsistence of rural corn producers and poor urban consumers. Because of its importance as a subsistence crop for rural producers and as an important source of food intake for consumers, price changes in maize and its human consumption forms have the potential of significantly affecting the welfare of the lower end of the Mexican population. As Mexicans eat corn primarily in the form of tortillas, it is notable that as the domestic price of corn in Mexico has steadily *decreased*; the price of tortillas has steadily *increased*, indicating a significant distributional effect for Mexico's poor corn producers and urban consumers.

### ***Importance of corn***

Before examining the possible adverse economic and distributional effects that corn's inclusion into the North American Free Trade Agreement, may have had in Mexico, it is essential to understand the importance of this crop for Mexico. Corn manifests its importance in Mexico, not only economically, but also socially, culturally, historically and politically. Corn is the staple food of the Mexican diet, and, as indicated above, is consumed mainly as tortillas. Mexican household expenditures rank tortillas as their number one food expenditure and despite an increased amount of corn imports over the last 15 years of NAFTA implementation, corn production has increased in Mexico, consisting of 65% of total agricultural grain production.<sup>3</sup> In

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<sup>2</sup> Frank Ackerman and others, *Free Trade, Corn, and the Environment: Environmental Impacts of US-Mexico Corn Trade Under NAFTA*, Vol. Working Paper No. 03-06 (Tufts University Medford, Massachusetts: Global Development and Environmental Institute, 2003).

<sup>3</sup> Miramontes Piña, César Ulises, *Situación Actual y Perspectivas Del Maíz En México 1996-2012* (México City: SAGARPA SIAP,[2007]).

2006, approximately 58% of the people employed in the food industry in Mexico were employed in the corn industry, while 40% of the labor force, produced corn.<sup>4</sup>

Mexico is the largest consumer of corn in the world and it is distinctive because 68% of all corn produced is used for direct human consumption as opposed to animal feed, the main use of corn in most other industrialized countries.<sup>5</sup> In fact, Mexico has the world's highest per capita corn consumption at 127 kg.<sup>6</sup> Corn derived products represent a large proportion of rural and poor people's caloric intake; some studies point out that tortillas provide 59% of total caloric intake.<sup>7</sup> Moreover, subsistence farmers produce and consume corn throughout Mexico; corn is produced and consumed in all 32 states of the country, yet the northern states have larger surpluses of corn.<sup>8</sup> This fact further emphasizes the distributional differences between the North and South of the country.

Before the NAFTA agreement, maize cultivation occupied between one-third and one-half of total arable land, meanwhile, it employed one out of three rural workers.<sup>9</sup> Rural poor farmers and poor urban consumers tend to be affected more by price changes in corn because they produce and consume larger quantities than do their urban middle class counterparts. There are some studies however, that contend that subsistence farmers of corn are not affected by price fluctuations in the market since they are not part of the market. Nevertheless, subsistence farmers buy inputs to produce corn as well as sell any excess corn that they may have. Thus, even if they do not participate in the maize market in large numbers, they do so in small numbers

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<sup>4</sup> Ackerman and others, *Free Trade, Corn, and the Environment: Environmental Impacts of US-Mexico Corn Trade Under NAFTA*

<sup>5</sup> *Ibid*

<sup>6</sup> *Ibid.*

<sup>7</sup> *Ibid.*

<sup>8</sup> Salazar José García, "Evaluación De La Política Comercial De México Respecto Al Mercado De Maíz," *El Trimestre Económico* 71, no. 1 (2004), 175

<sup>9</sup> Santiago Levy and Sweder Wijnbergen van, "Maize and the Free Trade Agreement between Mexico and the United States," *The World Bank Economic Review* 6, no. 3 (1992).

and can be affected by price fluctuations. In fact, according to Kirsten Appendini, all producers participate in the commercialization of maize, before the implementation of NAFTA, 57.4% of the supply of maize for human consumption, came from production done in 2.5-10 hectare fields, which is the size of plots where most poor farmers produce maize.<sup>10</sup>

Maize originated in the American continent and was one of the few crops that was cultivated before the Spanish Conquest of Mexico: some contend that maize actually originated in Mexico.<sup>11</sup> According to archeological evidence, domestication of corn took place five to seven thousand years ago in four areas, two of which are located in Mexico. Corn is a domesticated form of the Mexican grass *teosinte*.<sup>12</sup> Furthermore, in Mexico, there are many varieties of corn and these represent important genetic varieties from which further future varieties can be produced.

### ***Inclusion of corn into NAFTA***

The Mexican government decided to include its major staple crop, corn, into NAFTA for various reasons. The decision to include this sensitive crop was extremely controversial; therefore, the final decision to include it relates to many factors that range from the purely economic benefits of trade to political aspects and having bargaining chips in the negotiation of the trade agreement.

At the time of NAFTA's negotiation, productivity in the agricultural sector was extremely low. In 1990, the sector constituted 23.4% of active populace and contributed only 6% to GDP.<sup>13</sup>

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<sup>10</sup> Kirsten Appendini, *De La Milpa a Los Tortibonos La Restructuración De La Política Alimentaria En México*, 2nd Edition ed. (México: El Colegio de México, Instituto de Investigaciones de las Naciones Unidas para el Desarrollo Social, 2001).

<sup>11</sup> José Rogelio Álvarez, *Enciclopedia De México*, Vol. Tomo IX Sabeca International Investment Corporation, 1996), 4911-4914.

<sup>12</sup> Alejandro Nadal, *The Environmental and Social Impacts of Economic Liberalization on Corn Production in Mexico*, 2000).

<sup>13</sup> Appendini, *De La Milpa a Los Tortibonos La Restructuración De La Política Alimentaria En México*

Increasing productivity through trade would also entail moving producers from less competitive sectors such as grains to sectors that would exploit Mexico's comparative advantage in labor, thus the idea was, that producers of corn would find their crop uncompetitive after liberalization and move to more competitive crops, such as fruits and vegetables. The Mexican government wished to liberalize the industry in order for the country to begin its development into a more industrialized and higher-income country. In other words, the government believed in using trade liberalization as a development strategy.

According to some researchers, corn producers were not adequately represented during the NAFTA negotiations, with more representation given to industrialists and manufacturers of corn related products.<sup>14</sup> These groups are in the higher income deciles of the Mexican population. A full evaluation of the inclusion of corn in the agreement is discussed in chapter II of this thesis.

Because of the importance of corn to the entire Mexican society, specifically its significance to the rural and poorer sectors of the population, and due to the exclusion of corn producer representation in negotiating the agreement, the inclusion of corn into NAFTA could have caused adverse economic and distributional effects in Mexico. This thesis will examine those effects by examining the different models developed by several researchers that have contended that including corn into the NAFTA agreement has exacerbated poverty and inequality as well as studies by researchers that do not believe that the inclusion of corn into NAFTA has had adverse economic effects for corn producers and consumers. Possible adverse distributional effects may be not all attributable to the free trade agreement, but also to government policies that may have exacerbated any adverse effects of trade liberalization. For instance, the government did not respect the implementation period outlined by the trade

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<sup>14</sup> Nadal, *The Environmental and Social Impacts of Economic Liberalization on Corn Production in Mexico*

agreement of tariff rate quotas in the corn sector. In addition, the structural economic reforms and support policies that subsidized producers and consumers of corn could have caused larger distributional and welfare effects than the trade agreement itself. This study will use price changes caused by the dismantling of CONASUPO (National Company of Popular Subsistence)<sup>15</sup> as a base case. The case of CONASUPO will be used as a base case because it is widely agreed that the elimination of this State Trading Enterprise was the single most important domestic agricultural policy reform.<sup>16</sup> This analysis will entail the assumption that no trade agreement takes place, but instead that only structural reforms occurred. These reflect a more market oriented economy. Structural reforms that included reforming price supports to corn could have occurred without NAFTA, yet NAFTA could not have occurred without these structural reforms. Hence, to examine NAFTA's true effect on corn prices and welfare, it is imperative to examine the price changes that structural reforms alone may have caused. Mexico has a long history of poverty and inequality. If inequality and poverty did indeed increase in the years in which NAFTA implementation occurred, the correlation between the trade agreement and adverse economic effects does not necessarily indicate causation.

Therefore, to examine this question further, the following economic parameters will be considered along with price differentials of corn with or without dismantling CONASUPO:

- Examinations of the Engel curve for corn and corn related foods. An Engel curve analyzes how the quantity of corn demanded, changes with respect to income. This will prove that people who have lower incomes demand proportionately more corn with consequent reduction in welfare if the price of corn increases.

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<sup>15</sup>Mexican State Trading Enterprise that controlled the distribution and production of corn. ((National Company of Popular Subsistence). It subsidized consumers, producers and industrialists of corn.

<sup>16</sup> Antonio Yunez-Naude, *Lessons from NAFTA: The Case of Mexico's Agricultural Sector*, ed. Fernando Paredes Barceinas Final Report to the World Bank, 2002).

- The budget allocations of poor and rich households on corn and corn-related foods. Because rich households spend proportionately less of their income on food, and on corn in particular, fluctuations in the price of corn will more adversely affect poor household welfare.
- An examination of net buyers and net sellers of corn will also be examined, as will the welfare implications of the heterogeneity of the sector.
- Cross-price elasticities of white and yellow corn. This will determine if increased exports of yellow corn during the NAFTA years have had adverse economic effects on farmers and subsistence farmers growing white corn in Mexico who face increased competition from exports. Because Mexican producers of corn produce mainly white corn, if the two commodities are substitutable and yellow corn becomes cheaper for industrialists, Mexican producers of corn will lose and their welfare will be affected.

These parameters will determine how changes of prices of corn affect poor subsistence farmers and poor urban consumers of corn.

This thesis is divided into six chapters: the subsequent chapter will examine the background of the agricultural chapter of the North American Free Trade Agreement and briefly explain the goals and reasons for including corn into NAFTA. This chapter of the thesis will also describe corn production and consumption in Mexico and the diversity and heterogeneity of producers and consumers. The third chapter will evaluate the different contributions of researchers that have evaluated NAFTA's prospects in agriculture through a brief literature review of the two contending viewpoints about the effects of NAFTA on agriculture and corn. The fourth chapter will examine the economic parameters discussed above to determine if including corn in NAFTA brought about adverse economic and distributional effects. In this chapter, the base case of the dismantling of CONASUPO will be analyzed to determine if

NAFTA alone could have caused adverse distributional effects. The fifth chapter will briefly examine the questions faced by the government due to possible adverse economic and distributional effects and will present a summary of policy recommendations. Finally, the sixth chapter will present concluding remarks, summary of contributions and future research.

## **Chapter II. A brief background and review of the NAFTA negotiation and its Agricultural Chapter.**

Mexico began its process of economic reforms in the mid 1980's after the debt crisis of 1982. Many experts blamed the financial crisis on the policies of protectionism followed by the country throughout the previous decades. Such policies included price controls, import substitution industrialization, and protectionist border barriers in agriculture. These experts contended that such protectionist policies were the direct cause of high inflation and low economic growth. The Mexican government set out to reform the Mexican economy with policies of deregulation, and trade liberalization that would promote a more open economy that attracted foreign capital, increased exports, modernized the country by reducing its dependence on agriculture, and increased its productivity. The advocates of this policy thought that trade liberalization could be used to attain all of these goals and would improve the economy in many different ways. For instance, it would reduce inflationary pressures by providing cheaper imports, it would restructure the economy by shifting resources from inefficient sectors to more productive sectors, —which would exploit the country's comparative advantages,— and the reduction of subsidies and government price controls would ease budgetary pressures on the government's public finances.<sup>17</sup>

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<sup>17</sup> Nadal, *The Environmental and Social Impacts of Economic Liberalization on Corn Production in Mexico* 14

In effect, negotiating and implementing NAFTA formed a substantial part of the Mexican government's strategy for development and "modernization" of the country.<sup>18</sup> In order for the government to pursue actively a trade agreement that would lead to export-led growth, it first needed to reform the many protectionist barriers that were part of the country's economic make-up. One of these reforms was the dismantling of CONASUPO. The company did not conform to GATT and WTO regulations; because of it was a State Trading Enterprise. Therefore, its dismantling was part of Mexico's commitment to the GATT and later the WTO.

### ***Mexico's goals in negotiating NAFTA and including corn***

In general, Mexico wanted to establish a trade agreement with Canada and the U.S. in order to gain free access to two of the biggest world markets, establish a comprehensive scheme to resolve trade controversies, attract foreign direct investment and through this to ensure a steady and stable economic growth that would in turn reduce migration pressures. In agriculture Mexico wished to guarantee free access to its products in the Canadian and American markets, ensure a transition with long enough deadlines for a smooth shift into a free market, assure access to agricultural raw materials in an internationally competitive market, and encourage the transfer from inefficient and uncompetitive crops to activities that generate higher incomes for producers. NAFTA negotiators thought that Mexico would be able to exploit its comparative advantage in labor by reallocating unproductive resources in grains production to production in more labor-intensive crops such as fruits and vegetables. It was thought that the economy in rural and urban sectors would absorb uncompetitive corn and grain producers.

Mexico, agreed to include corn in the agreement by giving it a longer transition period; the United States in exchange gave longer transition periods to crops that it considered more

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<sup>18</sup> Narayani Lasala Blanco, "Las Negociaciones Del Maíz En El Tratado De Libre Comercio De América Del Norte" (Bachelor Degree in International Relations, Colegio de México: Centro de Estudios Internacionales).

sensitive such as sugar, tomatoes, and oranges.<sup>19</sup> The inclusion of corn was surprising to the U.S. negotiators because they recommended keeping corn out of the agreement.<sup>20</sup>

### ***Why did Mexico include corn into NAFTA?***

As Nadal states, corn producers were not well represented in the negotiation of NAFTA, consequently, their interests were mainly not met. Including corn into the free trade agreement was most likely not in their interests. Farmer groups protesting the recent full liberalization of all agricultural products clearly suggests that they did not have adequate representation in NAFTA negotiations. They claimed that domestic corn could not compete with American corn because of the gap in technologies used to produce it, and the large subsidies provided to corn by the American government.

For industrial purposes, it is evident that buying imported corn is cheaper than using domestically produced corn. Mexican white corn is on average 25% more expensive than American yellow corn.<sup>21</sup> The lack of adequate technologies and the fact that a large amount of Mexican-produced corn is produced in rain-fed land are some of the aspects related to the price differential between domestic and international corn prices.

Mexico produces mainly white corn, while the United States produces mainly yellow corn. Despite the recent peak in the price of yellow corn, (probably due to the increase in its demand for the crop because of ethanol demand), for the past few years, on average, white corn has been slightly higher-priced than yellow corn (Figure 1). The price differential could be due to many factors, but some could include; that white corn has higher flour content, it is finer in

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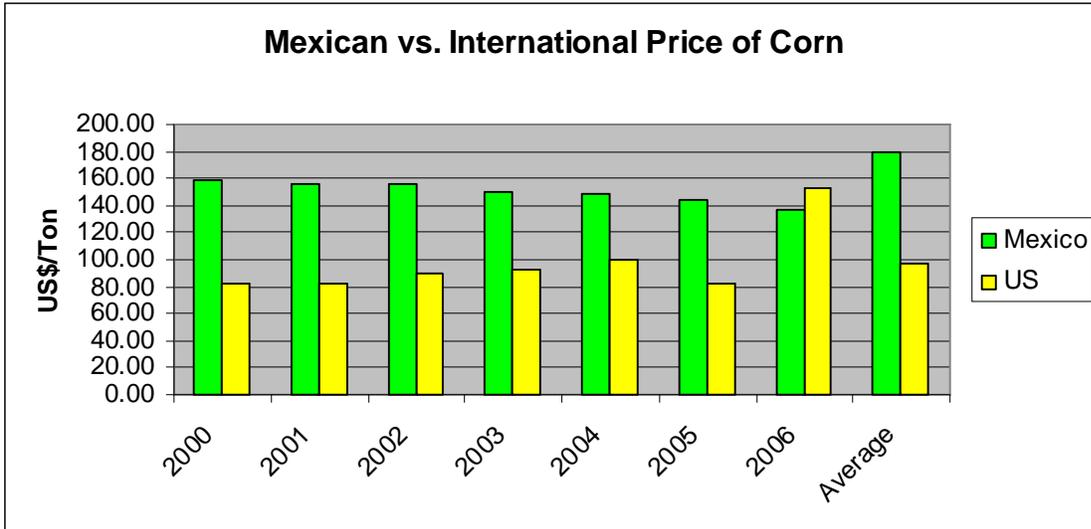
<sup>19</sup> Alicia Puyana and José Romero, *Diez Años Con El TLCAN. Las Experiencias Del Sector Agropecuario Mexicano*, First edition ed. (Mexico City: Colegio de México, 2005). 38

<sup>20</sup> Lasala Blanco, *Las Negociaciones Del Maíz En El Tratado De Libre Comercio De América Del Norte*

<sup>21</sup> Nadal, *The Environmental and Social Impacts of Economic Liberalization on Corn Production in Mexico* 16

texture, and it is more suitable for making tortillas. Mexican consumers generally prefer white corn-produced tortillas. The substitutability of white and yellow corn will be explored in subsequent sections.

**Figure 1 Mexican vs. International Price of Corn**



Source: SIAP, Banxico

Was the inclusion of corn a bargaining chip in the agreement that allowed Mexico to convince the U.S. to include crops of interest to Mexico such as tomatoes, sugar and oranges? Alternatively, was corn included into the agreement because of the government’s desire to increase the productivity of the crop as well as reduce its financial burden in subsidizing corn?

Some experts contend that Mexico had more to gain from the agreement than the United States; consequently, Mexico had less negotiating power than the United States. In other words, if Mexico wished to exclude corn from the agreement, other sectors in which Mexico had an interest would not be negotiated to its advantage. Some Mexican negotiators expressed this view in the following way: “It was easier to negotiate an all-inclusive agreement rather than an

agreement with many exceptions.”<sup>22</sup> Other arguments contend that Carlos Salinas’ structural reforms allowed corn to be included in the agreement. In other words, liberalizing corn through NAFTA was part of Salinas’ agricultural structural reform plans.

