

Influence of import and export prices on grain market during bubble and non-bubble periods

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Essentially, during an economic bubble is when we witness the price go either above or below the true fundamental value as determined by the market. This means that in any market regardless of the commodities being traded is bound to experience these bubble and non-bubble periods so long as there is trade occurring. Thus the case has been no different in the grain market that is especially very volatile in terms of prices fluctuation happening due to external and more so internal factors.

It is worthwhile to note that all these price bubble issues have only risen recently in 2000 as previously investors had majorly concentrated on technological investments and this was major during what we would call the digital era. But it was not until when the bubble finally burst in the commodity markets when now products like grains became an investment choice for many investors that was triggered heavily by the fluctuations in the energy sector. Thus we can find influential investors with millions of tons of grain in their stores but are not planning on how to add value to it by maybe processing it to a certain product but rather holding it for speculative purposes with the idea of selling for a huge profit. This has however had a great impact on the import and export prices on the grain future market. The purpose of this paper is to analyze the price impact of the quantity/price of import and export in market during non-bubble and bubble period.

Researchers have done analysis to establish the causes of agricultural future price movements during bubble and non-bubble periods. Researchers have identified increasing demand for food, lower rates of food production, fluctuation in energy prices, and speculation as key factors. Not every researcher, however, appreciates one factor to be playing a pivotal role in the price movement causes than the other (Xiaoli, Scott, & Philip, 64). Alternatively, most of these

earlier studies agree that demand and supply factors play a major role in the movements of prices of agricultural commodities.

The demand for more agricultural commodities has been one of the major factors for price movements during bubble and non-bubble periods. Growing world population has resulted in growing demand for agricultural products, particularly population growth in countries such as China and India (Xiaoli, Scott, & Philip, 64). When the market projects the high demand for the agricultural products, then the prices of these goods rise. Therefore, people will have to pay higher prices in order to acquire food and this can happen either during bubble and non-bubble periods. Also Joseph wrote the new article that 2008 cotton price was driven by precautionary demand and 2011 cotton price was caused by the supply (Joseph P. Janzen, Aaron Smith, Colin A. Carter).

The second reason for the future movements in prices of agricultural products is the low production of these goods. The majority of people in many parts of the world are moving to the city to find career opportunities while deserting food-producing ventures. This leads to fewer individuals producing food. Moreover, the population levels has increased the demand for land for setting up residential homes which in turn end up reducing the proportion of land that was being used for agriculture (Thürer 35). Also, low production could be majorly attributed to climatic conditions especially the partial drought and also flooding conditions that were experienced in most parts of the world around 2010. We can see 47 percent increase in wheat prices around the world. As much as increase happened in Russia and spilled across the board to even Canada and Australia markets due to the competition of crops and the limited resources allocated to them. Therefore, the food production in many areas of the world cannot satisfy the market demand and thus making the prices of most of these products unstable.

Thirdly, fluctuation in energy prices is another reason for the price movements of agricultural products during bubble and non-bubble periods. When the prices of energy goes up for instance, it will increase the price of farming inputs such as fertilizers (Thürer 35). Moreover, machinery such as plowing tractors and Lorries that transport seeds and farm inputs use energy that are of high prices. When the farmer incurs high production costs in his or her farming process, he or she will have to sell the produce at a higher price in order to cover the expenditure. In the end, when the agricultural goods get in the market, they will be sold at higher prices. On the other hand, when energy products are of low prices, then the agricultural foods in the market will be sold at lower prices thus being a factor that affects price movements of agricultural products.

Fourth, speculations are the last cause of movement of prices of agricultural products. When the people in each market speculate that the supply of agricultural food commodities will reduce, they will go out to buy in bulk so that they can keep for future use (Thürer 35). This thus increase the demand of these products, which end up causing their prices to increase. On the other hand, if the population speculates that the supply of agricultural products will increase in the near future, then they will reduce their expenditure on these goods with the hope that they will get them at a lower price when they are oversupplied in the market. Therefore, these speculations of users of agricultural prices end up cause the prices of agricultural products to move.

The Food and Agricultural Organization has, however, pointed out that biofuels crops like corn are going to be the new threat that will affect import and export since there is a rise in energy-related demand that will absorb such crops. Generally, the production of biofuel crops will be the new alternative in terms of land use and will eventually have a major impact on agricultural

production. All these revolve around the constraints of oil production which is not sustainable and thus the alternative is turned to biofuels and eventually impact greatly the demand for oil by emerging markets. Oil basically is a major player when it comes to propagating trade and thus shocks experienced in its demand and supply result to significant price fluctuations in these markets.

