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The Competitiveness of Mexico's Apple Imports

A Case Study of the U.S.

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Abstract: The revealed comparative advantage, price competitiveness, market penetration rate, market share, and stability coefficient were applied to examine the competitiveness of apple demand from the major exporters to the Mexican market. During 2012-2016, The US had a higher rate of the revealed comparative advantage, price competitiveness, market penetration rate, and market share comparing to other competitors. However, U.S. apples received a lower stability coefficient rate than competitors from the period spanning from 1992 to 2016.

Keywords: US, Mexico, RCA, price competitiveness, market penetration rate, market share, stability coefficient

القدرة التنافسية لاستيراد التفاح في المكسيك: دراسة حالة للولايات المتحدة

الملخص: تم تطبيق الميزة النسبية، والقدرة التنافسية للأسعار، ومعدل اختراق السوق، والحصة السوقية، ومعامل الاستقرار لدراسة القدرة التنافسية لطلب التفاح من المصدرين الرئيسيين إلى السوق المكسيكية. خلال الفترة من ٢٠١٢-٢٠١٦، أظهرت النتائج أن الولايات المتحدة حصلت على أعلى معدل من الميزة النسبية، والقدرة التنافسية للأسعار، ومعدل اختراق السوق، وحصة السوق مقارنة بالمنافسين الآخرين. ومع ذلك، فقد تلقى التفاح الأمريكي معدل معامل استقرار أقل من المنافسين من الفترة الممتدة من عام ١٩٩٢ إلى عام ٢٠١٦.

الكلمات الرئيسية: الولايات المتحدة، المكسيك، RCA، تنافسية الأسعار، معدل اختراق السوق، الحصة السوقية، معامل الاستقرار

Introduction:

In general, agricultural markets used to be a risk and uncertainties. Uncertainties of climate changes and agricultural diseases. Risks of price fluctuation as well as marketing issues. These uncertainties cannot control by a human that led to a variation in market prices (growers are suspicion of the probabilities of expected returns). Similarly, fresh apple crops are one of the agricultural products which vulnerable to risk and uncertainties.

Apples are seasonal crops need almost a year to be cultivation. Moreover, during the period of agriculture, the farmer expected their quantities production at the begging of farming (to give the highest possible returns) and could not be controlled if the uncertainties exist during the planting period (in short run).

World agricultural production raises from 2012 through 2016 posted at 3%, with higher consumption and lower export value. On the other hand, world fresh apple production grown by 12%, global consumption increased by about 11.7%, and export value rising by 1.2% (FAO, 2018).

This show the importance of this product in the global market comparing to the other product. Among the fresh apple market, this market needs more investment due to the increase in gap trade, between the import and export value, by 40% during the same period (FAO, 2018).

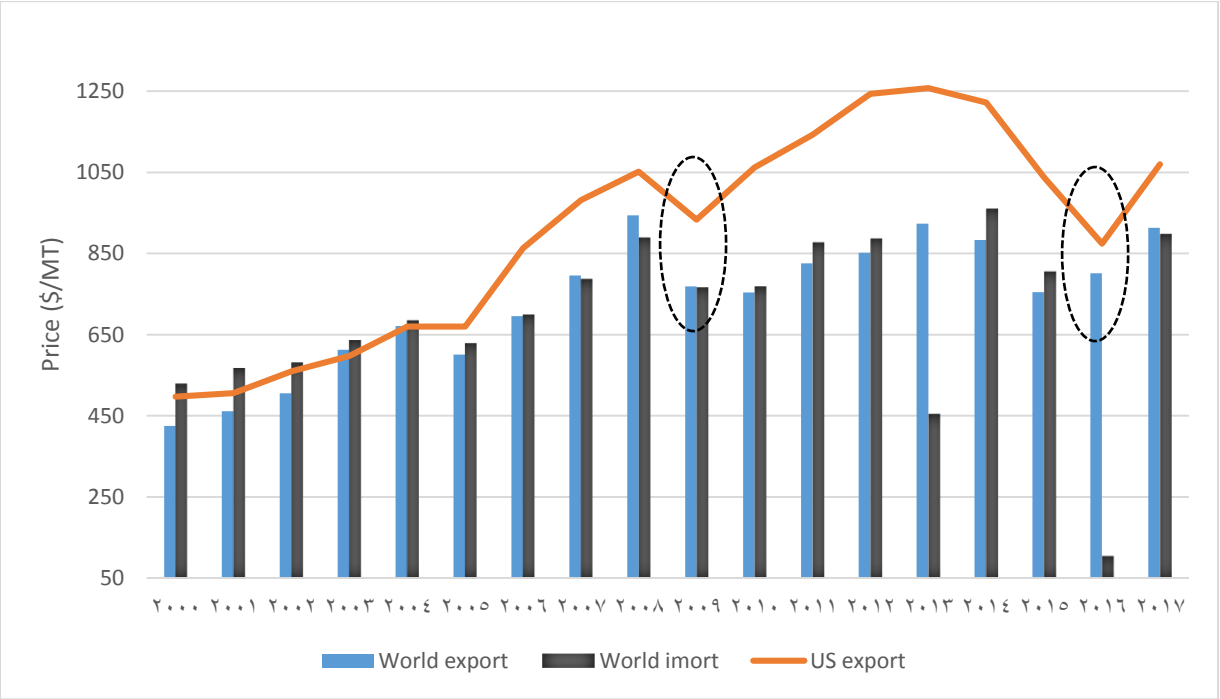
US fresh apple growers face a big problem related to the fluctuate in domestic price. From the data in (FAO, 2018), we found that the producer received an $818 /MT in 2012 but fell to $754/MT in 2015. The gap between the producer price and export price led the growers to look for more gain by border trade. The growers will increase the amount of apple export to remove the risk of domestic price fluctuation.

