Global Trade Analysis Project
https://www.gtap.agecon.purdue.edu/

This paper is from the
GTAP Annual Conference on Global Economic Analysis
https://www.gtap.agecon.purdue.edu/events/conferences/default.asp

A Coherent Agriculture Trade Policy for Mexico

Ralf Peters and David Vanzetti[1]

Draft, 30 April 2012

Abstract

Mexico's agricultural trade reform coincides with increasing imports, decreasing employment in agriculture and high poverty rates in rural areas. Imports have increased from all major trading partners and particularly from NAFTA members who supply more than 80 per cent of Mexico's agricultural imports. NAFTA has been accused of damaging farmers in Mexico and jeopardizing Mexico's food self-sufficiency. Although tariffs have been gradually reduced, many Mexican producers have expressed concern about the removal of tariff protection. In addition, although NAFTA specified the removal of bilateral tariffs on both sides of the border, there are no limitations in the agreement concerning the use of domestic support.

The purpose of this study is to assess alternative policy options. A global general equilibrium model, GTAP, is used to analyze the production, trade and welfare effect of such policy changes. The results show that policies that increase distortions may strengthen the agricultural sector in terms of higher output, exports and employment but are likely to have adverse effects on the remaining economy. Removing payroll taxes and policies that increase agricultural productivity instead have positive effects for both the agricultural sector and the economy as a whole.

---

[1] Ralf Peters, UNCTAD, and David Vanzetti, Australian National University. The views expressed are those of the authors and do not necessarily reflect the views of the United Nations. Contact: ralf.peters@unctad.org

Introduction

Mexico has a large rural territory and population - the largest population living in predominantly rural areas in the OECD[2]. Farm employment, however, has dropped dramatically in recent decades. Agriculture accounts for about 14 per cent of employment in Mexico[3], down from more than 25 per cent in the early 1990s. Furthermore, agriculture contributes only about 4 per cent to its GDP which is half the level it contributed two decades ago. Rural poverty is high with 56 per cent of the people in rural areas living in poverty[4].

This development coincides with a trade policy that has led to much more open markets, especially within the NAFTA region, and significantly increased trade in agricultural products. Although a shrinking agricultural sector is not uncommon during the course of development, the situation of the agricultural sector in Mexico has been found unsatisfactory and it has been argued that Mexico's external trade relations have an adverse impact on the agricultural sector in Mexico.

What can the Mexican Government do to strengthen its agricultural sector so as to increase employment and food security while reducing poverty? The scope for trade measures is limited as Mexico has committed itself in the WTO and various regional trade agreements to abstain from certain types of measures and as it has a free trade agreement with its largest trading partner. There is limited scope for increasing tariffs on imports or reducing tariffs facing its exports.

If agricultural tariffs were to be raised trade agreements, especially NAFTA, was to be changed. Corresponding renegotiations have been advocated including by presidential candidates and discussed in the literature.[5] Mexico would probably have to offer Canada and the United States something in return, and any benefits to the agricultural sector could be offset by additional costs to others sectors in Mexico. Because of the links between grains, oilseeds and livestock, trade policies raising prices for feedgrains could have negative effects on livestock producers and consumers.

An alternative policy is to provide additional domestic support, or provide the same amount in a different fashion, possibly better targeted to producers in need. Input subsidies, on electricity or credit, for example, have the advantage of distorting only one side of the market, production, as opposed to two sides as do output subsidies. To address poverty, the Government might consider providing targeted direct income support to those in need, irrespective of whether they are farmers. Subsidies on output tend to benefit non-target groups, that is, those farms that are larger than average. Currently (2009), Mexico provides producers with 79 MXN million in support to produce output valued at 577 MXN million. Some 28 MXN million is in support of output, and 33 MXN million is directed at inputs. General services attract 12 MXN million but of this only 1.5 MXN million is for research and development.

The purpose of this study is to assess alternative policy options. Policies examined include:
(1) Increasing tariffs on agricultural imports from NAFTA countries to MFN levels;
(2) Switching current domestic support to subsidies on output;
(3) Removing payroll tax on agricultural labour; and
(4) Funding research and development to increase agricultural productivity.

---

[2] OECD Rural policy reviews Mexico 2007 p. 14.
[3] World Development Indicators 2011; FAO reports that the agricultural population is 19 per cent in 2008, down from 30 per cent in 1990.
[4] OECD Rural policy reviews Mexico 2007 p. 16.
[5] DTB Associates and AgRisk Management. IMPLICATIONS FOR THE U.S. AND MEXICO OF MEXICO WITHDRAWING CERTAIN AGRICULTURAL PRODUCTS FROM NAFTA. 2006

A global general equilibrium model, GTAP, is used to analyze the production, trade and welfare effect of such policy changes. The results show that policies that increase distortions may strengthen the agricultural sector in terms of higher output, exports and employment but are likely to have adverse effects on the remaining economy. Removing payroll taxes and policies that increase agricultural productivity instead have positive effects for both the agricultural sector and the economy as a whole.

The Agricultural Sector

Agricultural production

Production in terms of value and quantity has increased for most major products from 1990 to 2010. Meat products have the highest value of production followed by the crops sugar and maize, and fruits and vegetables (table 1). Wheat and rice production values are rel. low, about US$ 600 and 200 mill., respectively.[6] Imports for meat products such as bovine and poultry meat, and for cereals increased at a higher pace so that the share of production to production plus imports decreased for these products (FAO Balance Sheets).

Table 1 Products with highest production value in 2010

Commodity	Value (US$ 1 mill.)
Indigenous Cattle Meat	5279
Indigenous Chicken Meat	3811
Cow milk, whole, fresh	3332
Hen eggs, in shell	1975
Indigenous Pigmeat	1804
Sugar cane	1656
Maize	1433
Tomatoes	1108
Chillies and peppers, green	1099
Mangoes, mangosteens, guavas	978
Oranges	783
Avocados	767
Lemons and limes	750
Beans, dry	665
Bananas	592
Wheat	554

Source: FAOstat

Mexico's agricultural sector is diverse. In some areas, predominantly in north-western parts of the country, larger commercialized farms operate. In central and southern states farms are often smaller and often produce for subsistence. The relative importance of products for big and small farms varies as well. According to Prina (2010), for smaller farms fruits and vegetables are relatively more important than for larger farms for which maize is more important.
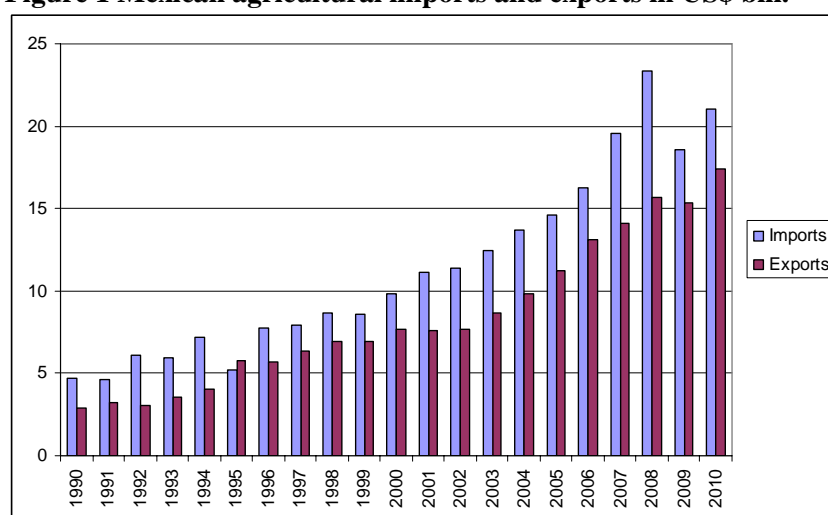
Agricultural Trade

Aggregate agricultural trade

---

[6] Rice production value was not available from FAO. The value has been assessed by the production and a rice price of US$ 500 per tonne.

Total merchandise exports were about US$ 298 bill. and imports US$ 301 bill. in 2010. The United States is by far the main trading partner. More than 80 per cent are exported to the US. Import sources are more diversified with the US accounting for about one half of all merchandise imports.

Agriculture[7] makes up about 6 per cent of Mexico's merchandise exports (about US$ 17 bill.) and less than 7 per cent of its imports (US$ 21 bill.) in 2010 (figure 1). Agricultural exports and imports are highly concentrated towards the US, accounting for 78 per cent and 74 per cent of its total merchandise exports and imports, respectively, in 2010. The share of agricultural imports sourced from the United States increased before the start of the implementation of NAFTA in 1994 to a level of around three-quarters (74 per cent in 1993) and fluctuates since then around that level (figure 2). The share of exports to the United States decreased from 89 per cent in 1993 to the current level of 78 per cent. Thus, the share of agricultural trade with the US has not significantly increased since the implementation of NAFTA began.

Figure 1 Mexican agricultural imports and exports in US$ bill.

Source: UN Comtrade

**Figure 2 Agricultural imports from the world and the US in US$ bill.**
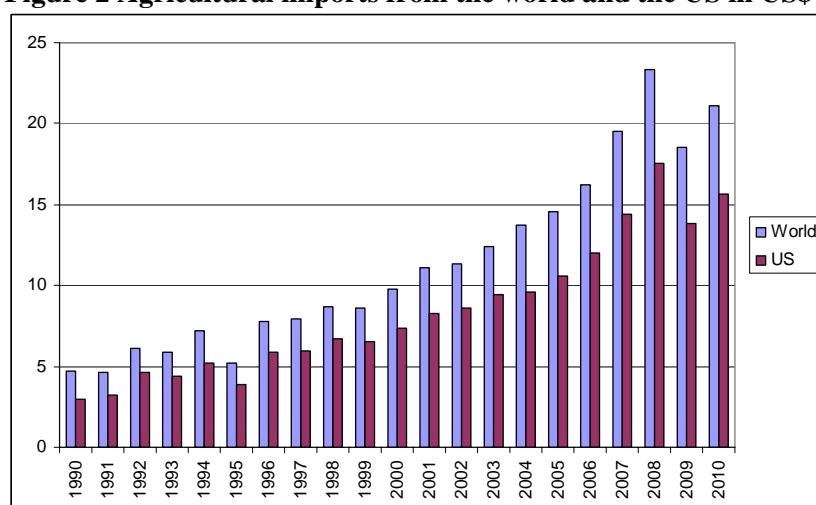
Source: UN Comtrade

---

[7] WTO definition of agricultural trade.

Trade with Canada has been growing disproportionately but remains at a low level. The share of imports from Canada grew from 5 per cent to 8 per cent from 1993 to 2010 and the share of exports to Canada from 1 per cent to 3 per cent. Due to the increasing share of imports from Canada has the share of total agricultural imports from NAFTA markets increased slightly from 79 per cent to 82 per cent between 1993 and 2010 (figure 3). The total share of exports to NAFTA markets decreased from 90 per cent to 81 per cent. The European Union is the third largest market for imports and the second largest market for exports from Mexico, followed by Canada and Japan. These four destinations account for about 90 per cent of Mexico's agricultural exports.

