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The Impact of Drought on Key Macroeconomic Variables

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Adverse weather conditions have become more prevalent all over the world, and with devastating impacts on economies. In Kenya, adverse weather conditions are manifested in the frequent occurrence of droughts and floods, and while droughts are widespread throughout the country, floods tend to be localized.

Data obtained from Climate Hazards Group InfraRed Precipitation with Stations (CHIRPS) shows that there has been an increase in the frequency of occurrence of drought months in Kenya, ranging from mild to extreme drought. For example, in the 1980s, there were two extreme drought months, three extreme drought months in the 1990s and four extreme drought months in the 2000s. Between 2010 and 2015, the country experienced five extreme drought months. Additionally, data from the Kenya Meteorological Department (KMD) identifies 2017 as a severe drought year. Floods though do not exhibit a pattern but have become more frequent. The same data sources (CHIRPS and KMD) identify 1997/98, 2000, 2003, 2006, 2010, 2016 and 2018 as flood years.

The economic effects of droughts and floods are manifested in the disruption of production flows resulting in production losses, income losses, loss of employment, and increased operational costs. These effects are compounded by lack of and/or inadequate infrastructure development such as storage facilities that can absorb surpluses during bumper harvests. However, droughts and floods do not occur in isolation, and at times they occur in presence of other events that have effects on economic systems, including political instability, high international commodity prices, and global downturns, among others. This complicates the task of disentangling economic losses caused by droughts and floods from losses brought about by these other events. However, it is possible to identify patterns in the disruption of production flows, decline in revenues, and higher operational costs that typify disaster periods and which are felt across all sectors.

In 2004, for example, extreme drought was reported between May and July, which coincided with the cultivation season. As a result, the agricultural sector grew by 1.6% during the year compared to 6.9% in 2005 and 6.4% in 2010, which were considered normal production years. This decline in production caused a food deficit that necessitated importation of 241,800 tonnes of maize valued at Ksh 4.6 billion to cover the deficit from production. Again in 2011, imports of unmilled maize increased by 56.5% from 2010 to supplement local production. Likewise, the average monthly hydro electricity generation declined in 2009 and 2011, both extreme drought years. Similarly, the prolonged drought in the period 2016-2017 saw a decline in the growth of the agricultural sector from 5.1% in 2016 to 1.6% in 2017. Like in the previous drought years, there was a deficit in maize production which necessitated an increase in imports of unmilled maize from 148,600 tonnes to 1.3 million tonnes at a cost of Ksh 40 billion. These direct adverse effects from drought are passed on to other sectors, for example manufacturing and transport, that

incur higher operational costs for their own production.

During the drought of 2011, 0.2% of GDP was lost, amounting to approximately Ksh 6.2 billion, while the drought of 2017 caused a one per cent pullback on GDP, amounting to approximately Ksh 71.6 billion (World Bank, 2011). A field survey carried out in 2011 by a joint assessment team drawn from the Kenyan government line ministry staff, the World Bank, European Union, United Nations and other partners on post-disaster needs assessment for Kenya showed that during the 2008–2011 drought, the losses and damages incurred amounted to US$ 12.1 billion, with livestock sector absorbing 72% of the losses. What exacerbates the adverse effects is the lack of preparedness and late response occasioned by poor road networks especially in the arid and semi-arid regions which are most vulnerable.

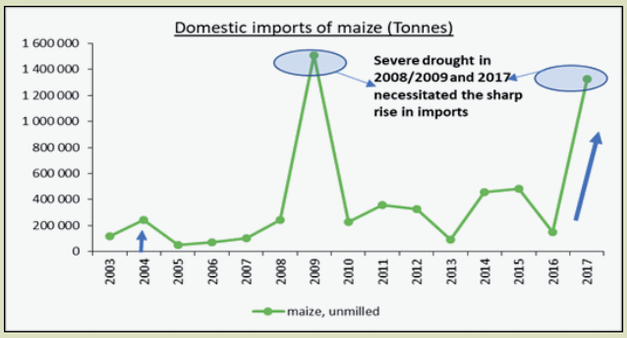
The Government of Kenya has initiated programmes to directly respond to drought-related issues. For example, in response to the prolonged drought of 2008 - 2011, Ending Drought Emergencies (EDE) strategy was put in place that commits the government to end drought suffering by 2022. This strategy is incorporated into Kenya Vision 2030. Likewise, the National Drought Management Authority (NDMA) was established in 2011 to coordinate drought management and it manages the National Drought Contingency Fund whose funds are pooled from both the government and donors for response purposes. This will ensure a more timely and efficient response.