World apple trade prices were fluctuation. In 2016, world import prices were dropping heavily by 808% comparing to 2014. However, apple trade in the US gets a higher return than the world. It was noted from figure1 that the export price of the US apples was higher than the world price. At 2009 and 2016, the global export quantity exceeds the import quantity with increases in world production. US export price drop by 40% during the same time but the price was above the world price (PSD, 2018); (GATS, 2018). Reed (2016) describe the value fluctuation in trade market were due to the exchange rate change, the partner GDP, tariff, and change in domestic price. Therefore, we believe the drop in 2009 happened due to the massive fall in the annual percentage growth rate of Mexican GDP after the global financial crisis in 2008 (World Bank, 2018).

Also, in June 2009, the Mexican Plant Health Authorities prohibited the US fresh apple came from California because of the impacted of apple moth pest (Flores and Ford, 2009). While in 2015, the US and China reached a trade agreement to allow US fresh apple to access the Chinese market, which led to increasing the US export by 83.8% to China market compared to 2014. We believe that growers continue to raise their production amount, which led to a surplus in apple crops (as demand theory increasing the amount will lead to a decrease in the price). Also, the US export price to China market was more significant than the Mexico market by 74.8%. (Gale & Huang, 2016; GATS, 2018). Also, Flores et al., (2016) mention that the decrease in the amount of Mexico import was a result of the depreciation of the peso versus the dollar and the enjoined antidumping duties on US apples at 2016.

GATS data show that the balance trade had a negative sign starting in 2015 in total agriculture. A fresh apple is one of the most important food crops in the world. It accounts one of the economist product, because of the high level of share market of the US fresh apple export. In 2017, 5% of the total agricultural export value came from fresh fruit. More than 8% of fresh fruit export value came from a fresh apple.

Figure (1): Fresh Apple price ($/MT) during the period 2000 to 2017



Source: GATS: Global agricultural trade system online, USDA, Foreign Agricultural Service, 2018.

In this paper, we examine the US fresh apple export to the Mexican market. In 2017, the US fresh apple export accounted for 11% of the total export quantity of the world fresh fruit. At the same time, it accounts for 38% of the total export value of fresh fruit to Mexico and about 44% of the total export quantity. Its essential trade product, especially for three states which account for almost 98% of the US apple export to the Mexican market, which was Washington 46%, Arizona and California 26% each (GATS, 2018). The Mexican consumers prefer the US apples due to the color, size, and sweeter of the product. They prefer Red and Golden Delicious than other varieties because of the longer life of these products. While for cooking and backing, they prefer Rome Beauty (Flores and Ford, 2009).

In this context, it is important to study the competitiveness of some U.S. agricultural exports, especially apple crops,

Because it is of relative importance to the value of U.S. agricultural exports, representing about 14% of the value of total world exports in ٢٠١٦. The U.S. export value of apples was 7.3% of the average value of U.S. agricultural exports from 2012 to 2016. The value of the growth rate for U.S. agricultural exports declined by about 5.8% between 2008 and 2016, despite the increase in export values by about 22.8% during the same period.