Figure 3 Imports of agricultural products in 2010
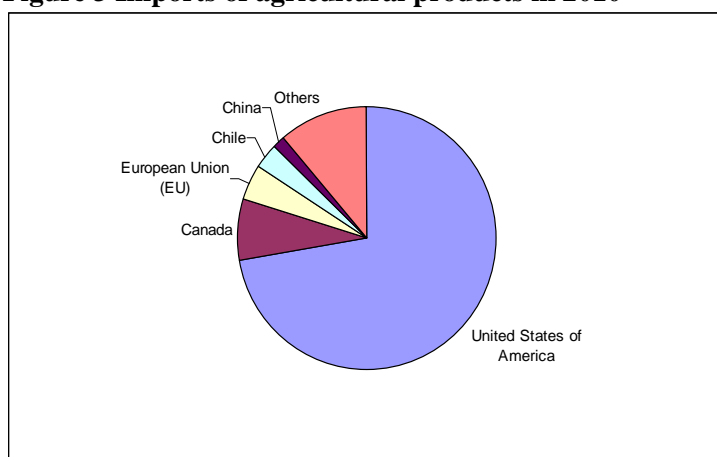
Source: UNCTADStat

The rise of Mexico's agricultural imports in recent years is significant but broadly in line with the world average and several other countries. Since 1993, Mexico's imports increased by 257 per cent until 2010 and world imports of agricultural goods increased by 325 per cent in US$ nominal value terms.[8] During the same period imports into e.g. Brazil increased by 180 per cent, Chile, 456 per cent, Colombia 350 per cent, Guatemala 502 per cent, Peru 294 per cent and Turkey 311 per cent. The low and middle income countries import value increased by 587 per cent between 1993 and 2010.[9] As seen from the discussion of the share of agricultural imports from the US, Mexican growth rates of imports from the world and from the US are very similar for agricultural products in Mexico (257 per cent and 258 per cent, respectively).

Aggregate agricultural exports to both the world and the US have also been very dynamic. For the period 1993 to 2010 exports to the world grew 391 per cent and to the US 331 per cent - more than imports. The relation between import and export growth during the recent two decades in Mexico depends, however, on the exact reference periods that are taken from the early 1990s until the late 2010s. For example, from 1993 to 2008 or from 1990 to 2007 and 2008 average import growth was higher than export growth.[10] Comparing three- and five-year

---

[8] Data here are based on UN Comtrade data.

[9] The import growth is affected by many elements including trade policy changes, transport cost changes, population growth and changing consumption and production patterns. Thus, the comparison with the import growth of other countries is not a clear indicator whether a trade policy change did or did not have an impact.

[10] Data are based on UN Comtrade data reported by Mexico. Results depend on whether US data or Mexican data are used and which definition of agriculture is used, e.g. the WTO definition based on HS classification or another frequently used definition based on SITC classification. The above stated pattern, that in some periods between the early 1990s and late 2010s average export growth was higher

averages from 1991 to 1993 (1990 – 1994)) with 2008 to 2010 (2006 - 2010) reveals that both exports and imports were similarly dynamic with a slightly higher increase of exports (figure 4). A different data source, UNCTADStat, and a different definition of agriculture where fish products are included confirms that imports and exports of food items and agricultural raw materials were similarly dynamic with, this time, a slightly higher increase of imports (e.g. 260 per cent growth of exports from 1996 to 2010 compared to 275 per cent increase in imports).

Figure 4 Change in total exports and imports of agricultural goods (average 1992-93=100)
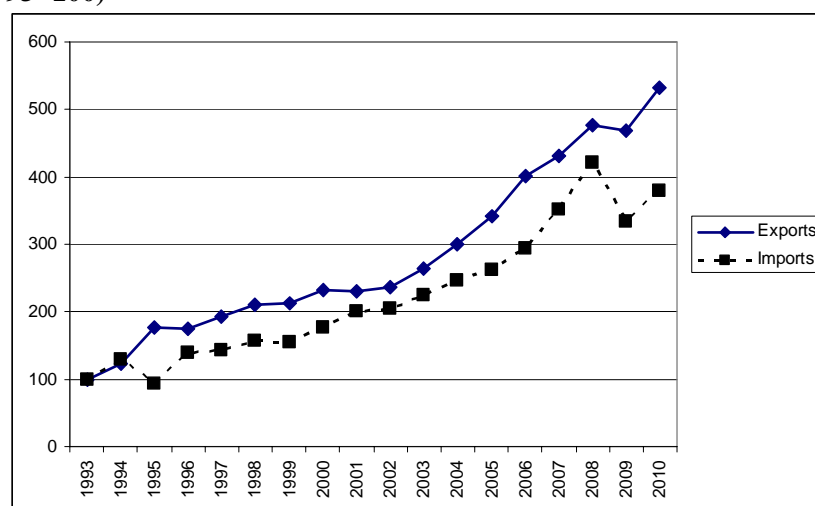
Source: UN Comtrade

Regional trade agreements (RTAs) usually lead to trade creation and diversion effects, resulting in a higher share of intra-RTA trade. Mexico's imports from Canada and the US have increased slightly from 79 per cent to 82 per cent (table 2). United States imports from Mexico have increased from an import market share of 11 per cent to 17 per cent between 1993 and 2010 and Canada's share of imports from Mexico from 2 per cent to 4 per cent. This confirms the trade creation effect. The decreasing share of Mexico's exports to the NAFTA markets is explained by the lower import growth rates in Canada and the US and does not reflect loosing market shares. However, the Mexican market share in Canada is still very low.[11]

Table 2 Market shares of exports and imports in NAFTA

		Imports		Exports	
Reporter	Partner	1993	2010	1993	2010
		%	%	%	%
Mexico	United States	74	74	89	78
	Canada	5	8	1	3
	NAFTA	79	82	90	81
United States	Mexico	11	17	8	12
Canada	Mexico	2	4	2	4

than import growth and vice versa in other periods, however, remains. During the year of the Mexican peso crisis, 1995, imports were very low.
[11] The average MFN rate in Mexico has not decreased since the implementation of NAFTA. It remains relatively stable at around 20 per cent for the simple average. It is possible, however, that the non-NAFTA trade which accounts for about 20 per cent of agricultural trade is not MFN-trade but under other preferential schemes.

Source: UN Comtrade

To summarize, both aggregate agricultural imports and exports have increased significantly in Mexico at a similar pace. Trade with the US is dominating accounting for some three-quarters of its agricultural trade. Mexican agricultural imports were always higher than its exports since 1993 with both the world and the US (except in 1995). Trade with NAFTA partners was slightly more dynamic indicating a small trade creation and trade diversion effect.

2.2 Product specific trade

Liberalization of agricultural trade within the NAFTA implementation period coincides with a changing composition of traded agricultural goods with more staple crops and meats flowing south and more beverages, seasonal fruits and vegetables flowing north. In that sense, NAFTA's liberalization of agricultural trade appears to have produced the "expected" results (Wise, 2009). The major imports from the US are stock feed soyabeans, maize and sorghum. Wheat and beef are the major foods.

Table 3 Top ten Mexican agricultural imports from USA, share in total agriculture imports from US

HS 2 digit	Product	1993 %	2010 %
10	Cereals	15.4	19.0
02	Meat and edible meat offal	13.5	17.7
12	Oil seed, oleagi fruits; miscell gr	14.4	12.8
52	Cotton.	8.0	6.8
23	Residues & waste from the food indu	4.9	6.0
15	Animal/veg fats & oils & their clea	7.3	5.4
04	Dairy prod; birds' eggs; natural ho	5.8	5.4
21	Miscellaneous edible preparations.	4.2	4.8
17	Sugars and sugar confectionery.	1.9	4.7
08	Edible fruit and nuts; peel of citr	3.5	3.5
	Total agriculture (US$ bill.)	4.3	15.6

Source: UN Comtrade

Notwithstanding the growth of aggregate imports which is basically in line with or below other developing countries' growth of agricultural imports, imports of some particularly sensitive products such as corn, rice, beef, poultry and beans are partly dramatically high. For all these products the US market share is very high and for many of these products has it been increasing since 1993. Imports of maize are 670 per cent higher in 2008-2010 than they were in 1991-1993. Almost all of the maize is imported from the US (table 4). Similarly, beans imports have increased by 853 per cent. Imports of wheat from the world have increased by less, 192 per cent, but the share of imports from the US increased from 58.9 to 76.1 per cent, showing that imports from the US have increased disproportionately. Pork and poultry meat import growth was also high at 664 per cent and 390 per cent, respectively.

Table 4 Imports of selected agricultural products

		Imports from the world			Share US imports of total imports	
	Volume	Change	Value	Change	Value	Value
	Average 2008-10	1991-93 to 2008-10	Average 2008-10	1991-93 to 2008-10	1991-93	2008-10

	1'000 tonne	%	US$ mill.	%	%	%
Barley	104.4	-1.1	43.3	214.7	68.9	57.8
Beans	129.1	852.6	126.1	1330.0	92.4	90.8
Beef	318.9	70.2	1152.7	198.6	81.1	84.6
Coffee	8.0	218.8	54.8	912.3	45.2	54.6
Eggs	9.9	-10.6	33.2	159.8	82.0	99.9
Maize	8179.6	670.3	1854.6	947.7	99.0	99.3
Milk	309.5	22.4	654.4	91.8	34.9	75.5
Pork	478.4	664.1	843.3	791.5	78.3	90.5
Poultry	642.6	390.2	757.9	506.4	98.5	90.7
Rice	820.7	173.7	345.5	390.8	72.3	99.5
Shrimp	6.1	39.6	33.0	62.2	98.9	3.4
Sorghum	2101.0	-44.4	411.3	-3.9	99.4	100.0
Sugar c.	2.1	-98.3	0.6	-98.1	25.2	84.6
Sugar	4556.5	1031.5	649.7	413.1	43.5	73.9
Tuna	33.9	1121.5	71.2	1451.3	81.1	4.6
Wheat	3323.2	191.7	1006.8	484.0	58.9	76.1

Source: UN Comtrade, SITC classification of products see Annex.

Mexico's exports to the US are estimated at \$13.6 bill. accounting for about 17 per cent of the total value of US imports. The major exports are shown in table 4. Horticulture products such as tomatoes and fruits are the main exports. Beer exports have increased significantly while the importance of live cattle has decreased, though it remains important. Shrimps and prawns are also major exports.[12]

Table 4 Top ten Mexican agricultural exports to USA, share in total agriculture exports to US

HS 2 digit	Product	1993 %	2010 %
07	Edible vegetables and certain roots	38.1	30.3
22	Beverages, spirits and vinegar.	7.8	17.0
08	Edible fruit and nuts; peel of citr	12.3	14.9
17	Sugars and sugar confectionery.	1.3	8.7
19	Prep.of cereal, flour, starch/milk;	1.9	5.3
20	Prep of vegetable, fruit, nuts or o	5.0	5.2
01	Live animals	14.3	4.0
21	Miscellaneous edible preparations.	2.3	3.7
18	Cocoa and cocoa preparations.	0.7	3.4
03	Fish & crustacean, mollusc & other	11.2	2.8
	Total (US$ bill.)	3.2	13.6

Source: UN Comtrade

To summarize, the changing composition of agricultural trade reveals a higher trade specialization with more staple crops and meat flowing south and more seasonal fruits and

---

[12] Fish is not part of the table 2 as is is not an agricultural products under the WTO definition used for the table.

vegetables flowing north. This is confirmed by a trade specialization index calculated by Dimaranan, Hertel and Keeney (2003) cited in Stiglitz and Carlton (2005, p. 221). Mexico has actually become more dependent on imports in program crops and meat/livestock between 1996-75 and 1986-98.

Employment

Agriculture accounts for about 14 per cent of employment in Mexico[13] contributing about 4 per cent to its GDP. In the early 1990s more than 25 per cent of employment was in agriculture and the contribution to GDP was almost twice as high as it is nowadays.

Between 1993 and 2010 total agricultural employment in Mexico declined according by 28 per cent according to OECD data.[14] In 1993 about 8 million people were employed in agriculture in Mexico and in 2010 5.8 million. These data are unfortunately not disaggregated by agricultural sectors.