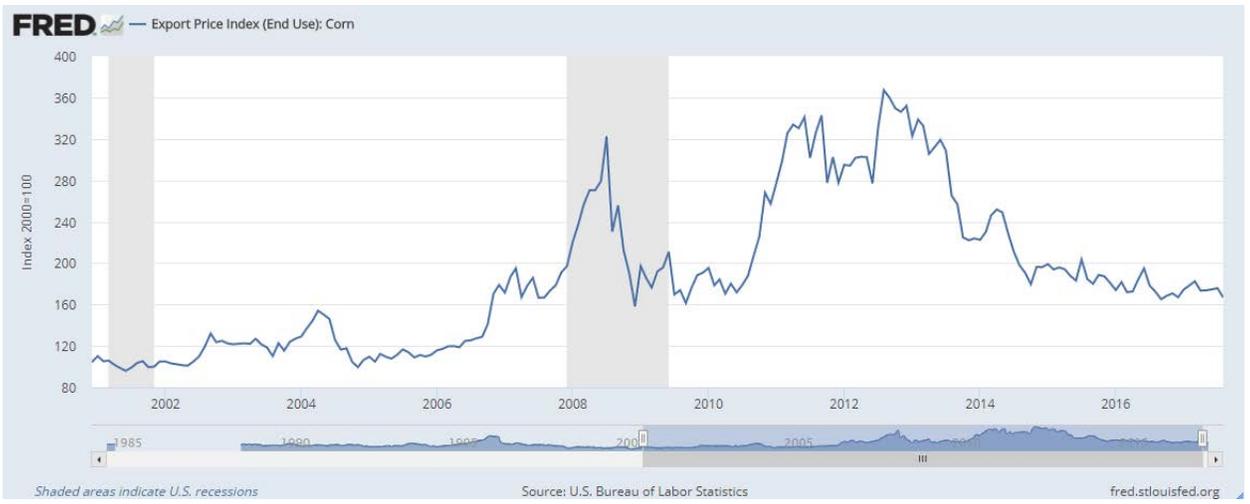
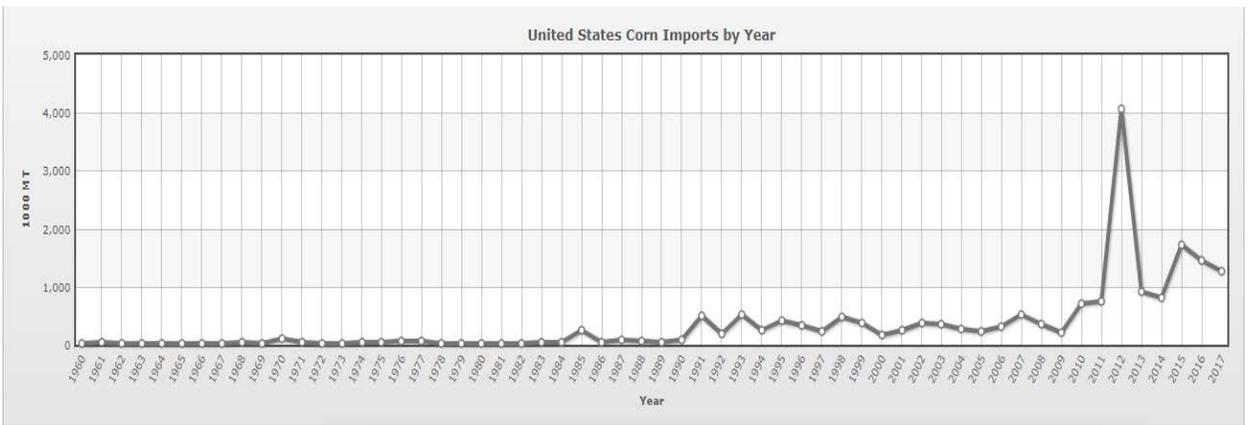
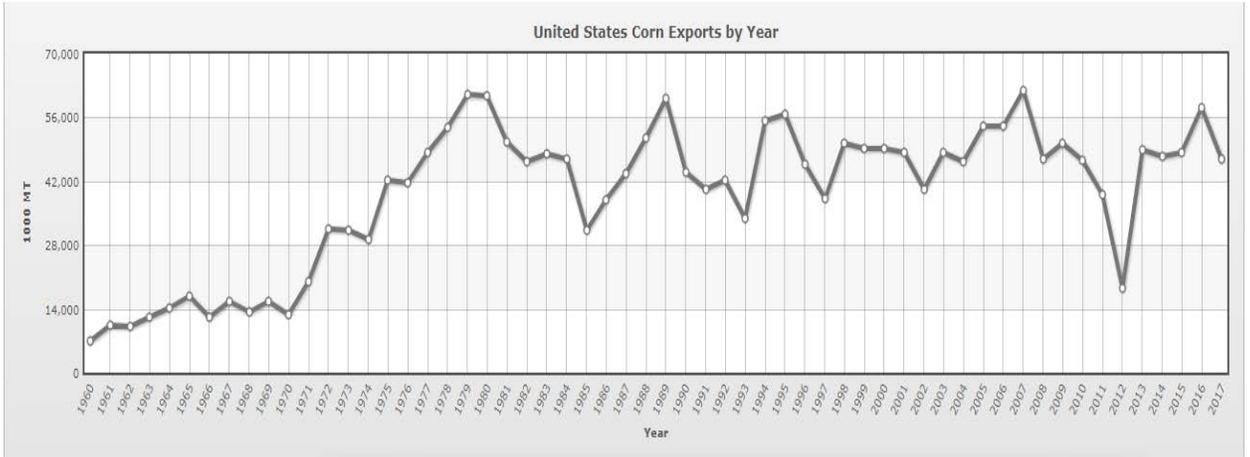
With regard to biofuels and them being a clear alternative, there is still a lot of contention since new-energy would really affect food prices. It is important to note that most countries heavily rely on government subsidies since there is always a deficit in the import and export of commodity goods, thus shifting to biofuels would also call for such subsidies. The main reason behind government support the subsidies is the end goal of being self-reliant on energy and also reduced the impact on the environment. Biofuels can eventually benefit society but cannot be quite understandable to producers. Producers will acquire more land for production but will also raise controversy on environment conservation and benefits. In terms of policy implementation, there may be still other alternative ways to solve this problem in a bid to the quantity of imports and exports geared towards price control in the grain future markets.

