Response of Farm Energy Input Prices to World Crude Oil Prices

Kepifri Lakoh

Dept. of Agricultural Economics

University Nebraska – Lincoln

kepifri@huskers.unl.edu

May 2011

Response of Farm Energy Input Price s to World Crude Oil Prices

*Kepifri Lakoh – Dept. Agricultural Economics .University of Nebraska-Lincoln*

There had been drastic changes in crude oil prices over the last ten years. These price changes have been thought to affect all other commodity prices , particularly other farm energy prices.. This affects most farming decisions which are then reflected in agricultural product prices, including food prices.

Here we try to investigate the degree of responsiveness of farm energy input prices to changes in crude oil prices.

Table 1: Pearson Correlation Coefficients

	lcrude	ldiesel	lngas	lelect
lcrude	1			
ldiesel	0.959	1		
lngas	0.867	0.958	1	
lelect	0.819	0.913	0.963	1

Nebraska Natural Gas, Electricity, Crude Oil and Diesel Prices
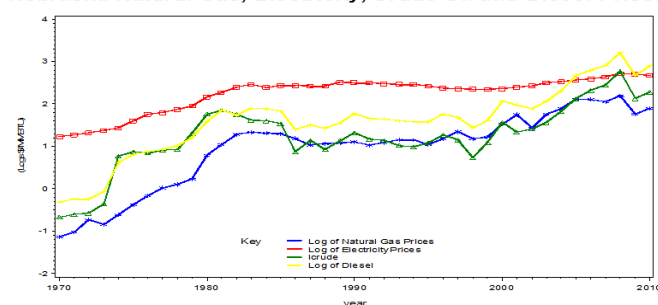
Objective:

Use time series analysis to determine the effect of an increase in crude oil prices on energy-related farm input (Diesel, Natural Gas and Electricity) prices.

Methodology

VAR: $Y_t = A_1 Y_{t-1} + e_t$

where $A_1 = B^{-1}\Gamma_1$ & $e_t = B^{-1}\varepsilon_t$

Unit Root and Stationary- ADF

Table 2: ADF Test Results

Variables	Logs	1st Diff	2nd Diff
Lcrude	-2.45	-4.45	AIC >
Ldiesel	-2.05	-4.44	AIC >
Lngas	-2.39	-3.68	AIC >
Lelect	-2.86	N.S	-5.53

Co-integration – JC.

Table 3: Johansen Co-integration

Null	Eigen	Trace	C-Value
rank = 0	0.56	51.59	39.71

From the JC. results there was strong evidence of co-integration therefore we used a VECM

VECM

$$
\begin{bmatrix} \Delta C_t \\ \Delta D_t \\ \Delta N_t \\ \Delta E_t \end{bmatrix} = \begin{bmatrix} \pi_{11} & \pi_{12} & \pi_{13} & \pi_{14} \\ \pi_{21} & \pi_{22} & \pi_{23} & \pi_{24} \\ \pi_{31} & \pi_{32} & \pi_{33} & \pi_{34} \\ \pi_{41} & \pi_{42} & \pi_{43} & \pi_{44} \end{bmatrix} \begin{bmatrix} C_{t-1} \\ D_{t-1} \\ N_{t-1} \\ E_{t-1} \end{bmatrix} + \begin{bmatrix} e_1 \\ e_2 \\ e_3 \\ e_4 \end{bmatrix}
$$

$$(C_{t-1} - \pi_{.2}D_{t-1} - \pi_{.3}N_{t-1} - \pi_{.4}E_{t-1})$$

Granger causality results reveal that natural gas, electricity and diesel prices were all granger caused by crude oil prices.

Results

Model Parameter Estimates

Eqns.	Parms.	Estimate	Pr > |t|
lelect	XL0_1_1	0.07519	0.0012
ldiesel	XL0_2_1	0.59709	0.0001
lngas	XL0_3_1	0.28981	0.0002

Alpha Estimates With Rank = 3

Variable	1	2	3
lelect	0.02794	-0.03029	-0.00111
ldiesel	0.15066	0.04115	0.00241
lngas	0.09437	-0.04309	0.01005

Conclusion

Even though all four energy price variables move independently in the short-run, co-integration results show that they all move in the same direction in the long-run.

The most responsive farm price was diesel; followed by natural gas and then electricity. The estimates of the VECM revealed that if crude oil prices continue increasing, natural gas, diesel and electricity prices would also converge to an increasing trend in the long-run. The reverse is also true for a decrease in crude oil prices.

Selected References

Brocklebank J.C et. Al. 2003
Carter .D.W et al. 2009
Enders,W. 2010.
Holden, D., and R. Perman , 1994.
Rosegrant, M.W. 2008.
Saghaian S. H. August 2010