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The Effects of Tomato Suspension Agreements on Market Price Dynamics

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Introduction

The production capacity of the U.S. tomato industry has declined significantly in recent years, while the imports from Mexico have been on the rise since the early 1990s. The North American Free Trade Agreement (NAFTA) that took effect in 1994 gradually eliminated tariffs, leading to increased imports and market competition (Ghazalian 2014).

In November 1996, the U.S. Department of Commerce (USDC) negotiated an antidumping investigation suspension agreement that set a mandatory reference (floor) price for the imported Mexican tomatoes. The USDC and Mexico renewed the agreement and reference price in 1998 and 2003. The latest suspension agreement was signed in March 2013. This agreement significantly increased reference prices for imported Mexican tomatoes. The reference prices were set at \$0.31 per pound for winter tomatoes, and \$0.2458 per pound for summer tomatoes grown in open fields and adapted environments, which represent a 43% increase for both winter and summer tomatoes.

Objectives

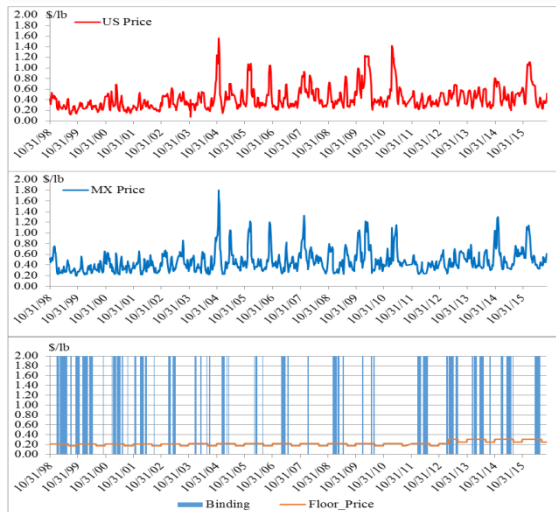
The objective of this study is twofold.

First, this study examines the price linkages of US and Mexican fresh tomatoes to investigate the causal relationship between the prices.

Second, this study simulates price changes with and without the 2013 suspension agreement to examine the impact of the new agreement on the prices of US and Mexican tomatoes.

Data

Figure 1. Mexican and US Tomato Prices and Weeks where Mexican Prices Restrained by Reference Prices



Methods

We use a dynamic Tobit model (Kim and Chavas 2002; Chavas and Kim 2004) to represent Mexican tomato price determination in the presence of price floor S_t :

$$p_{mt} = \max\{p_{mt}^*, S_t\}$$

$$p_{mt}^* = \beta_{m0} + \sum_{n=1}^N \beta_{mn} p_{m,t-n} + \sum_{n=1}^N \beta_{m,N+n} p_{u,t-n} + \beta_m z_t + \varepsilon_{mt}$$

and an autoregressive model to represent US tomato price determination

$$p_{ut} = \beta_{u0} + \sum_{n=1}^N \beta_{un} p_{u,t-n} + \sum_{n=1}^N \beta_{u,N+n} p_{m,t-n} + \beta_u z_t + \varepsilon_{ut}$$

where p_{mt} and p_{ut} are market prices of tomatoes imported from Mexico and those produced in the US at time t ; z_t is selected exogenous variables, including a time trend and seasonality variables. We allow for heteroskedasticity by considering a specification for the error terms. Equations are estimated simultaneously by the maximum likelihood estimation method for three agreement periods with different floor prices.

Estimation Results

Table 1. Parameter estimates for lagged variables over three sample periods

	Coe.	Mexican Tomato Price			Coe.	US Tomato Price		
		1998 Agree.	2003 Agree.	2013 Agree.		1998 Agree.	2003 Agree.	2013 Agree.
$p_{m,t-1}$	β_{m1}	1.139***	1.235***	1.295***	β_{u5}	0.228***	0.421***	0.340***
$p_{m,t-2}$	β_{m2}	-0.514***	-0.666***	-0.697***	β_{u6}	-0.257**	-0.502***	-0.292**
$p_{m,t-3}$	β_{m3}	0.272*	0.145*	0.192	β_{u7}	0.180*	0.028	0.126
$p_{m,t-4}$	β_{m4}	0.003	-0.033	-0.046	β_{u8}	-0.051	0.056	0.017
$p_{u,t-1}$	β_{m5}	0.069	0.098*	0.098*	β_{u1}	0.981***	0.854***	1.346***
$p_{u,t-2}$	β_{m6}	0.014	-0.014	-0.713***	β_{u2}	-0.292**	0.046	-0.843***
$p_{u,t-3}$	β_{m7}	-0.127	0.137**	0.568***	β_{u3}	-0.015	-0.053	0.384**
$p_{u,t-4}$	β_{m8}	-0.062	-0.015	-0.131	β_{u4}	-0.035	-0.030	-0.184*