### ***NAFTA’s Agricultural Chapter***

NAFTA’s agricultural agreement consists of a series of bilateral agreements between the United States and Mexico, Mexico and Canada, and Canada and the United States. This thesis focuses mainly on the bilateral agreement between Mexico and the United States because Mexico’s corn imports originate mainly from the U.S. NAFTA is the first agreement of its kind that involves asymmetric negotiations and in which no special or differential treatment is given to the developing country in the agreement.

In the agreement between Mexico and the United States, both countries agreed to eliminate all non-tariff barriers in January 1994 keeping protections only for sensitive products. All agricultural tariffs would be eliminated thereafter in three consecutive five-year periods liberalizing all agricultural products by January 2008. Both countries agreed to establish sanitary and phytosanitary barriers according to scientific evidence. They agreed to create mechanisms to resolve trade controversies. In the case of maize, both countries agreed to keep it on the sensitive product list and give the crop a 15-year adjustment and transition period that involved establishing a tariff-rate quota system to be phased-in through 2008.

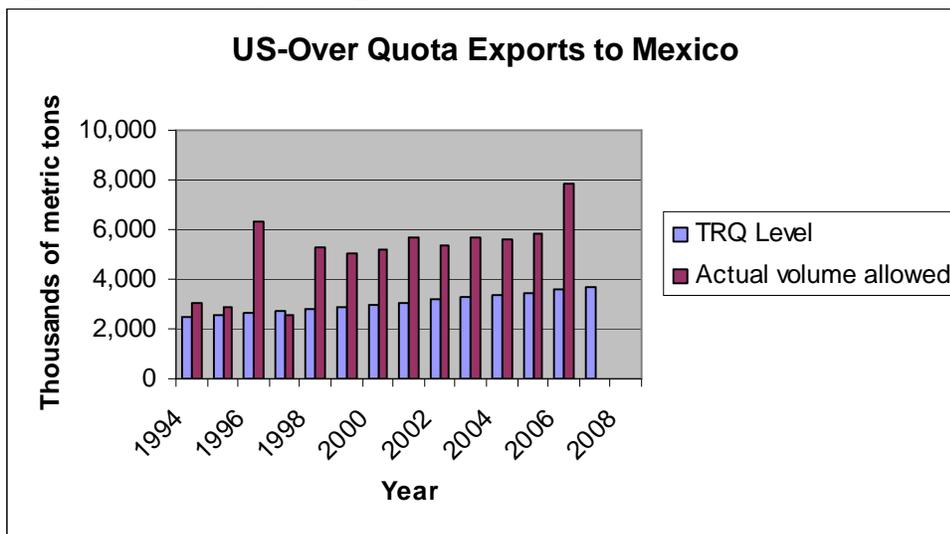
In 1994, the quota was set at 2.5 million metric tons, a limit to expand over the following fifteen years at a rate of 3% per year, so that by the year 2008 all agricultural trade would be liberalized; and the *ad valorem* tariffs would be reduced from 206% in 1994 to zero in 2008.

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<sup>22</sup> Alicia Puyana, Jorge Horbath and José Romero, "El Sector Agropecuario Mexicano: Un Quinquenio Con El Tratado De Libre Comercio De Norteamérica. La Pobreza y La Desigualdad Se Intensifican, Crece La Migración." *Cuadernos Sobre Relaciones Internacionales, Regionalismo y Desarrollo* 1, no. 1 (January-June 2006, 2006). 126

The Mexican government did not respect these quotas and allowed tax-free imports beginning in 1994 (Figure 2). The government contends that it did this to respond to the increased demand from the livestock industry for animal feed corn. It also says that increased imports would reduce inflationary pressures, by allowing cheaper corn imports to flood the domestic market. Nadal argues that the Mexican government experienced huge losses in revenue that amounted to over 2 million dollars.<sup>23</sup> Mexican imports of corn have surged since the implementation of NAFTA, these imports having been primarily yellow corn imports (Figure 3).

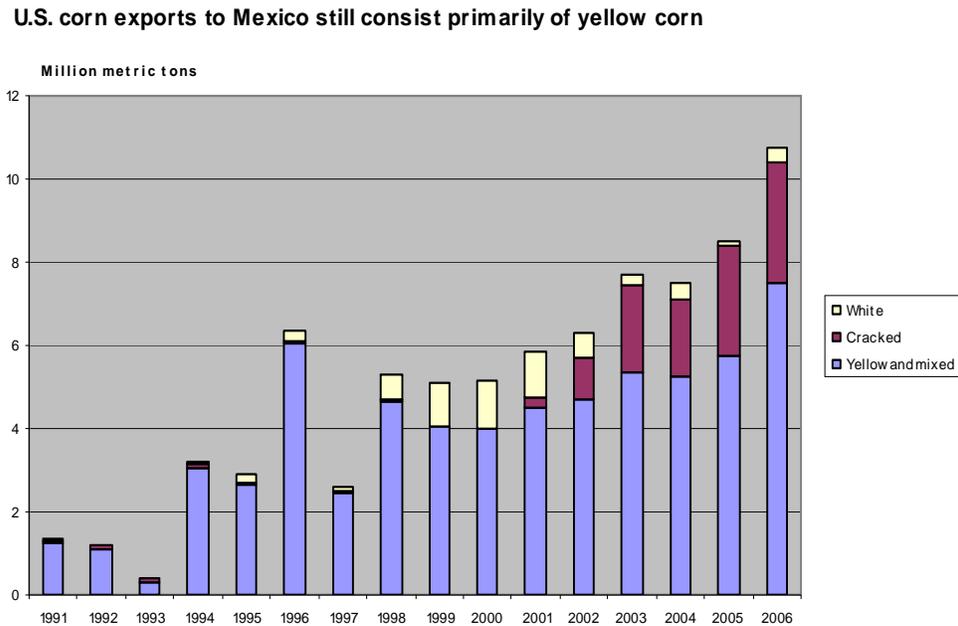
**Figure 2 U.S. Over Quota Exports to Mexico**



Source: USDA

<sup>23</sup> Nadal, *The Environmental and Social Impacts of Economic Liberalization on Corn Production in Mexico* 27

**Figure 3 U.S. Corn Exports to Mexico**



Source: USDA

### ***Overview of the Mexican Corn production sector***

Before evaluating any distributional effects that could have occurred due to NAFTA, it is imperative to describe the nature of the Mexican corn-production sector. The Mexican corn-production sector is a multi-faceted sector characterized by the heterogeneity of its producers. There are three main kinds of producers:

1. Subsistence or micro-producers generally produce only on less than 5 hectares of land each and they constitute 40% of all Mexican corn producers.<sup>24</sup> Subsistence producers' production is mainly directed at family consumption, but if they have any surplus after consumption they will generally sell it on the market. These producers work on low quality soil with rain-fed

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<sup>24</sup> *Supra.*

technology and cannot convert to other crops if they find corn unprofitable. These producers are mainly located in southern states and work on fields that are 5 hectares or less.

2. Intermediate producers make moderate profit margins and they may be able to convert their cropland to more efficient uses if they see it unprofitable to produce corn. These producers work on fields that are between 5 and 10 hectares.
3. Commercial producers have high profit margins and work with high levels of technology on irrigated land. These producers base the commercialization of the grain on economies of scale. They produce in similar conditions to their U.S. counterparts. They have access to higher quality soils and are capable of reallocating resources if they find corn production unprofitable. They are located mainly in northern states.

### ***Marketing chain of Mexican maize***

The marketing chain of maize involves three basic phases: production by the farmers, industrialization by the millers, and consumption by the consumers. While there are three main kinds of producers, there are two general levels of production of maize: those for subsistence and those for commercial production. Consumers of maize comprise two kinds of groups, urban and rural, and subsistence producers.

Before the mid and early 1990's, CONASUPO managed the country's consumption, production, and rural incomes of maize producers in Mexico. CONASUPO's programs did not involve only maize but also other crops termed "basic crops." Those included sorghum, barley, cotton, beans, rice, soybeans, sunflower and wheat.<sup>25</sup> With the agricultural liberalization reforms and Mexico's commitments to NAFTA and to the WTO, CONASUPO was eliminated and it ceased playing a role in the distribution, production and rural incomes of maize producers.

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<sup>25</sup> Antonio Yunez-Naude, "The Dismantling of CONASUPO, a Mexican State Trader in Agriculture," *The World Economy* 26 (January 2003, 2003), 97-122.

CONASUPO had played an extremely significant role in the marketing chain of maize in Mexico. It purchased the crops from producers at guaranteed prices, maintained price controls on corn and subsidized consumers of tortillas as well as the industrialists that produced them. The enterprise also controlled marketing and production by storing an excess of corn if necessary. This marketing scheme took place before 1994, after this year the restructuring of the marketing chain started to take effect.

The peso crisis of 1994 forced the government to reduce its support for the production and distribution of corn. CONASUPO's price supports changed in two different ways due to an increase in international prices of corn. Between 1994 and 1997, the state-owned enterprise established a "base price" for corn, which was fixed regionally between the guaranteed price and the international price. From 1997 until 1999, when all price supports to corn ended and CONASUPO was dismantled, an "indifference price" was established again. The "indifference price" was also arranged regionally based on average international prices set by the Chicago Commodity Exchange plus the domestic costs (transportation and storage). CONASUPO became a buyer of "last resort" of white corn for human consumption for the farmers who could not get a higher price than the indifference price when selling to processors of corn.<sup>26</sup>

Without CONASUPO and under the new regime, the market is allowed to determine the prices, imports and consumption of corn. Two main companies produce and distribute tortillas and corn dough, GRUMA and MINSA. Because these two companies control more than 90% of the market,<sup>27</sup> this new structure of the maize market in Mexico has an oligopolistic nature. The nature of the market creates several market distortions and imperfections that affect the price of

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<sup>26</sup> *Supra*.

<sup>27</sup> Steven Zahniser and William Coyle, "U.S.-Mexico Corn Trade during the NAFTA Era: New Twists to an Old Story," *Electronic Outlook Report from the Economic Research Service* (2004), [www.ersd.usda.gov](http://www.ersd.usda.gov) 11 The figures for control of the market by these two companies ranges from 75 to 90%, depending on the source.

maize and corn-related products such as tortillas. The welfare implication of this new scheme is that large maize millers can set the price of tortillas as they see fit. Moreover, the oligopolistic nature of the market does not allow consumers to benefit from the 60-70% price decrease in corn; instead, intermediaries and large corn millers obtain most of the gains resulting from lower corn prices.<sup>28</sup>

### **Chapter III. Overview of theories about NAFTA's distributional effects on the Mexican corn industry.**

As discussed previously, the inclusion of Mexico's most important crop in NAFTA has been highly controversial. Due to the recent complete liberalization of all agricultural products, the mainstream media have recently been addressing this issue. NAFTA's final phase has been implemented, and the last sensitive commodities such as corn and beans can now enter the country free of tariffs and quotas. Organized farmer groups, numerous civil society groups, and even some members of opposition parties such as the PRI (Institutional Revolutionary Party) and the PRD (Party of the Democratic Revolution)<sup>29</sup> have contended that corn's inclusion into NAFTA should be renegotiated due to the resulting negative distributional effects. Several researchers agree, affirming that the inclusion of corn into NAFTA has negatively affected Mexican corn farmers and that the agreement has not achieved what its negotiators intended for Mexican agriculture and the corn industry.

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<sup>28</sup> A. Timothy Wise, *The Paradox of Agricultural Subsidies: Measurement Issues, Agricultural Dumping, and Policy Reform* (Medford, Massachusetts: GDAE Tufts University, 2004).

<sup>29</sup> The PRI is the party that was in power in Mexico for 71- years, while the PRD is the opposition party whose candidate, Andrés Manuel López Obrador, lost Mexico's close election in 2006 and considers himself Mexico's "legitimate president."

Among these are Alejandro Nadal, Alicia Puyana, and Ana de Ita.<sup>30</sup> It is important to mention that they do not blame NAFTA entirely for increased inequality and poverty in Mexico; they simply underline the fact that NAFTA did not bring what it promised. Puyana *et al.* contend that the agreement did not provide fair treatment for the developing country in the agreement. They further emphasize the need to have an agreement that gives Mexico preferential treatment, as the developing country that it is, since the current agreement essentially treats all parties as equals, while they are not economically equal.

Nadal contends that NAFTA did not do what it intended to do and that it was not negotiated with Mexico's interests in mind, while De Ita says it has harmed more than it has benefited Mexico's agricultural sector. In general, critics refer to the bigger agricultural picture rather than specifically to the corn industry. Yet because of the importance of the corn sector to Mexico, the studies do tend to focus on corn. In particular, De Ita and Nadal study the socioeconomic and environmental impact of NAFTA on corn producers.

On the other side of the argument are those who contend that NAFTA has brought more benefits than detriments to Mexico and that as all trade agreements tend to create winners and losers, the government's goal becomes that of compensating those losers. Analogous to NAFTA critics, these supporters of the agreement also do not specifically refer to corn when making their arguments, but tend to take a broad agricultural perspective. Moreover, they contend that NAFTA has benefited exporters as a whole, and emphasize that Mexico had pre-existing inequality and poverty problems. Among NAFTA's supporters is newspaper journalist Sergio Sarmiento and organizations such as the World Bank. The subsequent section will give a brief

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<sup>30</sup> Alejandro Nadal is a researcher and professor at el Colegio de México; Alicia Puyana is also a researcher and professor at El Colegio de México; Ana de Ita is a researcher at the Centro de Estudios para el cambio en el Campo Mexicano.

literature review of the main criticisms of NAFTA as well as a summary of the arguments made in support of it.

### ***Criticisms and critics of NAFTA***

Most of NAFTA's critics are quick to point out that the policies and effects of NAFTA are tied to domestic macroeconomic policies that preceded and led to NAFTA. The main criticisms entail increased poverty levels, reduction of rural salaries, decline of progressive agricultural support, and increased out-migration. The critics attribute these effects to the fact that the trade liberalization goal was the aligning of domestic prices and international prices, which in turn has reduced domestic prices and decreased profitability of corn. Nevertheless, to the surprise of critics and supporters alike, production has not decreased. Some critics contend that the international price determined by the U.S. market is not an accurate representation of the true price of corn. The reason for this is that the United States has a large number of subsidies that distort and reduce the international price of corn to unfair levels with which Mexican producers cannot compete.

### ***Criticisms about the agreement itself***

Some critics argue that NAFTA could not meet its economic welfare goals because of the way it was negotiated and because of the fact that an asymmetric negotiation produced an asymmetric settlement. All signatories have to abide by the same rules and there is no preferential treatment given to the developing country in the agreement. Puyana *et al.* argue that NAFTA does not include compensatory mechanisms to accelerate economic growth for the

country that requires it.<sup>31</sup> Without these compensatory mechanisms designed to align the economies involved in the agreement, fair competition, especially in the highly unproductive Mexican agricultural sector, cannot take place. Mexican poverty and inequality have increased in the years from 1994-2004 and migration has intensified in the same period. Compensatory mechanisms such as those provided for countries such as Spain and Greece in the European Union could have accelerated development and growth in Mexico similar to what the EU policies did for such countries in Europe. Greece and Spain have been brought into alignment with other higher-income member countries in Europe, and despite the free flow of workers around the European Union, there is no massive migration from lower-income countries to higher-income countries.

Other criticisms entail that NAFTA was not negotiated with mid-size and small corn producers in mind, but mainly to benefit competitive producers of corn and industrialists that could compete with their U.S. counterparts, creating negative distributional effects.

### ***Criticisms about the effects of NAFTA***

Most experts contend that NAFTA did not meet its goals of reducing migration and benefiting consumers. Nadal states that the agreement has threatened producers' ability to grow corn while simultaneously reducing consumers' ability to afford corn-related products, such as tortillas.<sup>32</sup> Nadal emphasizes that it is not simply the agreement that has caused these negative welfare effects, but also, the lack of adequate policies to mitigate the adverse effects, and inequitable government support of producers, as well as poorly formulated assumptions at the onset of the agreement.

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<sup>31</sup> Puyana, Horbath and Romero, *El Sector Agropecuario Mexicano: Un Quinquenio Con El Tratado De Libre Comercio De Norteamérica. La Pobreza y La Desigualdad Se Intensifican, Crece La Migración.*

<sup>32</sup> Nadal, *The Environmental and Social Impacts of Economic Liberalization on Corn Production in Mexico* 3

Nadal underlines that the support for agriculture through PROCAMPO (Programa de Apoyos Directos al Campo)<sup>33</sup> has lost 40% of its value, mainly due to inflation, and that the rural credit provision has substantially decreased.<sup>34</sup> Moreover, the dismantling of CONASUPO has also negatively affected the prices of corn and the welfare of those dependent on the crop for survival, both as a means of production and consumption. Nadal gives an assessment of NAFTA's projected and actual effects and concludes that NAFTA did not meet its expectations. He affirms that it was ideology more than sound economic analysis that led to the inclusion of corn into NAFTA. He further emphasizes that the government did not analyze the heterogeneity of the corn producers and their motivations for switching production to more efficient or profitable crops during the NAFTA negotiations. Consequently, neither producers nor consumers have benefitted and migration and soil erosion have increased. The main assumption formulated at the start of the agreement, Nadal argues, was that with the drop in prices, producers would switch to cultivation of more profitable crops, and corn production would deteriorate resulting in efficiency gains. There has been a large drop in corn prices over the period (48%)<sup>35</sup>: (Figure 11) nevertheless, production<sup>35</sup> has not decreased and the only producers capable of switching to other crops have been the larger producers of the crop. These producers do not constitute the majority of Mexican corn producers. There is evidence that corn production in Mexico has increased and that despite the continued large amount of corn produced on rain-fed land, the trend has been toward increased irrigated-land produced corn (Figure 4).