This research aims to analyze the current structure market of US exports of apples, with highlighting the comparative advantage of this crop and the competitive status in the world market for the most apples exporting countries to Mexico.

Methodology:

This research applied some competitiveness indicators of apple demand from the major exporters to the Mexican market. These indicators were estimated for each country and are presented as follows (Pavithra al et, 2014; Alamri and Saghaian, 2018; WITS, 2018):

1. **Revealed comparative advantage (RCA)**:

The higher index value of the supplier country compared to any competitive country means higher competitiveness in foreign markets, and vice versa. If the index is higher than one, this means that the supplier country has a revealed comparative advantage in apples. The RCA can be calculated for any commodity through the following equation:

$$RCA_i = \frac{\frac{X_t^i}{\sum_i X_t^i}}{\frac{X_t^w}{\sum_i X_t^w}}$$

Where: RCA_i= the revealed comparative advantage of exporter countries for apples compared to competing countries, X_t^i = apple export value from i country to the market, $\sum_i X_t^i$ = the total agricultural export value of i country to the world, X_t^w = the global apple export value, and $\sum_i X_t^w$ = total global agricultural export valued.

2. **Price competitiveness (PCi):**

The ratio between the competing country average export prices of apples to the U.S. and the average export price of apples. It is calculated as follows:

$$PC_i = \frac{P_j}{P_{US}}$$

Where: P_j = The competitive country average export price of apples, and P_{US} = the U.S. average export price of apples.

An increase in the index value of greater than one means increasing competitiveness of the U.S. in the Mexican market, and vice versa.

3. **Market penetration rate (MPR):**

The penetration rate of the market is one of the most competitive measurement standards of any exporting country, because it represents a measure of the acceptance and absorption of the commodity exported to foreign markets, and demonstrates the possibility of increasing exports of that commodity in those markets. It is a ratio between the country's exports of apple and its consumption in Mexico. It is estimated in the average period and calculated using the following equation:

$$MPR \quad = \frac{X_i}{Q_{MX} + IM_{MX} - X_{MX}}$$

Where: X_i = country i export quantity of apples, Q_{MX} = Mexico's production of apples, IM_{MX} = Mexico's import quantity of apples, and X_{MX} = Mexico's export quantity of apples.

The higher the index value of the U.S. compared to any competitive country, the higher the competitiveness in the Mexican market, and vice versa.

4. **Market share (MR):**

The market share is one of the indicators for measuring competitiveness and assessing the possibility of developing the competitive conditions of exporting countries in foreign markets. The high value reflects the highly competitive position of the country in international markets for apples. The market share was calculated according to the following equation:

$$MR = \frac{X_i}{\sum X_{MX}}$$

Where: X_i = export quantity of apples from country i to the Mexican market. $\sum X_{MX}$ = Total Mexican import quantity of apples.

5. **Stability Coefficient (SC):**

If the stability coefficient value equals zero, this indicates the optimal state of export stability. The higher the value of the coefficient above zero, the greater the instability of exports. The stability coefficient was calculated according to the following equation:

$$SC = \frac{|X_i - \hat{X}_i|}{|\hat{X}_i|}$$

Where: X_i = actual value of the i country export quantity in a given year, and $\hat{X}_i$ is the estimated value of the exported amount in the same year[1].

Data: import and export data of Mexican apple trade were collected from the Food and Agriculture Organization (FAOSTAT) and the United States Department of Agriculture (USDA).

Empirical results:

1- Revealed comparative advantage:

As shown in Table (1), we found that Chile, New Zealand, and the U.S. had a revealed comparative advantage (RCA>1), with Chile displaying the highest revealed comparative advantage, followed by New Zealand and the U.S. However, Canada had a revealed comparative disadvantage (RCA<1).

[1] First, we run the regression of the export trend, and then we get the estimated value of the export.

Table (1): Revealed Comparative Advantage of the supplier of apple to Mexican market during the period 2012-2016

Average	i_{th} country export value of Apple 1000$	Total i_{th} country agriculture export value 1000$	World Apple export value 1000$	Total world agriculture export value 1000$	**RCA**
USA	1050485	143858706	7384483	1333159943	1.318305
Canada	35175.6	44466665.4	7384483	1333159943	0.142813
Chile	729931	11087946	7384483	1333159943	11.88483
New Zealand	411207.6	21177597	7384483	1333159943	3.505473

Source:
* FOASTAT, the Food and Agriculture Organization of the United Nations (FAO).
* The United States Department of Agriculture (USDA), GATS.