Estimation results in Table 1 show:

- Under each study period, the lagged own-price effects in the markets of both Mexican and US tomatoes are statistically significant, showing statistical evidence that there exist lagged own price effects in the Mexican and US prices.

The further causality analyses in Table 2 reveal:

- US tomato price has a positive impact on the Mexican tomato price, but there is no such positive effect of the Mexican tomato price on the US tomato price during the 2003 agreement period (2003-2013)
- The 2013 suspension agreement has supported the US tomato price by raising the Mexican tomato price.

Table 2. Granger-Causality Tests and Tests of Positive Causal Effects

Hypothesis	1998 Agree.	2003 Agree.	2013 Agree.
H_0 : US tomato price does not Granger-cause Mexican tomato price ($\beta_{m5} = \beta_{m6} = \beta_{m7} = \beta_{m8} = 0$)	4.396	32.856***	15.943***
H_0 : US tomato price has no positive effect on Mexican tomato price ($\beta_{m5} + \beta_{m6} + \beta_{m7} + \beta_{m8} = 0$)	--	17.175***	4.056**
H_0 : Mexican tomato price does not Granger-cause US tomato price ($\beta_{u5} = \beta_{u6} = \beta_{u7} = \beta_{u8} = 0$)	8.219*	63.337***	9.030*
H_0 : Mexican tomato price has no positive effect on US tomato price ($\beta_{u5} + \beta_{u6} + \beta_{u7} + \beta_{u8} = 0$)	2.406	0.002	4.797**

Simulation

Table 3. Effects of the 2013 Agreement on Prices and Farm Revenues

	Price without Agreement (\$/lb)	Price with Agreement (\$/lb)	Price Change	Revenue Change (\$/acre)
Mexico Average	0.469	0.497	5.5%	--
Mexico Summer Season	0.444	0.489	10.1%	2,470
Mexico Winter Season	0.480	0.495	3.1%	850
US Average	0.469	0.475	1.3%	--
US Summer Season	0.391	0.394	0.8%	95
US Winter Season	0.506	0.514	1.6%	220

We used the simulation method to examine the effects of the 2013 agreement on the paths of expected prices. We compared the expected prices under two scenarios. In the baseline scenario, the reference prices in the 2013 agreement period (Mar 9, 2013 - Sep 10, 2016) are assumed to be the same as those in the 2003 agreement period, whereas in the second scenario, the reference prices are changed to the current levels under the 2013 agreement. Simulation results in Table 3 show:

- In the baseline scenario, the average Mexican expected price is \$0.469/lb, while it increases to \$0.497/lb under the 2013 agreement, resulting in a 5.5% increase.
- For the winter season, the average Mexican expected price increases to \$0.495, up 3.1%; for the summer season, the Mexican price is \$0.489, up 10.1% compared to the baseline scenario.
- The average US prices with and without the agreement are \$0.469/lb and \$0.475/lb, respectively, which represents an increase of 1.3%.
- Winter US prices are 1.6% higher while summer US prices are 0.8% higher compared to the baseline.
- Because of the 2013 suspension agreement, farm revenue of Florida growers has increased by \$220 per acre.
- Mexican grower in the major winter production area would have an extra revenue of approximately \$850 per acre due to the 2013 agreement.

Conclusion

The study detected changing dynamics of Mexican and US tomato prices resulting from the suspension agreements; reference prices changed the own- and cross-price dynamics. In particular, the latest 2013 agreement with substantially higher reference prices have made the markets of Mexican and US tomatoes more closely integrated and resulted in bidirectional causal relationship.

The agreement effectively boosted the US tomato prices and lowered the pressure of competition. An increase in Mexican tomato prices will push US prices higher under the 2013 agreement. Such price effect did not occur under the previous agreements.

The results suggest the Mexican industry reaped most of the benefits from the elevated prices under the new suspension agreement.

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