The Economic Effect of COOL on the Mexican and United States Cattle Price Relationship

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Country of Origin Labeling (COOL), was included in the 2002 Farm Bill. COOL has been an extremely controversial subject in the U.S. meat and livesock industry, and even more so in Canada. Canada and Mexico have taken the United States to the World Trade Organization Court, accusing the U.S. Country of Origin Labeling policy of being trade distorting. Canada and Mexico argued that this policy added regulatory costs and reduced the value of their beef, cattle, hogs and pork, while the United States Department of Agriculture (USDA) responded that "detailed information justified additional costs to meat producers" (Martin, 2014). WTO recently ruled in favor of Canada and Mexico and the U.S. has indicated that it will appeal the ruling again.

Country of Origin Labeling was introduced in 2002 as a voluntary provision that would later require a mandatory program by September, 2004 (GAO, 2). Political opposition to COOL delayed implementation until September 30, 2008. COOL required covered commodities to indicate their country of origin. The list of commodities applied to: "muscle cuts of beef (including veal), lamb, and pork; ground beef, ground lamb, and ground pork; farm-raised fish and shellfish; wild fish and shellfish; perishable agricultural commodities (fresh and frozen fruits and vegetables); and peanuts" (AMS, 2003).

Cattle trade with Mexico is a longstanding market relationship. The U.S. imported below five percent of the total Mexican feeders between 1979 to 1985, and by 2011 and 2012 the total feeder cattle exports as a percentage of the total Mexican beef cow herd reached 20 percent

(Rabobank 2013). Since 2010, drought in Mexico has been a contributing factor to the early increased number of Mexican cattle exports to the U.S., its largest market for exported cattle. In face of drought, Mexican exports increased to historical levels due to the inability of Mexican producers to sustain the same herd numbers as those previous to the drought. After the drought-induced shock that started late 2010 through 2012, feeder cattle exports to the U.S. decreased. Mexican cattle exports to the U.S. exceeded expectations in 2014 as their industry continued to decrease their herd.

In the WTO COOL dispute case, Mexico argued that their industry had been injured through lower prices paid for calves for export to the U.S. due to the discriminatory effects of the law, in violation of WTO rules. This argument is, in effect, that COOL regulations result in U.S. cattle buyers paying lower prices for Mexican calves.

There is a lack of research quantifying COOL's impact, or lack of thereof, on the price relationship between calves sold in Mexico and the U.S. The purpose of this research is to examine the cattle price difference between Mexico and the United States and the impact of COOL on that price relationship.

Literature Review

COOL in meat began when Congress added a new subtitle to the Agricultural Marketing Act of 1946, the "Food Security and Rural Investment Act" in 2002, better known as the 2002 Farm Bill (Brester et. al 2003). COOL required obligatory labeling of a variety of meats, fruits, and

vegetables (Brester et. al 2003). With regards to animal products, such as beef or pork, sole U.S. origin could be claimed if the animal was born, raised and slaughtered in the U.S. The covered commodities included in COOL were: “muscle cuts of beef (including veal), lamb, and pork; ground beef, ground lamb, and ground pork; farm-raised fish and shellfish; wild fish and shellfish; perishable agricultural commodities (fresh and frozen fruits, and vegetables); and peanuts” (AMS, 2003).

The debate over COOL has been heavily contested for a decade and came close to derailing the 2014 farm bill, which was finally signed on February 7, 2014. Throughout the 12 years since its introduction, the greatest areas of contention surrounding COOL included: what the real justification for the law was; the language of the law, which created potential for conflict with other laws already in place and what kind of meats and supply sectors were affected; trade effects and, most important, the costs and benefits of COOL, if any.

The original proponents of COOL were producers who wanted a label to show that the covered commodities were a product of the U.S. Their motivation came from seeing many truckloads of cattle coming from Canada to the U.S. headed for packing plants. These cattle producers believed that the cattle were being imported to depress U.S. prices. They also believed that consumers would buy beef that was from the U.S. over other countries’ beef.