The macroeconomic imbalances that result, though temporary in nature, arise either directly from the natural disasters and/or from government's efforts to mitigate the economy against the negative effects of the drought. The main imbalances occur in the fiscal and the external sectors. Directly, natural disasters reduce government revenue following decreases in tax revenue collections due to production losses and destruction of productive fixtures. Expenditures also increase, especially expenditures related to building resilience and mitigation measures necessitated by the disasters. For example, in February 2017, the government declared drought a national disaster and Ksh 11 billion was set aside to cater for drought-related interventions, including providing food rations and cash transfers to the affected households. An additional Ksh 3.8 billion was set aside in February 2018 to address drought-related effects in drought hit parts of the country, out of which Ksh 2.5 billion was earmarked for food and cash transfer programmes. In the 2017/18 budget summary (Government of Kenya 2017), the government set aside Ksh 46.6 billion for environment management and protection, flood control and water harvesting. More recently, the government supported the Red Cross with Ksh 1 billion for their flood relief kitty. Similarly, Ksh 194 million was set aside by Nairobi County to address the recent floods that rocked the city during March, April and May 2018 long rain season. While these funds are not necessarily budgeted for, the fiscal responsibility principles provide for deviations from financial objectives of public revenues "only in a temporary basis and only where such deviation is caused by a major natural disaster, other significant unforeseen event…." (Public Finance Management Act, 2012).

The prolonged drought of 2008-2011 slowed growth of tax revenues especially from VAT and Excise duty. Notable during this period were the tax exemptions given to importers. For example, between February 2007 and February 2008, importers of raw/mill sugar could import up to 89,000 metric tonnes duty free from COMESA Free Trade Area countries to curb the rising prices caused by the drought (Kenya Gazette, Vol CXIX-No.47). Likewise, duty on imported maize was suspended in 2009, 2011 and 2017. Similarly, maize flour and bread were zero rated in 2017 to curb rising prices. It is not surprising therefore that despite the increase in imports to cater for production deficits, growth in import duty fell during this period. This has a direct implication on the fiscal balance. Reports show that extreme droughts and floods are estimated to reduce long-term growth by 2.4% of GDP, an estimated fiscal liability of Ksh 16 billion.

On the external sector, the current account of the balance of payments, in which the

Maize and wheat imports



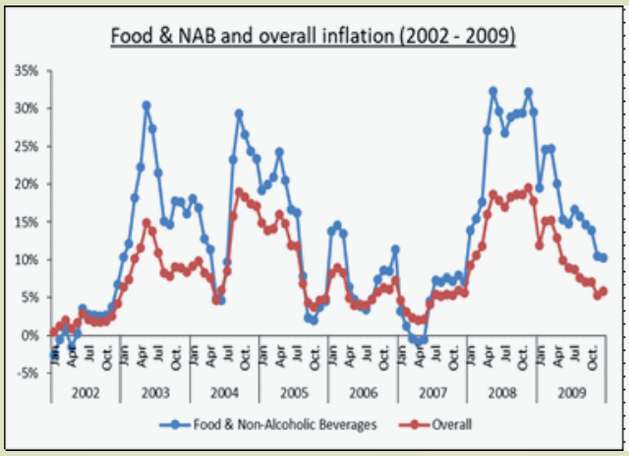
economic transactions of the economy with the rest of the world are recorded, is expected to be negatively affected. At the minimum, adverse weather conditions necessitate an increase in imports, specifically food imports to cater for the shortfall in production, where crop failure occurs. Likewise, we expect a decrease in the export of merchandise because of reduced production capacity. Such effects exert pressure on the exchange rate, leading to a depreciation of the Kenya shilling against major currencies, especially if exports of other major items decline. The figure below shows the sharp increases in maize imports during drought periods (2009, 2017) relative to other periods. Year 2011, also a drought year, saw a slight increase in imports relative to 2010 when the country experienced favourable weather. It is thus evident that droughts disrupt the normal flow of imports, which will feed into imbalances in the current account.