Figure 5 Employment in agriculture in Mexico in million
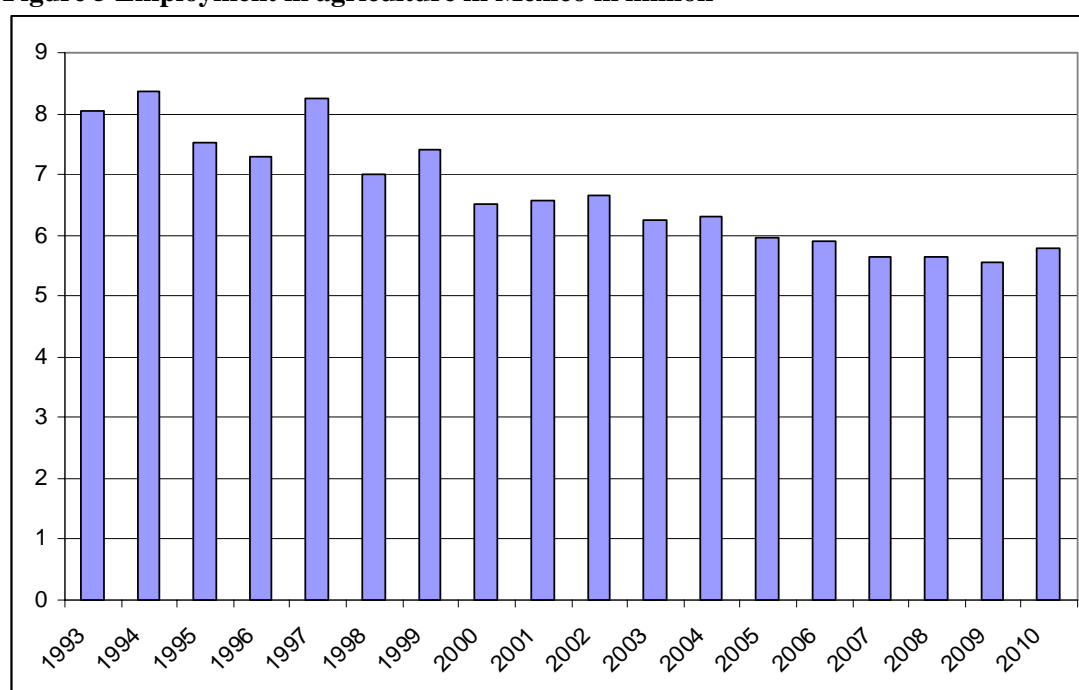

Source: OECD Labour force statistics; Note: break in 2004

The relative importance of agriculture to Mexico has declined as in other OECD countries. Productivity is increasing and more labour shifts to the manufacturing or the services sector. However, the decline in Mexico appears higher than in many other countries. According to World Bank data the share declined between 1990-95 to 2005-10 by 45 per cent; more than in e.g. Brazil, Chile, Malaysia or Turkey (Figure 6). In the World Bank classification Mexico is in the upper middle income group where on average the share of employment in agriculture to total employment declined by 29 per cent. Furthermore, the absolute share in Mexico is with 14 per cent at the lower end compared to many other developing countries in this group.

Figure 6 Employment share in workforce 1990 to 2010

---

[13] World Development Indicators 2011; FAO reports that the agricultural population is 19 per cent in 2008, down from 30 per cent in 1990; OECD statistics report 13.1 per cent employment in agriculture as a share of total civilian employment, down from 25.7 per cent in 1993.
[14] ILO data confirm the order of magnitude for the period 1995 to 2008.
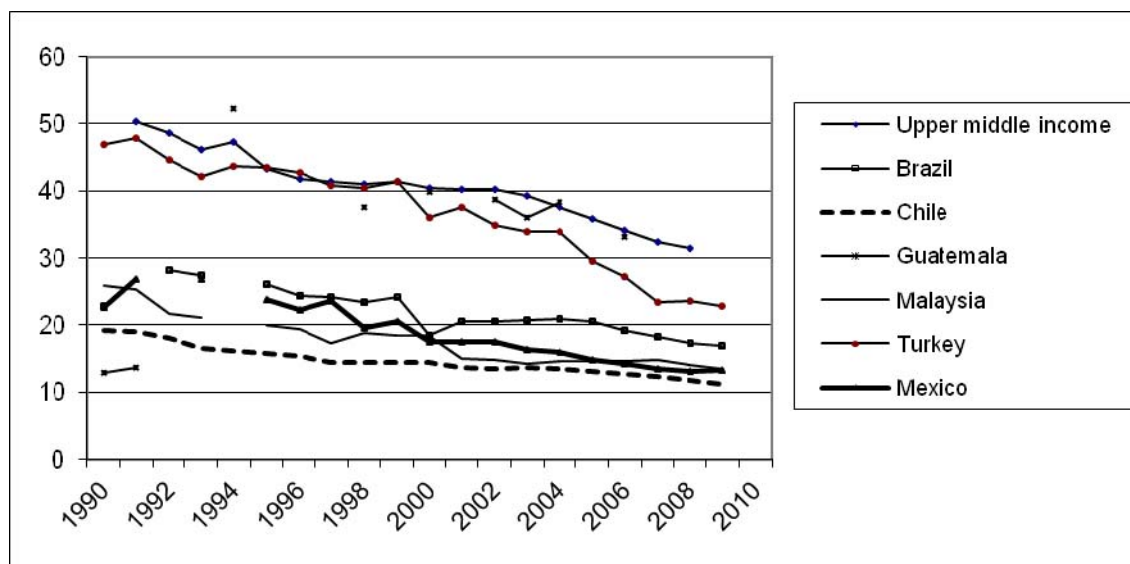
Source: WDI 2011

The structural adjustment of the rural economy with a declining contribution of agriculture and an increasing share of non-farm activities has increased significantly the number of unemployed people in both rural dispersed and rural semi-urban areas. Furthermore, significant migration from rural areas to urban areas or the US indicates a lack of employment opportunities.

Table: Employment share in workforce 1990 to 2010

Country	Average 1990-95	Average 2005-10	Change
Upper middle income	47	33	-29
Brazil	26	19	-29
Chile	17	12	-30
Guatemala	26	33	27
Malaysia	23	14	-37
Turkey	45	25	-43
Mexico	25	14	-45

Source: WDI 2011

Disparity and poverty remain a challenge in Mexico. Most people living below the poverty line live in rural areas.[15] The percentage of the rural population living below the national rural poverty line is 61 per cent.[16] This is one consequence of the low labour productivity in agriculture in Mexico.

Difficult to establish causality …

Trade policy

[15] Mexico Agriculture Policy Review, Agriculture and Agri-Food Canada.
[16] World Bank Development Indicators.

Mexico has undertaken significant agricultural market reforms. Since the early 1990s Mexico has decreased its trade barriers, shifted away from commodity support to more decoupled forms of support and encouraged market liberalization.[17]

Multilateral trade agreement
Mexico is a WTO member since 1995. Mexico has an average bound rate of 44 per cent and in 2010 an average applied rate of 21 per cent (simple averages for agricultural products). This compares to an average applied rate of e.g. 13 per cent in low and middle income countries, 15 per cent in OECD countries, and 5 per cent and 11 per cent in the US and Canada for agricultural products, respectively. Many other countries, however, still have considerably higher agricultural tariffs. Turkey has 43 per cent, for example, and India has 32 per cent. Thus, Mexico has relatively but not extremely high MFN applied agricultural tariffs. It has not reduced those MFN applied tariffs during the last two decades.

Graph: Average MFN applied tariff in Mexico
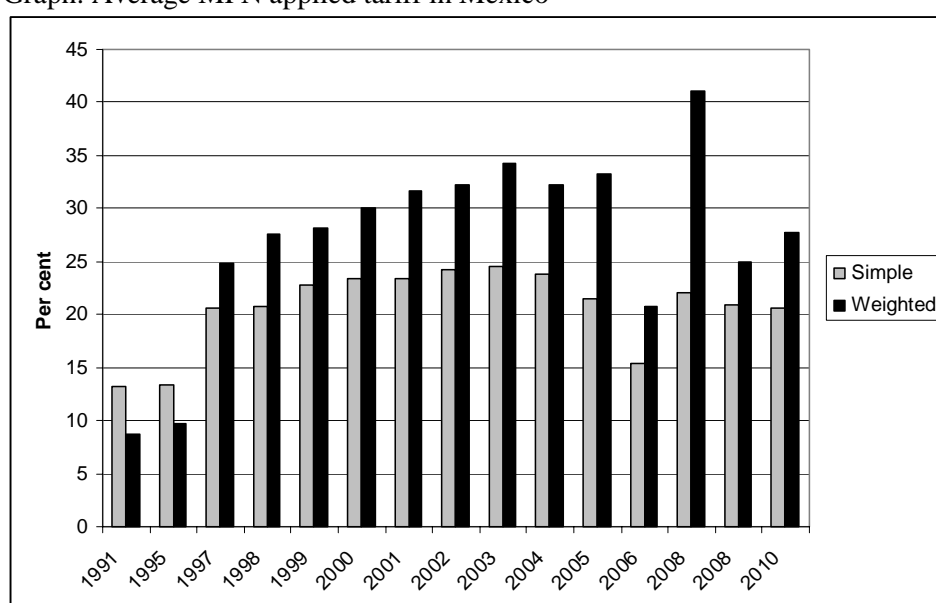
Source: UNCTAD Trains

Sugars and confectionary, animal and dairy products and coffee and tea attract the highest tariffs.

Table: Mexico tariffs by product group

	Bound	Applied 2010
Animal products	64	41
Dairy products	63	35
Fruit, vegetables, plants	37	18
Coffee, tea	64	37
Cereals and preparations	45	20
Oilseeds, fats and oils	44	17
Sugars and confectionary	119	66

---

[17] OECD Agricultural and Fisheries Policies in Mexico: Recent Achievements, Continuing the Reform Agenda. 2006.

Beverages and tobacco	44	28
Cotton	39	5
Other agricultural products	28	7
All agriculture	**44**	**21**
Fish and fish products	35	17

Source: WTO, ITC, UNCTAD World Tariff Profiles 2010

The more disaggregated HS 6-digit level confirms that for most products the applied rates are well below the bound rates providing Mexico with some policy space. For other products, however, applied rates are up against the bound rates so that Mexico has no possibility to increase tariffs on those products. Mexico has some tariff peaks in agriculture with a maximum applied tariff of 254 per cent in the sectors animal products and oilseeds, fats and oils.

For some cereals, applied tariffs were up against bound rates for others applied rates were below bound rates. The average bound rate of cereals and preparations is 45.1 per cent and the average applied rate in that sector 19.5 per cent.

Since most imports are under preferential agreements, MFN tariffs have not been decreased and are not particularly low in Mexico the significant increase in imports of cereals and meat products has not been caused due to Mexico's WTO commitments.

Commitments in Regional Trade Agreements

Mexico is member of several RTAs with countries in the region and South America as well as with the EU, EFTA and Japan. Trade in agricultural products is, however, relatively small with these partners.

The North-American Free Trade Agreement (NAFTA) between Mexico, the United-States and Canada was ratified in 1994. Because of the sensitivity of agriculture, the agreement featured an extended implementation period for sensitive products. In Mexico, maize is a sensitive product, and the NAFTA agreement had a fourteen year phase-in period of tariff reductions to protect the Mexican market from imports of US maize. The phase-in was completed in 2008. Although tariffs have been phased out there are no limitations in the agreement concerning the use of domestic support.

In NAFTA agriculture has not been negotiated trilaterally. While the US – Canada agreement allows for exceptions and quotas on sensitive products such as sugar, diary and poultry is the US – Mexico agreed on a comprehensive liberalization schedule. After a transition period, tariffs and quotas have now largely been eliminated. It is likely that the comprehensive liberalization schedule with the US has had an impact on the increase of imports from the US. The free market access to the US has most likely also helped Mexican exporters but the US has in general not very high tariffs on agricultural goods. On fruits and vegetables, the major export product to the US, the average applied MFN rate is low at 4.9 per cent. In many sectors where the US has high tariffs, such as in dairy (16.2 per cent) Mexico is not a major exporter. Thus, the tariff preferences through NAFTA had compared to the relative value for US farmers a relatively lower value for Mexico's agricultural producers.