Other proponents of COOL used food safety arguments to support COOL. However, COOL is a marketing tool, administered by the Agricultural Marketing Service (AMS) rather than the Food Safety Inspection Service (FSIS) and the Animal and Plant Health Inspection Service (APHIS)

(Peel 2008). The country of origin label does not imply any information about food safety, the production process, or inspection.

The language of the law is an important consideration, because calling it a label meant it interacted with already codified labeling laws. To put a label on the covered commodities meant that industry had to prove and support with documentation what the label contained. Identification information for country of origin of live animals through the final meat item was required.

USDA's Agricultural Marketing Services conducted a cost- benefit analysis of COOL in 2003. COOL was often touted to be of benefit to consumers. AMS examined studies to validate if consumers were actually willing to pay a premium for US beef over beef of other origin. The reported studies indicated a tendency for overestimating the willingness to pay for US beef, in addition to others like Umberger et. al (2003) who found that consumers ranked origin 8th out of 17 factors in importance. Food safety and freshness ranked higher than origin. It was also found that consumers may be willing to pay less when faced with binding budget constraints. Plain and Grimes pointed out that most beef consumed in the U.S. is born, raised, and slaughtered in the U.S., and almost all cattle imports are from Canada and Mexico (2003). They also forecasted that Mexico's 2.06 percent market share of beef supplied to the U.S. would not face a major marketing problem given the 13 percent Hispanic population inside the U.S. in 2002. In addition, they predicted that it was unlikely for consumers to penalize Canadian beef because of its image as a provider of good quality products.

The initial estimates of the expected costs of COOL in 2003 ranged between $200 million to $5.9 billion for the beef industry (Hanselka et al. 2004). There have also been studies of U.S. consumers' willingness to pay for U.S. labeled beef justified for the costs of COOL. Plain and Grimes' indicated that there may not be a premium, because most beef was of domestic origin (2003).

COOL's opponents emphasized the costs of regulation as a burden to their operations and that the cost of verification and certification may more than offset any benefits. As described by Martin, "Tyson stopped buying slaughter- ready Canadian cattle to avoid having to segregate the foreign animals" (2014). The effect of COOL on prices of Mexico and Canadian cattle (and hogs in the case of Canada) is the major WTO conflict over COOL. The increased costs associated to processing foreign cattle are argued to have resulted in lower prices part to Mexico and Canadian cattle. Economic theory would indicate that higher costs associated with COOL would be passed down to livestock producers and up to meat consumers.

It can be challenging to find objective arguments about the preferences between U.S. beef labels versus non-U.S. beef. By examining the literature on consumer preferences regarding COOL and U.S. beef, it was observed that the majority of consumers preferred U.S. born, raised and processed beef, such as Umberger's study, which concluded in 74 percent of surveyed individuals in Denver and Chicago (2003).

However, the U.S. Department of Agriculture suggested that the "estimated benefits associated with this rule [COOL] are likely to be negligible" and that there was insufficient evidence that

consumers were willing to pay a price for COOL (AMS, 2003). According to Rabobank's industry note, "The U.S. is a much more mature market with a slower population growth rate, which translates into relatively inelastic protein demand, especially for beef consumption" (2013).

According to Brester et al.'s study in 2003, in the absence of consumer willingness to pay for the premium (no change in demand for U.S. labeled meat) under COOL, producers would be negatively impacted due to the inability to make up for the regulatory costs. Brester et al. forecasted that there would be a need for a one- time beef demand increase of 4.05 percent to pay for the costs of this regulation. It is necessary to specify that COOL's mandate is directed to beef sold in retail outlets only. Meat sales on the Internet, butcher shops, hotels, restaurants, and institutions (the HRI sector) are exempt from COOL, in addition to beef that is an ingredient in another product. About 52 percent of meat consumption was sold in grocery stores in 2003, implying that 52 percent of beef would need no label. This meant that about one half of the total beef market sold in the United States would have needed to make the mentioned 4.05 percent total industry increase (Brester et al. 2003).

