

Electricity usage

An early signal of the impact of COVID-19 on Uganda's economy



In brief

- Since the beginning of the COVID-19 pandemic, Uganda has put in place swift policy responses, including country-wide restrictions on the movement of people and a national curfew.
- A critical challenge throughout this period has been a lack of timely economic indicators to better understand both the effects of the health crisis and of government policies in response.
- This policy brief uses transaction-level data on electricity consumption as an indicator of economic activity and explores how electricity use by firms and households varied before and after the onset of the global COVID-19 pandemic and the lockdown imposed in Uganda between March–May 2020.
- The data reveals a large and steep decline in average electricity consumption through the lockdown, with different levels between districts and regions, and a slow and incomplete recovery since then.
- Given the availability of real time electricity data in Uganda, it may be valuable for government departments to use it as an indicator of activity for future economic monitoring and work with UMEME (Uganda's largest electricity distribution company) to develop of a real time 'dashboard'.

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COVID-19 and the need for rapid indicators

As the coronavirus pandemic continues to take its toll on countries across the globe, governments are taking unprecedented measures to contain the speed of transmission, build much-needed testing and treatment capacity, and keep economies afloat.

In Uganda, we have seen swift policy responses to the pandemic. Country-wide restrictions on the movement and congregation of people put in place in March 2020 limited all non-essential business activities and public gatherings in the country. In addition, personal motorised travel was banned, a national curfew was put in place, and airports were closed for all travel. Following these immediate restrictions, the government has put together a COVID-19 recovery package, which includes additional spending on essential healthcare and social spending, alongside additional credit to businesses.

One critical challenge through all of this has been a lack of timely economic indicators to better understand both the effects of the COVID-19 pandemic (and resultant global recession), and of government policies in response. The problem in times of crisis is that official government statistics that would typically be availed to policymakers come with a significant lag of at least a month, and therefore cannot keep pace with the abrupt economic changes. This creates a costly window of uncertainty in which households may be exposed to the full economic costs of the downturn, but policymakers are unable to effectively measure these costs and respond accordingly.

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Existing indicators

In the case of Uganda, attempts to fill this information gap and create reliable, high frequency economic indicators have resulted in several commendable measures such as:

- The Bank of Uganda’s Composite Index of Economic Activity (CIEA) – constructed using seven (7) variables, that is: private consumption estimated by VAT, private investment estimated by gross extension of private sector credit, government consumption estimated by its current expenditure, government investment estimated by its development expenditure, excise duty, exports and imports.
- The Business Tendency Index (BTI) – a perception survey, also carried out by the Bank of Uganda, that measures the level of optimism that business executives have about the current and expected outlook for production, order levels, employment, prices and access to credit.
- Stanbic Bank’s Purchasing Managers’ Index (PMI) – a composite index calculated as a weighted average of five (5) individual private-sector sub-components: New Orders (30%), Output (25%), Employment (20%), Suppliers’ Delivery Times (15%) and Stocks of Purchases (10%).

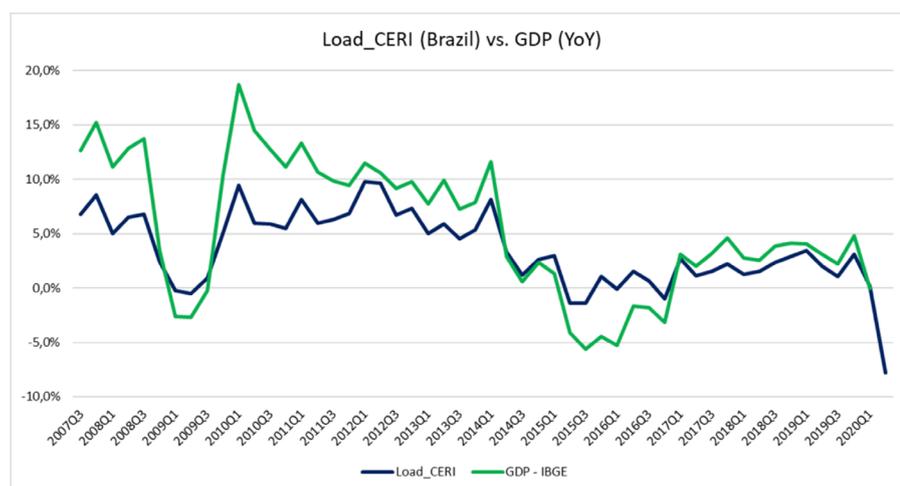
This note attempts to supplement these measures by looking to the grid and analysing changing electricity consumption since the onset of the COVID-19 pandemic in Uganda.