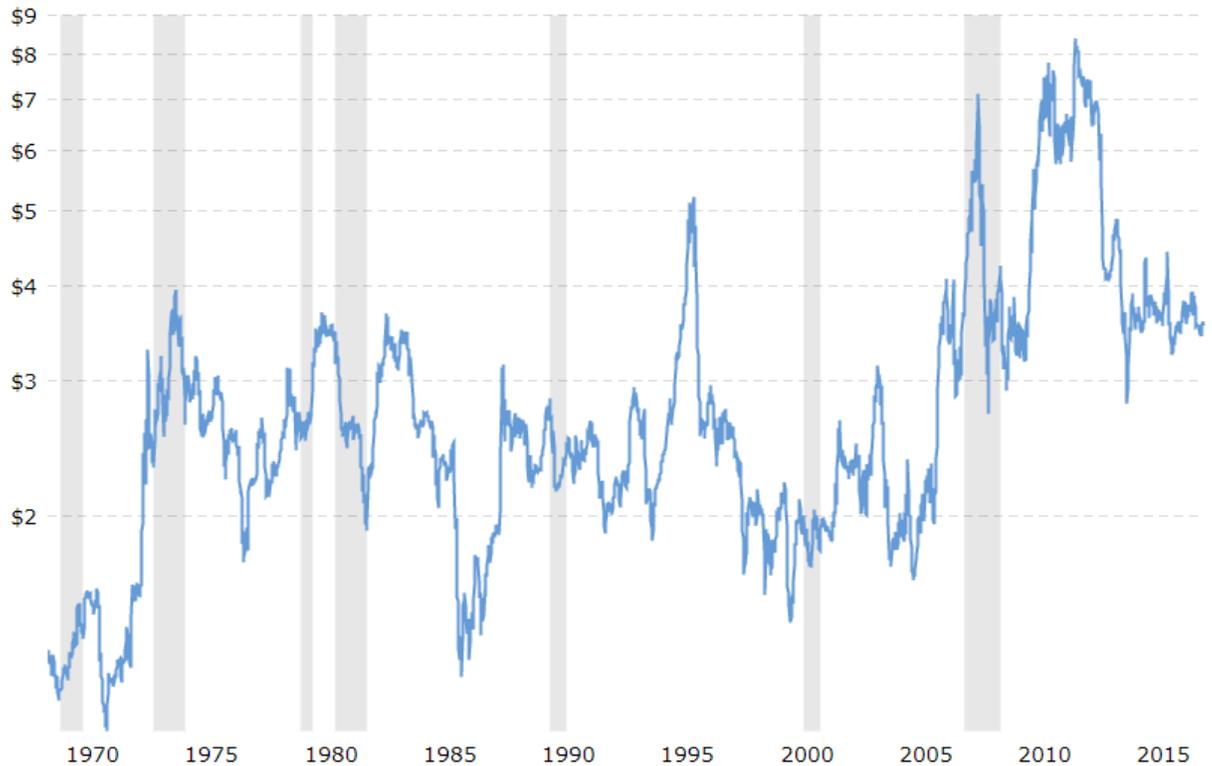
On the other hand, food production trade is possible and viable since there is consumption on the end of the channel and this eventually implies that there will be exportation and importation depending on the scarcity or excess production. Changes in consumption result from movement along the demand curve of any commodity market is a result of responses from price fluctuations. This means that when there is a sudden change in demand of a consumer product by the consumer equally leads to the demand of agricultural products at the farmer level thus forcing government institutions to come in with policies that will regulate the market and also benefit the government through exportation of surplus produce. Notable is that the intervention by the government through