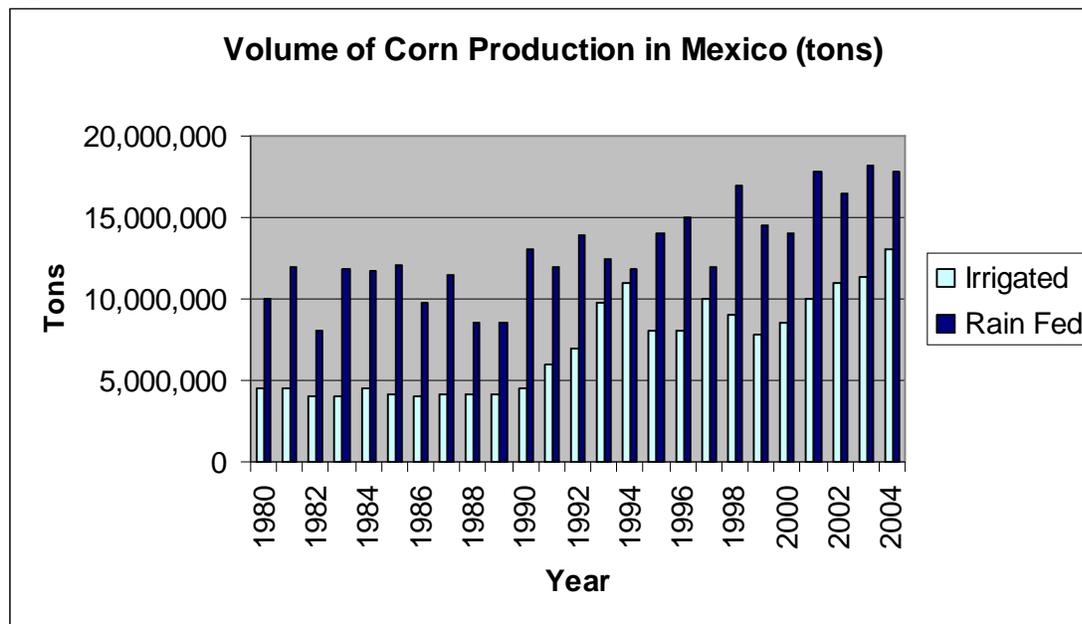
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<sup>33</sup> PROCAMPO (Program of Direct Support to Rural Communities) was created as a system that supported producers in a "decoupled" way such that it was consistent with WTO regulations and that would provide a transitional period during trade liberalization and was to be reformed after full NAFTA implementation in 2008. More information in Annex I.

<sup>34</sup> *Supra* note 31; 5

<sup>35</sup> Some other calculations contend that the price of corn has dropped 60-70% as expressed in this analysis previously.

**Figure 4 Volume of Corn Production in Mexico**



Source: <http://siea.sagarpa.gob.mx/sistemas/siacon/SIACON.html>

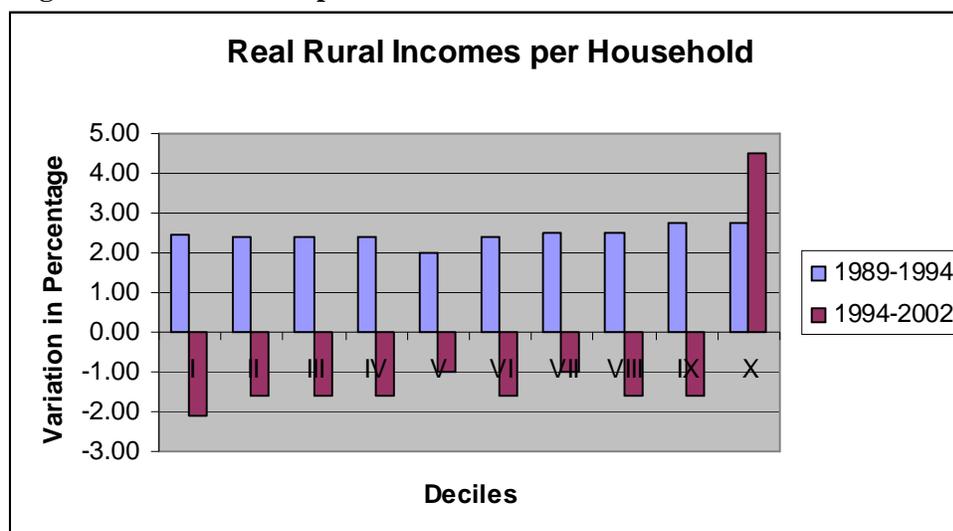
According to Nadal, the reason for this is that producers do not make their decisions on resource allocation based solely on price signals. Nadal also emphasizes that because the government did not implement the transition period, (Figure 2); it lost more than \$2 million in foregone fiscal revenue.<sup>36</sup> Not only did the government forego large amounts of fiscal revenue, but it also ignored the recommendations given by experts, *ex-ante*, in order to protect the corn sector during the fifteen-year transition period. In addition, Nadal emphasizes that assuming that subsistence farmers are not affected by falling prices is ill founded because subsistence farmers sell their excess corn on the market and depend on this income for survival.

In formulating their criticisms, Puyana *et al.* show econometric studies and data that reveal that rural salaries have decreased especially among the poorest deciles of the rural

<sup>36</sup>Puyana, Horbath and Romero, *El Sector Agropecuario Mexicano: Un Quinquenio Con El Tratado De Libre Comercio De Norteamérica. La Pobreza y La Desigualdad Se Intensifican, Crece La Migración.*

population. With more imports, lower prices and the eventual alignment of domestic prices with international prices, did not have the expected effects. The goal of liberalizing corn and agriculture was to reallocate resources and increase efficiency by exploiting Mexico's comparative advantage in labor. Puyana *et al.* argue that the effect of the reallocation of workers from one sector to the next would reduce the salaries of that sector especially if there were no opportunities in other agricultural or non-agricultural sectors. This reduction in salaries would be more detrimental for those with no land and rural workers receiving farm income.<sup>37</sup> While people in the richest decile increased their incomes by 4.52% in the period from 1994-2002, the incomes of those in the poorest decile decreased by 2.10%. (Figure 5).<sup>38</sup>

**Figure 5 Rural Incomes per Household**



Source: Puyana, Alicia 2006

Puyana *et al.* further affirm that rural jobs have been lost at the same time that other jobs in other sectors, such as manufacturing, have not increased. Finally, Puyana *et al.* say that the support given by government support programs, created as a means to curtail negative effects of

<sup>37</sup>Puyana, Horbath and Romero, *El Sector Agropecuario Mexicano: Un Quinquenio Con El Tratado De Libre Comercio De Norteamérica. La Pobreza y La Desigualdad Se Intensifican, Crece La Migración.*

<sup>38</sup> *Supra.*

trade liberalization, does not compare to the support given to farmers in the United States. These farmer support programs are discussed further in Annex (I).<sup>39</sup>

De Ita bases her criticism on emphasizing that trade liberalization has benefitted large competitive producers, which creates negative distributional effects. These effects are not only attributable to NAFTA, but also to the domestic economic policies enacted before and during the implementation of NAFTA. De Ita offers a similar criticism as Nadal; not all corn producers forced to reallocate resources to more efficient uses are able. Only those with sufficient resources and access to technology are capable to. In other words, competitive farmers with large-scale production — a minority in Mexico — are able to reallocate resources freely. De Ita, like Nadal, recommends respecting the tariff rate quotas established by NAFTA and ensuring that farmer supports such as PROCAMPO and *Alianza por el Campo* focus their support on those farmers who need it the most.

De Ita considers Mexican corn producers the largest losers in the trade agreement. Since 32% of corn producers in Mexico cultivate the crop on small parcels of land that do not exceed one hectare, Mexican corn producers are unable to compete with their American counterparts.<sup>40</sup>

### ***Arguments supporting NAFTA and corn inclusion***

This section will briefly outline the major theories and arguments relating to NAFTA's benefits. Most of these assessments rely on the increase of exports that Mexico has experienced during the NAFTA years. They compare pre-NAFTA with post-NAFTA exports, and deem that the difference has proved beneficial to Mexico. Most studies, however, do not focus on corn and tend to look at the entire agricultural sector. Contenders of NAFTA argue that both countries

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<sup>39</sup> PROCAMPO and Alianza Por El Campo were two of the programs Puyana *et al.* refer to. See Annex I.

<sup>40</sup> Ita de Rubio, Ana, *Los Impactos Socioeconómicos y Ambientales De La Liberalización Comercial De Los Granos Básicos En El Contexto Del TLCAN: El Caso De Sinaloa* Centro de Estudios para el Cambio en el Campo Mexicano, 2003), <http://www.cec.org/files/pdf/ECOMOMY/Impactos-Liberalización-comercial-Sinaloa-es.pdf>.

have benefited from their complementarity in that Mexico is able to export the goods that the United States is unable to produce efficiently and *vice-versa*.<sup>41</sup> Those studies that do contend that Mexico's corn sector has not been a loser in the agreement use the substitutability of white and yellow corn as an argument against Mexican corn producers' alleged inability to compete with U.S. corn producers.

### ***What are the welfare benefits of corn in NAFTA?***

The idea that Mexican corn farmers are being displaced is misleading, supporters of NAFTA argue, because the increase in corn imports from the United States to Mexico have largely been yellow corn, a crop that Mexican farmers, mainly, do not produce. The increase in imports has benefited the livestock production of Mexico increasing its productivity and output.<sup>42</sup> In addition, as Mexico already suffered from income inequality and a largely unproductive agricultural sector, it is argued that NAFTA has not exacerbated the already dire situation.

A study by the World Bank contends that the arguments outlining Mexico's uncompetitive agricultural sector and the contention that U.S. subsidies make it impossible for Mexican farmers to compete is ill-founded because the OECD has found that Mexico in fact, has been substantially more protectionist than the United States of its maize production. This study also reaffirms other supporters' assertions that yellow corn and white corn are not substitutes; therefore, they do not compete and even if Mexican farmers are not competitive vis-à-vis their

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<sup>41</sup> Steven Zahniser, "NAFTA at 13 Implementation Nears Completion," *USDA Outlook Report from the Economic Research Service* (2007), [www.ers.usda.gov](http://www.ers.usda.gov).

<sup>42</sup> Eduardo Porter, "Nafta is a Sweet Deal, so Why are they so Sour?" *The New York Times*, sec. Opinion, February 11, 2008, 2008, <http://www.nytimes.com/2008/02/11/opinion/11mon4.html?ex=1360472400&en=6a67a291669b7a40&ei=5088&pa rtner=rssnyt&emc=rss> (accessed February 11, 2008).

northern neighbors, the white corn that they produce, mainly for human consumption, is not a substitute for the yellow corn imports used mainly for animal feed.

Advocates of NAFTA affirm that price drops in Mexican corn are not due to the trade agreement itself but to government policies undertaken before the agreement. Moreover, they state that government policies and subsidies on corn producers and consumers of corn, administered by CONASUPO kept prices artificially high.<sup>43</sup> The fact that rain-fed corn production has increased over the period, is said to prove that poor producers of corn have not been hurt, since they produce mainly on rain-fed land. Under trade liberalization, increased corn production and especially the increase of rain-fed production are two factors that should not have occurred. In other words, as the expected effects of trade liberalization have not materialized in Mexico, there is no real reason to think that NAFTA has caused adverse effects because of this particular trend.

NAFTA advocates tend to emphasize that NAFTA is not a scapegoat for structural problems in Mexico's agricultural sector. Increased poverty and inequality are more an effect of poor government policies and the unproductive and even archaic nature of corn production in Mexico. Problems such as poor access to credit and fragmented land are the cause of poverty and inequality, not a trade agreement that has tripled exports and reduced Mexico's trade deficit. It has also increased trade between the two countries by 85%.<sup>44</sup> Sarmiento, an advocate of this view, determined that if the Mexican government had respected the quotas established by NAFTA, many Mexican poor would not have had access to corn for consumption. Moreover, he also mentions that the imports were largely of yellow corn and that without these imports the

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<sup>43</sup> Norbert Fiess and Daniel Lederman, *Mexican Corn: The Effects of NAFTA* The World Bank Group, 2004), [www.worldbank.org](http://www.worldbank.org).

<sup>44</sup> Sergio Sarmiento, "Mexico Alert NAFTA and Mexico's Agriculture," *Hemisphere Focus* 11, no. 7 (2003), <http://www.csis.org>.

livestock sector would not have been competitive. This view seems contradictory to this author because if imports were largely of yellow corn, which is mainly used for animal feed, these imports were in reality not helping to feed the poor consumers who demand corn for tortillas. Moreover, while it is true that livestock producers benefited from cheap imports of yellow corn, the government contends that it could meet demand for human consumption, making Sarmiento's first assertion inaccurate.

Other advocates point out that Mexico's agricultural sector has received large government support since the induction of NAFTA in 1994. Compared to other government budgets, the budget for the support of agriculture occupies 34% of the total budget. This includes the budgets for education, finance, tourism and health among others.<sup>45</sup>

## ***Conclusions***

It is not viable to attribute negative distributional and welfare effects to NAFTA alone and of itself because of the many different government policies that surround the agreement and the implementation of it. Both advocates and critics of the agreement have determined that the effects of NAFTA cannot be examined without examining the national policies that surround it. Critics affirm that NAFTA made the effects of poor macroeconomic policies worse, while advocates contend that poor economic policies are the main causes of adverse distributional effects. Neither of these groups of researchers, however, uses base cases to determine the true effect of the agreement on prices and welfare among corn producers in Mexico. The following analysis will further examine the literature as well as provide a base case to ease comparisons and determine a net effect on poverty and inequality in Mexico resulting from NAFTA.

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<sup>45</sup> Andres Rosenzweig, "Changes in Mexican Agricultural Policies, 2001-2003" (Paper Presented at a Conference, Policy Disputes Information Consortium's Ninth Agricultural and Food Policy Information Workshop "Farm Policy Developments and Tensions with NAFTA", Montreal, Canada, 2003).

## **Chapter IV. The True Effect of NAFTA on Poverty and Inequality in Mexico's corn sector**

The purpose of this thesis is to determine what effect, if any, the inclusion of corn in the North American Free Trade agreement had on inequality and poverty in Mexico. As has been examined, most experts affirm that the effects of NAFTA cannot be analyzed without taking into consideration the macroeconomic policies and structural reforms that the government of Mexico undertook since the early 1980's. Some say that NAFTA was simply an institutionalization of the implementation of those structural macroeconomic reforms. Determining whether it was NAFTA, other structural reforms that altered the corn sector in Mexico, or simply an existing unproductive agricultural and corn production sector that has not improved; that have caused adverse economic effects and poor growth rates, is not easily accomplished because all factors may have played a role.

From the literature explored in the above section, it is evident that even the critics of NAFTA reiterate that Mexico's domestic and macroeconomic policies have had an effect on most Mexican maize farmers' welfare. Further studies, and related economic and econometric models, will be analyzed in this section that will aid in the study of the determination of NAFTA's actual distributional effects.

Before determining the possible distributional and negative welfare effects during the NAFTA years, a full description of the events taking place during the period at hand will be discussed:

- The change in imports of corn will determine if NAFTA had an effect on the amount of corn imports from the United States.

- The change in production and productivity will determine if during NAFTA years production and productivity increased or decreased as compared to before NAFTA.
- The price variability of corn and its derivatives for human consumption during the NAFTA years will determine if there was a dramatic change during the period, which could have affected the welfare of producers and consumers alike.

After the examination of the aforementioned events, the first evaluation that this thesis will engage involves, the possible consequences that price fluctuations have upon welfare and inequality. In order to perform such an evaluation, it is necessary to understand the economic importance of the corn sector for the livelihoods of the poorest farmers and urban dwellers of the country. To do this the following economic parameters will be considered:

- An Engel curve, which will attempt to prove that people who have lower incomes demand more corn, thus their welfare is determined by price fluctuations in corn and corn related products such as tortillas.
- The budget allocation of poor and rich households on corn and tortillas, which will attempt to prove that poor households spend more of their income on corn and tortillas relative to rich households.
- An identification of net buyers and net sellers, that will attempt to prove that subsistence farmers tend to be both, and are heavily affected by price fluctuations as both consumers and producers.
- Finally, the cross-price elasticities of white and yellow corn, which will attempt to prove that these two commodities are to an extent substitutable, making Mexican farmers of white corn vulnerable to competition from their U.S. counterparts.

After taking into account these considerations, the dismantling of CONASUPO will be examined as the base case. As previously mentioned, many authors indicate that the adverse distributional effects possibly taking place in the corn sector in Mexico are most likely due to a combination of both trade liberalization and domestic economic restructuring. Therefore, to find the true effect that NAFTA has had on welfare in Mexico's corn sector, the analysis will assume that NAFTA never took place and that the dismantling of CONASUPO was the largest and most influential structural change that influenced prices, and, as a consequence welfare.

This study will determine the distributional effects of including corn in NAFTA and will analyze which of the studies mentioned in the previous section give a more accurate representation of the current trend in Mexican maize production and consumption. This thesis will determine these aforementioned effects, through not only the identification of the previously mentioned economic parameters and base case, but also using econometric models developed by analysts of the current and pre-NAFTA trends in Mexican maize production and consumption.

### ***Change in imports, corn production and prices during the NAFTA years.***

All data available generally present the same results and effects on the Mexican corn sector during the past 15 years of NAFTA implementation. Imports of corn from the United States increased, Mexican corn production, unexpectedly, increased, prices of corn dropped and astoundingly, tortilla prices increased (Figures 3, 6, 11, 12).

Before signing the agreement, analysts and supporters of the agreement as well as the Mexican government expected to experience lower corn production, increased imports and consequently lower consumer prices. Nearly all of these events turned out to be the complete opposite of what was anticipated in the goals and expectations of the agreement.

## Production

The volume of production in 2006 was double that of 1989 (Figure 6).<sup>46</sup> From 1993-2004, corn production on irrigated land increased from almost 10 million tons to 13 million tons. In the case of rain-fed land, corn production increased on this type of land from 12.5 million tons to 17.8 million tons (Figure 4).<sup>47</sup> The area of maize cultivation under irrigation decreased, yet productivity remained the same. Large commercial farmers perform most of this kind of production. Conversely, rain-fed lands have increased in both cultivation and production, while yields or productivity have not (Figure 7).<sup>48</sup> This Figure shows that yields on irrigated land seem to have experienced a sharp increase, whereas yields on rain fed land (where the majority of production lies), have remained steady. There could be several reasons why the *ex-ante* expectations were not met. One of these reasons could be the effect of keeping CONASUPO price guarantees until 1999, and the strategies followed by corn producers.<sup>49</sup> Price guarantees of CONASUPO may have encouraged continuous production of the crop, especially among larger producers. Because these producers determined that, they would receive a guaranteed price for corn, they may have preferred to continue producing the crop instead of risking conversion to riskier exportable crops.<sup>50</sup> A second reason could be the effect of PROCAMPO, as some researchers contend that the program enhances a rural household's ability to increase their income and liquidity.<sup>51</sup>

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<sup>46</sup> *Maíz: Indicadores Básicos* (México: Centro de Estudios Para el Desarrollo Rural Sustentable y la Soberanía Alimentaria (CEDRSSA), [2007]), <http://www.cedrssa.gob.mx/>.