The following table presents the average applied tariffs on agricultural products in NAFTA.

Table 9 Average applied tariffs in agriculture between the US, Canada and Mexico

Import country	Export country	Preferential tariff	MFN rate for export basket
		%	
Mexico	United States	0.0	31.1
	Canada	0.0	16.7
United States	Mexico	0.0	5.4
Canada	Mexico	0.0	5.8

Source: UNCTAD TRAINS Database, 2009 and 2010. MFN rate is the trade weighted average MFN tariff for the actual export basket from the indicated export country. Preferential tariff is the theoretical rate since some products may face the MFN level if they do not fulfill e.g. rules of origin requirements.

The average applied tariffs on agricultural trade between NAFTA members is not strongly preferential for Mexico. The difference between the applied rates within the NAFTA region and with the non-NAFTA members varies little. There are exceptions. US imports of processed tobacco and processed ground-nuts were protected by tariffs of 77 and 164 per cent of the product price respectively. Mexico benefits from preferences for those agricultural products to access the US market related to the rest of the world. For processed ground-nuts, the preferential rates for Mexico exports are around 50 per cent of the MFN rate. For processed tobacco, the preferential tariffs for Mexico are down to zero. Processed ground-nuts and tobacco seem to be sensitive products regarding to that analysis of tariff lines. The other imports with high tariffs, some vegetables and dates, have zero or insignificant preferential rates.

The most important variation occurs for Mexico's imports, where the global applied rate for the rest of the world is 12.2 per cent of the product price as the average of applied tariffs for US's exports to Mexico is 0.20 per cent.

Current domestic support policies

Subsidies in the US
Total support for US agricultural producers has risen and fallen since NAFTA was implemented in 1994. The latest figure for producer support, according to OECD estimates, is $26 billion. This is currently about 7 per cent of the total value of production, which is around $339 billion. The decline is attributable in part to an increase in commodity prices. As some of the payments are countercyclical, in times of high prices payments are reduced.

Figure 8 Producer Support in the US, US$ mill.
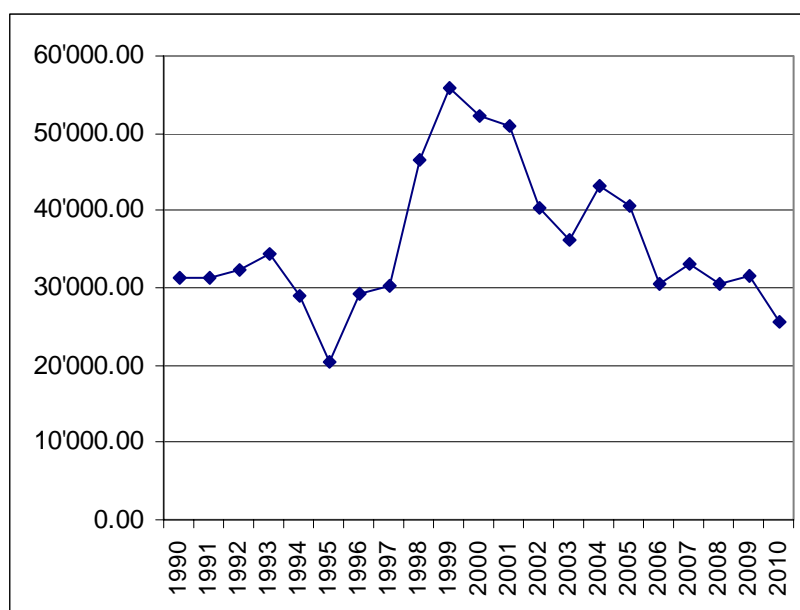
Source: OECD

Total domestic support for US agriculture in 2010 was still significant, totally $133 billion. However, little of this was paid to producers according to output ($1.9 billion) or input use (($9.6 billion). These are the categories that are considered most production distorting.

A larger component of support is through marketing and promotion. This includes food stamps, now called the Supplemental Nutrition Assistance Program (SNAP), which provides targeted income support for low income families. Most of the $70 bill. general service support estimate and the $38 bill. consumer support estimate is non-product specific food stamp program support. Almost all of the domestic support is provided by taxpayers rather than consumers.

Table 10 USA domestic support for agriculture, 2010

	$m
I. Total value of production (at farm gate)	339'075
II. Total value of consumption (at farm gate)	282'673
III.1 Producer Support Estimate (PSE)	25'551
A. Support based on commodity outputs	1'886
B. Payments based on input use	9'568
C. Payments based on current A/An/R/I, production required	5'638
D. Payments based on non-current A/An/R/I, prod. required	0
E. Payments based on non-current A/An/R/I, prod. not required	5'852
F. Payments based on non-commodity criteria	2'608
G. Miscellaneous payments	0
III.2 Percentage PSE (%)	7
IV. General Services Support Estimate (GSSE)	69'849
H. Research and development	2'293
I. Agricultural schools	0
J. Inspection services	1'065
K. Infrastructure	4'297
L. Marketing and promotion (includes food stamps)	60'018
M. Public stockholding	24

N. Miscellaneous	2'152
V.1 Consumer Support Estimate (CSE)	35'390
O. Transfers to producers from consumers (-)	-1'500
P. Other transfers from consumers (-)	-1'160
Q. Transfers to consumers from taxpayers (incl. food stamps)	38'050
R. Excess feed cost	0
V.2 Percentage CSE (%)	14
V.3 Consumer NAC	1
VI. Total Support Estimate (TSE)	133'450
S. Transfers from consumers	2'660
T. Transfers from taxpayers	131'951
U. Budget revenues (-)	-1'160

Source OECD

There are further payments not based on output. These are so-called decoupled payments. Payments based on previous production are considered decoupled, and are, supposedly, non-distorting as they don't affect current production. However, if farmers expect future payments to be rebased on to production in some future year, they may continue producing in anticipation. In this way the distortions are locked in.

It is therefore difficult to assess how distorting the US production subsidies are. A generalization that production subsidies in the United States are not highly distorting because little of the support is directly related to output may not hold especially not for every commodity.

Of particular interest is maize, as both Mexico and the United States grow this crop, and at the signing of NAFTA Mexican producers were concerned about being flooded with cheap imports of maize following the removal of tariffs.

Domestic support for maize as a percentage of production in the United States, according to OECD estimates, is shown in figure 2. Product specific support was very high in certain years and reached 16 per cent in 2005. Since then it has been decreasing and reached a level close to two per cent in 2010.

Figure 9 Producer support for maize in the US as a percentage of production value
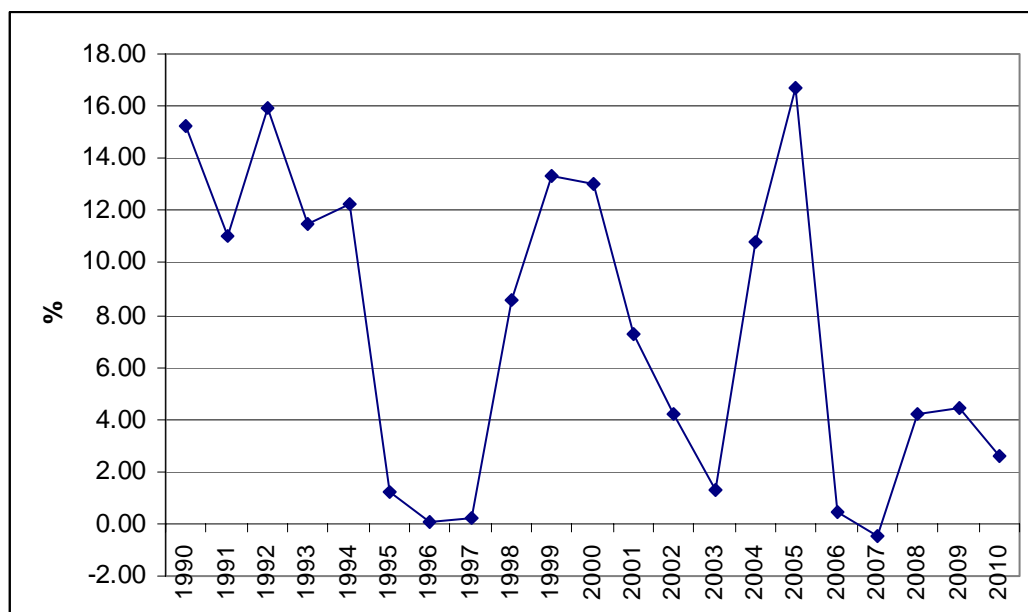
Source OECD

Maize producer prices in US dollars are shown in figure 10. Mexican prices were double US prices in 1994 when the NAFTA agreement was first implemented. Some convergence appears to have occurred in the first year, but little since then. Prices have generally moved in the same direction, with the exception of 2008, when US prices fell.

Maize prices have risen in the United States, and consequently, Mexico, in part because of US and EU policies on biofuels. The 2007 US Energy Independence and Security Act specifies that a proportion of the maize crop be used to produce ethanol for use as a fuel. Some 40 per cent of the US maize crop is diverted for this purpose, according to the USDA.[18] Stocks in 2011 are at their lowest level in 30 years, down to six month's consumption. This not only raises the price of maize, but also the prices of other crops, such as vegetable oils and sugar which are used in ethanol production, and wheat and coarse grains which are a substitute as animal feed.

Figure 10 Producer prices for maize

---

[18] http://www.usda.gov/oce/commodity/wasde/

Source FAOSTAT http://faostat.fao.org/site/570/default.aspx#ancor
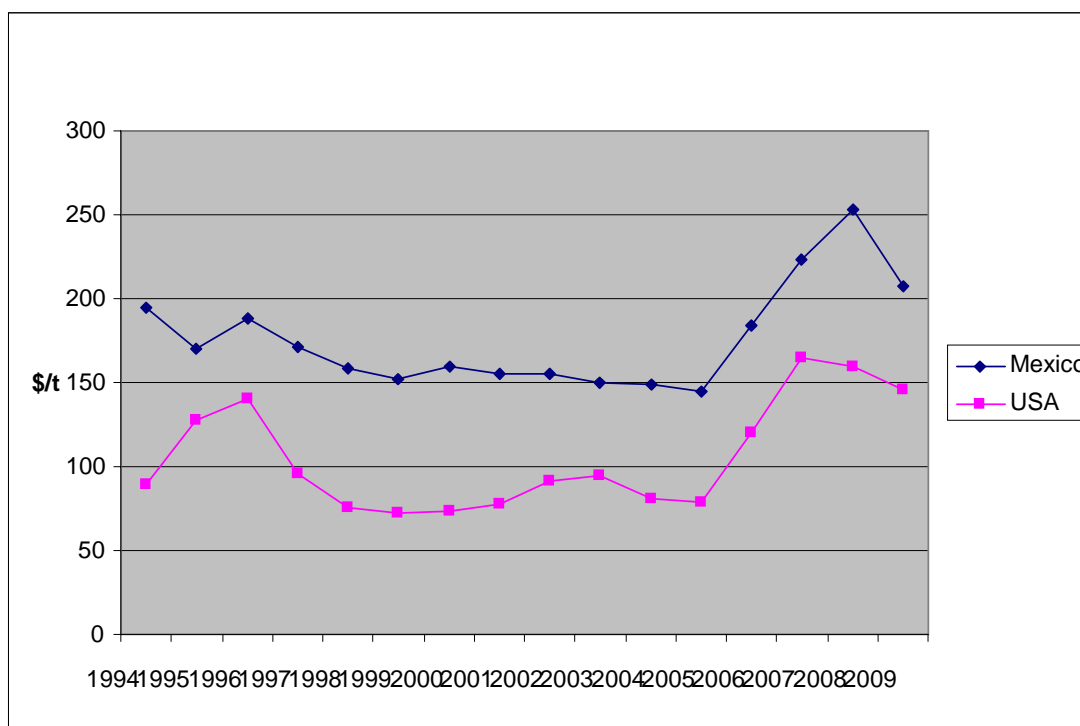
Other products that are important for Mexican producers are also among the products on which US support is concentrated. According to OECD's Producer Single Commodity Transfers estimate[19] mainly crops and milk are subsidized (table 11). Meat producers receive no support that is linked to the production of the corresponding product.