The United States is the largest producer of beef and the largest fed- cattle industry in the world (ERS 2014). Beef products are of high- quality, grain- fed both for domestic and export use. The U.S. is a net importer of cattle. It has been importing around 1 million head from Mexico since late 1980's. Its peak imports occurred in 1995, with over 2 million head. The U.S. imports feeder cattle, calves, and fed cattle. The U.S. is also an importer of beef, largely trimmings, to augment its ground beef production.

The cattle industry in the United States is made up of distinct production segments. This segmented structure suggests a more complex system than poultry or hog production. Poultry and hog production systems produce the animals in a confined area where they are fed as a group and then taken to processing plants. In contrast, the cattle industry made up of the cow/calf, stocker, feeder, and packer production segments, moves animals between different production operations before reaching the packing plants (Peel, 2008). Cattle moving between numerous operations reflects the difficulty of tracking its origin (this is also challenging when tracking diseases such as bovine TB), as well as the complexity of COOL's role in the cattle and beef industry.

The COOL literature mostly has examined change in prices due to COOL with relation to the beef market, not the cattle market. Cattle are not covered commodities and therefore they are not directly impacted by COOL, but "cattle producers are indirect suppliers of a covered commodity and are obligated to provide origin information to downstream industry sectors in order to verify the origin of meat" (Peel, 2008). Therefore we might hypothesize that there are impacts on prices of or demand for cattle imported from Mexico.

The Mexican cattle inventory has been decreasing since its last peak in 2002, with an estimated number of 26 million head (Rabobank 2013). According to the last agriculture census in Mexico in 2007, the estimated number of cattle herds was 23.3 million head, and less than 20 million in 2012, according to industry estimates (Rabobank 2013). The northern states in Mexico have the greatest numbers of beef cows (Chihuahua, Sonora, Tamaulipas, Nuevo Leon and Coahuila).

Dual- purpose cows (milk and beef cows) are in their majority located in the south and central regions, and dairy cows are located in all regions (Peel, 2009). The northern states' production systems, given that they are destined to cattle for beef production, are based on open grazing. Calves are often shipped from Mexico to the U.S. for finishing with beef being exported back to Mexico.

Rabobank's industry note suggests that feeder shipments from Mexico to the United States continue at an "unsustainable pace" (2013). In the mid 1980's, Mexico exported about 1 million head to the United States. Mexico had been a reliable supplier of calves to the U.S. until the recent years, when severe drought led to question the sustainability of Mexico's feeder cattle shipment levels. Drought, over the same time period as COOL's introduction into the U.S. legislation, had forced an increase in exports from Mexico.

Cattle shipments from Mexico arrive to 11 ports of entry into the United States: San Luis, Nogales and Douglas in Arizona; Columbus and Santa Teresa in New Mexico; and Presidio, Del Rio, Eagle Pass, Laredo and Hidalgo in Texas. The largest number of cattle arriving to the United States is at the port of Santa Teresa, New Mexico. For this reason, the price data that is used for this paper is taken from the reports generated by the port of Santa Teresa.

COOL, by imposing additional costs on the cattle and beef industry, may have resulted in low prices for calves or Mexican origin relative to U.S. calves. This research examines the price difference between Mexico and U.S. calves, exploring any impact of COOL's implementation.

Methods and Data

The goal was to observe this price spread and its weekly fluctuations over time. This research uses data from October 7, 2005 to February 7, 2014, almost one decade.

The a priori hypothesis for this research is that the implementation of COOL resulted in an increased price difference, or spread, between the United States and Mexican calves. The effect of COOL on price is hypothesized to begin before the actual date of implementation going back 7 to 9 months prior to September 30, 2008. This hypothesis reflects the approximate feeding period of a calf to be sold as a fed steer after COOL was implemented. This translates to a reduction in price of Mexican cattle relative to U.S. cattle. The assumption is that the market would anticipate the implementation of new regulation.

