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Do Climate Change and Institutional Quality Impact on Agricultural Productivity in Nigeria?

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Abstract: This study analysed the impact of climate change and institutional quality on agricultural productivity in Nigeria. The study used agricultural output as a proxy for agricultural productivity. In order to examine the hypotheses under the study, the Johansen co-integration test was used to test the time-series properties of the variables. Adopting the Ordinary Least Squares (OLS) estimation technique, the results from the study revealed that some climate change and institutional quality variables have significant impacts on agricultural productivity in Nigeria. In line with these findings, the study recommended among many others that policy makers and the Nigerian government should strengthen efforts towards strengthening institutional variables, integrating climate smart agriculture and investing in agricultural technology (agro-tech) to enhance and improve agricultural productivity in the economy.

Keywords: climate change; agricultural productivity; institutions, JEL Codes: C23, N57, Q25, Q01

1. Introduction

Different phenomena have challenged global and regional economies over time. The Great Depression, trade and military wars, hunger and starvation, plagues, diseases, and a variety of other natural or manmade activities, for example, are all topics of debate in the world's economic history. Today, the world is faced with another problem known as climate change, which is affecting many economies. Climate change is defined as a shift in the climatic condition or system as a result of the long-term accumulation of emitted greenhouse gases (GHGs) in the atmosphere (Ogbuabor et al., 2020).

Although climate change can be influenced by natural (geographic) factors in the atmosphere, research indicates that it is primarily caused by human (anthropogenic) activity such as GHG emissions or flare-ups (Ngongeh et al., 2014). With both causes, the United Nations Framework Convention on Climate Change (UNFCCC) attempted to distinguish between climatic alterations by human-natural sequestration in Belloumi (2014), in that what it considers climate change is the change primarily attributed directly or indirectly to human activities, whereas climatic variability is the change primarily attributable to natural causes. Regardless of this duality, anthropogenic GHG emissions have been established as the primary cause of climate change (IPCC, 1998). Carbon dioxide (CO₂), nitrogen dioxide (NO₂), methane (CH₄), ammonia gas (NH₃), and sulfur dioxide (SO₂) are some of the most common gases.

GH-gases are produced by agricultural activities such as bush burning, deforestation, and even soil cultivation. According to US-EPA (2006) in Ekpenyong and Ogbuabu (2015) agriculture accounts for roughly 14% of total anthropogenic GHG emissions.

On the other hand, climate change affects agrarian economy in multiple ways because agriculture is an economic activity that is subject to natural phenomena. Agriculture is a priority sector, which is why it is a key component of attaining a significant macroeconomic goal of raising national income. The agricultural industry meets the labor force's stomach economics as well as other industry demands for raw materials. Climate change, on the other hand, can stifle agricultural productivity in extreme circumstances (Ayinde, Muchie, & Olatunji, 2011).

The agricultural sector, according to Nastis, Michahidis, and Fotios (2012), is the most sensitive to climate change since climatic features directly affect agricultural productivity. In a different perspective, it has been noted (in Ebele & Emodi, 2016; Ogbuabor & Egwuchukwu, 2017; & Solomon & Edet, 2018) that crop yield and agricultural productivity might have a negative impact on Gross Domestic Product (GDP). Climate change effects on agriculture may be negative or positive depending on the country's climatic condition or geographic location, according to research. Climate change has a strong positive influence on agriculture for countries at mid-high latitudes, but a detrimental effect for low-latitude countries, according to Mendelsohn (1998). According to the IPCC (2007), African agriculture would be extremely vulnerable to climate change, owing to the region's tropical climate (low latitude) and rain-fed agriculture, as well as inadequate climate change adaptive capacities. More recently, research finds that the impacts of climate change vary not just across countries and latitudes but across individual crops (Onyeneke et al., 2022).

In the mid-20th century, 1960 to 1964 precisely, agriculture was the mainstay of Nigeria's economy accounting for about 62.5% of total GDP (CBN's report in Ugwu & Kanu, 2012). However, according to Sekumade (2009), following the oil boom era of 1964 to 1974, the agricultural sector was fraught with fiscal negligence and abandonment. From a macroeconomic perspective, agriculture in Nigeria is subdivided into crop production, livestock farming, fishery and forestry with crop production accounting for over 84% of total agricultural output (NBS, 2019). In terms of contribution to GDP, real agricultural output in the period of 2013–2015 accounted for about 23.11% of GDP and about 24.88% by 2016–2018 (NBS, & CBN bulletin, 2019). Interestingly, Government annual fiscal recurrent expenditure on agriculture in 2017–2018 was respectively 50.26 and 53.99 billion naira. These were very paltry sums when compared with Nigeria's corresponding annual total fiscal recurrent budgetary expenditure. The insufficient fiscal recurrent agricultural allocation is incapable of fast-tracking agricultural output boom and more even, there is a tendency of little or no budgetary appropriation for climate change adaptive strategies. Figure 1 shows the trend chart of Real Gross Domestic Product (RGDP) growth rate and Agricultural Output growth rate and Figure 2 shows the trend chart of Agricultural Output and Government Recurrent Expenditure on Agriculture in Nigeria.