<sup>47</sup> "Sistema De Información Agropecuaria De Consulta," <http://siea.sagarpa.gob.mx/sistemas/siacon/SIACON.html> (accessed March/19, 2008). <http://siea.sagarpa.gob.mx/sistemas/siacon/SIACON.html>

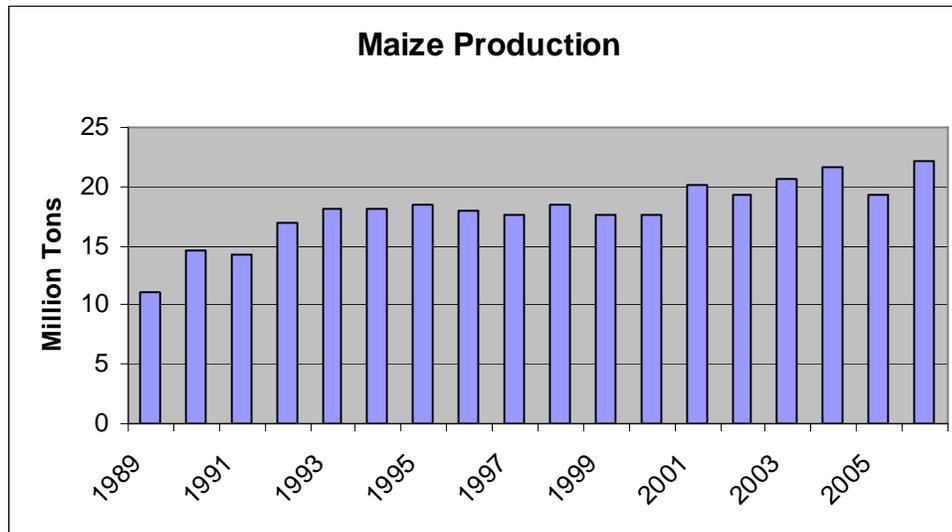
<sup>48</sup> Antonio Yunez-Naude and Edward Taylor J., "The Effects of NAFTA and Domestic Reforms in the Agriculture of Mexico: Predictions and Facts," *Région Et Développement* 23 (2006).

<sup>49</sup> Appendini, *De La Milpa a Los Tortibonos La Restructuración De La Política Alimentaria En México* 230

<sup>50</sup> *Ibid.*

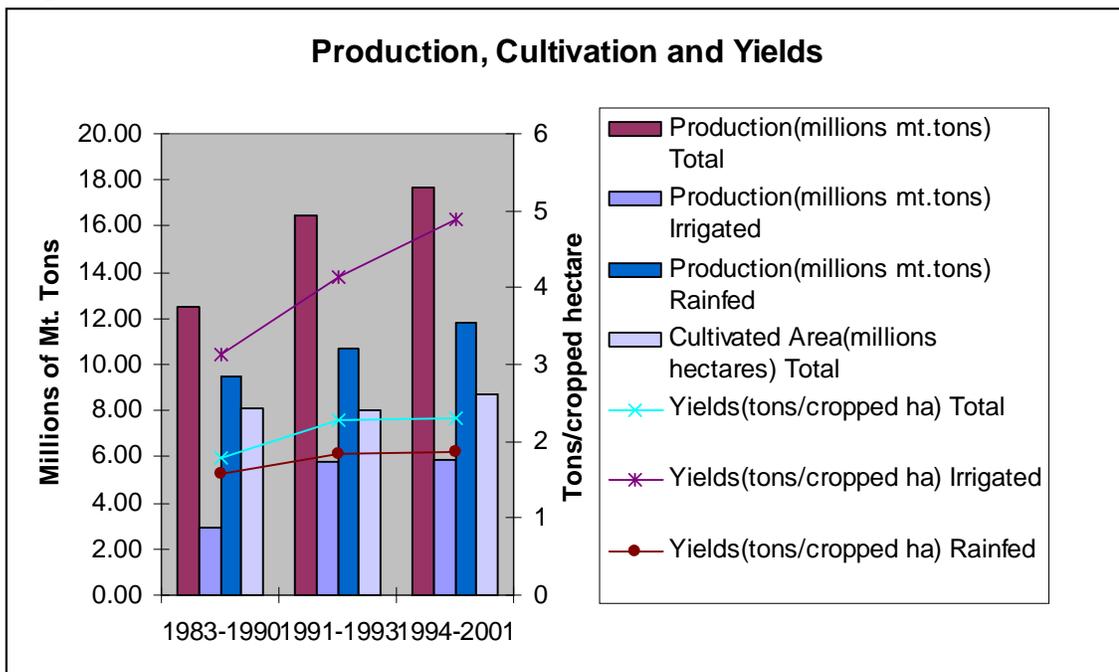
<sup>51</sup> *The Effect of Trade Liberalization on Mexico's Rural Population* (México: Fundación Idea Implementación, Diseño, Evaluación y Análisis de Políticas Públicas, 2008).

**Figure 6 Maize Production**



Source: SIAP, SAGARPA, CEDRSSA

**Figure 7 Production, Cultivation and Yields**



Source: Yunez-Naude *et al.* 2006, FAO SAGAR, SIACON

## Corn Imports

On the other hand, the volume of imports of maize was double in 2006 to what it was in 1998.<sup>52</sup> The volume of imports steadily increased from the date of the signing of NAFTA (1994). Maize imports in 2006 were nearly 10 times as much as imports in 1991 (Figure 3). Cheaper imports of U.S. yellow corn have benefitted Mexico's livestock sector and the industry's increased demand has led to a substantial increase in yellow corn imports for animal feed. The substitutability of white and yellow corn will be explored in a later section; however, it is important to point out that for several years during NAFTA implementation, white corn imports grew, at an increasing rate, until 2002, when they began to decrease again. This is an important aspect regarding farmer welfare because Mexican corn farmers produce mainly white corn.

## Corn Prices

Mexican corn producers have seen a substantial decrease in the price of corn that began in 1994, the year NAFTA was signed (Figure 11). The direct causality of NAFTA on prices will be explored in subsequent sections involving CONASUPO dismantling. Because of the demand for ethanol, however, international prices of corn have increased during the past two years and are expected to continue increasing. Nevertheless, for the purpose of this analysis, the effect of corn prices upon the Mexican society will be evaluated until 2006, a date from which prices steadily decreased.<sup>53</sup> This is in stark contrast to the prices of tortillas (Figure 11). Prices of tortillas rose faster than the price of imported corn (see Figure 8). Meanwhile compared to other goods such as pork, chicken and beef, the increment in the tortilla price index is much higher (Figure 9). Moreover, in 2006 tortilla prices experienced a sudden hike. These figures show that,

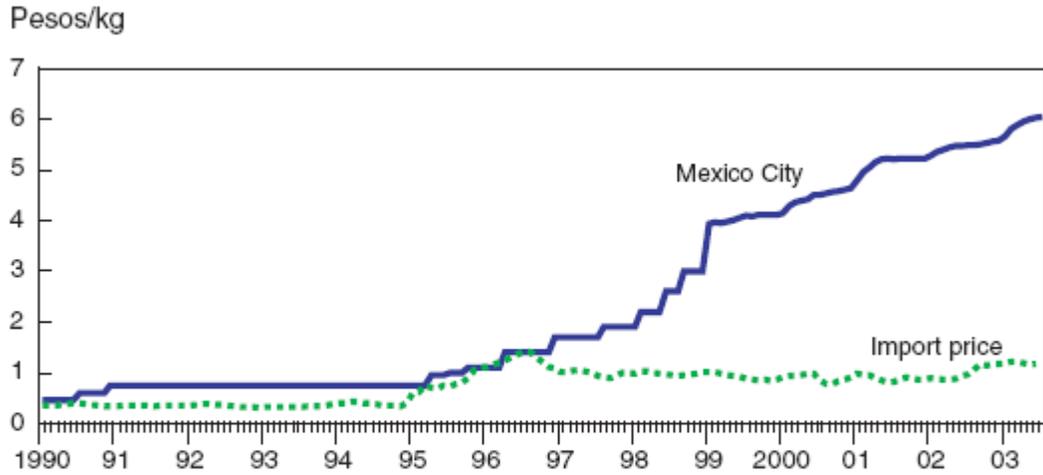
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<sup>52</sup> *Supra* note 46.

<sup>53</sup> A further analysis of prices with relation to ethanol will be mentioned in Chapter VI *Future Research*.

neither consumers nor producers have benefitted from the events occurring during the past 15 years of NAFTA implementation.

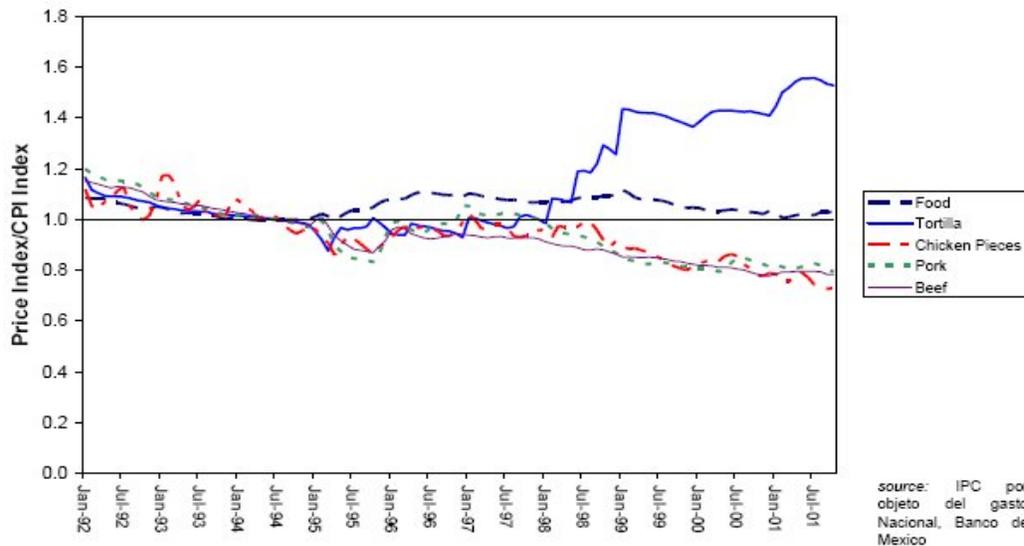
**Figure 8 Price of Tortillas Relative to Price of Imported Corn**  
**The price of tortillas in Mexico is rising faster than the price of imported corn**



Note: Monthly unit value of U.S. corn exports to Mexico was converted to pesos using exchange rates from the Pacific Exchange Rate Service, <http://pacific.commerce.ubc.ca/xr/>  
 Sources: U.S. Department of Agriculture, Economic Research Service, Foreign Agricultural Trade of the United States database (unit value of imports); Rosenzweig and Espindola (price of tortillas); Banco de Mexico (price index for tortillas); and Pacific Exchange Rate Service.

**Figure 9 Food Prices Relative to Overall Consumer Price Index (CPI)**

**Figure 1: Prices Relative to Overall CPI**  
 (1994=1)



## ***Methodologies and economic parameters that determine welfare and distributional effects***

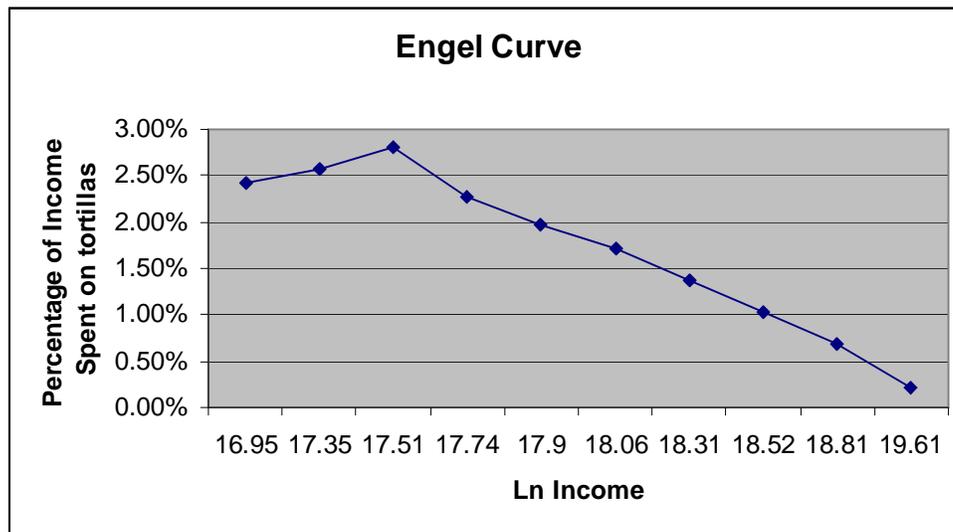
### **Consumer effect: Engel curve and budget allocation of maize**

Using data from INEGI (Mexico's Institute for Statistics Geography and Informatics),<sup>54</sup> I calculated household budget allocations of food expenditures and expenditures on the most ubiquitous corn related product consumed in Mexico: tortillas. The budget allocation is divided into ten deciles; (I) represents the lowest and poorest decile, while (X) represents the highest and richest decile. As portrayed by Annex (II), it is clear that the lowest deciles of the population allocate a great proportion of their budget to purchasing tortillas. The lowest decile spends 25.4% of income on food and 2.43% of it on tortillas, as opposed to the highest decile whose members spend only 6.4% of their income on food and only 0.22% of their income on tortillas. Moreover, for the lowest decile, 9.5% of food expenditures are on tortillas, whereas for the highest decile, 3.3% of food expenditures are on tortillas. Figure (10) is an Engel curve portraying the fact that the higher the income, the less the households spend on tortillas. The expenditures on tortillas peak at decile III, beyond which households in deciles above the third decile, begin spending less of their income on tortillas.

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<sup>54</sup> The data is taken from a national survey of household expenditures. It is the most recent survey of 2006. It represents urban and rural consumers of tortillas. The approximate number of households included is 21 million households. See [www.inegi.gob.mx](http://www.inegi.gob.mx).

**Figure 10 Engel Curve Tortilla Consumers**



Source: INEGI, Author's calculations.

Alessandro Nicita's study corroborates these figures. He also finds that poor and rural households dedicate more of their budget to maize and maize-based products. Nicita computed the data utilizing earlier surveys and based his data on the total expenditure for each commodity rather than for tortillas explicitly, yet his findings are similar to the findings of this author's calculations. In his study, the poorest decile allocated 7.1% of their food expenditures to maize, whereas the richest decile allocated only 1.1% of their food expenditures to maize.<sup>55</sup> Nicita made the further distinction between rural and urban household expenditures, demonstrating that rural households spend more on maize than urban households do. Out of all food expenditures for rural households, 5.5% are on maize as opposed to 3.4% for urban households. Moreover, a Mexican government study on household expenditures found that rural households generally dedicate more of their budget to corn tortillas as opposed to other basic foods. Expenditures for tortillas comprise 10% of total basic foods expenditures. Tortilla consumption is followed by

<sup>55</sup> Alessandro Nicita, *Efficiency and Equity of Marginal Tax Reform: Income, Quality and Price Elasticities for Mexico* World Bank Policy Research Working Paper 3266, 2004), <http://econ.worldbank.org>.

meat and chicken consumption.<sup>56</sup> These numbers clearly demonstrate that the poorest and rural households tend to spend more of their income on corn related products, which would in turn make them more vulnerable to price fluctuations of corn.

For net consumers, it is evident that with an increase in prices to purchase corn, the poorest part of the Mexican population will be most negatively affected by a higher price. This would lead to a negative welfare effect (see Engel curve, Figure 10). In effect, increases in imports brought about by NAFTA and the policies of ignoring quotas set by the agreement, brought prices of corn down, yet it did not bring prices of tortillas down (Figures 2, 3, 11, 12). This effect contradicts the goals and expectations, not only of the agreement, but also of basic economic trade theory, which states that when two countries trade, there will be winners and losers, but the winners could compensate the losers and in the aggregate, the entire country can benefit.<sup>57</sup> This was certainly an expectation of NAFTA; producers would lose with a lower price of corn, yet consumers would benefit from cheaper tortilla prices. The reason why this outcome did not occur is beyond the scope of this thesis; nevertheless, in examining the impacts of NAFTA on inequality and poverty in Mexico, these observations demonstrate that the trade agreement did not bring gains to consumers. This result, however, may be, in whole or in part, unrelated to the trade agreement and more related to the elimination of CONASUPO's price supports and guaranteed prices for corn and tortillas, as well as the oligopolistic nature of the maize-tortilla market in Mexico.<sup>58</sup>

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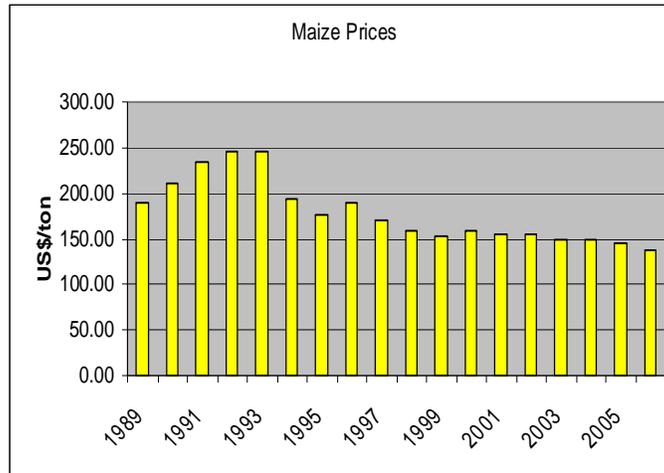
<sup>56</sup> "Sistema Integral De Información Agroalimentaria y Pesquera,"

[http://www.siap.sagarpa.gob.mx/ar\\_commenmpio.html](http://www.siap.sagarpa.gob.mx/ar_commenmpio.html) (accessed March/19, 2008). SIAP SAGARPA 2006; 24.

