1-1-2011

Climate Change, Agricultural Productivity and Food Security in Sub-Saharan Africa

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February 16, 2011

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Market Report	Yr Ago	4 Wks Ago	2/11/11
Livestock and Products, Weekly Average			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight	$87.57	$106.98	$106.21
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.	117.55	150.85	148.25
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.	101.56	127.59	126.00
Choice Boxed Beef, 600-750 lb. Carcass	139.32	168.24	169.24
Western Corn Belt Base Hog Price Carcass, Negotiated	64.34	73.09	81.64
Feeder Pigs, National Direct 50 lbs, FOB	*	*	*
Pork Carcass Cutout, 185 lb. Carcass, 51-52% Lean	68.36	83.44	88.80
Slaughter Lambs, Ch. & Pr., Heavy, Wooled, South Dakota, Direct	*	165.25	157.50
National Carcass Lamb Cutout, FOB	251.06	348.52	352.00
Crops, Daily Spot Prices			
Wheat, No. 1, H.W. Imperial, bu.	3.84	7.01	8.20
Corn, No. 2, Yellow Omaha, bu.	3.51	6.22	6.82
Soybeans, No. 1, Yellow Omaha, bu.	9.22	13.69	13.84
Grain Sorghum, No. 2, Yellow Dorchester, cwt.	5.39	10.36	11.45
Oats, No. 2, Heavy Minneapolis, MN , bu.	2.32	4.02	4.22
Feed			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.	135.00	140.00	140.00
Alfalfa, Large Rounds, Good Platte Valley, ton.	87.50	72.50	72.50
Grass Hay, Large Rounds, Premium Nebraska, ton.	*	*	*
Dried Distillers Grains, 10% Moisture, Nebraska Average.	105.00	196.00	203.50
Wet Distillers Grains, 65-70% Moisture, Nebraska Average.	35.00	64.50	69.75

*No Market

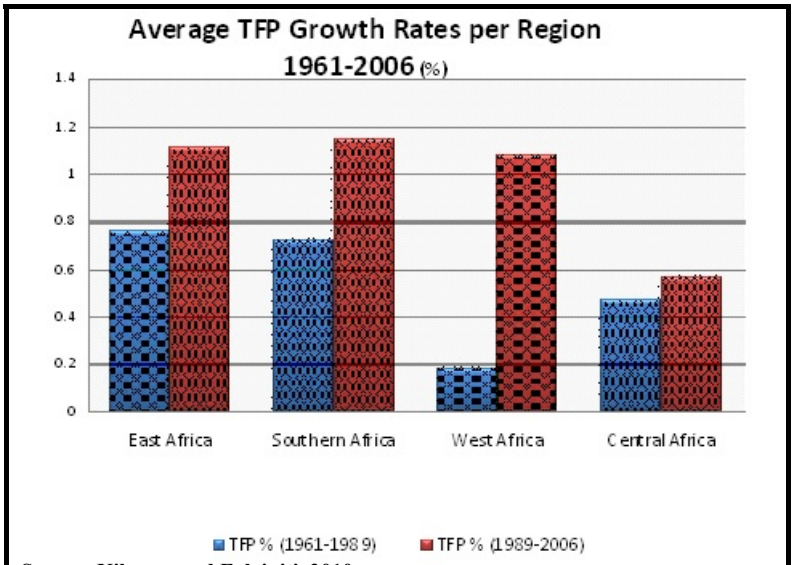
Agricultural productivity growth is a necessary condition for food security. Climate is directly related to the ability of a region to produce food. The Intergovernmental Panel on Climate Change (IPCC, 2007) reports that countries in Sub-Saharan Africa (SSA) are likely to be severely affected by climate change and climate variability. Projections show that extreme heat and heavy precipitation are likely to become more frequent, affecting the ability of an already stressed area to produce cash as well as food crops. Most of SSA agriculture (96 percent of harvested acres) is rainfed, making crop yields very sensitive to the temporal and spatial variability of climate, especially rainfall.

SSA's vulnerability to climate change is especially serious due to the dependency of its economy and the livelihood of its population on agriculture. On average, the agricultural sector accounts for about 21 percent of Gross Domestic Product (GDP), reaching up to 70 percent in some countries. About 70 percent of the population in Africa lists agriculture as its primary source of employment.

Although simulation models such as those of Kurukulasuriya and Rosenthal (2006) and Mendelshon et al. (1994), have shown this vulnerability to climate change, there have been few studies of the effects of climate change on agricultural productivity growth in SSA based on actual input-output observations. Productivity is measured as the amount of output that can be obtained from a given set of inputs. Productivity growth is growth in output not explained by growth in traditional inputs such as land, labor, fertilizer and chemicals; but by increases of efficiency in the use of

these inputs and by the adoption of technical innovations.

In a series of studies (Kibonge and Fulginiti, 2010a, 2010b), earlier estimates of agricultural productivity in 46 SSA countries (Fulginiti, Perrin and Yu, 2005), were updated to 2006. These results were linked to variables that would capture the effects of climate change on agricultural productivity. These results indicate that agricultural productivity in SSA was stagnant during the 1970's and 1980's, but shows an important recovery during the 1990's and 2000's. Recovery has been weak in Central and West Africa, but stronger in Eastern and Southern Africa.



Source: Kibonge and Fulginiti, 2010a

To investigate the sensitivity of these results to climate variables further analysis focused on the contribution of drought, temperature, precipitation and irrigation to agricultural productivity performance. We found that differential performance across countries in this region is primarily explained by rainfall and by the frequency of droughts. Countries with higher irrigation ratios have also experienced higher agricultural productivity growth. These results support the IPCC's projections that SSA will likely be severely affected by a deteriorating climate.

In addition, we investigated the vulnerability of agricultural productivity growth to political conflicts and wars. Our results, not surprisingly, indicate that performance has been significantly affected in countries that endured longer periods of violence. The prospect of climate change, coupled with violence and political instability could compromise the incipient agricultural recovery of the last twenty years in SSA, with important consequences for food security and peace in an already stressed area of the planet.

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