such policies as the introduction of subsidies affects food prices and the removal of the subsidies only increases the prices.

Moreover, there is going to be a lot of speculation in the market since different markets exist in different parts of the world thus industry players will have to export their products where are most valuable. Various governments also try to control these exports and imports by further imposing a tax on exports and subsidizing imports in order to shield the local consumers. This eventually results to the prices of tradable goods rising making exports to become cheaper in the foreign currency and eventually the steady rise in demand in the export market due to the intense pressure of the domestic price of the export good. However, some countries also put in measure to curb this kind of trading by introducing direct agricultural export taxes which will significantly reduce taxes and eventually maintain that the domestic prices of agricultural products are lowered and lastly the consumer enjoys low prices in goods.

Taking a case example of corn export prices in the United States of America, we note that dues to severe drought conditions that occurred in the summer 2012 and farming activities across the country. A significant rise in corn prices that had never been witnessed before which equally affected the export prices altogether. The severe weather conditions not only affected the corn export prices but also other by-products derived from corn like ethanol. Considering that America is the leading corn producer of the world, the effects that drought cut through other export markets equally and the effects were visible from the high global corn prices and minimal supplies.





The graph above shows the export corn price index relative to the production years during the months of September and August. It is evident from the graph that the constant prices before the 2011 season except 2008 season eventually affects supply not only in America but also around the globe. This obviously means that a change in tactic in corn production and usage as previously domestic purposes as a feed grain and after the drought, the corn is changed to be used in ethanol production.

The implication above was in line with the growing demand of ethanol across the world meaning a reduction in the importation of ethanol by America from countries like Brazil. Since the investment in ethanol, America surpass other leading ethanol producer as a world-leading ethanol producer. This basically shows how the levels of imports and exports of corn in the USA had a chain impact on other commodities in terms of production and prices both locally and globally.

The purpose of this report is to investigate the factors that affected the corn import and export prices during 2007-2008 and 2010-2011 year periods. Among the most important factors (dependent and independent variables), the following will be considered: monthly personal income in the United States of America (billions of dollars), the exchanging rate between the U.S. dollar and Chinese Yuan, export price index of corn, import price index of grain commodities, global price of corn (per one metric ton), monthly price of soybeans (per one metric ton), and monthly price of wheat (per one metric ton).

The analysis will be carried out by the mean of the ordinary least squares method. Two pairs of regression models will be developed separately for 2007-2008 and 2010-2011 year periods on monthly basis. The first model will investigate the impact of the monthly average personal income in the United States of America, the exchanging rate between the U.S. dollar and Chinese Yuan, global price of corn, monthly price of soybeans, and monthly price of wheat (independent variables) on the export price index of corn (dependent variable). The second model will use the same combination of the independent variables to predict import price index of grain.