Table 11 US producer support for selected products.

	1995	2000	2005	2010
Barley	29	4	12	4
Beef	-0	0	0	0
Eggs	9	0	0	0
Maize	1	13	17	3
Milk	24	50	19	2
Pork	-0	0	0	0
Poultry	1	0	0	0
Rice	24	37	6	2
Sorghum	4	14	15	4
Sugar, refined	38	50	44	28
Wheat	39	16	2	6

Source: OECD

---

[19] Producer Single Commodity Transfers (producer SCT): the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies linked to the production of a single commodity such that the producer must produce the designated commodity in order to receive the transfer. OECD (2008): OECD's PRODUCER Support Estimate and Related Indicators of Agricultural Support: Concepts, Calculations, Interpretation and Use (The PSE Manual)

The data in table xx on US producer support reflect the countercyclical nature of some of the support, indicating relatively low levels of support in 2010 and higher levels in previous years. In 2000, for example, both refined sugar and milk specific transfers were 50 per cent of the value of receipts from the sugar and milk production.

Mexican domestic support

Mexico supported its producers with MXN 79 billion in 2010 (US$ 6.2 bill.)20, 12 per cent of the value of agricultural production which is about MXN 592 billion. The total support estimate which includes transfers from consumers was MXN 94 billion.

Table 12 Mexico domestic support for agriculture, 2009

	MXNmn
I. Total value of production (at farm gate)	592'322
II. Total value of consumption (at farm gate)	638'453
III.1 Producer Support Estimate (PSE)	78'553
A. Support based on commodity outputs	21'864
B. Payments based on input use	39'822
C. Payments based on current A/An/R/I, production required	773
D. Payments based on non-current A/An/R/I, production required	3'781
E. Payments based on non-current A/An/R/I, production not required	12'312
F. Payments based on non-commodity criteria	0
G. Miscellaneous payments	0
III.2 Percentage PSE	12
III.3 Producer NAC	1
IV. General Services Support Estimate (GSSE)	10'984
H. Research and development	1'283
I. Agricultural schools	4'845
J. Inspection services	721
K. Infrastructure	2'828
L. Marketing and promotion	915
M. Public stockholding	0
N. Miscellaneous	392
V.1 Consumer Support Estimate (CSE)	-21'382
O. Transfers to producers from consumers (-)	-20'783
P. Other transfers from consumers (-)	-5'444
Q. Transfers to consumers from taxpayers	4'746
R. Excess feed cost	98
V.2 Percentage CSE	-3
V.3 Consumer NAC	1
VI. Total Support Estimate (TSE)	94'283
S. Transfers from consumers	26'227
T. Transfers from taxpayers	73'500
U. Budget revenues (-)	-5'444

Source OECD

The largest items are support based on commodity outputs and input use. Market price support is provided primarily to poultry meat and sugar (MXN 5 billion each) and milk (MXN 3 billion). Subsidies on input use include electricity (MXN 7 billion), price hedging (MXN 9 billion) mainly on maize, sorghum and wheat, and fixed capital formation (MXN 16

---

[20] Exchange rate from USDA ERS 12.64.

billion). On farm services, which includes plant and animal health, amounted to (MXN 5 billion) in 2010. Expenditure on research and development is relatively low at (MXN 1.2 billion). During many years in the past were product specific subsidies on crops in Mexico lower than in the US. For instance, maize support was 8.8 per cent and support on Barley 0 per cent in 2005.

Mexico and agricultural trade

Mexico's agricultural trade reform coincides with increasing imports, decreasing employment in agriculture and high poverty rates in rural areas. Imports have increased from all major trading partners and particularly from NAFTA members who supply more than 80 per cent of Mexico's agricultural imports.

NAFTA has been accused of damaging farmers in Mexico and jeopardizing Mexico's food self-sufficiency (see e.g. Khor, 2007b, Polaski 2006). Although tariffs have been gradually reduced, many Mexican producers have expressed concern about the removal of tariff protection. In addition, although NAFTA specified the removal of bilateral tariffs on both sides of the border, there are no limitations in the agreement concerning the use of domestic support (Wise, 2009).

Agricultural subsidies
For a time the US subsidized maize production by as much as $4.4 billion a year (in 2005).[21] This is an instance where tariffs have been reduced substantially but domestic support contributes to distortions. Wise (2009) analyzed the impact of US agricultural policy on Mexican producers and assess to which extent subsidized products were exported to Mexico at prices below production costs between 1997 and 2005. Maize producers were by far the most heavily affected with $6.6 billion in losses.

Maize is not the only product where US production benefiting from subsidies and which competes with Mexican production. For eight products, maize, soybeans, wheat, cotton, rice, beef, pork and poultry, Wise (2009) estimates that subsidies in the US caused losses of $12.8 billion for Mexican producers for the period 1997 to 2005. His calculation is based on dumping margins that are supposed to capture not only the effect of direct subsidies but also other subsidies that allow exports below production costs. Thus, this dumping margin differs from the producer subsidy equivalent calculated by the OECD. For crops, the average dumping margin from 1997 to 20085 is between 12 per cent and 34 per cent, and for meat products between 5 per cent and 10 per cent.

Since 2005 product specific domestic support has dwindled to very low levels. A major reason is the rise of US commodity prices. The US maize prices, for instance, have risen from a little over $2 per bushel in 2001 to $8 per bushel in 2011. Some observers have attributed part of this rise to the influence of US and EU mandated biofuels polices (see section on biofues). For example, Babcock (2011) suggests US maize prices were 17 per cent higher in 2011 than they would have been otherwise.

US and Mexican maize is not completely substitutable. The US produces mainly yellow maize which is used as a stock feed. Mexico produces white maize which is also used as a food for human consumption.

While previous US policies may have had a detrimental effect on Mexican maize producers, the data suggests this effect is now small or indeed may have reversed. If the US policy which supports the production of maize for ethanol production leads to higher prices the maize

---

[21] (OECD 2010).

sector could benefit from that policy. While beneficial for maize producers, higher maize prices are detrimental for Mexican livestock producers and consumers.

Despite these relatively new developments which would need further analysis, the policies of many of Mexico's main trading partners to subsidize agricultural production is negatively affecting those Mexican producers producing the same products or close substitutes. Commitments on upper ceilings on tariffs, especially ambitious ones in RTAs, have increased Mexican farmers' exposure to agricultural policies of its main trading partners.

Agricultural tariffs and non-tariff measures
NAFTA has not excluded agriculture from liberalization and has most likely contributed to trade creation between participating countries. Trade between border countries, however, has been traditionally high. Mexico's imports of certain sensitive products have increased significantly with likely adverse effects on producers of those products. It is unclear to what extent increasing exports of other products notably fruits and vegetables as well as processed agriculture products can be attributed to NAFTA due to relatively low preference margins in the US. The highest tariffs on imports outside of NAFTA are limited to very few products like tobacco or ground-nuts for US's imports from Mexico. Traditional or historic business relations, as well as cultural or geographical proximity, may have contributed to the trend in agricultural trade. Furthermore, it is unclear to what extent higher exports of horticulture and processed products and lower input prices for animal feed have compensated farmers for increased imports of cereals and meat products.

Various non tariff measures, such as quantitative restrictions or rules of origin, may impede trade. Non tariff measures in the chapter in agriculture are related to quotas for sugar, dairy, egg goods, poultry products and special safeguard for fruits and vegetables, meat and coffee.

Policies
The commitments on agricultural tariffs, the phase-out of the possibility to use in NAFTA tariff rate quotas, the fact that subsidies have not been addressed in existing RTAs and that a successful conclusion of the Doha round where subsidies would be limited is currently unlikely, leaves Mexico with few policy options if the development of the agricultural sector is to be changed. Some are discussed in the next section.

The need to strengthen the rural sector in Mexico is evident with its high unemployment and poverty rates. Policies could target non-farm and farming activities. Some regions have successfully developed non-farm activities that contribute significantly to incomes. The tourism sector is one example that has been successful in certain regions. In addition, however, agriculture can make an important contribution to the development.

UNCTAD (2011) argues that agricultural development can facilitate economic take-offs, can promote higher value addition and provide export-led growth opportunities while generating positive externalities for society, such as on poverty reduction, employment and food security. World Bank (2008) earlier also argued that agricultural development can make positive contributions to development. In recent years, agriculture has contributed little to Mexico's growth. Between 1996 and 2010 the contribution of agriculture to real GDP growth was 2.6 per cent, considerably lower than the contribution in, for instance, Brazil or Turkey. In developing countries the contribution was with 5.7 per cent much higher (table 13).

Table 13 Contribution of agriculture to real GDO between 1996 and 2010

	Contribution of Agriculture to real GDP growth

Brazil	6.6
Mexico	2.6
Turkey	3.9
US	1.4
Developing economies	5.7
World	3.2

Source: Authors' calculation based on UNCTADStat

It is important though to increase productivity of the agricultural sector. Agriculture in Mexico is the least productive sector in Mexico while this is not the case in many other Latin American countries where agriculture is often more productive than e.g. wholesale and retail trade, construction or even business services (Rodrik and McMillan, 2011). Poverty in rural areas is correlated with a low productivity. A reason for the unsatisfactory low growth in recent decades in Latin America has been identified by Rodrik and McMillan (2011) as the low contribution of structural change to growth. While individual sectors became more productive, including due to increased trade competitiveness, was the overall growth low because there were no significant employment movements in Latin America from low productive sectors to high productive sectors or employees even moved from high productive to lower productive sectors.

What can the Mexican Government do to strengthen its agricultural sector so as to increase employment and food security while reducing poverty? The scope for trade measures appears limited as Mexico has committed itself in the WTO and in various regional trade agreements (RTAs) to abstain from certain types of measures. There is limited scope for increasing tariffs on imports or reducing tariffs that its exports face.

If agricultural tariffs were to be raised, trade agreements, especially NAFTA, was to be changed. Corresponding renegotiations have been advocated including by presidential candidates and discussed in the literature.22 Mexico would probably have to offer Canada and the United States something in return, and any benefits to the agricultural sector could be offset by additional costs to others sectors in Mexico. Because of the links between grains, oilseeds and livestock, trade policies raising prices for feedgrains could have negative effects on livestock producers and consumers.

An alternative policy is to provide additional domestic support, or provide the same amount in a different fashion, possibly better targeted to producers in need. Input subsidies, on electricity or credit, for example, have the advantage of distorting only one side of the market, production, as opposed to two sides as do output subsidies.

Mexico spends relatively little on research and development in agriculture and has a low labour productivity. It has been shown in studies that increasing research and development can increase the productivity of the agriculture sector and that this policy can have a high rate on investment. Another possible policy is to reduce payroll taxes on agricultural labour. These policies are analyzed in the next section.