<sup>57</sup> This economic theory was coined and developed David Ricardo but it is based on a full-employment model. A characteristic absent in Mexico's agricultural sector.

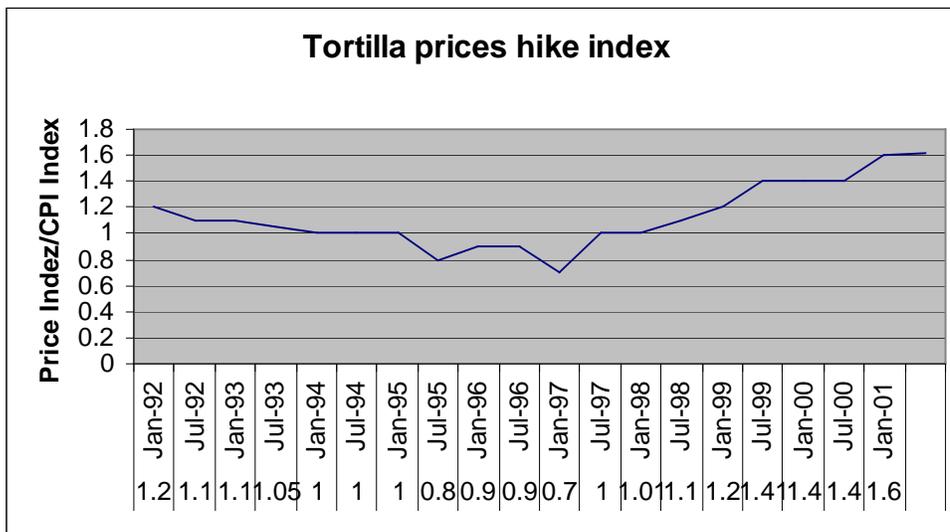
<sup>58</sup> As discussed in part (II) of this document, two companies (MINSA and GRUMA) control 90% of the industrialization of maize and production of tortillas.

**Figure 11 Maize Prices**



Source: SIAP, Banxico

**Figure 12 Tortilla Price Hike Index. Base year: 1994=1**



Source: Banxico.

### **A comparison of welfare effects for consumers and producers**

Net buyers and net sellers of maize in Mexico

To determine the welfare effects of price fluctuations and drops in the corn sector in Mexico, the identification of net buyers and sellers is essential. Nevertheless, as established by a

study done by the OECD before the agreement, accurate data that describes these two groups is limited.<sup>59</sup> Even after 15 years of NAFTA implementation, data that describes net buyers and sellers, as well as the welfare effects on these two groups is scarce and in some cases non-existent. Yunez and Taylor describe the lack of information in the following way, “no nationwide time series data exists to distinguish peasant from commercial operators.”<sup>60</sup>

Despite this lack of concrete facts, identifying net sellers and net buyers aids the analysis to determine the potential winners and losers of trade liberalization. Several studies attempt to determine the welfare benefits of NAFTA for the corn sector prior to the agreement using household data to develop models involving the net effects of NAFTA on net buyers and net sellers of corn.

The main works analyzed will be those of Alain de Janvry *et al.*, Levy *et al.*, Yunez-Naude *et al.*, and Alejandro Nadal. The work by Yunez-Naude *et al.* describes effects of NAFTA post-implementation, while de Janvry and Levy describe net buyers and net sellers *ex-ante* and in the context of possible future distributional effects due to trade liberalization and NAFTA. Nadal’s work focuses on several households along differing Mexican states.

De Janvry and Levy’s studies are published *ex-ante* and demonstrate an acceptable analysis and identification of net sellers and net buyers of corn in the Mexican corn sector. All of the studies used in this analysis tend to emphasize the dualistic nature of corn producers in Mexico. In other words, Mexican maize producers can be either net buyers or net sellers whether they are small subsistence farmers or not. Some studies divide farmers into three main groups, subsistence farmers, landless workers and medium and large-scale producers, while

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<sup>59</sup> Santiago Levy and Sweder Wijnbergen van, *Mexican Agriculture in the Free Trade Agreement: Transition Problems in Economic Reform*, Working Paper No. 63 ed. OECD Development Centre, 1992). 84 note 15.

<sup>60</sup> Yunez-Naude and Taylor J., *The Effects of NAFTA and Domestic Reforms in the Agriculture of Mexico: Predictions and Facts* 168.

others divide them into two groups, those that work on irrigated land as opposed to those who work on rain-fed land.

The studies conducted prior to the trade agreement in 1992; analyze the distributional impacts of trade liberalization, identifying net buyers and net sellers of the crop. They examine the welfare effects that Mexican maize producers would have under NAFTA by demonstrating that the majority of maize producers in Mexico would not be affected by price drops of corn due to trade liberalization because they largely do not produce for the market. This thesis will use these analyses to identify net buyers and sellers and determine what the distributional effects might be in the aggregate. The studies presented show diverging numbers that portray aggregate figures and only one of the researchers, Alejandro Nadal, presents figures that represent individual households. In order to represent the diverging views, this analysis will present the upper and lower bounds described by the studies. Subsequently, representative households, provided by Nadal, will be discussed to determine the welfare consequences of being a net seller or a net buyer on the individual household level. In addition, to Nadal's analysis, Yunez' study will further confirm that micro-producers can either be net buyers or net sellers of corn.

Levy *et al.* determine that out of the 2.25 million producers in Mexico, only 34% of those are net sellers.<sup>61</sup> They classify producers into three groups: subsistence producers, landless workers and medium and large-scale producers. Levy *et al.* argue that many subsistence producers and all landless workers are net buyers.<sup>62</sup> From data gathered by different government authors and INEGI, Levy *et al.* determine that before the agreement was signed there were 2.25 million maize producers; out of which 2 million were subsistence producers, 0.25 million were

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<sup>61</sup> Levy and Wijnbergen van, *Mexican Agriculture in the Free Trade Agreement: Transition Problems in Economic Reform*.

<sup>62</sup> *Ibid.*

large-scale producers and 3 million were landless rural workers.<sup>63</sup> Their study contends that net sellers of the crop would be the most affected by price drops, yet because there are less net sellers than net buyers in the rural poor market, the majority of winners in the agreement would be subsistence producers and landless workers, in other words, the majority of the rural population. They further underline that 66% of producers who cultivate maize on less than 2.5 hectares keep all of their output. In addition, from the total output produced only 50% enters the market. Therefore, a small amount of Mexico's corn producers are net sellers; consequently only a small percentage would be harmed by lower corn prices according to their *ex-ante* model that presents a partial-equilibrium analysis of the effects of maize prices on the groups previously described. Summarizing the argument made by Levy *et al.*, subsistence producers who are net sellers lose with a drop in prices of corn, while those who are net buyers gain with a drop in prices.<sup>64</sup> Thus, their analysis of net buyers and sellers does not demonstrate any adverse distributional effects. The percentages presented by Levy *et al.* have a substantially higher number of net buyers than sellers, but unlike de Janvry's studies presented below, they do not show a percentage of self-sufficient farmers.

Alain de Janvry *et al.* provide two different studies performed *ex-ante* describing net buyers and net sellers of maize that attempted to determine the welfare effects upon these groups as an outcome of NAFTA. Only the study that represents the lower bound of net buyers and sellers will be utilized in this analysis.

De Janvry *et al.* used household data, that included 1,035 corn-producing households, to determine that the households in the survey could be divided into three groups, depending on participation in the market: 40.6% were net sellers, 28.6% were net buyers and 30.7% were self-

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<sup>63</sup> *Ibid.*

<sup>64</sup> *Supra.*

sufficient, neither net buyers nor net sellers.<sup>65</sup> In this study, de Janvry utilized a utility maximizing model that determined the group under which producers would most likely fall. To examine further the behavior of producers in these three categories de Janvry identified a “price band” of corn. This “price band” represents the difference between sale price and purchase price. The gap could be due to the policies enacted by CONASUPO, which de Janvry assumes to distort the behavior of corn producers and their utility function. De Janvry affirms that there is a difference of 28% between the sale price and the purchase price of maize.<sup>66</sup> Akin to Levy *et al.*, de Janvry *et al.* determined that corn producers who depend more on wages, than on the price of corn, would lose more under the NAFTA agreement. The producers that depend more on wages are net buyers of corn. He also states that under NAFTA, 31% of all corn producers will remain competitive even after the price drops, while a drop in prices will affect negatively 41% of households. Using, Levy’s logic, and de Janvry’s numbers, more producers will be affected by drops in corn prices, 40% as opposed to 28%.

These results show the upper and lower bounds of the numbers of net buyers and net sellers described by the literature. To accentuate the importance and distinction between the two groups, the following argument will emphasize that being a micro-producer on land that is less than 5 hectares does not necessarily make a farmer a net buyer of corn. Yunez-Naude *et al.* and Nadal present numbers of producers that underline this fact. While most commercial producers are net sellers, the majority of micro-producers are not necessarily net buyers of corn.

Yunez-Naude *et al.* make a distinction between commercial producers and subsistence farmers. This distinction, nonetheless, does not imply that subsistence farmers are net buyers of maize. Moreover, their status as micro-producers does not prevent them from being net sellers.

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<sup>65</sup> Alain De Janvry, Elisabeth Sadoulet and Gustavo De Anda-Gordillo, "NAFTA and Mexico's Maize Producers," *World Development* 23, no. 8 (March 1995, 1995), 1349-1362.

<sup>66</sup> *Ibid.*

Yunez-Naude's distinction between commercial producers and subsistence farmers lies in the manner in which the crop is harvested. Commercial producers plant on irrigated land while subsistence producers do so on rain-fed land. Yunez *et al.* divide farmers into those who produce on more than 5 hectares of land, those who produce on land between 2-5 hectares in area and those who produce on less than 2 hectares. Those who have excess supply of maize are those who participate in the market and are affected by lower prices of corn. Nevertheless, as described by the two previous authors, if subsistence farmers do not participate in the market, they are also affected by lower corn prices through labor and wages. In their study evaluating predictions and effects of NAFTA, Yunez *et al.*, mention the studies by Levy *et al.* that predicted less corn production by net sellers and decreased migration did not take into consideration that when there is less demand for land and labor due to less production, subsistence production actually increases. Yunez *et al.* have the benefit of looking at past effects rather than predicting an effect in the future, nevertheless they also present an econometric model that proves their assertions. Yunez *et al.* contend that lower maize prices affect both commercial farmers and subsistence farmers, bringing their income down, however, the income effects for subsistence farmers is small because their income is diversified.

According to estimates by the Mexican government's Secretary of Agriculture, micro-producers comprised 85% of 2 million corn producers (Table 1).<sup>67</sup> This percentage of micro producers obtained in 2004 is very similar to the percentage found by Levy *et al.* (80%). If we identify net sellers of corn as those farmers working on more than 5 hectares of land, despite the fact that a majority of producers are part of this category, most Mexican maize producers would be unaffected by lower corn prices. It is unrealistic to conclude that net sellers are those who cultivate on plots that are larger than 5 hectares. Because micro-producers are a large majority

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<sup>67</sup> Miramontes Piña, César Ulises, *Situación Actual y Perspectivas Del Maíz En México 1996-2012*, 7-47.

of all corn producers, not calling these producers, net sellers, involves relying on 15% of all domestic corn production to fulfill demand. These figures suggest that subsistence and small producers can also be net sellers.

**Table 1 Number of producers and land cultivated**

Hectares of Land Produced	Number of Producers	
	2003	2004
>0, <=1	530,392	524,811
>1, <=2	549,201	522,086
>2, <=5	577,594	543,836
>5<=10	207,139	201,416
>10,<=18	45,363	45,094
>18, <=50	23,882	25,841
>50, <=100	3,788	4,359
>100	1,155	1,507
<b>Total</b>	<b>1,938,514</b>	<b>1,868,950</b>
Percentage of <=1	27.36%	28.08%
Percentage >1, <=2	28.33%	27.93%
Percentage >2, <=5	29.80%	29.10%
Percentage >5<=10	10.69%	10.78%
Percentage >10,<=18	2.34%	2.41%
Percentage >18, <=50	1.23%	1.38%
Percentage >50, <=100	0.20%	0.23%
Percentage >100	0.06%	0.08%
<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>
Total Microproducers	1,657,187	1,590,733
<b>Percentage of Net Buyers if Net buyers produce on &lt;5 hectares of land</b>	<b>85.49%</b>	<b>85.11%</b>
<b>Percentage of net sellers if Net buyers produce on &lt;5 hectares of land</b>	<b>14.51%</b>	<b>14.89%</b>

Source: Miramontes Piña, César Ulises 2007; 48

As can be established from the different proportions and numbers of producers present in 2004 as compared to the early 1990s given by the numbers provided by Levy *et al.*, and the Mexican government, the number of producers hardly declined, from 2.25 million to 2 million. It cannot be determined with certainty that there was a significant change. Therefore, it is difficult to conclude that a large proportion of Mexican corn farmers switched production to

more rentable crops. The following Table summarizes the percentages of net buyers and sellers identified by the aforementioned researchers.

**Table 2 Differing Estimates for the percentage of Net Buyers and Net Sellers**

	<b>Net Buyers</b>	<b>Net Sellers</b>
<b>De Janvry</b>	<b>28.60%</b>	<b>40.60%</b>
<b>Levy et al.</b>	<b>66%</b>	<b>34%</b>
<b>Produce on &gt; 5 hectare= Net seller</b>	<b>85.11%</b>	<b>14.89%</b>

Sources: (Miramontes Piña, César Ulises 2007, Levy, Santiago 1992, De Janvry, Alain 1995.)

De Janvry *et al.*'s estimates of net buyers and net sellers, represents the lower bound of net buyers because he takes into consideration farmers who are self-sufficient. Nevertheless, their description of net sellers shows that a slightly larger proportion of producers (40.60%) would be affected by corn price fluctuations as opposed to Levy *et al* (34%).

On the other hand, data gathered by Alejandro Nadal demonstrates that the size of land cultivated matters little in determining net sellers of maize. Moreover, his estimates show that each household can choose to be a net buyer or a net seller of the crop depending on several different factors that include whether or not the household owns livestock. Those household that own livestock appear to be more likely to keep maize for household needs. The size of cultivated land appears to have little to do with whether a producer is a net buyer or a net seller of the crop. Some producers cultivating maize on less than 5 hectares of land are net sellers of the crop (Table 3).

**Table 3 Percentage of corn sold on Market, Individual Household Data**

<b>Producers</b>	<b>Land for Maize Cultivation</b>	<b>Sold to Market</b>	<b>Kept for Household Needs</b>
Producer 1 Guerrero	3	0%	100%
Producer 2 Guerrero	3	50%	50%
Producer 3 Guerrero	3	30%	70%
Producer 4 Guerrero	1	0%	100%
Producer 1 Michoacán	18	50%	50%
Producer 2 Michoacán	8	50%	50%
Producer 3 Michoacán	12	60%	40%
Producer 4 Michoacán	9	30%	70%
Producer 1 Puebla	3	50%	50%
Producer 2 Puebla	4	60%	40%
Producer 3 Puebla	5	50%	50%
Producer 4 Puebla	1	0%	100%
Producer 5 Puebla	1	0%	100%
Producer 6 Puebla	3	75%	15%
Producer 7 Puebla	3.5	50%	50%
Producer 8 Puebla	2	70%	30%
Producer 1 Chiapas	3.75	77%	23%
Producer 2 Chiapas	6.5	88%	12%
Producer 3 Chiapas	9	92%	8%
Producer 4 Chiapas	7.5	90%	10%
Producer 5 Chiapas	5	90%	10%

Source 85 Nadal, Alejandro 2000; 67-80

The description of these studies clearly demonstrates that it is not easy to classify Mexican maize farmers into net sellers or net buyers, and there seems to be no concrete conclusions about adverse welfare and distributional effects. Poor farmers of corn in Mexico can either choose to be net buyers or net sellers depending on economic and social circumstances, therefore not benefiting from lower prices of corn, in either capacity.

The fact that production did not decrease during the years of NAFTA implementation suggests not only that, poor farmers of corn in Mexico can be either net sellers or net buyers, but also that producers are somehow financing continuous production despite lower prices. Corn production has not decreased, on low-productivity or rain-fed land, in fact it has increased.

There are a few possible reasons for this surprising effect. Subsistence farmers are not affected by the market prices, and continue production, conceivably obtaining funds from remittances. Other reasons could include that perhaps most corn farmers in Mexico are not net sellers of the crop.<sup>68</sup> In addition, possibly government support programs such as, PROCAMPO, have helped maintain production. Subsistence producers may also be attempting to compensate for losses in profit by producing more.

The other surprising aspect of the events of the recent years has also been an increase in tortilla prices; therefore, even with a decrease in corn prices, net buyers of tortillas have also not benefitted from the price drops. Consequently, it appears as though net buyers are another group that has not benefitted from trade liberalization. The effect on net sellers continues to be ambiguous according to the facts, yet not according to the *ex-ante* theory. Net buyers of corn for animal feed seem to be the group that benefitted the most.

The current analysis of the literature that identifies net buyers and sellers, demonstrates the effects that trade liberalization could have on net buyers and sellers. Nonetheless, there is no clear adverse distributional effect on net sellers, despite the *ex-ante* theories predicting that they would be more affected by trade liberalization. The difficulty in determining net buyers and sellers is demonstrated further by the lack of data and the estimate that during the 1990's more than 35% of corn production was not commercialized.<sup>69</sup> All authors analyzed give diverging figures that refer to net buyers and sellers, yet they all come to the same conclusion overall. Net sellers will generally lose with a lower price of maize and with trade liberalization. Due to the actual results of increased production on rain-fed land and increased productivity on irrigated

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<sup>68</sup> All studies, however, tend to point out that 40% or more of the producers studied are net sellers. Theoretically making them vulnerable to lower prices of corn brought about by cheaper imports through NAFTA.

