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STRUCTURAL CHANGES IN COMMODITY PRICES: THE ROLE OF POLICIES

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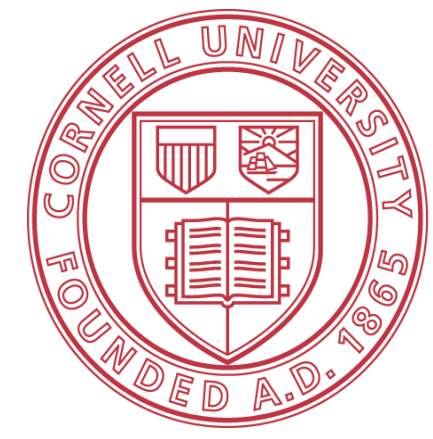
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STRUCTURAL CHANGES IN COMMODITY PRICES: THE ROLE OF POLICIES



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Introduction

Food commodity prices have recently increased sharply and become more volatile, highlighting greater uncertainty in markets and serious implications among the poor globally.

Diversion of food crops to biofuel production stands out as an important and relatively new driver of high food prices in the recent decade.

Empirical studies have shown that the use of food crops in biofuel production has reduced availability for food uses and hence raised food prices. This has raised living costs throughout the world and, in poor food-importing developing countries, has threatened food security and increased vulnerability. High food prices may have contributed to political unrest.

High fuel prices combined with legislative policies have increased biofuel production causing high food prices and establishing a link between fuel and agricultural prices.

Biofuel production may also have changed the nature of the relationship between energy and agricultural markets by creating a new demand side link between these two markets.

Data and Methodology

Weekly crude oil, gasoline, corn, and ethanol prices are mainly obtained from Chicago Board of Trade (CBOT), US Energy Information Administration (EIA) database and Chicago Mercantile Exchange (CME).

This research uses the time-varying autoregressive model (TV-AR) to tests for the presence of structural breaks; examines the nature of these breaks and locate these breaks in the single price series and the bi-variate relationships of these prices from 2000-2012.

Using an AR(p) specification:

$$\Delta y_t = \delta(t-1) - \rho y_{t-1} + \sum_{j=1}^p \theta_j \Delta y_{t-j} + \varepsilon_t$$

Where, $\delta(t)$ is the time-varying mean. This research tests for multiple breaks using the Bai and Perron (1998) test. With k breaks, the shifting mean is now defined by:

$$\delta(t) = \delta_0 + \sum_{j=1}^k \delta_j z_{jt} \quad \text{where } z_{jt} = \begin{cases} 0 & (t=1, \dots, T_j-1) \\ 1 & (t=T_j, \dots, T) \end{cases}$$

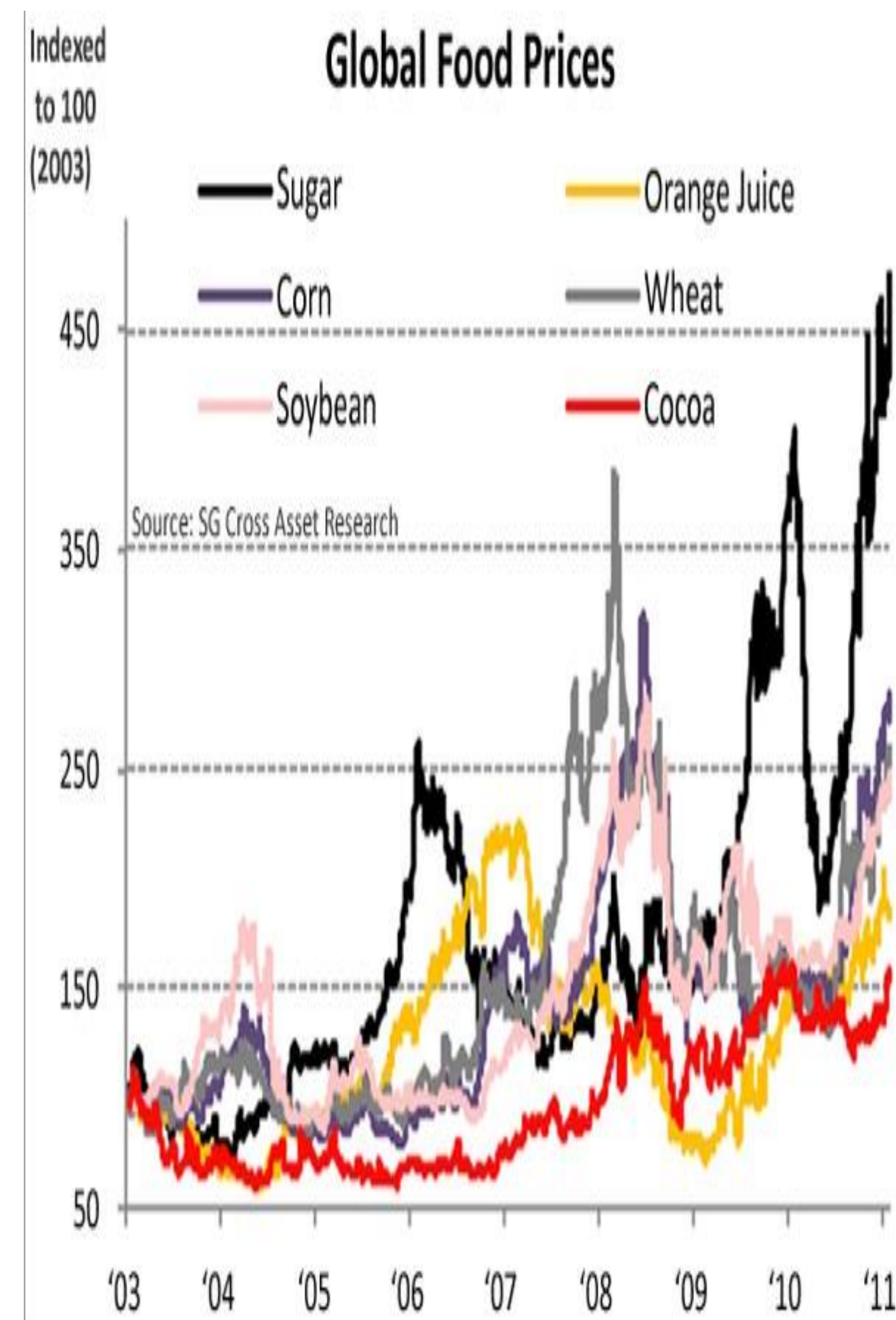
Do policies matter?