---

[22] See e.g. DTB Associates and AgRisk Management. Implications for the U.S. and Mexico of Mexico Withdrawing Certain Agricultural Products from NAFTA. 2006

Model, data and scenarios

The well-known global general equilibrium trade model, GTAP, is designed for trade policy analysis of this nature (Hertel 1997). Specifically, it contains bilateral trade and tariff data that are necessary to model the impacts of preferential agreements. The GTAP database, Version 8, refers to the base year 2007. The model divides labour into to types, skilled and unskilled. Input-output tables link the sectors in each economy.

The base data specifies the use of each primary factor (land, labour, capital, etc) and intermediate input into the production of each good. Changes in output affect the use of labor according to the labour out rations shown in table 2. For example, assuming no changes in response to relative prices, a $1 change in output of rice requires an additional 39c in labour costs, whereas the production of wheat requires less than half the amount of labour. It can be seen that crops are more labour intensive than livestock products. This suggests that policies to encourage the output of crops are likely to be of greater assistance to labour.

The GTAP database has Mexican tariffs of 16 per cent on coarse grains and 5 per cent on milk products.[23] The US has tariffs off 27 per cent on sugar imports from Mexico.

Table 14 Labour-output ratios in Mexican agriculture

Product	Code	Labour-ouput ratio	Capital-output ratio
Primary agriculture			
Paddy rice	pdr	0.39	0.24
Wheat	wht	0.18	0.12
Cereal grains nec	gro	0.36	0.23
Vegetables, fruit, nuts	v_f	0.34	0.21
Oil seeds	osd	0.09	0.07
Sugar cane, sugar beet	c_b	0.35	0.22
Plant-based fibers	pfb	0.13	0.09
Crops nec	ocr	0.30	0.19
Cattle, sheep, goats, horses	ctl	0.17	0.13
Animal products nec	oap	0.27	0.18
Raw milk	rmk	0.10	0.08
Wool, silk-worm cocoons	wol	0.15	0.09
Forestry	frs	0.47	0.08
Fishing	fsh	0.03	0.46
Processed agriculture			
Meat: cattle, sheep, goats, horse	cmt	0.07	0.01
Poultry and other meats	omt	0.23	0.34
Vegetable oils and fats	vol	0.16	0.40
Dairy products	mil	0.03	0.06
Processed rice	pcr	0.69	0.17
Sugar	sgr	0.31	0.35
Food products nec	ofd	0.23	0.04

Source: GTAP version 8 database.

Four hypothetical scenarios are simulated to assist in analyzing the likely impacts of alternative policies aimed at assisting agriculture.

---

[23] Wits data shows that for 2010, Mexico imported maize worth $1423m from the United States at a trade weighted tariff of 5.9 per cent. However, for the previous two year the tariff was zero.

Table 15 Scenarios

Scenario	Description
MFN	Increasing tariffs on agricultural imports from NAFTA countries to MFN levels
Labour	Removing payroll tax on agricultural labour
R & D	Funding research and development to increase agricultural productivity
Domestic Support	Increase support on output to 5 per cent

Trade between Mexico and the United States is now duty free. One possible approach to support Mexican producers that has been proposed would be for Mexico to renegotiate NAFTA. One option, albeit somewhat speculative, would be for Mexico to raise agricultural tariffs to their mfn levels. This is analysed in the first scenario, MFN.

The second scenario, Labour, involves removing taxes on the employment of agricultural labour. Payroll taxes for unskilled and skilled labour amount to 4 and 5 per cent respectively of the cost of employing labour. Lowering the cost of hiring labour would lead to a substitution of labour for capital and make the sector more competitive domestically and internationally.[24]

In the third scenario, 'R & D', we assume R&D expenditure is increased to 10 per cent of expenditure (8 MXN million) with a resulting increase in productivity of 1 per cent. Mexico spends only 2 per cent (1.5 MXN million) of its support to agriculture on research and development. A survey of meta-studies suggest R & D expenditure has an internal rate of return between 20 and 80 per cent per annum (Alston 2010), indicating a likely underinvestment in R&D. Estimates of returns will depend on specific circumstances, such as location and crops, but are likely to be greater in developing countries where productivity is low.

The third scenario, Input, involves doing the reverse, switching support from output to input. Support for inputs is currently 33 MXN million, about 5 per cent of the value of production.

Finally, the fourth scenario, Domestic Support, involves switching all domestic support, some 78 MXN million or 13.5 per cent of production, to an input subsidy. Currently the input subsidy is 33 MXN million. This involves eliminating the output subsidy of 27 MXN million and increasing the input subsidy by this amount.
This leaves intact general services expenditure.

In this application, the standard closure is modified to reflect a semi-flexible labour market for unskilled labour, implying a change in the demand for labour leads to some increase in both wages and employment. Skilled labour is assumed to be mobile in each country but in fixed supply, with no surplus labour. This is the standard GTAP closure.

GTAP is used here to compare the trade and welfare effects of changes in bilateral tariffs and domestic support once the impacts have worked through. There is no attempt to neither phase in the policy changes nor trace the time profile of the impacts. Thus, we ignore changes such as growth in trade that may have occurred over the implementation period.

---

[24] Technically, changing the payroll tax requires to run an uncondensed version of the GTAP model. In the standard model, the payroll tax is not an exogenous variable that can be shocked.

Results

MFN Scenario
Tariffs in Mexico on all agricultural imports from the United States are increased from the preferential tariffs to Mexico's MFN rates (table 16).

Table 16 Initial and new tariffs in Mexico on imports from US

Product	Initial	MFN
	%	**%**
Agriculture		
Paddy rice & proc rice	0	49.99
Other cereals	16.1	20
Sugar	0	10
Oilseeds	0	5
Vegetable oils and fats	0	18
Vegetables and fruit	1.53	19
Other crops	0	13
Milk	0	0
Dairy products	4.66	29
Cattle and sheep	0	7
Pigs and poultry	0	9
Ruminant meat	0	31
Non-ruminant meat	0	57.33
Other processed agriculture	0	20

Source: GTAP and WITS

The increase in the tariff leads to a reduction of imports in Mexico by 0.8 per cent. Total imports from the US are reduced by 3.6 per cent. The main products where imports from the US are reduced are rice, vegetable oils and fats, dairy products and meat products (table 17).

Table 17 Imports of Mexico from US

Product	Initial	Under MFN	%
	$mill.	**$mill.**	**%**
Agriculture			
Paddy rice & proc rice	884.29	142.98	-83.8
Other cereals	1917.38	1895.42	-1.1
Sugar	141.68	110.54	-22.0
Oilseeds	1449.05	1399.8	-3.4
Vegetable oils and fats	747.18	386.44	-48.3
Vegetables and fruit	824.69	681.62	-17.3
Other crops	190.46	104.4	-45.2
Milk	0.5	0.54	8.0
Dairy products	894.83	269.09	-69.9
Cattle and sheep	57.97	44.23	-23.7
Pigs and poultry	648.09	597.78	-7.8
Ruminant meat	1352.44	569.65	-57.9
Non-ruminant meat	939.41	57.56	-93.9

| Other processed agriculture | 3179.58 | 2069.92 | -34.9 |

Source: GTAP simulation

The sharp reduction of imports from the US is partly compensated by higher imports from other countries as their products become relatively less expensive. This trade diversion and creation effect, however, still leads to significantly reduced imports for agricultural products indicating the importance of the NAFTA agreement for imports of Mexico. Meat and sugar imports are about 20 per cent smaller if tariffs vis-à-vis the US would be at MFN levels.

Table 18 Imports of Mexico from the world

Product	Initial	Under MFN	
	$mill.	$mill.	%
Agriculture			
Paddy rice & proc rice	1128.96	1022.4	-9.4
Other cereals	2014.96	1999.88	-0.7
Sugar	156.6	129.9	-17.0
Oilseeds	2046.85	2118.18	3.5
Vegetable oils and fats	1150.97	1001.3	-13.0
Vegetables and fruit	1077.75	1054.39	-2.2
Other crops	587.48	576.03	-1.9
Milk	2.73	2.95	8.1
Dairy products	1747.01	1432.84	-18.0
Cattle and sheep	126.67	122.98	-2.9
Pigs and poultry	709.83	668.68	-5.8
Ruminant meat	1661.84	1592.61	-4.2
Non-ruminant meat	1097.12	608.52	-44.5
Other processed agriculture	5033.18	4342.96	-13.7

Source: GTAP simulation

As a result of decreasing imports of most agricultural products, domestic output increases by 2.5 per cent. The value of domestic production of rice would increase by 22 per cent and the value of certain meat products would increase by 9 per cent (table 19).

Table 19 Change of value of production in Mexico

Product	Initial	Under MFN	
	$mill.	$mill.	%
Agriculture			
Paddy rice & proc rice	1504.36	1828.09	21.5
Other cereals	7270.61	7462.83	2.6
Sugar	6967.28	7038.59	1.0
Oilseeds	370.7	394.24	6.4
Vegetable oils and fats	3308.05	3514.4	6.2
Vegetables and fruit	15414.69	15513.99	0.6
Other crops	1029.5	1030.1	0.1
Milk	5345.48	5559.76	4.0
Dairy products	14627.55	15084.68	3.1
Cattle and sheep	4128.76	4152.97	0.6
Pigs and poultry	11260.29	11806.32	4.8
Ruminant meat	5043.36	5316.62	5.4
Non-ruminant meat	7622.01	8285.39	8.7

Other processed agriculture	83037.75	84087.45	1.3

Source: GTAP simulation

While output for agricultural products increase, the output for non-agricultural products and services decreases even though tariffs for those products have not changed. Agricultural output is more expensive, and this raises the cost of production of downstream processed agricultural products. Since the share of agricultural inputs for non-agricultural production is low, the main reasons are general equilibrium effects. In addition, demand for primary resources such as land and labour in agriculture is increasing which raises the costs for these factors. Total value of output increases only slightly by 0.2 per cent.

Table 20 Change in unskilled labour demand in Mexico

Sector	Fixed wages	Wages/employment adjustment 50/50
	%	
Agriculture		
Paddy rice & proc rice	20.50	20.48
Other cereals	2.02	1.98
Sugar	1.02	1.01
Oilseeds	4.99	4.97
Vegetable oils and fats	3.97	3.99
Vegetables and fruit	0.15	0.11
Other crops	-0.39	-0.41
Milk	2.88	2.85
Dairy products	2.26	2.29
Cattle and sheep	-0.48	-0.50
Pigs and poultry	3.73	3.70
Ruminant meat	0.52	0.54
Non-ruminant meat	7.36	7.39
Other processed agriculture	0.54	0.56

Source: GTAP simulation

The impact on imports, exports and output is fairly robust regarding changes in the labour market assumption. This is also the case for changes of employment at the sectoral level. Table 20 shows the changes of the value of employment for unskilled labour in two different assumptions. In the first wages are fixed and all adjustment is absorbed by a change of employment. This is the standard assumption in this paper. Total employment of unskilled labour would decrease by 0.4 per cent. Behind this nationwide change is an increase of employment in the agricultural sector and a decrease in the non-agricultural sector. The value of employment in agriculture, i.e. wages times employment, increases by 1.4 per cent in agriculture while the value of employment in the non-agricultural sector would decrease by 0.02 per cent. Results are similar if the adjustment of changes in labour demand is shared equally by employment changes and wage changes. In this case total employment of unskilled labour would only decrease by 0.2 per cent but wages for unskilled labour would decrease slightly by about 0.06 per cent. Sectoral changes of the value of unskilled labour are similar.

Real land rents would increase in both scenarios by almost 5 per cent. Thus, if farmers own their land, the de facto impact on incomes would be a mixture of increased revenue from land rents and slightly decreasing wages.

An increase of tariffs to the MFN level in Mexico vis-à-vis imports from the US would have a strong redistribution effect. Similar but much smaller effects would result from a similar

exercise regarding trade with Canada. The agricultural sector would benefit while the other sectors would be worse off. The total welfare in Mexico is estimated to be reduced by about US$ 1.0 billion.

