A Very Serious Analysis of the Stationarity of Corn and Soybean Prices

Introduction

This paper is a very serious examination of the relationship between the December 2016 corn and November 2016 soybean futures prices.

Data

We use daily settlement prices for the December 2016 and November 2016 corn and soybeans futures contracts on the Chicago Board of Trade from January 2, 2015 to April 29, 2016. The data are plotted in Figure 1.

Methods

We conduct a thorough statistical analysis, begining with pretesting for stationarity and cointegration; then we proceed to fitting an econometric model of the price relationships.

Pre-testing for Stationarity and Cointegration

We conduct an adf test on the corn and sobean price series to determine if they have a unit root (Said and Dickey 1984, Enders (1995)).

$$(1) \quad \Delta y_t = \alpha + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \cdots + \delta_{p-1} \Delta y_{t-p-1} + \epsilon_t$$

where p is the order of the autogressive term in the prices. The test will determine if there is a unit root, H0: $\gamma = 0$, with no drift, H0: $\alpha = 0$.

Results

We found there to be a unit root in soybeans, but corn exhibited stationarity. The values of the ADF statistics for corn and soybeans were -2.6 and -1.45, respectively.

References

Enders, Walter. 1995. *Applied Econometric Time Series.* Applied Economic Time Series.

Said, Said E, and David A Dickey. 1984. "Testing for Unit Roots in Autoregressive-Moving Average Models of Unknown Order." *Biometrika* 71 (3). Biometrika Trust: 599–607.
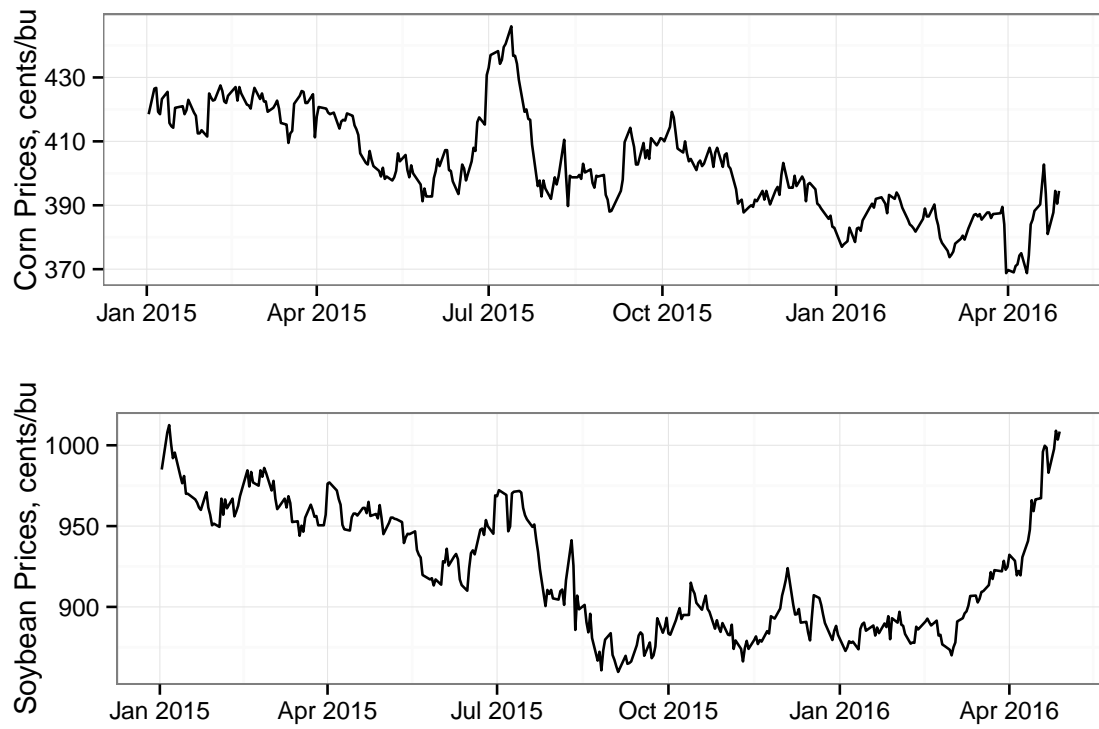
Figures

Figure 1. Corn and Soybean Prices

Tables

Table 1. ADF Results for Corn

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	15.4552	5.9709	2.59	0.0101
z.lag.1	-0.0386	0.0148	-2.60	0.0096
z.diff.lag1	-0.0091	0.0558	-0.16	0.8706
z.diff.lag2	-0.0815	0.0558	-1.46	0.1448
z.diff.lag3	0.1012	0.0559	1.81	0.0710
z.diff.lag4	0.0269	0.0560	0.48	0.6316
z.diff.lag5	0.0611	0.0564	1.08	0.2791

Table 2. ADF Results for Soybeans

	Estimate	Std. Error	t value	Pr($>$|t|)
(Intercept)	16.7430	11.5656	1.45	0.1487
z.lag.1	-0.0181	0.0125	-1.45	0.1494
z.diff.lag1	-0.1084	0.0563	-1.93	0.0551
z.diff.lag2	-0.0258	0.0565	-0.46	0.6478
z.diff.lag3	-0.0367	0.0563	-0.65	0.5149
z.diff.lag4	0.0036	0.0565	0.06	0.9487
z.diff.lag5	-0.0062	0.0558	-0.11	0.9109