<sup>69</sup> Antonio Yunez-Naude and Fernando Barceinas, *Efectos De La Desaparición De La Conasupo En El Comercio y Los Precios De Los Cultivos Básicos* (Mexico: Colegio de México PRECESAM, 2000).

land, it is not evident that net sellers are losing with lower corn prices. The main beneficiaries are those net buyers of corn for animal consumption. Net buyers of tortillas, however, are losing from higher tortilla prices. The lower prices of yellow corn for animal feed appear to be a causal effect of NAFTA. However, the higher tortilla prices appear to be a causal effect of trade liberalization and market oriented reforms in absence of previous and on-going regulation.

### **Cross-price elasticity of white and yellow corn**

Mexico produces mainly white corn for human consumption, namely, tortilla production. In contrast, the United States produces mainly yellow corn. Yellow corn is used for animal feed, the production of ethanol, corn syrup, cornstarch, cereals and snacks. In addition, white corn is on average 25% more expensive than yellow corn.<sup>70</sup>

The increase in imports during NAFTA implementation has largely been yellow corn for animal feed. Mexican consumers prefer the white corn variety for the preparation of tortillas; nevertheless, comprehensive studies have not been performed as to the substitutability of white and yellow corn. Nevertheless, it is known that large tortilla industries, mainly MINSA and GRUMA, have substituted or mixed yellow corn with white corn to produce tortillas in order to reduce their costs and increase their profits.<sup>71</sup> A study by Antonio Yunez-Naude in regards to white and yellow corn substitutability will be explored in this analysis to determine if there is some substitutability between the two. If there is no substitutability, cheap yellow corn imports do not compete with Mexican white corn, because in a sense they would be two different commodities. Conversely, if yellow corn is a substitute for white corn, Mexican maize production will continue to compete with cheaper imports of the yellow corn variety. In addition, because most maize production in Mexico is done on small farmland with little technology, with

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<sup>70</sup> Nadal, *The Environmental and Social Impacts of Economic Liberalization on Corn Production in Mexico*

<sup>71</sup> Appendini, *De La Milpa a Los Tortibonos La Restructuración De La Política Alimentaria En México*

complete free trade Mexican farmers would be highly uncompetitive. Paradoxically, however, previous data show that even if there is such substitutability, production does not decrease. Nevertheless, critics of NAFTA claim that there is complete substitutability between the two, while supporters of the agreement and the government official version contend that there is no substitutability. On the other hand, various researchers indicate that neither version is completely correct; white and yellow corn are to a certain extent substitutable, but not complete substitutes.<sup>72</sup>

In 2005, Mexico produced 19.5 million tons of corn, of which 7 million tons were directed towards family consumption of subsistence farmers, while 12.5 million tons were sold on the market. Of all maize produced in Mexico 96% is white corn.<sup>73</sup> According to government documents, domestic demand of white corn for human consumption is met through domestic supply. However, Mexico does not produce enough yellow corn for animal feed to meet domestic demand.<sup>74</sup> Therefore, it must rely on imports of yellow corn to meet domestic demand. It is because of this reason that the government claimed it had to surpass the tariff-rate quotas delineated in NAFTA during the first fifteen years of implementation. The government claims that it requires imports of yellow corn above 5 million tons.<sup>75</sup>

During NAFTA corn imports rose steadily. The period of 1990-1994 registered an increase in corn imports of 6.3%. When distinguishing between yellow and white corn, yellow

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<sup>72</sup> A. Timothy Wise, Personal Communication, February 10, 2008, 2008. Antonio Yunez-Naude, Personal Communications, January 8, 2008, 2008.

<sup>73</sup> Antonio Yunez-Naude, Anabel Martínez-Guzmán and Manuel A. Orrantia-Bustos, "Capítulo 2 Impactos En México De Las Importaciones De Maíz Provenientes De Los EUA" In *Elementos Técnico- Económicos Para Evaluar Los Fundamentos Que Tendría Una Controversia Comercial En Contra Del Maíz Originario De Los Estados Unidos De América* (México: PRECESAM, CEE, El Colegio de México, 2007), 24-44.

<sup>74</sup> Miramontes Piña, César Ulises, *Situación Actual y Perspectivas Del Maíz En México 1996-2012*, 7-84

<sup>75</sup> *Ibid.*

corn represented the highest percentage increase; 7.1% as opposed to 3.1% increase in import of white corn.<sup>76</sup>

Yunez-Naude runs an econometric model using prices of white corn from Mexico City's *Central de Abasto* where most of domestic demand is met, and using prices of yellow corn from Louisiana export gate. He uses constant prices and his model includes sorghum and wheat because those two commodities would be substitutes for maize in consumption and production. The model also uses quantity of imports as the other variables in the model.<sup>77</sup> The results of the model show that with a 1% increase in the price of white corn, imports of white corn are substituted for imports of yellow corn by 11.17%; whereas with a 1% increase in the price of yellow corn, imports of yellow corn are substituted with imports of white corn by 9.25%. Yunez-Naude determines that there is empirical evidence to conclude that an increase in the price of imported white corn causes an increase in the quantity imported of yellow corn.

Because of the difficulty in finding concrete data with convincing numbers that demonstrate a change in the quantity demanded of yellow corn with an accompanying change in the price of white corn, it is not possible to conclude with much certainty whether or not yellow corn is a substitute for white corn. Even after examining Yunez-Naude's econometric model results, this uncertainty remains. In addition, the price of white corn is already higher than the price of yellow corn. If there were such substitutability, then it would be realistic to assume that tortilla industries would demand more yellow corn with the inflow of cheaper yellow corn imports. This has not been the case, yet this could be due to the government support of domestic farmers through PROCAMPO and *Alianza por el Campo* or quotas on imports. Moreover, the evidence demonstrates that the increased imports of yellow corn have been used for animal feed

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<sup>76</sup> Yunez-Naude, Martínez-Guzmán and Orrantia-Bustos, *Capítulo 2 Impactos En México De Las Importaciones De Maíz Provenientes De Los EUA*, 24-44

<sup>77</sup> *Ibid.*

rather than for direct human consumption. Furthermore, when negotiating NAFTA, the Mexican government never affirmed or contended that Mexican maize was a different commodity. They further insisted on a 15-year adjustment period for the crop. This demonstrates, as Yunez-Naude also concludes, that there is some substitutability between white and yellow corn. In addition, the official goals during NAFTA negotiations also included that domestic and international prices would converge. White and yellow corn were treated as substitutes during the negotiation of the agreement and during the implementation. After 2008, there will be complete free trade. If corn production in Mexico decreases and imports of yellow corn increase human consumption, demand will have to be met through those imports of yellow corn.

### **Conclusions derived from economic parameters examined**

From the economic parameters examined to determine welfare and distributional effects because of NAFTA in Mexico's corn sector, a few points are clear. Consumers are not benefiting. There are negative distributional effects because of this, given that the data concretely show that people with lower incomes spend more of their food budget on corn and corn related products, and the price of tortillas has steadily risen. This effect, as discussed, could be a consequence of poor regulation on domestic markets than the NAFTA agreement itself. On the other hand, judging from increased production experienced in Mexico during NAFTA implementation, and recognizing that the identification of net buyers and net sellers of the crop is not definitive, the distributional and welfare effects of the agreement are not conclusive with regard to net sellers. Nevertheless, circumstantial evidence shows that there could be many reasons for increased production. Subsistence farmers who are net sellers of the crop could be continuing production due to outside sources of income that include migrant remittances, or because tortillas are more expensive; therefore, they benefit more from cultivating the crop

themselves and making their tortillas at home. Subsistence farmers could also be increasing production because they need to increase their income; as the price of corn decreases, planting less corn would yield less income, while increasing production would grant them more needed income, using other sources of income to offset non-profitable production. Conversely, as shown by several studies, large producers who are also net sellers obtain income from government programs such as *Alianza Por el Campo* that helps them maintain production and even increase it despite the lower price of the crop.<sup>78</sup> Circumstances and data show that there have been negative distributional effects during NAFTA implementation. In order to better conclude if the agreement itself was the cause of a negative fluctuation in prices that caused adverse welfare and distributional effects, an analysis using CONASUPO dismantling will be examined in the next section.

### ***CONASUPO as a base case. What if there had been no NAFTA Agreement?***

Examining the circumstances by assuming that only CONASUPO reforms took place without a trade agreement represents a counterfactual that has not been previously presented in the researched literature.<sup>79</sup> Therefore, this thesis will present this counterfactual as a base case to determine the true effect of NAFTA on adverse distributional effects in Mexico's maize sector. Because most researchers investigating the effects of corn inclusion into NAFTA consistently affirm that examining NAFTA's effects on Mexican agriculture cannot be complete without examining other domestic macroeconomic and structural reforms, this study will examine price and production changes using, arguably, the most important structural reform to Mexico's agriculture, the dismantling of CONASUPO. In other words, this thesis will examine what

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<sup>78</sup> See Yunez, Nadal.

<sup>79</sup> The exception to this is a study performed by Antonio Yunez-Naude that will be used in this section to analyze the effects that the elimination of CONASUPO had on prices.

would have happened to welfare had there been no agreement, no tortilla subsidy, no price supports or guaranteed prices for corn. With this base case, the true effects of the agreement itself will be easier to determine.

The dismantling of CONASUPO began many years before the negotiation of NAFTA. Therefore, it would have taken even place without the agreement. In addition, with the debt crisis of 1982, Mexico obtained a loan from the World Bank for agriculture. The terms of that loan involved the restructuring of CONASUPO in order to end the monopoly that the enterprise had on imports.<sup>80</sup> To begin the analysis, this thesis will provide a summary of the control that CONASUPO had over the distribution, marketing and production of corn in Mexico. Secondly, in order to analyze the effect of the elimination of CONASUPO, qualitative and quantitative analyses will be given. The qualitative analysis will involve examining who were the beneficiaries of the guaranteed prices and the tortilla subsidy, to determine how their welfare was affected by the dismantling and to determine any adverse distributional effects. Lastly, this study will examine the effect that the dismantling of the state enterprise alone could have had on prices and production had there been no free trade agreement.

As described in the marketing chain section of this thesis, CONASUPO played a large role in the distribution and production of maize. It also determined prices paid to the producers and subsidized consumer prices of tortillas. Due to the commitments in the GATT as well as due to the heavy fiscal burden that the enterprise placed on the government, through intense debate the government decided to begin phasing out the company. Because the government was already going through a process of restructuring and managing heavy fiscal deficits, it is plausible to assume that the elimination of CONASUPO could have taken place without NAFTA. Moreover, there was disagreement about whether or not CONASUPO truly benefited the poorest in Mexico.

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<sup>80</sup> Lasala Blanco, *Las Negociaciones Del Maíz En El Tratado De Libre Comercio De América Del Norte*

In the early-to mid-eighties, Nora Lustig asserted that low-income peasants, who tend not to buy tortillas, but instead make them at home, do not benefit from the subsidy.<sup>81</sup> Furthermore, corruption allegations surrounded the state-run enterprise, especially while former President Carlos Salinas' brother, Raul Salinas, was the head of CONASUPO. According to the New York Times, CONASUPO illegally benefited Maseca, part of GIMSA, one of the current largest industrial processors of tortillas.<sup>82</sup> It is clear that a corrupt enterprise that did not benefit those who most needed it, created negative distributional and welfare effects. Therefore, eliminating such a state-run enterprise represented a sound policy. Nevertheless, perhaps the restructuring also caused negative welfare effects because instead of eliminating only schemes that benefited large industries and curtailing corruption, it also eliminated subsidies that did benefit the poor. The tortilla subsidy may not have benefited low-income rural peasants as much as it benefited the urban poor.

### **Brief history and the dismantling of CONASUPO**

CONASUPO was created in the 1960's and was part of a development scheme that was thought to benefit the poor. This development scheme involved large government intervention that imposed price controls. Starting in 1982, the government began its process of restructuring resulting from the shock of the debt crisis. CONASUPO was dismantled in stages. While, in the mid eighties, price interventions included twelve basic crops, in the mid nineties price interventions remained for only three basic crops: corn, beans and milk powder. Finally, in 1999 price controls and interventions for maize were removed.

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<sup>81</sup> Nora Lustig, "Fiscal Cost and Welfare Effects of the Maize Subsidy in Mexico" In *Food Subsidies in Developing Countries*, ed. Per Andersen-Pinstrup (Baltimore: IFPRI Johns Hopkins University Press, 1988), 277-288.

<sup>82</sup> Anthony DePalma, "Graft Inquiry in Mexico Ties Zedillo to Disputed Payment," *The New York Times*, sec. World, July 5, 1996, 1996, [http://query.nytimes.com/gst/fullpage.html?res=9B02E0DB1039F936A35754C0A960958260&sec=&spon=&page\\_wanted](http://query.nytimes.com/gst/fullpage.html?res=9B02E0DB1039F936A35754C0A960958260&sec=&spon=&page_wanted) (accessed March 8, 2008).

CONASUPO's goals were to eliminate dishonest and rent-seeking intermediaries in the distribution of maize, and protect low-income consumers. In other words, CONASUPO subsidized both consumers and producers of maize. In addition, to subsidizing consumers and producers, CONASUPO also subsidized the maize industries that elaborate the corn dough (nixtamal) and the corn millers (who produced corn flour) to make tortillas.<sup>83</sup> CONASUPO subsidized the industries by selling them maize at subsidized prices through which they would be able to make a profit from tortilla sales, and at the same time, subsidized those tortilla prices for consumers by selling the finished product at cheaper prices (Table 4).

**Table 4 Subsidies to maize and tortillas**

Subsidies to maize and tortillas in 1984 dollar/peso exchange			
Thousands of dollars			
Year	Subsidies to maize	Program maize-tortilla	Total
1979	154	N/A	N/A
1980	208	N/A	N/A
1981	285	N/A	N/A
1982	339	N/A	N/A
1983	451	N/A	N/A
1984	411	4	415
1985	312	13	325
1986	108	12	120
1987	87	51	138
1988	164	55	219
1989	289	55	344

Source: Kirsten Appendini (2000)

CONASUPO subsidized producers with an “indifference price.” This price would be agreed upon at the beginning of the production season. CONASUPO would pay the farmers the difference between the international price and the agreed-upon price. The company processed, stored and distributed the crop and regulated maize trade through direct intervention in imports

<sup>83</sup> Nixtamalización comes from the Aztec word meaning baked in wood ashes: it is the traditional process of making tortillas. This process involves corn dough that is first soaked and then cooked in water with lime. On the other hand, the more modern process of making tortillas is with corn flour, using the wet corn dough that has been cooked in water and lime and then converting it into flour. This corn flour is easier to store for prolonged periods and is more amenable to economies of scale in tortilla production. (Zahniser, Steven 2004;12)

and exports. Several different ministries institutionalized through the Agricultural Council determined the guaranteed prices for producers that CONASUPO implemented.<sup>84</sup> This very complicated process created a large government bureaucracy that required large fiscal outlays.

On the consumer side, CONASUPO was also dismantled in stages. The subsidy on tortillas went from a general subsidy to a directed subsidy. This directed and selected subsidy would benefit low-income workers and urban dwellers who resided in marginal areas. CONASUPO distributed coupons to buy tortillas. Currently, while this scheme has also been eliminated, with the elimination of CONASUPO, there are specialized stores that continue to sell tortillas at subsidized prices to low-income workers.

### **Qualitative analysis of the beneficiaries from CONASUPO's policies**

CONASUPO subsidized maize consumers, producers and industries in Mexico. It also controlled imports and exports of the crop. In this section, a description of benefits to each of the groups will be provided. In the analysis, an assessment of the net beneficiaries and the welfare and distributional implications will also be explored.

#### **Producers**

Because maize is an important source of income for the poor as well as an important consumer good for the poor, determining a policy that increases welfare can be complicated.<sup>85</sup> Producers benefited from CONASUPO's policies through a guaranteed price for the crop. Some contend that CONASUPO kept the price higher than it should be and well above international prices. Moreover, Lustig recommends targeting the price policy to increase production and productivity, in that way reducing dependency on imports.

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<sup>84</sup> Yunez-Naude, *The Dismantling of CONASUPO, a Mexican State Trader in Agriculture*, 97-122

<sup>85</sup> *Ibid.*

According to Kirsten Appendini, the small producers who had generally sold a small amount of their excess production on the market were the net beneficiaries of the CONASUPO subsidy. Therefore, these producers were the net losers in the dismantling of CONASUPO. The majority of such producers are located in areas around Mexico City and Chiapas. Currently, these producers affirm that they can no longer afford to continue harvesting the crop; they are mostly women who have husbands working either in urban areas or in the United States, and having determined that harvesting corn is no longer affordable; they prefer to work cleaning houses in Mexico City.<sup>86</sup> CONASUPO had a larger beneficial effect in the case of large producers. For instance, Sinaloa, a state that was never known to be a large and important producer of corn, became one of the largest suppliers of the crop for CONASUPO shortly before its elimination. In 1990, the state produced 236,000 tons, while in 1999 it was producing 2.1 million.<sup>87</sup> These figures show that CONASUPO's policies were benefitting large producers to the extent that they produced more corn and became more competitive in the market. This possibly prepared these larger producers better to compete with their counterparts in the United States. Perhaps a goal of the Mexican government from the start; to do away with small subsistence farmers who produce on very small plots of land and who do not have the technology that large-scale producers possess. The latter produce on larger plots of land, and with advanced technology, they are able to compete with their U.S. counterparts.

Due to the elimination of CONASUPO, and to curtail the effects of trade liberalization, two farmer support programs were created: PROCAMPO and *Alianza Por el Campo*. These were created to make the production of corn profitable and make it competitive by giving direct

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<sup>86</sup> Appendini, *De La Milpa a Los Tortibonos La Restructuración De La Política Alimentaria En México*

<sup>87</sup> *Supra*.

support to producers and at the same time making corn affordable to the consumer.<sup>88</sup> According to Yunez-Naude, there is no evidence to conclude that the elimination of CONASUPO had any negative effects on government support of farmers. This is because the two-farmer support programs created in 1994 essentially replaced CONASUPO support.<sup>89</sup> Some contend, however, that those benefiting from government support during the CONASUPO years and now with PROCAMPO, are mainly large-scale producers. Those with small plots of land and subsistence farmers, for various reasons including lack of education about the current support programs, do not benefit from government support.

