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The Cattle Price Cycle: Revisited Again

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Summary

New analyses and statistical techniques were applied to historical data to determine if time, changes in production technology, and business structure changes in the sector had altered the length of the cattle price cycle. Most recent work has been done the cattle inventory cycle. The price cycle was shown to be remarkably constant, despite many changes in the industry. Feeder cattle prices have continued to follow an approximate 10-year cycle. The model demonstrates the consistency of the cycle but shows that unexplained price variations occur suggesting caution be employed when it is used as a marketing guide.

Introduction

Most recent research on cattle cycles have been done on inventories. An advantage of studying the price cycle is it is reflective of the interaction of supply and demand while research on inventory cycles impact only supply. A clearer understanding of defined price patterns can lead to better and more informed production and marketing decisions by stakeholders.

It has long been accepted that beef cattle prices are cyclical in nature. Identifying the exact point where an individual cycle reaches its low or high is complicated by random variation (noise) in the price series. The purpose of this study was to determine if the cattle price cycle's length has persisted over time.

Procedure

Several techniques were used to capture the nature of the cattle price cycle. This work used USDA's price data for calves less than 500 lb for two primary reasons. First only a few price series of an appropriate length were readily available, the 500 lb feeder calf series was one of those. Secondly, our recent work supports the use of this feeder cattle weight/gender group, because we determined lighter weight feeder cattle prices were key in the price discovery process.

The price series for calves less than 500 lb was obtained from USDA's National Agricultural Statistics Service's web-hosted data base called "Quick Stats." This price series was from "U.S. & All States Data – Prices – Monthly Prices Received – Calves Less Than 500 Lbs." The data series began August 1909 and continued through December 1990. It resumed January 1998 and continued through December 2006. Data for 1991 through 1997 were obtained from the Publication titled "Agricultural Prices Summary," and was consistent with Quick Stats data. This report can be accessed at the Web site *usda.mannlib.cornell.edu/MannUsda/homepage.do* under the subject "Economics and Management."

The Consumer Price Index values used to convert these nominal prices to 1982 prices were obtained from the U.S. Department of Labor's Bureau of Labor Statistics Web site located at *www.bls.gov/cpi/*. This site provided a number of indices. The index titled "All Urban Consumers (Current Series) U.S. All items, 1982-84=100 - CUUR0000SA0" was the one chosen to convert the price series.

Because of the cyclical nature of the price cycle, a harmonic function was used in the estimation process. Harmonic functions, those that use the trigonometric identities such as sines and cosines, are commonly used to model cycles in many different areas of science where waves, or repetitive motion model are required.

First, the real prices were plotted (Figure 1). If these data were truncated, leaving off the first and last partial cycles, they exhibited a distinctive bow shape with the high point being January 1972, indicating a period of an increasing price trend and a later period of downward trending prices. This overall trend was consistent with demand of the two periods. The per capita consumption of meat reached a high in the 1970s and has since declined.

This bow shape trend was verified by the application of the Akaike Information Criterion (AIC), which
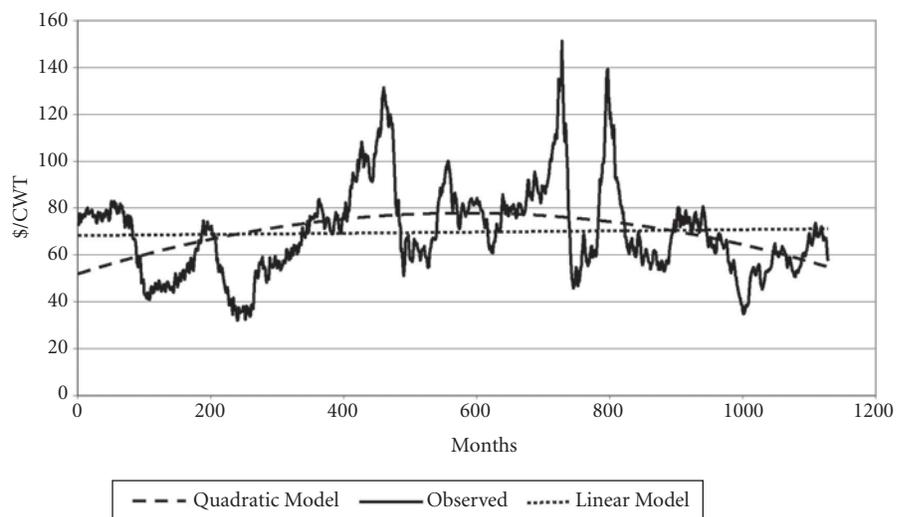
Figure 1.   Comparison between the quadratic and linear models.