2- Market share:

The U.S. had the highest percentage of the apple trade with the Mexican market to fulfill their need for apples. Mexico obtained about 97.8 % of its total imports of apples from the U.S., followed by Chile at about 1.6%, Canada at about 0.4%, and New Zealand at about 0.2%, as shown in Table (2). Previous results indicate that the U.S. dominated the majority of Mexico's market share of apples.

Table (2): Market share of the supplier of apple to Mexican market during the period 2012-2016

Year	Export Quantity Tones	Export Value 1000$	Import Quantity Tones	Import Value 1000$	Production Tones	Canada Tones	Chile Tones	New Zealand Tones	USA Tones
2012	261	483	235893	291284	375045	1696	5438	632	228110
2013	269	526	274978	344048	858608	859	4393	456	269270
2014	305	589	235502	277467	716865	1045	4839	164	229454
2015	313	511	306402	279849	750325	649	1809	772	303171
2016	1656	1756	212678	234837	716931	629	3984	21	208044
Avg	560.8	773	253090.6	285497	683554.8	975.6	4092.6	409	247609.8
Market share						0.40%	1.60%	0.20%	97.80%

Source:
* FOASTAT, the Food and Agriculture Organization of the United Nations (FAO).
* The United States Department of Agriculture (USDA), GATS.

3- Market penetration coefficient:

Table (3) shows the high market penetration of U.S. apples compared to competing countries such as Chile, Canada, and New Zealand. For the U.S., it reached about 0.26, while in other competing countries it reached about 0.001 (Chile), 0.004 (Canada), and 0.0004 (New Zealand, as an average of the period spanning from 2012 to 2016. This may be due to the decline in both Mexico's production and its import sources.

4- Price competitiveness coefficient:

In reviewing the price competitiveness index between the U.S. and competing countries in the export of apples to Mexico we observed that the U.S. has a price competitiveness advantage for apples in Chile and New Zealand. The U.S. price competitiveness index for these countries was about 94% and 76%, respectively, for the period spanning from 2012 to 2016. The price competitiveness index between the U.S. and Canada shows that U.S. prices exceed the Canadian export price of about 101% as an average (Table 4).

Table (3): Market Penetration Coefficient of the i^{th} supplier of Apple into the Mexico market during 2012-2016 (Tones)

	Import from				Production	Total import	Total export
	USA	Canada	Chile	New Zealand			
Average	247609.8	975.6	4092.6	409	683554.8	253090.6	560.8
Market Penetration Coefficient	26.42%	0.10%	0.44%	0.04%			

Source:
* FOASTAT, the Food and Agriculture Organization of the United Nations (FAO).
* The United States Department of Agriculture (USDA), GATS.

Table (4): Price competitiveness Coefficient of the i^{th} supplier of Apple into Mexico market during 2012-2016

Year	Export price ($/Ton)				Price competitiveness between		
	Canada	Chile	New Zealand	USA	USA- Canada	USA-Chile	USA-New Zealand
2012	1323.70	1241.08	1362.34	1233.60	0.93	0.99	0.91
2013	1171.13	1341.22	1622.81	1249.34	1.07	0.93	0.77

2014	958.85	1207.07	1908.54	1178.07	1.23	0.98	0.62
2015	1053.93	1067.44	1227.98	911.32	0.86	0.85	0.74
2016	1176.47	1187.00	1428.57	1102.35	0.94	0.93	0.77
Average					1.01	0.94	0.76

Source:
* FOASTAT, the Food and Agriculture Organization of the United Nations (FAO).
* The United States Department of Agriculture (USDA), GATS.

5- Stability coefficient of export quantity, value and price of apples:

Regarding estimation and analysis of the stability degree of the quantity, value and export price of apple exports, as shown in Table (5), the overall mean of the stability index of apple exports to Mexico from 1992 to 2016 was 21%, 10%, 12% 9%, for Canada, Chile, New Zealand, and the U.S., respectively.

These results indicate that export quantities from these countries during the period of study are relatively stable, as the closer the value of the general index to the degree of stability to zero, the greater the indication of stability.