BODY

The data on the export price index was retrieved from FRED Economic Data website ("Export Price Index (End Use): Corn"). The data on the import corn prices was generalized from the indicator of import prices on all grain commodities due to unavailability of monthly corn import prices data ("Import Price Index (NAICS): Grain And Oilseed Milling"). As a measure of income data, the personal real income in the United States of America on a monthly

basis was selected ("Personal Income"). The Federal Reserve Bank of St. Louis website was used to retrieve monthly data on global corn, soybean and wheat prices. The exchange rates of the U.S. dollar to the Chinese Yuan was retrieved from the average exchange rates data on Oanda ("Average Exchange Rates | OANDA").

Four regression models were developed for the periods 2007-2008 and 2010-2011, and the following results were received:

1) Export Price index 2007-2008 OLS model:

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.963901
R-square	0.929105
Adjusted R-square	0.909412
Standard error	13.4251
Observations	24

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	42516.32	8503.26	47.1792	1.01E-09
Residual	18	3244.198	180.233	2	
Total	23	45760.51			

	<i>Coefficients</i>	<i>Standard error</i>	<i>t-statistic</i>	<i>P-Value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Y-intercept	-94.2157	398.3205	-0.23653	0.81569	-931.056	742.624
Personal Income	0.004181	0.02603	0.16060	0.87419		7
Global Price of Corn	0.776666	0.214906	3.61398	0.00198	-0.05051	1.22816
Global Price of Soybean	0.199914	0.16872	1.18488	0.25147	0.325166	6
			5	2	-0.15455	0.55438
			5	2		2

Global Price of Wheat	-0.13617	0.113842	-1.19609	0.24718	-0.37534	0.10300
			0.50500	0.61968		8
Exchange Rate	8.490529	16.81271	7	1	-26.8317	43.8127
						3

The regression analysis showed that the overall regression equation is significant ($F = 47.179$, $p < 0.001$), and the model explains approximately 90.94% of the variance in the export price index of corn. However, there was only one individually significant factor – global price of corn ($t = 3.614$, $p = 0.002$).

**2) Import Price Index 2007 - 2008 OLS model:
SUMMARY OUTPUT**

<i>Regression Statistics</i>	
Multiple R	0.984133
R-square	0.968517
Adjusted R-square	0.959772
Standard error	4.108723
Observations	24

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	9347.924	1869.58	110.746	7.18E-13
Residual	18	303.8689	16.8816		
Total	23	9651.793			

	<i>Coefficients</i>	<i>Standard error</i>	<i>t-statistic</i>	<i>P-Value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Y-intercept	-13.8334	121.9052	0.11348	0.91090	-269.947	242.279
Personal Income	0.020827	0.007966	2.61435	0.01756	0.00409	0.03756
Global Price of Corn	0.098187	0.065771	1.49284	0.15279	-0.03999	0.23636
Global Price of Soybean	0.037589	0.051636	0.72794	0.47601	-0.0709	0.14607
			5	1		3

			3.81716	0.00126		1.69570
Global Price of Corn	1.093731	0.286529	9	2	0.491755	7
Global Price of Soybean	0.139867	0.201773	7	0.49704	-0.28404	0.56377
Global Price of Wheat	-0.2719	0.220965	-	0.23434		0.19232
Exchange Rate (US to CNY)	-26.5404	96.13304	1.23052	1	-0.73613	8
			-	0.78563		175.427
			0.27608	2	-228.508	6

The regression analysis showed that the overall regression equation is significant ($F = 100.64$, $p < 0.001$), and the model explains approximately 95.59% of the variance in the export price index of corn. However, there was only one individually significant factor – global price of corn ($t = 3.817$, $p = 0.001$).

4) Import Price Index 2010 - 2011 OLS model:

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.985955
R-square	0.972107
Adjusted R-square	0.964359
Standard error	3.727428
Observations	24

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	8715.786	1743.15	125.463	2.43E-13
Residual	18	250.0869	13.8937	7	
Total	23	8965.873	2		

	<i>Coefficients</i>	<i>Standard error</i>	<i>t-statistic</i>	<i>P-Value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
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Y-intercept	-932.106	304.8775	3.05731	0.00678	3	-1572.63	291.582
Personal Income	0.035423	0.010847	3.26571	0.00429	4	0.012634	0.05821
Global Price of Corn	0.258106	0.080142	3.22061	0.00474	6	0.089734	0.42647
Global Price of Soybean	0.078846	0.056436	1.39709	0.17937	4	-0.03972	0.19741
Global Price of Wheat	-0.04789	0.061804	0.77492	0.44845	2	-0.17774	0.08195
Exchange Rate (US to CNY)	82.98022	26.88829	3.08611	0.00637	-	26.49003	139.470
							4

The regression analysis showed that the overall regression equation is significant ($F = 125.46$, $p < 0.001$), and the model explains approximately 96.44% of the variance in the import price index of corn. Three factors were significant individually – personal income ($t = 3.266$, $p = 0.004$), global price of corn ($t = 3.221$, $p = 0.005$), and exchange rate ($t = 3.086$, $p = 0.006$).