Figure 1 contains Texas and Mexican 500- 600 pound monthly average steer prices over the 2005 to 2014 period. Casual observation indicates that there have been times over the study period where Mexican cattle have had a premium to the Texas calf price.

Mexican feeder steer price data was taken from the livestock market news daily reports (report AL_LS603) found in the USDA Agricultural Marketing Service website. The largest port of entry of Mexican cattle, where cattle are inspected by APHIS veterinarians and prepared for shipment throughout the U.S., is located in Santa Teresa. Therefore, the Mexican price data was taken from this specific port. This paper's price data starts in October 7, 2005 until February 7, 2014.

U.S. cattle prices were gathered from the USDA, AMS and Livestock Market News. The Texas combined auction price series was used for the Texas calf prices.

The cattle import numbers were from both Mexican and U.S. (Texas) locations were calculated as an average of five import-days in order to produce a weekly price database for the model. More specifically, each set of data for the model has been calculated or drawn as a weekly average. Figure 1 contains the Texas and Mexico weekly average cattle prices for 500-600 pound steer calves. Mexico calf prices are generally below the Texas prices and they follow the same pattern.

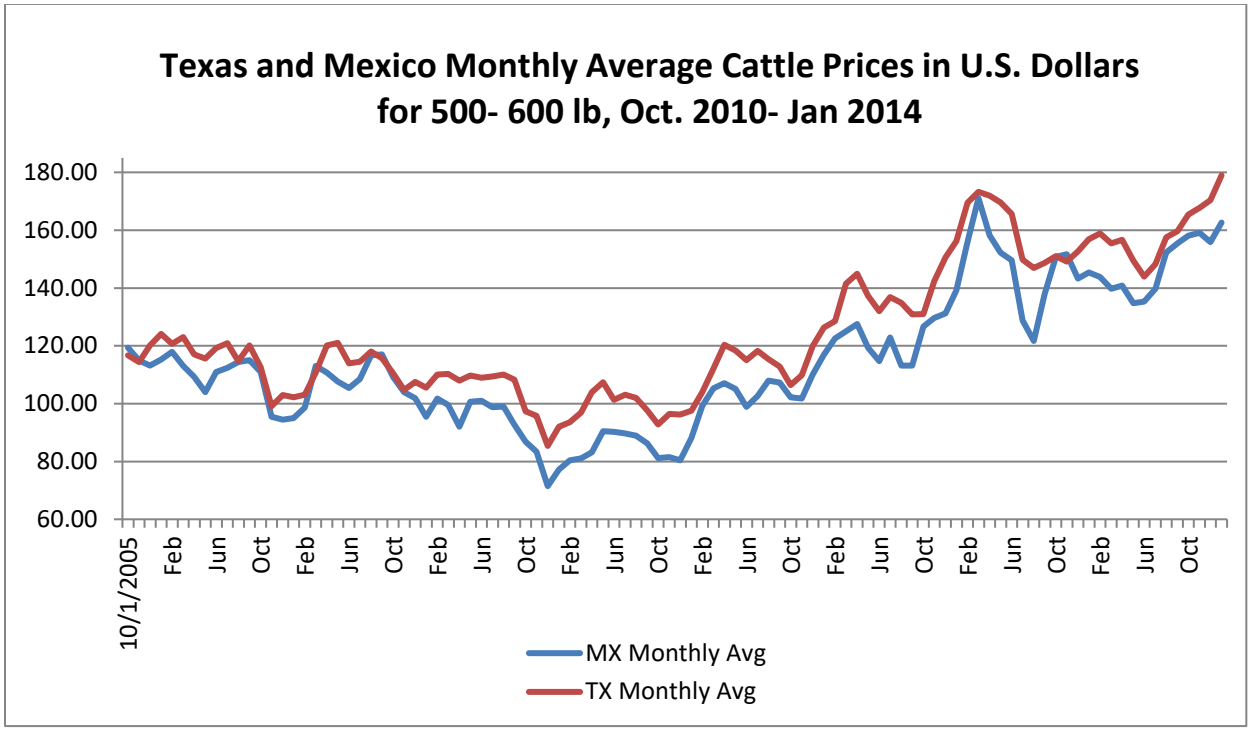

Figure 1. Sources: Agricultural Marketing Service and Animal and Plant Health Inspection Service