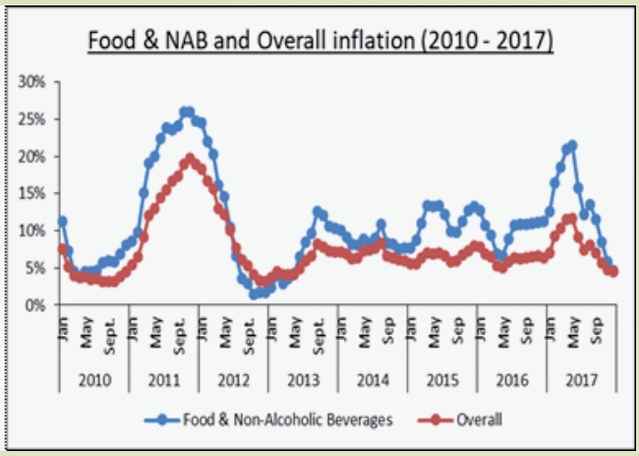
The effect on prices and inflation are felt due to supply constraints brought about by crop failure that results in reduced production, coupled with delayed importation. For example, food and electricity prices are bound to rise due to food shortages and reduced hydro power generation. The figure below shows that food and non-alcoholic beverages inflation (which contributes 36% to overall inflation) rises sharply during the drought periods, contributing to increases in overall inflation. Maize, which contributes over 10% to crop production in Kenya plays a major role in the increase in food prices. For example, the high food inflation in 2017 was attributed mainly to the increase in the prices of maize flour, sugar and beef. This necessitated government intervention, which it did by subsiding the cost of maize flour to cushion consumers from the price rise.

With reduced and unreliable hydropower, there is bound to be an increase in industrial costs due to power outages, forcing firms to seek alternative sources of power. The figure below shows that generation of hydropower declined significantly in 2009 and 2017, all of which are drought years. It also shows that generation of geo-thermal power has been increasing over time and has now overtaken hydropower generation. The combined effects of increasing food prices and high industrial cost have inflationary pressure on domestic prices.

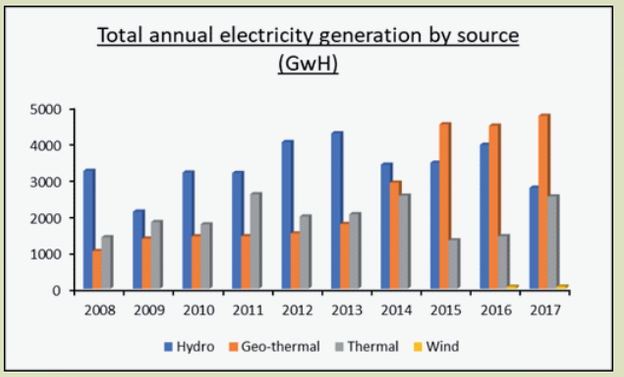
With the projected climate change, droughts are likely to become more frequent. The consequences of not being prepared for the disasters from a macroeconomic perspective means that the country will continue to experience economic costs with the likely

Overall and food and non-alcoholic beverages (NAB) inflation





Total annual electricity generation by source (GwH)



exposure to macroeconomic imbalances that can hamper the country's development agenda. There is, therefore, need for the country to increase its efforts in managing and responding to the disasters. Adequately considering the climate change effects in the macroeconomic framework is critical in sustaining macroeconomic stability.

Infrastructure, including transport, storage and ICT is key in mitigating the effects of drought especially in ensuring supply is stabilized, consequently reducing inflationary pressure. For example, the current poor state of infrastructure especially in drought prone areas hampers effective preparedness, response and recovery efforts. To reduce the effects of drought, it is necessary for the national and county governments to improve infrastructure development by upgrading the existing infrastructure and expanding to areas with low coverage to allow for timely distribution of food from surplus and scarce areas, and enhance access to the market. The design and mix of these infrastructure needs to consider climate change vulnerabilities.

In addition, there is need to integrate research and development into drought management and response. This will entail research on fast growing and drought resistant crops which have higher productivity under depressed rainfall. Agricultural production can also be enhanced through adoption of irrigation technologies to reduce over-reliance on rain-fed agriculture. This will be key in ensuring food security in the country.

To reduce the cost of power, diversifying the sources of energy becomes paramount. For example, the vast renewable energy resources such as geo-thermal, solar and wind should be scaled up to increase their overall share in the country's energy mix.

It is thus evident that addressing disaster-related issues will be key in realizing the "Big Four" development agenda, especially food security, and manufacturing.

Further Readings

http://chg.geog.ucsb.edu/data/chirps/

Government of Kenya (2017), The budget summary for the fiscal year 2017/2018 and the supporting information

The Public Finance Management Act, 2012

World Bank (2011), Kenya Economic Update, December 2011, Edition No. 5

About KIPPRA Policy Briefs

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