## Consumers

Consumers in recent years have been affected negatively by higher prices of tortillas. The removal of tortilla subsidies has caused a price hike in tortillas. The tortilla subsidy was removed in 1999; in 2000, the price for one kilo of tortillas was four pesos, and in 2006 7.50 pesos.<sup>90</sup> Starting at that time the price began to increase steadily until the government made an agreement with tortilla processors to keep the price below 8.50 pesos per kilogram. It can be argued that with the previous CONASUPO scheme this would not have happened because tortilla prices were subsidized, and could not go above a certain price. Moreover, those who were not beneficiaries of direct tortilla subsidies, enacted in the mid to late 90's, were affected more because in 2000 a minimum wage could buy 8.7 kilograms of tortillas, while in 1990, a minimum wage could buy 14.4 kilograms.<sup>91</sup> In 2006, tortilla price hikes began a steady upward trend (Figure 13); with CONASUPO in place; this event could plausibly have been prevented.

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<sup>88</sup> García, Salazar José Alberto, "Efecto De Procampo Sobre La Producción y Saldo De Comercio Exterior De Maíz," *Agrociencia* 35, no. 6 (2001), 671-683.

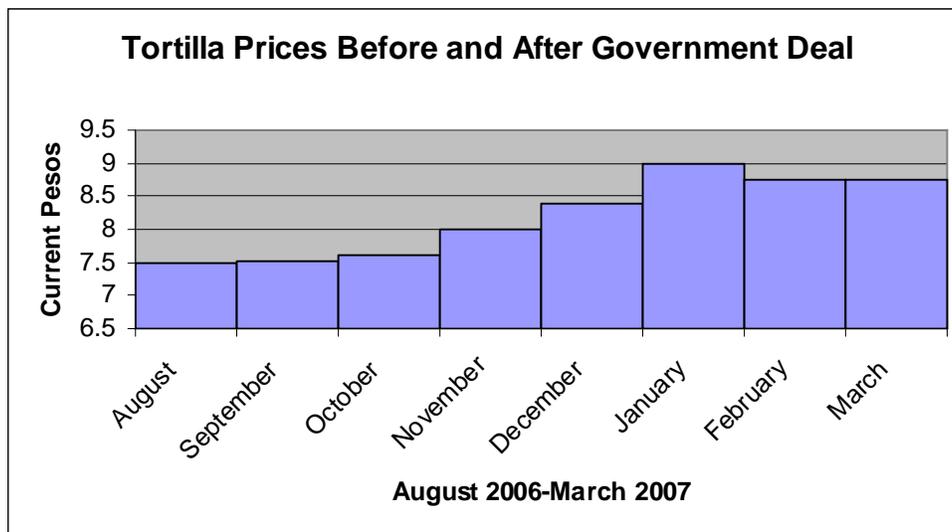
<sup>89</sup> Yunez-Naude, *The Dismantling of CONASUPO, a Mexican State Trader in Agriculture*, 97-122

<sup>90</sup> All prices are current prices.

<sup>91</sup> Appendini, *De La Milpa a Los Tortibonos La Restructuración De La Política Alimentaria En México*

With tortilla prices approaching 9 pesos per kilo, the Mexican government made an agreement with tortilla processors and industries to keep the price below 8.75 pesos per kilogram. Industries and processors have complied with the agreement and have kept the price below 9 pesos.

**Figure 13 Tortilla Prices Before and After Government Agreement of 2007**



Source: Banxico, Agreement between government and industries: January 2007

Lustig affirms that the beneficiaries of the subsidy on tortillas were mainly the urban people who bought their tortillas at the local *tortillería*.<sup>92</sup> That is because the consumption of processed maize increases with the degree of urbanization.<sup>93</sup> Those that consumed maize in its non-processed state, who would not benefit from the subsidy on tortillas, live mainly in rural areas. Indeed, some low-income peasants who processed their own tortillas did not benefit at all from the tortilla subsidy. Lustig recommended that in order for the subsidy to have been more equitable, instead of subsidizing tortillas, CONASUPO should have subsidized corn dough making it cheaper to make tortillas at home. In this way, those poor consumers who do not have *tortillerías* close by or have very marginal incomes can benefit from the subsidy more, thus

<sup>92</sup> A *tortillería* is a local or corner store and distributor of tortillas. They are generally run by small business owners.

<sup>93</sup> Lustig, *Fiscal Cost and Welfare Effects of the Maize Subsidy in Mexico*, 277-288

making it more equitable. This would be more equitable but ending tortilla subsidies, as seen by the huge hike in tortilla prices also has adverse distributional implications.

CONASUPO never subsidized corn dough in a way that made it cheaper to prepare tortillas at home, but instead created a system of direct subsidies designed to provide cheap tortillas to those who needed it the most. This system consisted in the distribution of coupons to be used to buy tortillas. These coupons were later termed *tortibonos*. Those who benefited were families who earned less than two minimum wages.<sup>94</sup> In 1990, 1.3 million families benefited from this subsidy, yet this only represented 35% of the poor population, those who earned less than two minimum wages. The reason for this is unknown, but it could be due to the families' lack of access to the *tortibonos*, perhaps because of lack of education about the program, a shortcoming also of the direct support to farmers provided by the government (PROCAMPO). This system of direct subsidies also created discrepancies in prices in different areas across Mexico. For instance, in 1986 tortillas purchased outside of Mexico City cost 15% more than in the Mexico City area.<sup>95</sup> However, the *tortibono*, discounted the regular price of tortillas by 35%. Without these price supports for poor rural and urban consumers, they are unable to obtain discounts on tortillas at such rates, thus are affected negatively by the removal of CONASUPO and its price supports.

#### Industrialists and Processors of maize

Industrialists and processors benefited from CONASUPO because the enterprise sold maize to these processors (sometimes called “nixtamaleros”<sup>96</sup>) for a wholesale price at which

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<sup>94</sup> Appendini, *De La Milpa a Los Tortibonos La Restructuración De La Política Alimentaria En México*

<sup>95</sup> *Ibid.*

<sup>96</sup> Nixtamaleros are those that process nixtamal to make tortillas.

they were able to make a profit after selling tortillas retail at subsidized prices.<sup>97</sup> The most inequitable aspect of CONASUPO's interventions relates to support for maize industries. These industries in a sense controlled the market even when CONASUPO intervened. This is because even at that time there were very few producers of corn dough that sold directly to *tortillerías*. Most were sold to stores owned by CONASUPO, GRUMA or MINSA. In the early 1990's Maseca, part of GRUMA, provided 70% of the nation's corn dough, while MINSA controlled 28% of the market. Currently these two companies control 80-90% of the market.

### **Quantitative analysis of the effects of CONASUPO on maize prices**

In order to examine the effects of CONASUPO's intervention on prices and determine the effect that it alone could have had on price fluctuations, this study will once again use an econometric study performed by Antonio Yunez-Naude. Because CONASUPO's price guarantees kept the price of maize offered to producers high, this made their price higher than the international price of corn. Taking this into consideration, the reason why Mexican white corn is 25% higher lies between two possibilities. Is it because of CONASUPO's intervention or because white maize is simply a different commodity that costs more to produce? In either case, Yunez-Naude's study aims to explain what effect CONASUPO's price interventions have had on the convergence between domestic prices of maize and international prices of maize. This determines fluctuations in relative prices. According to Yunez-Naude, this convergence determines the degree of protection created by the government's price interventions.<sup>98</sup> The econometric model used by Yunez-Naude responds to the following questions: Have the CONASUPO reforms tied domestic markets to international markets? Have there been

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<sup>97</sup> Yunez-Naude, *The Dismantling of CONASUPO, a Mexican State Trader in Agriculture*, 97-122

<sup>98</sup> Yunez-Naude and Barceinas, *Efectos De La Desaparición De La Conasupo En El Comercio y Los Precios De Los Cultivos Básicos*

significant changes in prices of corn, and have domestic prices converged with international prices? Yunez's analysis is divided into two periods, one from 1970-1991, when there was heavy government intervention. The second period was from 1991-1996, when the process of trade liberalization began.<sup>99</sup> The model could not conclude without ambiguity if the difference between domestic prices and international prices decreased. Nevertheless, the model was able to conclude that there have been changes in the relative prices of maize during the two periods studied. The model also shows that there is some evidence that the process of fixing prices responded to both domestic and international prices. Moreover, domestic and international prices were not diverging. The fact that they were not diverging does not tell us with certainty that they were instead converging, however. The model responds to the questions posed by concluding that there was already some convergence between international markets and domestic markets during the period of price interventions, and that domestic prices of maize were already converging with international prices of the crop before the NAFTA agreement. Therefore, with or without NAFTA, prices of maize were on a downward trend. Nevertheless, without the agreement the trend was slower, the agreement may have hastened the process.

## **Conclusions**

In conclusion, the dismantling of CONASUPO caused a drop in prices for producers, and a hike in prices for consumers. With the deregulation and elimination of the tortilla subsidy, the imperfect market structure of this industry has more power to determine prices as they see fit. Therefore, without the trade agreement, the adverse distributional effects described in this research would most likely, take place, nonetheless. Market forces determining imports and prices as they do with the elimination of CONASUPO, affect consumers more than they do large

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<sup>99</sup>*Supra*

producers because price drops in the crop do not translate to price drops in the consumer market. Small-scale and subsistence producers on the other hand, benefitted from CONASUPO policies, therefore the dismantling of CONASUPO had an adverse effect on consumers and small-scale producers. The dismantling of CONASUPO entailed that the State Trading Enterprise would no longer determine prices, but instead international prices would. This effect would have a similar effect to complete trade liberalization through NAFTA.

### ***Conclusions for the determination of the true effect of NAFTA***

After examining the factors involved in determining welfare and distributional effects of including corn in NAFTA, there is more evidence to conclude that there were negative welfare and distributional effects than the opposite. Firstly, those in the lower deciles of the population tend to buy more maize. Secondly, as the price of corn for producers decreased, those affected were mostly subsistence farmers who were net sellers of the crop. Thirdly, since yellow corn produced mainly in the U.S. is, to a certain extent, a substitute for Mexican white corn, Mexican producers of the crop are facing competition from cheaper imports. Finally, through the examination of CONASUPO as a base case, those who benefitted more from its schemes and later from direct government support were large scale farmers rather than people with lower incomes and smaller farms. The facts and data, however, show that it was not simply the NAFTA agreement itself that caused adverse welfare effects for the poor in Mexico. Instead, it was a combination of factors related to trade liberalization. As some critics contend, NAFTA was simply the institutionalization of policies already taking place in Mexico. As has been demonstrated by the quantitative analysis of price convergence in Yunez's econometric study, domestic prices were converging towards international prices before the agreement was signed.

From this analysis, using the dismantling of CONASUPO as a base case and the economic parameters that determined distributional effects due to NAFTA, the critics of the agreement seem to have more evidence on the side of adverse welfare and distributional effects. Nevertheless, the evidence also shows that NAFTA was simply an engine accelerating the policies and effects already taking place. NAFTA is not the only aspect of Mexico's agricultural and maize sector that harmed the poorest members of the population.

Defenders of NAFTA determined that trade liberalization policies created winners and losers. It was contended that the winners would outweigh those losers. Government programs that were more corrupt than beneficial for the poor were dismantled. However, reforms undertaken to assist the losers did not materialize in such a way as to benefit consumers or small-scale producers who had benefitted from CONASUPO policies.

The winners are mainly livestock producers who have benefitted from cheaper imported corn feed. Another set of winners were the large maize producers. As explained earlier, while Sinaloa, a seat of agribusiness in Mexico, had not been an important maize producing state, after NAFTA and the policies accompanying the agreement, it became the largest and one of the most important maize producing states. Moreover, advocates of the agreement point to an increase in the budget for agriculture. This increase again, has benefited larger producers more than it has smaller producers who need more support. This clearly demonstrates adverse distributional effects, not due to NAFTA alone, but due to poor government policies. Subsistence producers do not have access to PROCAMPO because it is paid to farmers on a hectare basis. Even with the changes to the program introduced in the early 2000's subsistence farmers continue to have little access to its benefits because of lack of information about the program.<sup>100</sup> Thus, the increase of government supports confirms the claim that it is not due to U.S. subsidies alone that

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<sup>100</sup> Rosenzweig, *Changes in Mexican Agricultural Policies, 2001-2003*

Mexico's corn sector has been unable to compete. This is because Mexico also heavily subsidizes its farmers. As with U.S. subsidies, Mexican subsidies also support large producers. Therefore, small Mexican maize farmers are doubly affected: on the one hand, U.S. crop subsidies make these small-scale farmers less competitive by keeping the international price of corn artificially high; on the other hand, subsidies provided by the Mexican government support small-scale producers less than large-scale producers.

Those advocates of NAFTA who contend that increased imports have benefitted the livestock producers are correct. Numerical figures demonstrate that the consumer price of meat, pork and chicken has dropped relative to consumer prices of corn (Figure 9). Nevertheless, the claims that yellow and white corn are not substitutable are inaccurate. This is demonstrated by the econometric studies performed by Yunez-Naude as well as by the assertion of various producers and scholars that even though consumers prefer white corn for tortillas, cheaper yellow corn is, to an extent, substituted for white corn in the process of making corn dough.

Critics of the agreement on the other hand, have substantial evidence that determine adverse distributional and welfare effects. These effects, as mentioned before, do not relate solely to NAFTA. Nevertheless, the outcome indicates that the agreement's goals were not met, and that pre-negotiation assumptions were wrong.

The increased production of corn proved wrong the assumption that corn producers would reallocate resources to horticultural crops. Small-scale and subsistence farmers began producing more corn to compensate for income losses. Large-scale producers benefited from government support and increased production. These results not only demonstrate that small-scale producers are incapable of, or unwilling to, reallocate resources, but also that they are not simply driven by price drops when making production decisions.

In conclusion, adverse distributional and welfare effects found in this research, and in the work of others, prove that, a combination of factors that caused these adverse effects, rather than just NAFTA. The North American Free Trade Agreement was a component, and not the sole culprit of adverse distributional effects in Mexico's corn sector.

## **Chapter V. Questions raised by the research that could present a problem for the government and a need for policy changes.**

At the outset of 2008, when all NAFTA implementations began and the last products, including corn and beans, were liberalized, several farmer and civil society organizations began protests that blocked traffic in various places, including border towns. These organizations wanted the renegotiation of the North American Free Trade agreement excluding corn from its agricultural chapter. Civil society and farmer organizations were not the only groups demanding renegotiation. The opposition parties including the Partido de la Revolución Democrática (PRD) and the Partido Revolucionario Institucional (PRI) indicated that without a renegotiation, the government would be ignoring the needs of the thousands of corn producers in the country.<sup>101</sup> It is clear that those affected by the structural reforms that advocate trade liberalization tend to blame NAFTA for most of their woes and see renegotiation as a solution to their plight.

### ***Is renegotiation the solution?***

As presented through this research, adverse distributional and welfare effects resulted after the start of the NAFTA agreement, yet none of these effects was caused solely by the agreement. Therefore, a renegotiation of NAFTA is not the solution; such a strategy would take time, and would not curtail the adverse effects detailed above. As described by the Mexican

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<sup>101</sup> "Se Debe Renegociar Capítulo Agropecuario Del TLCAN," *El Financiero*, sec. Política, January 2, 2008, 2008, <http://www.elfinanciero.com.mx>.

Ambassador to the U.S., Arturo Sarukhán, renegotiation is diplomatically and politically a very difficult issue.<sup>102</sup> This is because all countries sitting at a renegotiation table would bring their own concerns and as a result, a brand new agreement might have to be negotiated. This could possibly take years to accomplish, during which time the effects of the current agreement would continue to affect Mexico. In the long run, a renegotiation might be economically more beneficial, but too challenging diplomatically to have any short-term significant effects. Moreover, as demonstrated in the foregoing, NAFTA is not the sole culprit in producing adverse distributional effects. Other solutions that involve strengthening the current institutions and regulating the market could ostensibly provide more of a short and long-term solution.

The Mexican government must develop policies that compensate the small-scale and subsistence producers as well as create structural reforms that regulate the oligopolistic tortilla market. In negotiating NAFTA, Mexico intended to do away with small-scale producers as a means to develop its agricultural sector into one that would be more competitive in the international market: a wholesale shift from small-scale producers to agribusiness. It is important, however, to consider the effects of the disappearance of small-scale and subsistence producers not only upon economics and politics, but also upon culture. Firstly, the assumption that these producers can be absorbed by the Mexican economy is misguided; increased migration was a problem before NAFTA, increased during the NAFTA years, and could continue to be a problem if no support is given to individual farmers. Secondly, small-scale and subsistence producers are those who produce corn in the many different varieties that are endogenous to Mexico. Their loss would cause the disappearance of many different and unique varieties of corn. Culturally this would be analogous to losing fundamental historical artifacts; biologically

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<sup>102</sup> Karina Aviles, "Renegociar TLCAN Abriría "Caja De Pandora": Sarukhán," *La Jornada*, sec. Portada, January 8, 2008, 2008, <http://www.jornada.unam.mx>.

it is a dangerous reduction in the diversity of an important species. The renegotiation of NAFTA to exclude corn from the agreement would not ensure that these producers remain producing their unique varieties of corn. Perhaps they would not have to compete with cheap imports, yet other government supports could also ensure their survival. Unfortunately, this would require fiscal expenditures that the government might be unable or unwilling to meet.

The Mexican government's official position is opposed to renegotiation. As previously described, the government believes that overall, Mexico has benefited from NAFTA. Currently, in relation to agriculture Mexico's current President, Felipe Calderon, has approved an increase in the budget for agriculture. How these funds will be used remains to be seen.

PROCAMPO should continue because it replaced the support given by CONASUPO and it has generally benefited corn farmers positively. Without PROCAMPO, corn production in Mexico would drop by 2.86 million tons.<sup>103</sup> However, in order to benefit small-scale and subsistence producers, PROCAMPO needs to establish a program that informs these producers in order for them to reap more benefits from this government support program.

Other policy implementations that could benefit Mexico's corn sector as Mexico continues to be part of NAFTA, would be schemes that encourage the use of Mexican white corn for tortilla production and imports of yellow corn solely for animal feed. This could be done through subsidies to make white corn affordable and make it profitable for industries to produce tortillas. On the other hand, instead of subsidies that would require larger fiscal outlays that the government may not be able to afford, a requirement could be imposed on industries under which they would be required to use a certain amount of white corn in the production of tortillas.

