The Net Effect of Exchange Rates on Agricultural Inputs and Outputs

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The Net Effect of Exchange Rates on Agricultural Inputs and Outputs

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Introduction

For more than thirty years studies about the effect of the exchange rate on inputs have been conducted. However, few have considered the conditional effect of the exchange rate on imported inputs into the agricultural system and the export of final agricultural products those inputs produce. A current concern is the net effect on the future value and quantity of inputs imported has increased. This research examines the effect of the exchange rates on inputs into the corn, wheat, and feedlot livestock production systems, keeping in mind the potential impact on corn and soybean production.

Objectives

1. Determine the net effect the exchange rates have on this corn, wheat, and feedlot livestock production systems.
2. Determine the impact of the exchange rates has increased over time.

Methodology

- A Vector Autoregression (VAR) model was used to model the relationship between the variables and the exchange rate.
- Corn, Wheat, and Feedlot Livestock systems were included.
- Exchange Rate
- Prices
- Feed
- Antimicrobials
- Livestock
- EAF

After the initial tests for stationarity, we tested for serial correlation to determine the number of parameters to include. The decision was based upon the idea that a structural change in the commodity market had occurred. The data set was from 1997 to 2003, and this time period was from 1990 and uses data from 1990.

- The Researchers’ Autoregressive Conditional Heteroskedasticity (ARCH) and Conditional Heteroskedasticity (GARCH) tests were run to indicate the number of variables in the system.

Methodology (continued)

- The conditional log likelihood function between the VAR and the Likelihood Ratio Test were incongruous. Therefore, a Bayesian Average of Classical Estimators (BACE) model was used.
- A BACE model comes from the approach that there is not a “true” model. It Estimates probabilities to different possible models, in this case, different log likelihoods.
- Conditional Probability for the model: $p(y_t|y_{t-1}, M) = \sum_{1}^{g} p(y_t|y_{t-1}, M, g_j)$

Where $p(y_t|y_{t-1}, M)$ is the prior probability on the $g_j$ model and $p(y_t|y_{t-1}, M, g_j)$ is the integrated likelihood of model $g_j$.

- Following the estimation of the posterior probability, the mean of the quantity of interest, which is the price response to an exchange rate shock, was calculated as

$$E[y_t|y_{t-1}] = \sum_{1}^{g} p(g_j|y_{t-1}) \cdot y_j$$

Where $p(g_j|y_{t-1})$, the quantity of interest, is calculated from the estimated parameter vector $g_j$ assuming model $g_j$.

Analysis and Results

The posterior probability heavily favored the model with a log likelihood structure of one. The probability for the model of other log likelihoods was very small and equally decline as additional lags were added.

Summary and Conclusions

1. The conclusion between the exchange rates and all stated variables is not direct but is a indirect relationship based on the exchange rate changes.
2. The exchange rate changes do not have a significant effect on the price levels of wheat, feed, and feedlot livestock systems.
3. The increasing dependence on imported inputs has not reached a level where the positive effects of the exchange rate shocks are offset by the negative effects on crop production.
4. Agricultural producers should not be overly concerned about a lower valued dollar from the perspective of their agricultural systems.