Electricity as a measure of economic activity

Electricity data has three major benefits as an indicator of economic activity:

- Trends in electricity consumption can be made available to governments within a week of real time.
- Several recent studies have shown that sharp economic shifts often show up in a large and rapid changes in electricity usage.
- Given its usage across all sectors in the economy and across different geographic areas, in a disaggregated form electricity data can provide critical information on differential effects of shocks to the economy.

Cicala (2020) studies electricity consumption in the US that has been highly correlated with past recessions to examine the impact of COVID-19 on economic activity. He finds 12 -14% reductions in commercial and industrial electricity usage, alongside rising residential usage as people shift to working from home. Figer et al. (2020) examine electricity usage and compare this with monthly and quarterly GDP figures in Brazil during the 2008 and recent COVID-19 crises and find a strong correlation between electricity and economic growth.¹



Electricity consumption indicator and economic activity in Brazil over the years. (Source: Figer et al., 2020)

1. See Blonz and Williams (2020) for another example of the use of electricity demand as a high-frequency indicator of the effect of COVID-19 and Hurricane Harvey. Among others, Brühlhart et al. (2017) use nightlight data as a proxy of economic activity in their study of trade integration and spatial development.

Tracking economic activity in Uganda using electricity data

In this note, we use transaction-level data on electricity consumption to explore how electricity use by firms and households varied before and after the onset of the global COVID-19 pandemic and the lockdown imposed in Uganda between March – May 2020.

For this analysis, we collected administrative data from Uganda's dominant electricity distribution company, UMEME Ltd., spanning a 2-year period from November 2018 to November 2020. UMEME is the largest electricity distributing company in Uganda covering 95% of total power connections. The dataset provides details on consumption, customer identification, month consumed and tariff. There are six categories of customers, namely:

- *Domestic, i.e., for household use*
- *Commercial, i.e., smaller vendors*
- *Medium industrial*
- *Large Industrial*
- *Extra Large Industrial*
- *Street lights*

Due to restrictions on data access, we analyse consumption of all domestic and commercial customers. The total number of all customers in these two categories is 1,687,128. This represents 81% of all UMEME customers.

Additional administrative data was retrieved from Uganda Bureau of Statistics (UBOS). This data enables us to describe the composition of consumers within each district and region in Uganda and further map out data from the two sources.

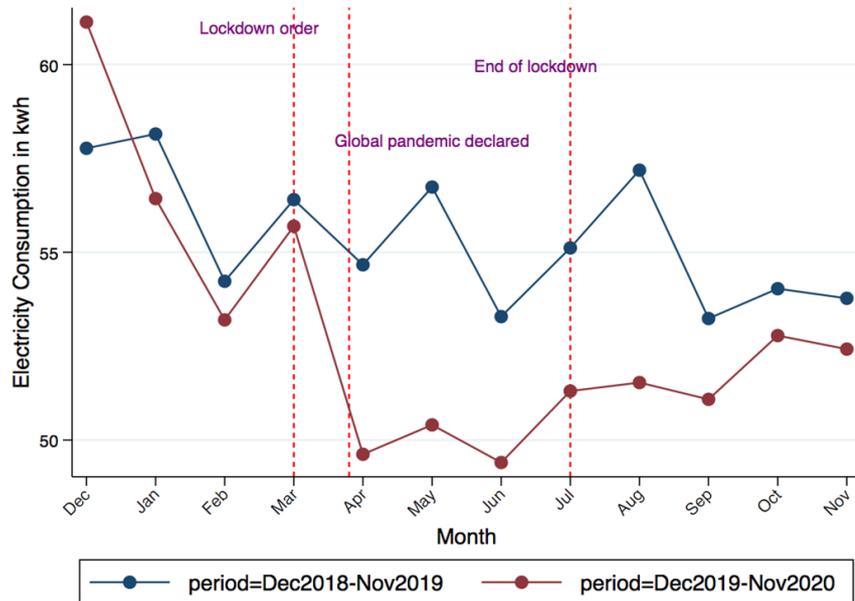
Results

A sharp decline, with signs of (incomplete) recovery

The data reveals a large and steep decline in average electricity consumption through the lockdown, with a slow and not complete recovery since then. Average consumption declined by 12.3% or 6.1 KWh between March and April 2020.