indicated that the quadratic model was superior to a linear model. The AIC was also used to determine the length of the two cycles, the long term cycle (LTC) over many years, and the short term cycle (STC), seasonal variation. Other studies have shown the price cycle completed one cycle in approximately 120 months, LTC, and that the cattle prices exhibit seasonal variation making the STC cycle of 12 months appropriate. Rather than search across all possible combinations of the two cycles, the number of possible cycle lengths was limited. The only possible LTC's considered ranged between 110 and 130 months and the possible STC's were limited to range between 6 and 18 months. However, before estimating each possible combination of the two cycles, the data set was truncated at both ends to remove the effect any incomplete cycles might have on the explanatory parameter estimates. The first 107 and last 38 observations were dropped.

Results

The combination LTC and STC with the lowest AIC score was an LTC of 123 months, and an STC of 12 months (Figure 2). This outcome was supportive of the notion that the price cycle maintained its regularity since 1972 when it was last studied. This result was not surprising and was in-
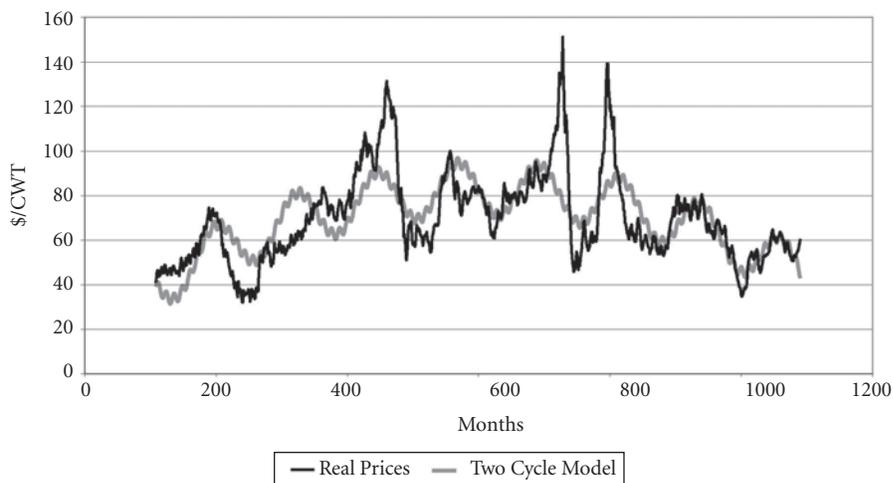

Figure 2. Real prices versus the two cycle model.

dicative of the robustness of the price cycle over an extended period of time. The most recent low in the cycle prior to 2003 was in 1993, and if the cycle holds true the next high will occur early in 2009 and the next low in 2014.

It was clear from Figure 2 that while the general pattern was consistent, there was a great deal of variation. This variation seems to provide lows and highs that occur off cycle and out of scale from the predicted prices.

This limited work only addresses the length of the cycle. No effort to analyze the pattern or magnitude of the highs and lows was conducted. Our analysis does not prove without a doubt the cattle price cycle will be

about 10 years long, but it does suggest a cycle about that long has persisted historically and the persistence has been maintained despite many economic, institutional, and physical changes in the industry. It would be unwise to ignore the past persistence of the cycle and equally unwise to assume it will always persist unchanged. The results of this research should be considered carefully and used cautiously.

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