Taking into account that the free-trade agreement is a reciprocal preferential agreement, a scenario where Mexican tariffs are raised to its MFN levels could imply also higher rates on Mexican exports to the US. This would result in lower agricultural exports from Mexico to the US. Raising tariffs in the US to its MFN levels would reduce agricultural exports of Mexico by 13 per cent and reduce its increase in output by 60 per cent. Opposite employment effects in agriculture would almost neutralize and leave only a small positive effect in agriculture of 0.2 per cent but a small negative total employment effect of -0.01 per cent. Output in agriculture would, however, still increase since US mfn rates are considerably lower than Mexico's. Thus, excluding the agricultural sector in both Mexico and the US from preferential access would have higher effects on Mexico's imports than on its exports.

The effect from raising tariffs to MFN levels is likely to be different than leaving trade barriers at that level in the first place, i.e. excluding sensitive sectors from tariff reductions as this is frequently done with respect to agricultural products as shown by Peters et al. in this volume. Years of economic integration have increased the interdependency e.g. in terms of inputs being imported and led to a structural adjustment with some sectors having declined and others having expanded.

A scenario with a long term closure where capital is mobile and adjusts to the new trade policy, does not lead to very different results. The assumption can have a significant impact but in the MFN scenario the impact on the agricultural sector is not dramatic. The decline in employment in Mexico would be slightly higher at about 0.6 per cent compared to the lower reduction of 0.4 per cent in the standard MFN scenario. Sectoral changes in terms of trade and output are roughly similar to the changes above.

Labour

GTAP records information about payroll taxes which drive a wedge between what the employer pays and what the employee receives.[25] A payroll tax is often an important source of revenue for governments and social security systems but has negative economic effects on both the demand side and the supply side. It reduces workers' income and increases the costs of employers to hire a worker. In theory payroll taxes reduce the incentive to work and increase the incentive to substitute labour with other production factors. Reduction of payroll taxes can be an instrument to increase employment. As a policy instrument, this is frequently discussed. In the labour scenario the payroll tax on both unskilled and skilled labour is eliminated in the agriculture sector. Table 21 shows the initial payroll tax in the agriculture sector in Mexico in GTAP. The payroll tax is on average only 4 per cent for unskilled and 5 per cent for skilled labour.

Table 21 Payroll tax in agriculture on unskilled and skilled labour

Product	Unskilled	Skilled
	%	%
Agriculture		

---

[25] The data are not represented explicitly. They are implicit as the difference between different valuations of primary factor flows. Payroll taxes are the difference between market value and agents' value (where agents are employers of factors).

Paddy rice & proc rice	2.85	3.57
Other cereals	-0.88	-1.01
Sugar	2.78	4.87
Oilseeds	3.48	3.46
Vegetable oils and fats	5.59	5.59
Vegetables and fruit	2.53	2.49
Other crops	2.97	2.94
Milk	2.95	2.94
Dairy products	5.59	5.59
Cattle and sheep	2.48	2.46
Pigs and poultry	-0.72	-0.78
Ruminant meat	5.59	5.59
Non-ruminant meat	5.59	5.59
Other processed agriculture	5.59	5.59

Source: GTAP

Elimination of payroll taxes has a small impact on trade and output value. Total agricultural exports increase by 1 per cent and total agricultural imports decrease by 0.3 per cent. Total overall and total agricultural production values remain almost the same, though with some small variation in sectors. The total value of output increases by 0.1 per cent. This reflects the changing domestic prices that are falling due to the reduction in production costs. Output in real terms is increasing for all agricultural sectors and all non-agricultural sectors (Table 22).

Table 22 Changes in imports, exports and output (real) of Mexico from the world

Product	Exports	Imports	Output
	%	%	%
Agriculture			
Paddy rice & proc rice	2.9	-0.1	1.4
Other cereals	-0.4	0.6	0.2
Sugar	2.4	-1.0	0.4
Oilseeds	2.8	0.3	2.0
Vegetable oils and fats	1.5	-0.5	0.6
Vegetables and fruit	0.6	0.1	0.6
Other crops	2.7	-0.3	2.2
Milk	0.0	-1.5	0.5
Dairy products	3.2	-1.4	0.5
Cattle and sheep	1.4	-0.5	0.5
Pigs and poultry	0.0	0.1	0.2
Ruminant meat	3.1	0.0	0.5
Non-ruminant meat	1.7	-0.7	0.4
Other processed agriculture	1.4	-0.7	0.5

Source: GTAP simulation

The impact on employment in agriculture is clearly positive. The total value of unskilled employment in agriculture increases by 2.5 per cent. Employment in the sectors vegetable oils and fats, dairy products, ruminant and non-ruminant meant and other processed agriculture increase significantly by more than 5 per cent (Table 23). These are sectors in which the payroll tax was relatively high so that its removal had a significant impact. Total employment of unskilled labour in Mexico increases by 0.5 per cent.

Table 23 Changes in employment, unskilled labour

Product	Employment
	%

Agriculture

Paddy rice & proc rice	2.15
Other cereals	0.25
Sugar	1.80
Oilseeds	2.52
Vegetable oils and fats	5.24
Vegetables and fruit	0.97
Other crops	2.73
Milk	0.91
Dairy products	5.60
Cattle and sheep	0.87
Pigs and poultry	0.20
Ruminant meat	5.10
Non-ruminant meat	5.42
Other processed agriculture	5.27

Source: GTAP simulation

For skilled employment it is assumed that changes in demand for labour leads to changes in wages instead of changes in total employment as assumed for unskilled labour. Wages for skilled labour in Mexico rise modestly by 0.23 per cent (Table 24). Since skilled labour is mobile between sectors and agriculture employs only a small fraction of skilled labour in Mexico, skilled labour account for only 8.4 per cent of the wage bill, this small increase is still remarkable.

Table 24 Changes in factor prices

Product	Employment
	%
Whole economy	
Rent for land	1.55
Wage unskilled labour	0
Wage skilled labour	0.23
Capital	0.12
Natural Resources	0.12

Source: GTAP simulation

Eliminating the payroll tax in agriculture is an opportunity to increase employment in the sector. Although the payroll tax is on average not very high, removing it leads to an increase in employment of about 2.5 per cent in the agriculture sector. Government revenue may fall as a consequence of the tax cut. On the other hand, a tax cut can stimulate the economy and lead to more activity which in turn leads to higher revenues from other taxes. The general equilibrium model takes the effect on government revenue into account. Removing the payroll tax in agriculture leads indeed to a very small increase of government revenue and spending and to a small increase of the GDP. The total welfare effect in Mexico is at US$ 940 million positive though small.

R & D Scenario

About 13 per cent of total employment in Mexico is in agriculture producing 4 per cent of the national output (WB WDI, 2009 and 2010). Thus, labour productivity in agriculture in Mexico is, like in most developing countries, low compared with other sectors in the economy. While this partial productivity measures the output per unit of a particular input, the total factor productivity (TFP) measures output in relation to an index of inputs, usually the value weighted sum of all agricultural production components. TFP can be taken as a measure of technological progress that can be attributed to changes in agricultural research and development, human capital, infrastructure, extension services and government policies. A high productivity implies high competitiveness for given factor prices. In an open economy where domestic goods compete with goods from abroad the productivity is therefore very important.

Productivity in agriculture is low because labour is relatively unskilled and the amount of capital used with labour is small. Productivity could be enhanced by improving the quality of labour through an increase of farmer education and skills and by investments in physical capital such as infrastructure. Other factors also impact productivity. It has been shown that, public investments in institutions, extension services, training and technology research are important sources of increasing productivity in agriculture (Zepeda, 2001). Investment in developing and extending agricultural technology leads to high rates of return to such investment.

The R & D scenario, assumes a hypothetical one per cent increase in productivity of the Mexican agricultural sector. Increasing productivity is clearly desirable for an economy, but there are two negative impacts that could potentially outweigh the benefits. The increase in domestic supply may lead to a decrease in domestic prices of agricultural goods. In addition, if the technology change is labour saving, the productivity change may lead to a decrease in employment. A general equilibrium model can capture some of these effects.

Table 25 Changes in imports and exports of Mexico from the world and domestic output

Product	Exports	Imports	Output
	%	%	%
Agriculture			
Paddy rice & proc rice	6.4	-1.3	1.3
Other cereals	1.5	-1.0	0.2
Sugar	4.8	-3.1	0.4
Oilseeds	3.0	0.0	1.9
Vegetable oils and fats	5.4	-1.6	0.5
Vegetables and fruit	0.9	-0.5	0.6
Other crops	3.5	-1.0	2.2
Milk	8.7	-4.5	0.5
Dairy products	8.9	-3.9	0.5
Cattle and sheep	5.1	-2.3	0.5
Pigs and poultry	2.0	-0.8	0.2
Ruminant meat	8.5	-0.8	0.4
Non-ruminant meat	13.5	-5.2	0.3
Other processed agriculture	2.0	-1.0	0.4

Source: GTAP simulation

Exports from Mexico increase significantly by 3.4 per cent. Exports of meat and dairy products increase by more than 8 per cent. Rice exports increase by 6.4 per cent. Products where initial exports are high such as vegetables and fruits increase by a smaller percentage, e.g. 0.9 per cent. On the other hand, imports decrease for all agricultural products except

oilseeds. The impact on non-agricultural products is small. Exports decrease and imports increase slightly. Changes are less than 1 per cent, respectively.

The impact on employment is positive but small. Total employment of unskilled labour in agriculture increases by 1 per cent and is positive in most sectors (table xx). The total employment effect for Mexico is also positive but with an increase of 0.4 per cent of unskilled labour very small.

Table 26 Changes in employment

Product	Employment
	%
Agriculture	
Paddy rice & proc rice	1.1
Other cereals	-0.8
Sugar	-0.6
Oilseeds	0.7
Vegetable oils and fats	0.6
Vegetables and fruit	-0.2
Other crops	1.6
Milk	-0.7
Dairy products	0.8
Cattle and sheep	0.2
Pigs and poultry	0.1
Ruminant meat	0.7
Non-ruminant meat	1.8
Other processed agriculture	0.3

Source: GTAP simulation

The reason for the more significant change of exports and imports and small positive employment effects is that an increase of productivity leads to reduced factor demand for a given output. Thus, if the real output increases only slightly more than the productivity then the employment effect is small. Table 25 shows that the output effect is mostly below 1 per cent.

R & D programs that increase productivity show beneficial effects, but the benefits do not accrue solely to the workers. Much of the benefit may go to owners of capital and land, and to domestic and foreign consumers. In fact, if the labour mobility between sectors is in reality not as assumed here perfect but sluggish, workers in some sectors may be worse off as a result. Wages can also come under pressure. A program of increasing productivity by one per cent in the agricultural sector generally increases output in each agricultural sector and real GDP as a result. However, increased output drives down the output price, and the fall in prices more than offsets the increase in output. This implies the value of agricultural production falls, and with it employment in the agricultural sector. If real wages are fixed, some agricultural workers will seek jobs in the industrial and service sectors.

Despite these caveats, the productivity increase would have many positive implications for many of Mexico's states objectives. It leads to higher self-sufficiency ratios is agriculture, higher employment in the some agricultural sectors as well as total employment in Mexico and produces significant welfare gains of some $4.3 billion. Costs for the R & D programmes, however, would need to be deducted from those benefits.

Domestic Support

Mexico's domestic support is significant but lower than the average OECD farm support. The OECD calculated for 2010 an average producer support estimate of 18.3 per cent, driven by highly subsidizing countries such as Korea, Norway, Switzerland and Japan. The European Union and Canada are also close to the average. Mexico has a producer support estimate of 12.1 per cent. The United States has a significantly lower percentage rate at 7 per cent but had a much higher rate at above 20 per cent in the early 2000s.