Biofuel production and consumption in the US varied over the recent decade, mainly in response to a large number of government policies.

These policies and regimes affected energy production and consumption which in turn, affected the prices and price linkages between energy and agricultural food commodities.

Key public policies include:

- Biofuel consumption subsidies, such as the tax credits (implemented in 1978) that expired at the end of 2011;
- Formal ethanol mandates such as the Renewable Fuel Standard (RFS), which took effect in 2005;
- Production subsidies for both biofuels and feed-stocks such as the blend wall and blending limit for standard gasoline type fuel;
- Import tariffs and tariff-rate quotas, such as the \$0.54/gal ethanol import tariff.



Structural breaks in commodity prices

The objective of this research is to empirically examine structural changes in commodity prices and price relationships in the recent decade. It evaluates the nature of these changes in relation to changes in United States agricultural, environmental and energy public policies in determining structural breaks in food and energy prices.

The hypothesis here is that structural changes in commodity prices may either be driven by market forces or changes in government policies and policy regimes.

Results

TABLE 1: STRUCTURAL BREAKS IN PRICES

| COMMODITY | NUMBER OF BREAKS | BREAK DATES |
|-----------|------------------|--------------------------|
| CRUDE OIL | 1 | 29/10/2010 |
| GASOLINE | 2 | 04/03/2005 03/12/2010 |
| CORN | 2 | 03/10/2008 08/10/2010 |
| ETHANOL | 2 | 05/08/2005 08/10/2010 |

TABLE 2: STRUCTURAL BREAKS IN PRICE RELATIONSHIPS

| COMMODITY | NUMBER OF BREAKS | BREAK DATES |
|--------------------|------------------|--|
| CRUDE OIL-GASOLINE | 3 | 30/07/2004 11/07/2008 30/07/2010 |
| CRUDE OIL-CORN | 2 | 23/07/2004 06/10/2006 |
| CRUDE OIL-ETHANOL | 1 | 01/06/2007 |
| GASOLINE-ETHANOL | 1 | 30/03/2007 |
| GASOLINE-CORN | 3 | 17/09/2004 22/09/2006 17/09/2010 |
| ETHANOL-CORN | 2 | 07/03/2008 10/07/2009 |

Conclusions

This research identifies the presence of multiple structural breaks in each of the prices as well as in the price relationships in all the commodities examined.

Structural changes in commodity prices and price relationships are and indication of a true shift in the mean implying changes in market fundamentals.

In the single price series, the most of the breaks occurred after 2005. This is the period when most of the public policies were implemented.

The structural breaks incurred in the price relationships not only depend on the public policy but also on the switch in the policy regimes such as binding mandates. The switch in policy regime is a result of responses to changes in market conditions as well as production and consumption constraints in these markets.

These results highlight the importance of public policies in determining permanent changes in prices trends as well as price relationships.

Literature

ABBOTT, P.C., C. HURT, and W.E. TYNER. (2008): What's Driving Food Prices?: Farm Foundation Issue Report, Oak Brook, IL.

BAI, J., AND P. PERRON. (1998): Estimating and Testing Linear Models with Multiple Structural Changes: *Econometrica*, vol 66, pp. 47-78.

DEGORTER H. and D.R. JUST. (2009): The Economics of a Blend Mandate for Biofuels." *American Journal of Agricultural Economics* 91 (3): pp. 738-50.

ENDERS W. and M.T. HOLT (2012): Sharp Breaks or Smooth Shifts? An Investigation of the Evolution of Primary Commodity Prices: *American Journal of Agricultural Economics* 94 (3): pp. 659-673.

FAO. (2010): *Commodity Market Review 2009-2010*. Rome: Food and Agriculture Organization of the United Nations.