Another four regression models were developed for the periods 2000-2006 and 2012-2017, and the following results were received:

1) Export Price index 2000-2006 OLS model:

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.979982
R-square	0.960364
Adjusted R-square	0.957823
Standard error	3.367498
Observations	84

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	21431.54	4286.30	377.98	3.83E-53

Residual	78	884.5231	11.3400
Total	83	22316.06	4

	<i>Coefficients</i>	<i>Standard error</i>	<i>t-statistic</i>	<i>P-Value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Y-intercept	-44.0071	76.00716	0.57899	0.56426	-195.326	107.311
Personal Income	-0.00086	0.000941	0.91325	0.36392	-0.00273	0.00101
Global Price of Corn	0.981869	0.055747	17.6128	6.6E-29	0.870885	1.09285
Global Price of Soybean	0.041723	0.015709	2.65595	0.00958	0.010448	0.07299
Global Price of Wheat	0.017952	0.029517	0.60818	0.54482	-0.04081	0.07671
Exchange Rate (US to CNY)	6.8471	8.258915	0.82905	0.40960	-9.59514	23.2893

The regression analysis showed that the overall regression equation is significant ($F = 377.98$, $p < 0.001$), and the model explains approximately 96.04% of the variance in the export price index of corn. Two factors were significant individually – global price of corn ($t = 17.613$, $p < 0.001$), and global price of soybean ($t = 2.656$, $p = 0.01$).

2) Import Price Index 2000 - 2006 OLS model:

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.9276
R-square	0.860443
Adjusted R-square	0.851497
Standard error	2.91623
Observations	84

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	4089.847	817.969 3	96.1819 6	6.82E-32
Residual	78	663.3428	8.50439 5		
Total	83	4753.19			

	<i>Coefficients</i>	<i>Standard error</i>	<i>t-Statistic</i>	<i>P-Value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Y-intercept	410.0403	65.82167	6.22956 4	2.21E-08	278.9994	541.0812
Personal Income	0.004776	0.000815	5.85952 3	1.05E-07	0.003154	0.006399
Global Price of Corn	-0.20936	0.048277	-4.33675 -	4.28E-05	-0.30548	0.11325
Global Price of Soybean	0.041002	0.013604	3.01398 7	0.00347	0.013919	0.068086
Global Price of Wheat	-0.02603	0.025562	-1.01833 -	0.31167	-0.07692	0.024859
Exchange Rate (US to CNY)	-41.212	7.152163	-5.76217 -	1.58E-07	-55.4508	26.9731

The regression analysis showed that the overall regression equation is significant ($F = 96.182$, $p < 0.001$), and the model explains approximately 86.04% of the variance in the import price index of corn. Four factors were significant individually – personal income ($t = 5.859$, $p < 0.001$), global price of corn ($t = -4.337$, $p < 0.001$), global price of soybean ($t = 3.014$, $p = 0.003$) and exchange rate ($t = -5.762$, $p < 0.001$).

3) Export Price index 2012-2017 OLS model:

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.993878
R-square	0.987794

Adjusted R-square	0.98676
Standard error	7.242689
Observations	65

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	250465.5	50093.09	954.9446	4.51E-55
Residual	59	3094.936	52.45654		
Total	64	253560.4			

	<i>Coefficients</i>	<i>Standard error</i>	<i>t-statistic</i>	<i>P-Value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Y-intercept	6.301708	51.71327	0.121859	0.903425	-97.1763	109.7797
Personal Income	0.000236	0.003064	0.077045	0.938849	-0.00589	0.006367
Global Price of Corn	0.941039	0.044979	20.92161	5.57E-29	0.851036	1.031043
Global Price of Soybean	0.042674	0.029283	1.457295	0.150337	-0.01592	0.101269
Global Price of Wheat	0.062611	0.057861	1.082108	0.283608	-0.05317	0.17839
Exchange Rate (US to CNY)	-1.2181	8.077168	-0.15081	0.880642	-17.3805	14.94428

The regression analysis showed that the overall regression equation is significant ($F = 98.78$, $p < 0.001$), and the model explains approximately 98.78% of the variance in the export price index of corn. However, only one factor was significant: global price of corn ($t = 20.922$, $p < 0.001$).

