



# Do oil prices drive agricultural commodity prices? Evidence from South Africa



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## ABSTRACT

The global economy has witnessed a concurrent rise in oil prices and agricultural commodities prices and this has generated interest in understanding the energy-food nexus. Many studies have attributed the rise in agricultural commodity prices to the role of world oil prices. Similar to global oil prices, South Africa experienced a surge in agricultural commodity prices from 2004 and reached a peak in 2008. This study conducts an empirical investigation of the effects of oil prices on agricultural commodity prices in South Africa. Structural breaks cointegration tests showed no evidence of a long-run relationship between oil prices and agricultural commodity prices in South Africa. Nonlinear causality tests showed no evidence that agricultural commodity prices in South Africa respond to oil prices. The results show that agricultural commodity prices in South Africa are neutral to global oil prices.

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## 1. Introduction

The global economy has witnessed a ‘twin-surge’ in prices in the past 10 years. From September 2003, the oil price embarked on a bull run and reached a peak of \$145 per barrel in July 2008, but this surge was halted by the onset of the global financial crisis, and by December 2008, the oil price had plummeted to \$40 a barrel. Almost simultaneously, the prices of agricultural commodities also experienced a similar increase with prices particularly rising from the beginning of 2006 until the middle of 2008 when again, the onset of the global financial crisis put a halt on the rise in prices. This concurrent rise in oil prices and agricultural commodities prices has generated interest in understanding the energy-food nexus and many studies have attributed the rise in agricultural commodity prices to the role of world oil prices [1,2,11,24].

This rising trend in prices of both oil and agricultural commodities has not been restricted to global prices alone but has also been noticed in emerging economies, such as South Africa. Fig. 1 presents the trend of oil prices and South African agricultural prices between January 2003 and January 2014 and a similar trend can be observed in the movements of both sets of prices. From 2003 to 2006, oil and agricultural prices rose modestly, and then from 2007 both sets of prices experienced a spike which peaked in 2008 and subsequently fell. This decline in prices continued until 2010 when

again, both sets of prices started rising. This simultaneous rise in oil prices and South African agricultural prices is further seen from Table 1, which shows correlation coefficients between oil prices and South African agricultural prices. The table shows a high degree of correlation between oil prices and South African agricultural prices, with the highest correlation of 0.80 observed between sunflower and oil prices. This is followed by a correlation of 0.71 between maize and oil. The lowest correlation is observed between oil prices and soybeans prices (0.65). These high correlation coefficients suggest a close relationship between oil prices and agricultural commodity prices in South Africa and support the claims that the surge in agricultural commodity prices has been due to high oil prices experienced in the same period [1,2,11,24].

The basis for such attribution relate to the dynamics of world agricultural markets. Global agricultural markets have experienced a steady decline in prices since the mid-20th century. Table 2 shows that between 1960 and 2000 the agricultural price index fell by 45.6 percent. Food prices fell by 46 percent, beverage prices fell by 57.8 percent, and the prices of raw materials fell by 37.9 percent. Conversely, Table 2 also shows that agricultural prices experienced tremendous increase in the period from 2001 to 2013 as the agricultural price index increased by 63.5 percent. Of the three components of agriculture, food prices rose highest by 72.1 percent, with beverages and raw materials rising by 62.3 percent and 42.9 percent respectively. Closer examination of the food components shows that oils and meals, and grains experienced phenomenal increases of 110.8 percent and 97.4 percent respectively. This is in

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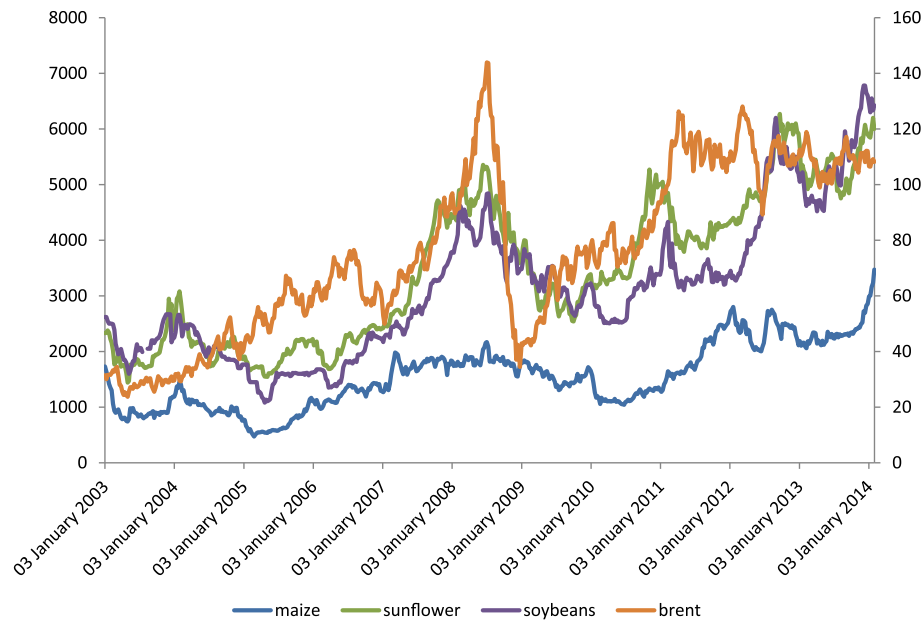