The following model was estimated to examine factors affecting the price difference between U.S. and Mexican calves

$$PDcattle = f(PDt\text{-}1, Hct, PCt, PCt\text{-}1, MXPt, PDt, DCt, Dt, PFt, DSjan\text{-}nov, T, T^{\wedge 2})$$

where *PDcattle* is the difference of U.S. and Mexican cattle price in U.S. Dollars (USD), *PDt-1* is the lag of the price difference in USD, *Hc* is the weekly Mexican cattle numbers exported to the U.S., *PC* for corn prices in USD per bushel, *MXP* for exchange rate, PD for diesel price in USD, *DC for COOL, D* for drought, *PF* for fed cattle futures price in USD, a variable for seasonality, trend and trend squared. This equation was estimated using Ordinary Least Squares.

Data

Tables 1 and 2 contain the descriptive statistics of the data used in this research. The implementation of COOL is a dummy variable (*DC*), equalling 1 after March 2008 for the 500-600 pound cattle, and December 2007 for the 300- 400 weight class and 0 prior to those dates. The data for COOL equal 1 was hypothesized to begin in March 2008 (and December 2007), reflecting the time to feed a steer to the finished weight. COOL was implemented at the end of September, 2008.

In Table 1, the average price difference between Mexican and U.S. cattle was $10 per cwt. But the spread ranged from a negative $6.76 to a positive $36 per cwt At some times Mexican cattle

sold at a premium to U.S. cattle. In Table 2, the average price difference between Mexican and U.S. cattle was $9.23 per cwt., and the spread ranged from a negative $22.09 to a positive $39.34 per cwt.

The head count (*Hc*) of the cattle that arrives from Mexico to the U.S. is taken as a weekly average for the respective size and category of the animal. The average number of cattle imported per week was 21,805. There was a large range in this data from 0 to 75,000 head.

Corn price (*CP*), reported by USDA is a proxy for cattle feeding costs. Corn price ranged from $2.09 to $8.52 per bushel. This time period covered the impact of ethanol on corn prices. The diesel price variable was used to reflect transportation costs from the border.

Drought is an important weather related event that is hypothesized to impact prices and the number of cattle supplied. The data on drought is the percentage of acres in category D3 or higher in the National Oceanic and Atmospheric Administration (NOAA) drought monitor. The drought reduced the ability of U.S. ranches to buy Mexico calves to put on grass.

Cattle production and prices tend to exhibit a strong seasonal pattern. For this reason, monthly dummy variables were included in order to account for this seasonality. Trend (T) and trend squared were also included.

Table 1. Variable definitions and descriptive statistics for the cattle price difference model; cattle weight: 500- 600 lb.