This was seen across urban and rural areas, as well as across both commercial and domestic users. As a result of businesses being forced to suspend operations, commercial electricity usage was particularly badly affected.

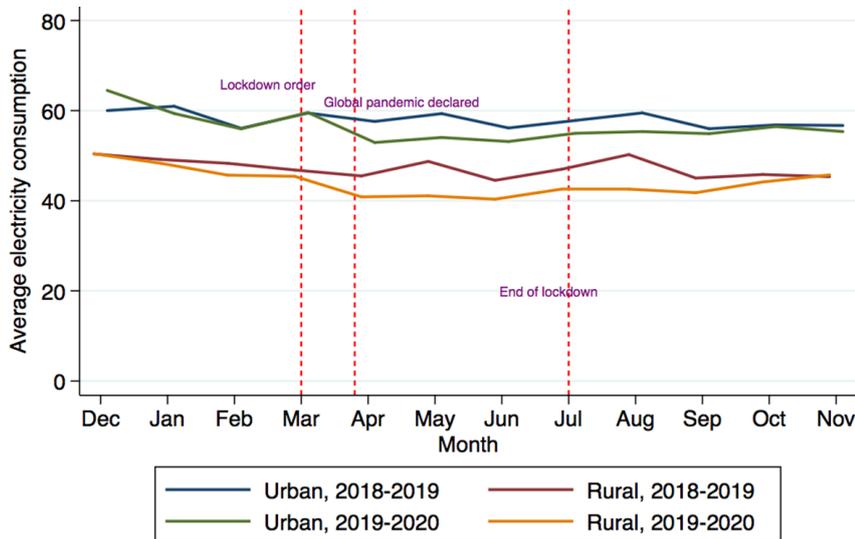
Figure 1: Average electricity use across all commercial and domestic customers



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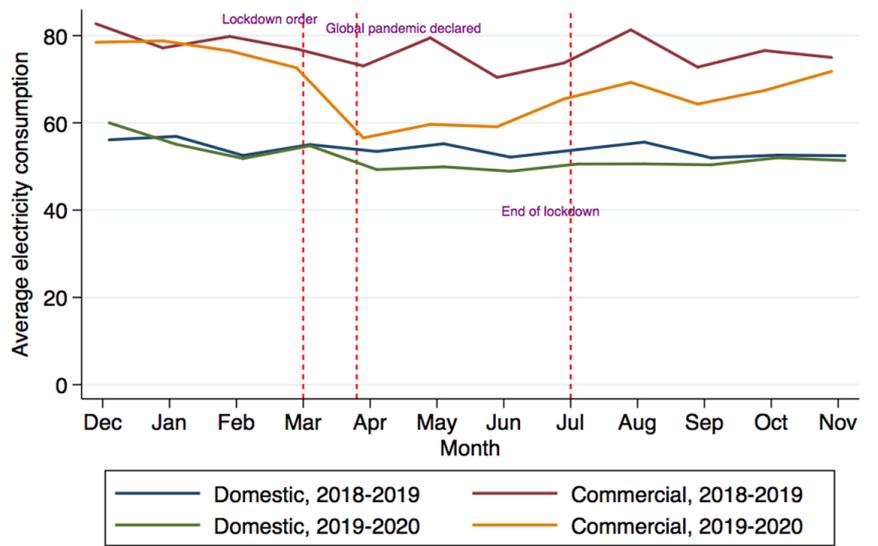
Source: author’s own illustration, based on data from UMEME Ltd

Figure 2: Average electricity use across commercial and domestic customers, urban vs rural