Fig. 1. Oil prices and South African agricultural commodity prices.

**Table 1**  
Correlation coefficients between oil and South African agricultural prices.

	Maize	Sunflower	Soybeans	Oil
Maize	1.00	0.87	0.87	0.71
Sunflower		1.00	0.94	0.80
Soybeans			1.00	0.65
Oil				1.00

stark contrast to the 54.7 percentage decline of oils and meals between 1960 and 2000 and the decline of 51.7 percent in grain prices for the same period.

The decline in agricultural prices for most of the 20th century have been explained as rising from both supply side and demand side factors [27]. On the supply side, technological advancements in agriculture resulted in lower production costs, and this, coupled with increased competition for inputs, led to the fall in commodity prices. The competition for inputs and technological advancements increased productivity, reduced profit margins for farmers, and there was a subsequent rise in total output ([27], p.2). On the demand side, there has been a reduction in global food demand. The decline in global agricultural demand has been as a result of 3 factors: lower population growth; growing share of global proportion already attaining high levels of per capita food

consumption; and poverty which limited demand for food by those affected ([3], p.59). Table 3 shows that global agricultural demand has been falling and is estimated to fall even further. Global agricultural demand growth is projected to fall from 2.3 percent for the period 1990–2007 to 1.4 percent for the period 2005/2007–2030 and even further to 1.1 percent for the period 2005/2007–2050. Such falls in demand growth are expected in all regions and it is only in the developed economies where there will be a slight increase in demand growth from 0.4 percent per annum over the period 1990–2007 to 0.6 percent for the period 2005/2007–2030 and 0.5 percent for the period 2005/2007–2050.

The above narrative shows that the underlying fundamentals of global agricultural markets relating to households food consumption and farmers production have remained largely unchanged. Although various factors have been identified as driving the recent surge in agricultural commodity prices, the energy markets have been identified as the dominant source of the drastic rise in agricultural prices because agricultural products have become a competitive source of energy [27] and high oil prices have shifted focus to biofuels [1,2,11,18,24].

There has been a long-standing relationship between agriculture and energy which has been evolving over time ([11], p.3). Prior to the industrial revolution, agriculture served as a major source of energy as animals were used for transportation and to power

**Table 2**  
Real prices for food and agriculture.

	Agriculture				Agriculture					Fertilizers
	Agriculture	Agriculture			Food	Raw materials			Timber	Other raw mat.
		Beverages	Food	Raw materials		Oils & meals	Grains	Other food		
1960–1969	–6.2	–6.6	1.2	–23.1	–11.9	8.9	14.6	–1.0	–36.8	–37.8
1970–1979	0.5	41.9	–7.5	–3.0	–4.0	–8.2	–12.0	–5.6	–0.1	74.3
1980–1989	–31.6	–48.9	–32.3	–14.9	–34.1	–29.5	–32.7	–5.8	–24.1	–46.7
1990–1999	–5.2	6.5	–9.5	–0.6	2.4	–11.5	–19.0	14.9	–20.6	–9.2
2000–2013	63.1	45.0	84.9	26.3	106.1	106.2	45.9	10.4	55.1	138.8
1960–2000	–45.6	–57.8	–46.0	–37.9	–54.7	–51.7	–23.4	4.1	–64.1	–31.1
2001–2013	63.5	62.3	72.1	42.9	110.8	97.4	21.9	30.3	63.2	143.3
1960–2013	–11.3	–38.8	–0.1	–21.6	–6.7	–0.4	11.7	14.9	–44.3	64.5

Source: World Bank: Commodity Price Data Bank (The Pink Sheet).

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