Symbol	Definition	Mean	Standard Deviation	Min. Value	Max. Value
PD	Texas and Mexican cattle price difference	10.03	6.51	-6.76	36.50
Hct	Cattle weekly average feeder cattle head count exported from Mexico to the U.S.	21805	13628	0	75304
CP	Price of yellow corn ($/bu) as a proxy for feed costs	5.00	1.73	2.09	8.52
CP t-1	Weekly average yellow corn price lag ($/bu)	4.99	1.73	2.09	8.52
MXP	Mexican peso to adjust exchange rate with USD	12.16	1.14	10.00	15.31
DP	Price of diesel in USD	3.31	0.65	2.02	4.76
DC	Binary variable for COOL, March 2008- January 2014= 1, 0 otherwise	0.71	0.45	0	1
D	Drought weekly average, sum of categories D2- D4 in Texas (D2= severe, D3= extreme, D4= exceptional)	16.99	11.11	1.33	46.01
PF	Price of cattle futures in U.S. dollars	102.23	16.53	74.66	143.14
DSjan	Seasonal binary with January= 1, 0 otherwise	0.09	0.29	0	1
DSfeb	Seasonal binary with February= 1, 0 otherwise	0.08	0.26	0	1
DSmar	Seasonal binary with March= 1, 0 otherwise	0.08	0.28	0	1
DSapr	Seasonal binary with April= 1, 0 otherwise	0.08	0.27	0	1
DSmay	Seasonal binary with May= 1, 0 otherwise	0.08	0.27	0	1
DSjun	Seasonal binary with June= 1, 0 otherwise	0.08	0.27	0	1
DSjul	Seasonal binary with July= 1, 0 otherwise	0.08	0.27	0	1
DSaug	Seasonal binary with August= 1, 0 otherwise	0.08	0.27	0	1
DSsep	Seasonal binary with September= 1, 0 otherwise	0.08	0.28	0	1
DSoct	Seasonal binary with October= 1, 0 otherwise	0.09	0.28	0	1
DSnov	Seasonal binary with November= 1, 0 otherwise	0.09	0.29	0	1
T	Trend	218.00	125.57	1	435
T^2	Trend Squared	63292.67	56537.40	1	189225

Table 2. Variable definitions and descriptive statistics for the cattle price difference model; cattle weight: 300- 400 lb.

Symbol	Definition	Mean	Standard Deviation	Min. Value	Max. Value
PD	Texas and Mexican cattle price difference	9.23	10.10	-22.09	39.34
Hct	Cattle weekly average feeder cattle head count	21805	13627	0.00	75304
	exported from Mexico to the U.S.	5.00	1.73	2.09	8.52
CP	Price of yellow corn ($/bu) as a proxy for feed costs	4.99	1.73	2.09	8.52
CP t-1	Weekly average yellow corn price lag ($/bu)	12.16	1.14	10.00	15.31
MXP	Mexican peso to adjust exchange rate with USD	3.31	0.65	2.02	4.76
DP	Price of diesel in USDs	0.74	0.44	0.00	1.00
DC	Binary variable for COOL, December 2007- January	16.99	11.11	1.33	46.01
	2014= 1, 0 otherwise	102.23	16.53	74.66	143.14
D	Drought weekly average, sum of categories D2- D4 in	0.09	0.29	0.00	1.00
	Texas (D2= severe, D3= extreme, D4= exceptional)	0.08	0.26	0.00	1.00
PF	Price of cattle futures in USD	0.08	0.28	0.00	1.00
DSjan	Seasonal binary with January= 1, 0 otherwise	0.08	0.27	0.00	1.00
DSfeb	Seasonal binary with February= 1, 0 otherwise	0.08	0.27	0.00	1.00
DSmar	Seasonal binary with March= 1, 0 otherwise	0.08	0.27	0.00	1.00
DSapr	Seasonal binary with April= 1, 0 otherwise	0.08	0.27	0.00	1.00
DSmay	Seasonal binary with May= 1, 0 otherwise	0.08	0.27	0.00	1.00
DSjun	Seasonal binary with June= 1, 0 otherwise	0.08	0.28	0.00	1.00
DSjul	Seasonal binary with July= 1, 0 otherwise	0.09	0.28	0.00	1.00
DSaug	Seasonal binary with August= 1, 0 otherwise	0.09	0.29	0.00	1.00
DSsep	Seasonal binary with September= 1, 0 otherwise	218.00	125.57	1.00	435.00
DSoct	Seasonal binary with October= 1, 0 otherwise	63292.67	56537.40	1.00	189225.00
DSnov	Seasonal binary with November= 1, 0 otherwise	0.00	0.00	0.00	0.00
T	Trend	0.00	0.00	0.00	0.00
T^2	Trend Squared	0.00	0.00	0.00	0.00

Results

The full model was run using OLS regression in Simetar, an add-in statistical package for Excel, for the 300- 400 and 500- 600 pound steer weight classes. The regression results are contained in Table 3 for the 500- 600 pound steers. After testing, several variables were excluded from the final model due to statistical insignificance and because they added no explanatory power to the model. The final estimated model included the fewest explanatory variables.