4) Import Price Index 2010 - 2011 OLS model:

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.922665
R-square	0.85131
Adjusted R-square	0.838709
Standard error	3.914206
Observations	65

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	5175.416	1035.083	67.55973	3.88E-23
Residual	59	903.9395	15.32101		
Total	64	6079.355			

	<i>Coefficients</i>	<i>Standard error</i>	<i>t-statistic</i>	<i>P-Value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Y-intercept	237.9268	27.94768	8.513294	7.46E-12	182.0037	293.85
Personal Income	-0.01176	0.001656	-7.10163	1.82E-09	-0.01507	0.00845
Global Price of Corn	-0.05125	0.024308	-2.10815	0.03927	-0.09989	-0.0026
Global Price of Soybean	0.052479	0.015826	3.31606	0.00156	0.020812	0.08414
Global Price of Wheat	-0.02625	0.03127	-0.83942	0.40462	-0.08882	0.03632
Exchange Rate (US to CNY)	12.64206	4.365188	2.89611	0.00529	3.907342	21.37678

The regression analysis showed that the overall regression equation is significant ($F = 67.560$, $p < 0.001$), and the model explains approximately 85.13% of the variance in the import price index of corn. Four factors were significant individually – personal income ($t = -7.102$, $p < 0.001$), global price of corn ($t = -2.108$, $p = 0.039$), global price of soybean ($t = 3.316$, $p = 0.002$) and exchange rate ($t = 2.896$, $p = 0.005$).

CONCLUSION

The regression analysis showed that all four models are quite good prediction tools for import and export prices, since they explain a very big proportion of the variance of independent variables (R-squared are all above 90%). It was found that the export price index of corn was significantly predetermined only by the variation in the global corn prices – the impact of personal income, global prices of wheat and soybean, as well as the exchange rate had no significant impact on the export prices. This trend was observed both for 2007-2008 and 2010-2011 year periods.

In contrast, import price index in 2007-2008 was significantly determined by the change in personal income and exchange rate. However, in 2010-2011, the value of import price index depended on personal income, exchange rate, and global corn prices.

In 2000-2006 and 2012-2017 time periods, the situation remains the same for export prices: as in 2007-2008 and 2010-2011, it was found that the export price index of corn was significantly predetermined only by the variation in the global corn prices. However, the situation with import prices is quite different. In 2000-2006 and 2012-2017 years period, four factors were important determinant of the import price indexes: personal income, global price of corn, global price of soybean and exchange rate. In comparison to the first two periods, the global soybean prices became important predictors of the import prices on corn.

Price variability is a delicate issue that affects the commodity market overwhelmingly thus it is usually a large determinant in any market especially in our case of importation and exportation of corn in the American market. Therefore prices changes in the short run especially for agricultural produce like corn are bound to change due to climatic conditions

thus eventually affecting supply of the said product. On the contrary, it is business cycles of the importing countries that affect and influence the demand side of the product. Thus commodities such as corn which take a considerable amount of time to grow usually take time in the adjustments of demand and supply in relation to price.

It is the repercussions of this variance in the export and import commodities that results to the overall growth of the economic sector of a country since most of the primary goods form the major component of export commodities that many countries rely on. This means that exports greatly influence economic stability of nation's incomes and eventually affecting the growth of the importing nations depending on their economic structure.

Various countries have put in measure and policies that are geared towards stabilization of prices especially in the commodity market focusing primarily on the agricultural goods like in our case corn exportation and importation. Some nations have imposed subsidies in order to protect domestic producers from international price fluctuations though this is hindered but the high operational cost of public institutions thus resulting to inconsistencies in these government policies.

While all these price negotiations are happening, the concerned parties need to keep in mind that completely stabilizing the price is impossible since in the long run the demand and supply side of the commodity in question needs to remain in equilibrium for the market to operate seamlessly. Again the methodologies applied in price stabilization need to be carefully selected bearing in mind that different commodities react differently to such changes.

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