Source: author’s own illustration, based on data from UMEME Ltd

Figure 3: Average electricity use, domestic vs commercial tariff

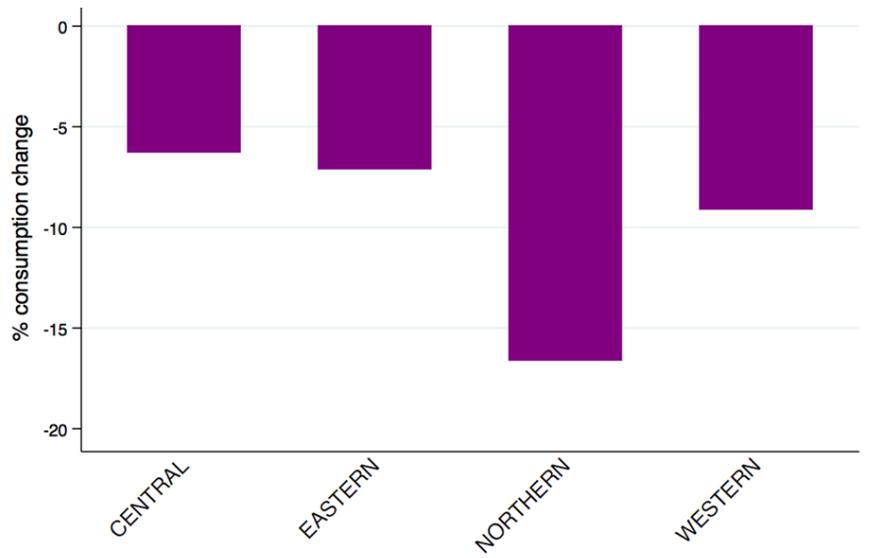


Source: author's own illustration, based on data from UMEME Ltd

Geographic variation

Considering geographic differences, we find that while the drop in electricity usage is widespread across the country, there is heterogeneity across different districts and regions.

Figure 4: Average annual change in electricity use by region

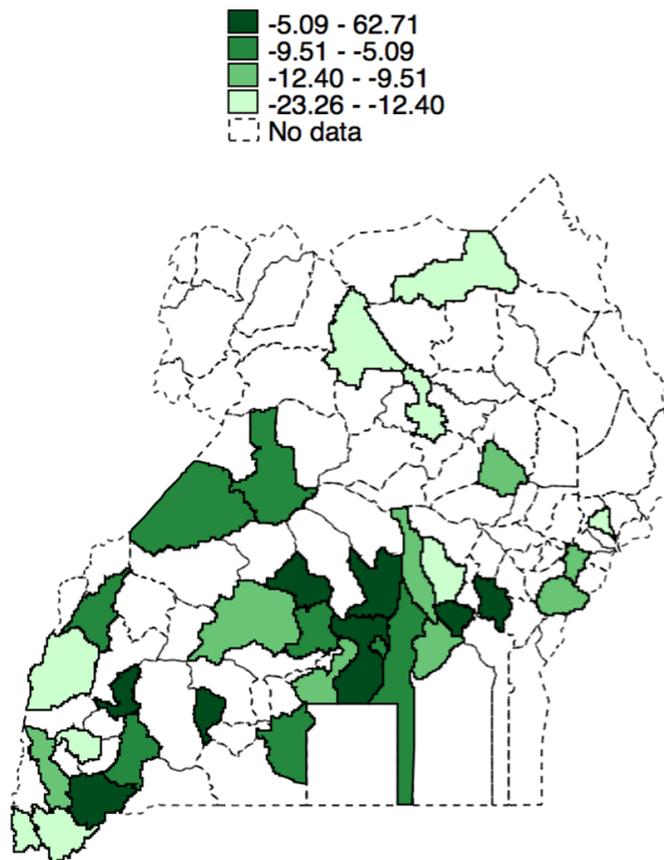


Source: author's own illustration, based on data from UMEME Ltd

Northern Uganda has experienced the largest change in electricity consumption between November 2018-19 and November 2019-20.

There are also significant differences between districts. For example, while average electricity consumption during lockdown months fell by 18% compared to the previous year in Kapchorwa district (Eastern Uganda) it actually increased by 3% in Jinja district (also Eastern Uganda). See Table 1 below.