Thus, Mexico is not at the higher end with its support of agricultural producers. According to its WTO commitments, it can provide trade distorting support under *de minimis* of up to 10 per cent product specific support. The scenario domestic support assesses the effect of raising domestic support on agricultural output to that level. Data in GTAP do not necessarily match exactly with the OECD estimates. One reason is that definitions of product specific support vary. Also, GTAP taxes do not fully correspond to the various complex and country specific support programmes. Furthermore, the producer support estimate aggregates output and input subsidies while these are separated in GTAP. Table 22 shows the initial and new output subsidies on agricultural products in Mexico.

Table 22 Support on output

Product	Initial	New
	%	%
Agriculture		
Paddy rice & proc rice	1.7	5.0
Other cereals	0.1	5.0
Sugar	-0.1	5.0
Oilseeds	4.8	5.0
Vegetable oils and fats	-0.1	5.0
Vegetables and fruit	0.8	5.0
Other crops	0.8	5.0
Milk	0.0	5.0
Dairy products	-0.1	5.0
Cattle and sheep	0.0	5.0
Pigs and poultry	0.0	5.0
Ruminant meat	-0.1	5.0
Non-ruminant meat	-0.1	5.0
Other processed agriculture	-0.2	5.0

Source: GTAP

Increasing domestic support to 5 per cent of the value of output in agriculture, leads to increasing exports and output for all agricultural products except oilseeds where the initial support value was already 4.8 per cent. Thus, relatively to the other sectors the support for this sector has declined. Imports increase for some products and decrease for others. Some imports increase due to the link in the value chain. If output for meat products increase, demand for imported feed increase, for example. .

Table 23 Changes in total imports, exports and output (real) of Mexico

Product	Exports	Imports	Output
	%	%	%
Agriculture			
Paddy rice & proc rice	7.5	2.9	5.8
Other cereals	1.5	2.5	4.2

Sugar	21.7	-8.4	3.4
Oilseeds	-10.5	8.1	-0.1
Vegetable oils and fats	28.0	-8.6	7.4
Vegetables and fruit	0.4	4.9	1.3
Other crops	0.9	4.3	2.6
Milk	16.7	-8.8	5.6
Dairy products	47.9	-17.4	5.8
Cattle and sheep	13.7	-4.5	5.3
Pigs and poultry	6.2	-2.9	5.4
Ruminant meat	45.3	0.2	5.8
Non-ruminant meat	71.6	-21.4	10.1
Other processed agriculture	11.8	2.9	4.3

Source: GTAP simulation

The impact on employment in the agricultural sector is positive. Employment increases in all agricultural sectors significantly and total unskilled employment in Mexico increase by 1.8 per cent.

Table xx: Change in employment of unskilled labour

Product	Employment
	%
Agriculture	
Paddy rice & proc rice	7.7
Other cereals	5.6
Sugar	5.5
Oilseeds	1.0
Vegetable oils and fats	8.7
Vegetables and fruit	2.5
Other crops	3.9
Milk	7.2
Dairy products	7.1
Cattle and sheep	6.8
Pigs and poultry	6.9
Ruminant meat	7.1
Non-ruminant meat	11.5
Other processed agriculture	5.6

Source: GTAP

Subsidizing output or inputs (not modeled here) supports the corresponding sector but is a costly policy for the rest of the economy. In trade theory it has been shown that under certain circumstances subsidies are welfare improving, e.g. when the subsidy has an impact on a countries terms of trade. This is unlikely for most agricultural products in Mexico. In general output subsidies are distorting and move resources into sectors where they are not used most efficiently. External effects, however, may economically justify subsidies. For example, when rural urban migration causes costs to the society that are not reflected in prices and when subsidies can prevent such migration certain subsidies may be rational. Though, unskilled labour employment increases and this is likely to have a poverty reducing effect, the policy may be poorly targeted as large industrial farms would disproportionately benefit from such a policy.

Therefore, despite the positive effects on output in the subsidized agricultural sector, and thus self sufficiency, employment and trade, input and output subsidies are distorting and may

only be provided in the case of external effects or if the positive effects are politically deemed more important than the costs for the rest of the economy.

Conclusion

Agriculture remains a very important sector for Mexico. Mexico's agricultural trade reform coincides with increasing imports, decreasing employment in agriculture and high poverty rates in rural areas. Imports have increased from all major trading partners and particularly from NAFTA members who supply more than 80 per cent of Mexico's agricultural imports. In recent decades, more staple crops and meat products have been imported and more fruits and vegetables and certain processed agricultural products have been exported.

The appropriate policy measures to strengthen the agricultural sector depend on the specific objectives. Policies to reduce poverty and rural urban migration differ from those that increase export revenue or maximize agricultural output. The policy options are limited due to Mexico's commitments in trade agreements. A stated objective is to use the existing policy space with a view to enhancing Mexico's benefits from its agricultural sector including in increasing the number of jobs in the sector, reduce dependency on imports and promoting exports in agriculture.

- Renegotiating RTAs to enable Mexico to impose tariffs on agriculture has been discussed in Mexico. Imposing MFN tariffs on imports from its largest trading partner, the US, would be beneficial for the agricultural sector if no tariffs on Mexico's exports would be applied. Imports would decrease and output increase. Employment in the agricultural sector would increase but decrease in the non-agricultural sector. If tariffs in the US on Mexico's imports would be applied, exports would decrease and opposite employment effects in agriculture would almost neutralize and leave only a small positive effect in agriculture of 0.2 per cent but a small negative total employment effect of -0.01 per cent.
- Removing the payroll tax in agricultural would have a small effect on trade and output but is an opportunity to increase employment in the sector. Removing the payroll tax leads to a small increase of the GDP. The total welfare effect in Mexico is with US$ 940 mill. positive though small.
- Mexico has a low productive agricultural sector and spends relatively little on research and development. Supporting activities that would lead to a higher productivity has a positive effect on output and exports. Imports would be lower and thus self sufficiency rate would increase. The impact on employment is positive but very small.
- Subsidizing output in agriculture or providing input subsidies would have a positive effect on production, exports and employment in the agricultural sector but could move resources to less efficient activities. It would involve costs for the rest of the economy.

In interpreting the results, several limitations ought to be kept in mind. This analysis is lacking in that the domestic support and the R&D policies are implemented without taking account of the costs of such programmes. However, the analysis here shows the distribution effects and does not focus on national welfare effects.

The analysis also assumes that the scenarios would be implemented as specified. The MFN scenario is purely hypothetical and is unlikely to be politically feasible. However since it was proposed by leading politicians, it is important to analyze it.

A further limitation is the data. No specific data are available on para-tariffs and non-tariff measures. As tariffs are changed, these other impediments are likely to play a role. Finally, the model used here is static, with no account taken of dynamic gains relating to technology, competition and productivity growth. Nor has account been taken of the one-off costs of structural adjustment, such as temporary unemployment.

Nevertheless, the results have important implications for policy makers. Policies that increase distortions may strengthen the agricultural sector in terms of higher output, exports and employment but are likely to have adverse effects on the remaining economy. Removing payroll taxes and policies that increase agricultural productivity instead have positive effects for both the agricultural sector and the economy as a whole.

Bibliography

Alston, J. (2010), "The Benefits from Agricultural Research and Development, Innovation, and Productivity Growth", OECD Food, Agriculture and Fisheries Working Papers, No. 31, OECD Publishing. http://dx.doi.org/10.1787/5km91nfsnkwg-en

Babcock, B. (2011), "The Impact of US Biofuel Policies on Agricultural Price Levels and Volatility", ICTSD Programme on Agricultural Trade and Sustainable Development; Issue Paper No. 35; ICTSD International Centre for Trade and Sustainable Development, Geneva, Switzerland. www.ictsd.org.

Dimaranan, B., Hertel, T. and Keeney, R. (2003), "OECD Domestic Support and Developing Countries," Working Papers UNU-WIDER Research Paper

Hertel, T.W. (ed.) 1997. Global Trade Analysis: Modeling and Applications. Cambridge University Press. Cambridge.

Jotanovic, Aleksandar and Gilmour, Brad, (2009), NAFTA: Outcomes, Challenges and Prospects Agricultural Policy Issues 2(2), Agriculture and Agri-Food Canada. http://ageconsearch.umn.edu/bitstream/55321/2/nafta_e.pdf

Khor M (2007). "Bilateral free trade agreements: An outline of elements, nature and development implications". Paper presented at the UNCTAD Ad Hoc Expert Group Meeting on The Development Interface between the Multilateral Trading System and Regional Trade Agreements, Geneva, 15–16 March 2007.

Mckinley, J.C. Jr. (2008), "Mexican Farmers Protest End of Corn-Import Taxes", The New York Times, United-States, February 1, 2008, p.10.

McMillan, M. and D. Rodrik (2011), "Globalization, structural change and productivity growth", in Making Globalization Socially Sustainable, Baccetta, M. and M. Jansen (eds.) WTO and ILO.

NAFTA, North American Free Trade Agreement, Chapter Seven, Agriculture

Pasadilla, G. (2006) "Preferential Trading Agreements and Agricultural, Liberalization in East and Southeast Asia", Asia-Pacific Research and Training Network on Trade, Working Paper Series, No. 11, April 2006.

Polaski, S. (2006), "The employment consequences of NAFTA". Testimony submitted to the Senate Subcommittee on International Trade of the Committee on Finance. Carnegie Endowment for International Peace, Washington, DC, September.

Prina, S. (2010), Who Benefited More from NAFTA: Small or Large Farmers? Evidence from Mexico.

Stiglitz, J. and A. Carlton (2005), "Fair Trade for All: How Trade Can Promote Development", Oxford University Press.

The Economist (2008), "The Americas: Tariffs and Tortillas; Mexico and NAFTA", The Economist, United Kingdom, January 26, 2008, vol. 386, issue 8564, p.59.

OECD (2010), "Producer and Consumer Support Estimates: Producer support estimate composition 2010", *OECD Agriculture Statistics* (database).

http://prospectjournal.ucsd.edu/index.php/2010/04/nafta-and-u-s-corn-subsidies-explaining-the-displacement-of-mexicos-corn-farmers/

UNCTAD (2011), Evolution of the international trading system and of international trade from a development perspective. TD/B/58/3

Wise, T. (2009), "Agricultural Dumping Under NAFTA: Estimating the Costs of U.S. Agricultural Policies to Mexican Producers", Global Development and Environment Institute Working Paper No. 09-08. Tufts University.

World Bank (2008), "World Development Report: Agriculture for Development". Washington DC.

Yunez-Naude, A. and Valeria Serrano-Cote (2009), 'Liberalization of Staple Crops: Lessons from the Mexican Experience in Maize', International Association of Agricultural Economists Conference, August 16-22, 2009, Beijing, China. http://ageconsearch.umn.edu/bitstream/50827/2/Paper%20%23%20586.pdf

Zepeda (2001), "Agricultural investment, production capacity and productivity", in Agricultural investment and productivity in developing countries, FAO 2001

Annex
Table: US MFN tariffs on Mexico imports

Product	Initial	MFN
	%	**%**
Agriculture		
Paddy rice & proc rice	0	2.59
Other cereals	0	0.43
Sugar	27.27	26.00
Oilseeds	0	6.54
Vegetable oils and fats	0	4.95
Vegetables and fruit	0.63	4.72
Other crops	0	3.63
Milk	0	-
Dairy products	2.22	18.48
Cattle and sheep	0	0.29
Pigs and poultry	0	0.74
Ruminant meat	0	7.92
Non-ruminant meat	0	3.23
Other processed agriculture	0.09	4.11