The explanatory variables in the 500- 600 pound steer class model explained about 68 percent of the variation in the U.S.- Mexican steer price difference. As for the 300- 400 steer class model, about 54 percent of the variation was explained.

Several of the variables were not important in the model. Variables like corn price, fed cattle price, and diesel prices are normally important factors in calf prices. Yet, when examining the price differences, they should affect Texas and Mexico calf prices about equally.

There is a clear seasonality of cattle shipments to the U.S. and this is likely based on biological factors of the production system in Mexico. December was the base month. August, September, and October were statistically significant and negative, with P- values below 0.05. In both models, the months of September and October are statistically significant.

The variable for COOL (*DC*) was statistically significant and positive in each model applied to both weights of feeder cattle. For the 500 to 600 pound cattle, the price difference increased by $2.11 after the implementation of COOL. And for the 300- 400 pound the price spread increased by $4.41. The results indicate a change in the price spread coinciding with COOL. The sign is the direction expected a priori. The results indicate that Mexican cattle have received a

significantly larger discount following COOL implementation, or it could be termed that U.S. cattle have received a greater premium over Mexican origin calves.

Table 3. Regression results for Mexico- U.S. 500- 600 lb. steer price difference

	Beta	S.E.	t-test	Prob(t)
Intercept	**3.14**	0.95	3.30	0
PD_{t-1}	**0.69**	0.04	18.93	0
Hct	0	0	-0.46	0.65
CP_{t-1}	-0.07	0.13	-0.50	0.62
DC	**2.11**	0.56	3.78	0
DS_{jan}	-0.75	0.89	-0.84	0.40
DS_{feb}	-1.56	0.90	-1.73	0.08
DS_{mar}	-0.52	0.87	-0.60	0.55
DS_{apr}	0.59	0.89	0.67	0.50
DS_{may}	-0.05	0.89	-0.06	0.96
DS_{jun}	-0.49	0.91	-0.54	0.59
DS_{jul}	-0.75	0.93	-0.80	0.42
DS_{aug}	**-2.09**	0.94	-2.23	0.03
DS_{sep}	**-2.40**	0.94	-2.56	0.01
DS_{oct}	**-2.26**	0.91	-2.48	0.01
DS_{nov}	-1.44	0.87	-1.65	0.10

Conclusion

The purpose of this paper was to observe and explain the relationship in price differences between Mexican and the United States feeder cattle prices. Country of Origin Labeling for beef was implemented on September 30, 2008. It is widely believed that COOL led to lower Mexican cattle prices relative to U.S. calf prices. This research indicated that the implementation of COOL led to a significant widening of the spread between U.S. and Mexican calf prices. This

result might provide some support to arguments by Mexico that COOL has harmed their industry.

As is often the case, research leads to more questions for further research. One area for more work is the use of some more sophisticated modeling techniques. This research used a relatively simple model. Some additional data would be useful, including the Mexican orign discount, if any, on Mexican fed cattle.

An additional observation in this research that could be inferred is that the Mexican calf price COOL discount has encouraged Mexico to grow its meat industry. With Mexican calves becoming cheaper, an opportunity has been created to further develop the Mexican beef industry. If a Mexican rancher is going to get a lower price from his traditional market (the U.S.), he might be more likely to sell to a new buyer in Mexico and avoid any costs related to transportation or regulation. In the years following COOL implementation Mexican beef production and exports to the U.S. have increased. The influence of COOL in the North American cattle and beef industry may have some unintended consequences.

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