Figure 5: Average annual change in electricity use by district



(Source: author's own illustration, based on data from UMEME Ltd/UBOS). Note: districts with no data do not have UMEME connections

Table 1: Change in electricity consumption in selected districts

District	Region	Av. consumption March - May 2020	% change Dec 19 - Feb 20 & Mar 20 - May 20	% change March - May 19 & March 20 - May 20
BUSHENYI	Western	32.108	-10.933	-6.349
GULU	Northern	53.887	-12.957	-10.894
JINJA	Eastern	50.163	-5.362	3.166
KABALE	Western	41.851	-16.362	-15.056
KAMPALA	Central	54.608	-8.618	-6.964
KAMULI	Eastern	32.77	-19.244	-17.37
KAPCHORWA	Eastern	43.956	-20.983	-17.666
KITGUM	Northern	48.337	-26.158	-24.963
LIRA	Northern	50.073	-20.611	-17.398
LUWERO	Central	42.015	-3.312	-2.743
MBALE	Eastern	42.762	-13.559	-12.713
MBARARA	Western	46.951	-11.809	-11.94
MUKONO	Central	46.5	-6.838	-4.74
WAKISO	Central	64.209	-3.855	-2.404

Source: author's own, based on data from UMEME Ltd.

Such differences could be attributed to the industrial structure of particular districts and how or to what extent the pandemic and resultant government restrictions limited economic activity. For example, Kapchorwa district is located at the border with Kenya and is heavily dependent on cross-border trade, mining of limestone, and tourism (being home to Sipi falls and Mt Elgon National Park) – all of these activities which have been severely impacted by the closure of international borders and shelter-in-place orders.

Zero-Vending Customers

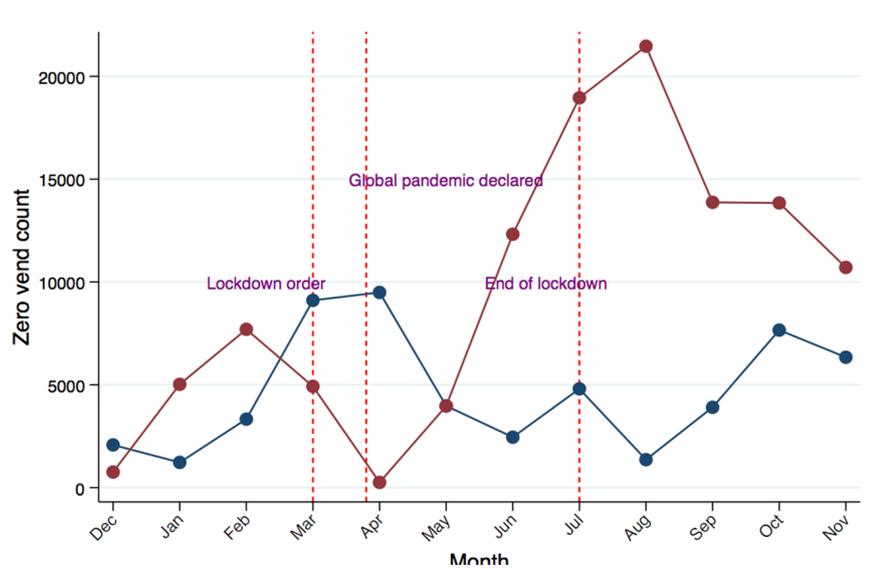
While the figures above suggest a sharp and persistent decline in economic activity in the wake of the COVID-19 pandemic, when considering inclusive recovery it is valuable to examine trends in 'zero vending customers' i.e., those customers who purchased zero electricity in a given month.

From Figure 6 below, we can see that in the first month of the lockdown, we saw a decline in zero vending customers, the majority of whom are domestic-tariff consumers. In other words, we saw more households who are connected to the grid but would normally not purchase electricity consumption in March and April.

One possible explanation for this is that with the majority of the population forced to stay at home or work from home, even those who would normally not purchase any electricity had to buy the bare minimum amount of electricity to 'keep the lights on'.

We have since seen a sharp increase in zero consumption customers since April, likely due to the introduction of free connections by the government which many new customers took advantage of, even if they were not going to use electricity.

Figure 6: Zero consumption count in Uganda



Source: author's own illustration, based on data from UMEME Ltd/UBOS.

Concluding remarks and next steps

Given the availability of real time electricity data in Uganda, it may be valuable for government departments to use this data as an indicator of activity for future economic monitoring.

A next step here would be to work with UMEME to develop of a real time 'dashboard' of this data. Ideally, this dashboard would include all tariff types, including high usage industrial tariffs, to get a more complete picture of economic activity in the country.

References

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