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<sup>103</sup> Garcia, Salazar José Alberto, *Efecto De Procampo Sobre La Producción y Saldo De Comercio Exterior De Maíz*, 671-683

Moreover, an education campaign could promote and encourage white maize grown in Mexico as the ideal for the production of tortillas because of its higher nutritional content.

The Mexican maize sector is highly heterogeneous and the events of these past fifteen years of NAFTA implementation, demonstrate, as detailed above, that the losers from the agreement have largely been consumers of tortillas and small-scale producers. Moreover, despite the fact that NAFTA was just another reason why poverty and inequality increased in Mexico's maize sector, many economists including Paul Krugman and Dani Rodrik contend that free trade does not always entail overall beneficial effects for the country as a whole. Krugman used an equilibrium model to conclude that trade accounted for a 10% increase in inequality.<sup>104</sup> In addition, Dean Baker affirms that the winners of trade agreements tend to be owners of capital and highly educated workers.<sup>105</sup> These arguments would support the critics of NAFTA and would also support a renegotiation because of its contribution to adverse distributional effects. If this were the case, it would be in Mexico's best interest to renegotiate the agreement.

The government currently in power does not intend to renegotiate and most likely will not do so despite insistence from farmer groups and opposition parties. If the opposition PRD government were in power, it would ostensibly attempt to negotiate as it promised in its presidential campaign. Lopez Obrador, the PRD presidential candidate in 2006, is a strong advocate of renegotiation and currently holds public campaigns to encourage renegotiation. If the government intended to renegotiate, what could they renegotiate, and how feasible would it be?

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<sup>104</sup> Dean Baker, "Trade and Inequality: The Role of Economists," *Real-World Economics Review*, no. 45 (March 15, 2008, 2008), 23-32, <http://www.paecon.net/PAPERreview/issue45/Baker45.pdf>.25

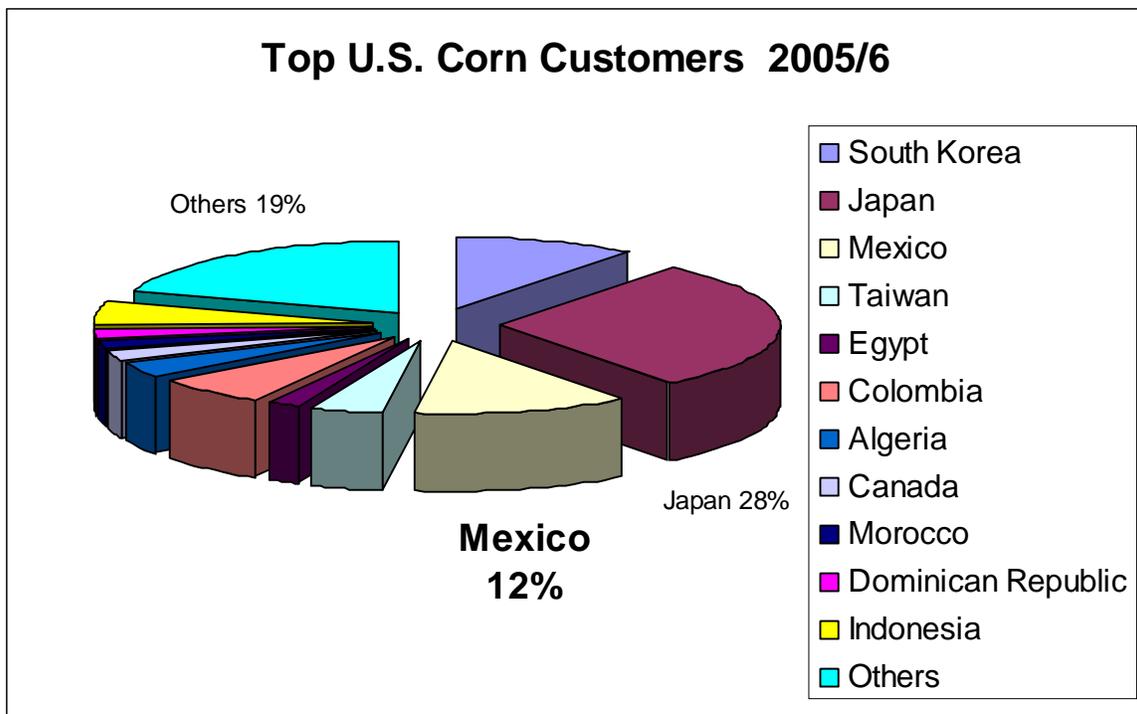
<sup>105</sup> *Ibid*

### *Aspects and feasibility of renegotiation*

The advocates of renegotiation contend that this would entail removing corn from the trade agreement because it is the staple food of Mexico and affects a large number of producers. In addition, Mexico has increased its dependency on the United States for the supply of its staple food resulting in decreased food-self-sufficiency. Moreover, the displacement of corn producers could be causing increased migration to the United States. Because the current U.S. Democratic presidential candidates are advocating renegotiation, Mexico could possibly have a bargaining chip with a U.S. Democratic victory late in 2008. Nevertheless, with the increase in corn imports, it would not be in the United States' best interests to remove corn from the NAFTA agreement. The U.S. is the world's top exporter of corn; in addition, Mexico receives 12% of total corn exports, after Japan, it is the United States' largest corn customer (Figure 14). Mexico would have to give certain concessions in order to obtain the removal of corn from NAFTA. To a certain extent Mexico's argument in such a renegotiation could be that the agreement was asymmetrical to begin with. This is because, as Puyana affirms, Mexico as a developing country did not obtain preferential treatment in contrast with Spain and Greece in the European Union. Moreover, when the original negotiation took place, the goals of the Mexican government were simply to finalize the agreement. Because of this, several scholars contend that Mexico added corn into NAFTA in order to obtain benefits in other areas as well as to seal its approval. In general, signing this agreement was not as important to the U.S. as it was to Mexico. Finalizing NAFTA was part of the development strategy devised by the government of Carlos Salinas. For the current or future Mexican governments to be able to renegotiate NAFTA, their goals and priorities would have to change drastically. Instead of using trade as a development strategy, food self-sufficiency protection of corn production would have to be priorities, as opposed to any

benefits obtained through manufacturing, horticultural exports, and foreign direct investment acquired through NAFTA. Such a shift in priorities would likely make it unfeasible to remove corn from NAFTA. A renegotiation of the agreement would ostensibly entail scrapping the original agreement altogether. In other words, this can only be done if the Mexican government's priorities for development change from encouraging foreign direct investment and export-led growth towards protectionist measures for corn farmers.

**Figure 14 Top U.S. Corn Customers 2005/6**



Source: U.S. Grains Council 2008

Since the United State's major real goal in signing the agreement was to ensure a more stable and economically strong southern neighbor, it can be argued that the increase in inequality and migration experienced by Mexico does not meet the strategic objectives of the United

States.<sup>106</sup> Therefore, a renegotiation to enhance Mexico's ability to grow economically would perhaps be more beneficial for all.

A possible scheme would resemble that of the European Union, in which the European Investment Bank provides funds to bolster poorer regions and the promotion of "economic and social cohesion."<sup>107</sup> Such a renegotiation would require specific strategies by both governments and would, only be pursued with a Mexican government led by the PRD and a U.S. government led by the Democrats. Each of these governments would most likely have different goals and priorities that would be difficult to align. In addition, perhaps both promises of renegotiation voiced by Presidential candidates in both countries are only political campaign messages that in reality would not be pursued.

In summary, a renegotiation currently is not only unlikely but also time-consuming and a strategy that would not fully solve the adverse distributional effects currently experienced in Mexico's maize sector. More feasible policy recommendations include encouraging the use of only white corn for tortillas, regulation of the oligopolistic tortilla market that distorts prices and harms consumers, and more equitable programs of government support for corn farmers.

## **Chapter VI. Conclusion**

This research and analysis has demonstrated that the price drops in maize taking place during NAFTA implementation have affected those who are in the lowest deciles of the population, which in turn has created adverse distributional and welfare effects. Moreover, these

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<sup>106</sup> In the U.S. Report of the Administration on The North American Free Trade Agreement, President George H.W. Bush declared the following: "NAFTA will help Mexico grow, which is beneficial to us because it will make Mexico a better trading partner and a more stable neighbor. This will have a positive effect on migration because migratory pressures will be reduced as a consequence of Mexico's growth." Lasala Blanco, *Las Negociaciones Del Maíz En El Tratado De Libre Comercio De América Del Norte; Four Decades of Failure: The U.S. Embargo Against Cuba*, Cuba and the United States in the 21st Century see [www.free-trade.org/node/433](http://www.free-trade.org/node/433).

<sup>107</sup> "Treaty on European Union," [http://europa.eu/eur-lex/en/treaties/dat/EU\\_treaty.html#0093000017](http://europa.eu/eur-lex/en/treaties/dat/EU_treaty.html#0093000017) (accessed March 17, 2008, 2008).

price drops affected producers in an unusual manner. Instead of lowering production, poorer producers increased their production of corn to compensate for losses in income, while large producers increased their production because of government support. In addition, adverse distributional effects took place on the consumer side. The oligopolistic nature of the tortilla market as well as the elimination of tortilla subsidies caused a price hike in tortillas. Those who were most affected by these price hikes were the people in the lowest deciles of the population because they consume more tortillas. Not all of these effects were a direct consequence of NAFTA, as there were several other contributory factors. As can be shown by using the base case of CONASUPO, without a trade agreement, such as NAFTA price increases for consumers would have occurred anyway. The conversion of domestic and international prices was taking place with CONASUPO. NAFTA simply accelerated and intensified those effects. Moreover, livestock producers would not have benefited from cheaper imports of corn for animal feed without an increase in these imports. The qualitative analysis of the impacts of the removal of CONASUPO discussed the implications that its elimination had on the lowest deciles of the population. From this examination, it can be concluded that those who were most affected by the elimination of tortilla subsidies were the poor urban consumers of tortillas and subsistence producers who are net sellers of the crop.

The inclusion of corn into NAFTA, as controversial as it was, did in fact accelerate adverse distributional effects. However, NAFTA was not the sole cause of these adverse effects. The largest misconception on the part of the Mexican government involved using NAFTA as a development strategy. Several scholars have concluded that trade as a development strategy can create more inequality than benefits for the economy as a whole. Moreover, Mexico as a developing country, was not given preferential treatment.

Several steps need to be taken in order for these effects to be reversed. A continuation of the farmer support programs provided by the government and the enhancement of these programs so that they reach more small-scale and subsistence producers. The regulation of the tortilla market is necessary in order to curtail any negative effects on consumers. This could be done through the creation of more competition to the two biggest processors of maize. As a policy recommendation, given the implications of the current situation, renegotiation would not bring immediate benefits to the corn industry in Mexico.

### ***Summary of contributions and limits of the research***

This thesis uses CONASUPO as a base case to determine if NAFTA alone would have had adverse distributional effects in the maize sector in Mexico. The examination of this base case demonstrated that such effects would have occurred without the trade agreement. Nevertheless, as stated above, the trade agreement also hastened and enhanced those effects. In a sense, it is what many other researchers have already acknowledged. The critics of the agreement and of the inclusion of corn into NAFTA have demonstrated that macroeconomic policies followed by Mexico cannot be ignored when assessing the effects of NAFTA.

Most figures and econometric studies used in this thesis on the impacts of NAFTA on agriculture and corn depended upon the collaboration of the same researchers, specifically Yunez-Naude. This limits verifiability of the data. However, these data seemed to be unbiased and reliable because they have been used in many different contexts and for the purpose of diverse organizations; including governmental policy recommendations, international organization documents, and academic journals.

The data involved in determining net buyers and net sellers were also limited. Because of the heterogeneity of Mexican maize farmers, determining who were net buyers and net sellers

proved to be challenging. Therefore, the welfare effects comparing these two groups did not provide sound conclusions.

### ***Future Research***

This analysis provided a limited examination of the cross-price elasticities of white and yellow corn. As there is currently only one study available that examines the cross price elasticities of white and yellow corn; a more thorough examination of this elasticity is needed to better determine the possibility that yellow corn produced mainly in the U.S. competes fully with Mexican white corn. As concluded in this thesis, there is some substitutability between white and yellow corn. With a complete analysis of these elasticities and perhaps a greater variety of studies done by several different researchers, it could be concluded more readily whether or not Mexican maize farmers will be affected by increased competition from imports.

Over the years of NAFTA implementation, the international price of maize dropped, however, it began an upward trend starting in 2006. This could be due to the increase demand for ethanol. Because of this trend, Mexican farmers may see an increase in the price of the crop. This increase in off-farm prices could have the opposite effects described in this thesis and seen throughout the NAFTA period. In terms of consumer prices, this increase in the international price of corn could in fact create further increments and even more disparities in the price of tortillas. If tortilla prices are high even though corn prices are low, with oligopolistic industries tending to control these prices, a sharp increase in the price of corn due to ethanol demand could have tremendous adverse consequences for consumers of tortillas. More research is needed to determine the true reasons for the increases in tortilla prices. It was beyond the scope of this thesis to explore this subject further; the preliminary conclusions drawn were that the oligopolistic nature of the market, as well as the elimination of tortilla subsidies, were two

reasons why tortilla prices increased despite lower corn prices. This aspect of the maize-tortilla marketing chain, however, needs to be further explored in order to determine any policy recommendations in the event of drastic increases in the international price of corn due to ethanol demand.

The examination of welfare effects on the maize sector in rural Mexico due to NAFTA is an extremely challenging endeavor. The Mexican government undertook many structural reforms of the rural and maize sectors starting with the limited re-distribution of land in 1992 and reformation of the *ejido* laws.<sup>108</sup> Other reforms included restructuring the entire agricultural economy including the elimination of its biggest State Trading Enterprise, CONASUPO. These considerations make it difficult to conclude that NAFTA alone could have caused adverse distributional effects.

This research concludes, however, that Mexico's poorest corn farmers have not benefited from trade liberalization or structural reforms. Not only have they been unable to reallocate resources to produce more profit-earning crops, but also the economy has failed to compensate for losses in wages and jobs. Nevertheless, NAFTA was simply one of several contributors to all of these effects, a contributor that may have developed and improved welfare in some Mexican agricultural sectors, such as horticulture or livestock production, but did not enhance or improve the lives of poor maize farmers and rural and urban consumers of tortillas, thus exacerbating already existing inequalities.

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<sup>108</sup> *Ejido* land is communally held land. The government allocates a certain plot of land to a community who works it, usually an extended family. It has its historic roots in the Spanish colonization of Mexico in which the land outside of the city was given to indigenous people and was termed 'ejido land'. In 1992, Article 27 of the Mexican Constitution was modified so that farmers could usufruct, rent or use the *ejido* land as collateral. Morett Sánchez, Jesús Carlos, *El Ocaso De La Reforma Agraria Mexicana*, 1st Edition ed. (Mexico: Universidad Autónoma de Chapingo, 2001).

## **Annex I. Mexican Government Support Programs mentioned in the analysis.**

### **PROCAMPO:**

Programa de Apoyos Directos al Campo (Program of Direct Transfers to Rural Communities). This Program was created in 1993 as a substitute to the price guarantees provided by CONASUPO, and to compensate producers while making them more competitive with their foreign competitors. The program provides support per hectare of land cultivated in eligible crops (maize is one of the eligible crops). The support is given to those producers who are accredited as owners or in possession of land through, either usufruct or rent. Producers voluntarily inscribe themselves on the directory of this support program. This suggests that producers must be well educated about the program in order to take advantage of it.

### **Criteria of eligibility for the program**

*Producer:* An individual or a business who is legally in possession of eligible land.

*Eligible land:* Piece of land that is being cultivated with an eligible crop during these agricultural cycles: Spring-Summer, Fall-Winter.

*Eligible crops:* maize, beans, wheat, rice, sorghum, soy, cotton, barley.

### **Requirements for access to the program**

- Apply to the program through the Agency for the Support of Rural Development CADER (Centro de Apoyo al Desarrollo Rural). The land in question has to be legally registered and prove this registration through the following documentation:
  - Official form of identification for the individual or the business.
  - Document that determines that the land has been registered in CADER's directory.
  - Document that determines the eligibility of the land.
  - If the producer is not the owner of the land, a contract proving usufruct or rent is required which authorizes the producer to use the land.
  - Individual number that determines if the individual has registered as a member of the population. CURP (Clave Única de registro de Población)- (Similar to a Social Security Number)

### **Monetary compensation**

- For rain-fed land under sections I and II a compensation of \$1,160 Mexican Pesos<sup>109</sup> will be provided for crops in both cycles of production in 2005 and 2006.

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<sup>109</sup> \$106.51, exchange rate average for the 2005-2006: 10.89 pesos per dollar; available from <http://www.oanda.com/convert/fxhistory> (Accessed on April 11, 2008).

- For the rest of land registered for each cycle of production in the aforementioned period, \$963 pesos (US\$88.43) per hectare will be provided.
- For all land registered for each cycle of production \$963 pesos per hectare will be provided.<sup>110</sup>

### **Alianza Por el Campo (Alliance for the Countryside)**

This is a group of programs whose objective is to increase productivity and competitiveness. Other objectives of the program include, improving country's trade balance, improve producers' salaries, keep food production and supply to double the amount of the quantity demanded. In this way, consolidate national food security.

The program is a federalized system, which means that each state is responsible for the application of the program.<sup>111</sup>

The program provides matching funds to supplement payments on irrigation systems, high yield crop varieties and mechanized equipment among others.<sup>112</sup>

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<sup>110</sup> "Secretaría De Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación," Mexican Government, <http://www.sagarpa.gob.mx/> (accessed March/19, 2008).

<sup>111</sup> *El Campo Mexicano En Los Albores Del Siglo XXI*, Public Law 4, *El Nuevo Milenio Mexicano* (2004): 184.

<sup>112</sup> Alejandro Nadal, *The Environmental and Social Impacts of Economic Liberalization on Corn Production in Mexico*, 2000).

## **Annex II. Budget Allocations Per Decile of the Population**

**Separate Documentation  
Contact author for access.**

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