As for the general index of the stability coefficient of export values of apples to Mexico during the study period, there were about 13%, 28%, 20% and 22% for Canada, Chile, New Zealand, and the U.S., respectively.

Regarding the average of the stability coefficient of the export price of apples to the Mexican market during the study period, it reached about 10%, 16%, 17%, 12%, for Canada, Chile, New Zealand, and the U.S., respectively. These results indicate that the value and export price of these apples during the study period were stable.

From the above, the stability coefficient for U.S. export values was less than competitors, which may be an obstacle to the ability of American apples to maintain the high share of the Mexican market, as stability is an important indicator of the competitiveness of apples.

Conclusion:

The revealed comparative advantage, price competitiveness, market penetration rate, market share, and stability coefficient were applied to examine the competitiveness of apple demand from the major exporters to the Mexican market. All of these indicators show that the U.S.
exports of apples dominated in the Mexican market compared to other competitors. U.S. apples received the highest share from the period spanning from 1992 to 2016.
It is expected that the growers who are investing in apple crop have a high cost (Flores and Ford, 2009). The main significant benefit that US apple growers get from the Mexican market is lower transportation cost and no tariff impose on US export (NAFTA agreement).

The decline in the share of U.S. apples exported to international markets given their instability and growth in demand, especially in the last years, as well as possibilities for maintenance and development of global markets. Therefore, we recommend more studied on the competitiveness affect the price of the Mexican apple market.

Table (5): Stability Coefficient of the exports quantity, value and price of apples to the Mexican market during 1992-2016

Year	Canada			Chile			New Zealand			USA		
	Value	Quantity	Price	Value	Quantity	Price	Value	Quantity	Price	Value	Quantity	Price
1992	3%	12%	44%	220%	8%	55%	5%	20%	22%	69%	3%	36%
1993	18%	20%	19%	50%	11%	15%	1%	15%	12%	36%	5%	20%
1994	14%	13%	9%	20%	18%	17%	7%	25%	18%	68%	31%	14%
1995	15%	17%	4%	36%	3%	23%	53%	11%	32%	35%	10%	15%
1996	37%	48%	5%	28%	5%	27%	68%	8%	51%	21%	4%	12%
1997	8%	24%	14%	6%	15%	9%	10%	3%	5%	13%	12%	1%
1998	8%	6%	6%	1%	14%	10%	8%	4%	13%	14%	6%	8%
1999	2%	2%	11%	12%	6%	14%	19%	27%	7%	15%	1%	15%
2000	2%	0%	6%	37%	24%	13%	23%	30%	41%	18%	2%	18%
2001	4%	0%	14%	26%	9%	28%	46%	10%	40%	19%	8%	23%
2002	6%	7%	11%	19%	6%	9%	23%	8%	29%	30%	11%	18%
2003	0%	12%	1%	29%	0%	24%	10%	9%	17%	37%	20%	17%
2004	11%	17%	5%	16%	19%	25%	16%	19%	2%	37%	30%	7%
2005	2%	6%	15%	30%	0%	25%	2%	5%	5%	22%	4%	16%
2006	13%	0%	1%	17%	10%	21%	27%	14%	15%	19%	12%	4%
2007	1%	15%	4%	13%	14%	3%	11%	6%	4%	9%	10%	6%
2008	2%	2%	6%	7%	10%	2%	22%	17%	5%	0%	5%	10%
2009	37%	37%	7%	9%	5%	1%	17%	4%	12%	2%	6%	6%
2010	28%	32%	0%	12%	14%	0%	26%	11%	15%	3%	1%	4%
2011	19%	32%	15%	12%	6%	6%	14%	8%	5%	12%	5%	9%
2012	2%	16%	16%	15%	2%	16%	13%	13%	1%	23%	8%	15%
2013	14%	27%	24%	27%	5%	19%	18%	2%	21%	22%	8%	13%
2014	19%	54%	15%	19%	1%	14%	20%	1%	20%	14%	6%	7%
2015	27%	49%	0%	18%	25%	4%	20%	7%	13%	4%	17%	11%

2016	25%	66%	6%	11%	10%	7%	33%	12%	19%	8%	10%	0%
Average	13%	21%	10%	28%	10%	16%	20%	12%	17%	22%	9%	12%

Source:

* FOASTAT, the Food and Agriculture Organization of the United Nations (FAO).
* The United States Department of Agriculture (USDA), GATS.

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