Final report UGA-23163 February 2024

Re-estimating potential growth in Uganda

Liam Carson

DIRECTED BY LSE UNIVERSITY OF OXFORD

FUNDED BY UKaid from the British people

Re-Estimating Potential Growth in Uganda

Liam Carson (22/08/2023)

Executive Summary

This paper uses a range of different techniques - including several filtering methodologies and a production function approach - to estimate current and historical potential growth rates in Uganda. We reach the following key findings:

- **Potential growth has slowed markedly in recent years**. After averaging around 8% in the 2000s, this appears to have weakened to around 5% in the 2010s and now probably stands at somewhere around 4-5%. *(See Figure A.)*
- **Our model to estimate potential growth using the production function approach suggests that variations in rainfall and private sector credit growth have been key determinants of productivity growth.** Accordingly, policymakers must increasingly think about options to enable farmers to adapt to climate change. Meanwhile, MoFPED has set out ambitious targets to boost access to credit in the 2nd National Private Development Strategy - in collaboration with the Bank of Uganda, it must do all it can to achieve those goals.
- **The large negative output gap that opened during the Covid-19 pandemic appears to have closed up.** *(See Figures B and C.)* However, given there is little evidence of a sizeable positive output gap, there is some scope to loosen monetary conditions further without triggering inflationary pressures. The finding that accelerating credit growth is vital to boosting productivity growth supports the argument for further interest rate cuts.

Figure A: Potential GDP Growth Estimates & Forecasts (Based on Several Filtering Techniques & Production Function Approach)

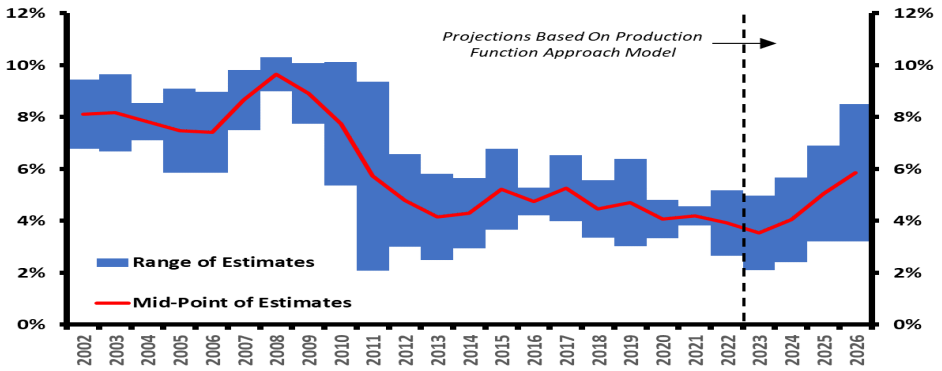


Figure B: Actual & Potential Output (Avg. of Filtering Approaches)

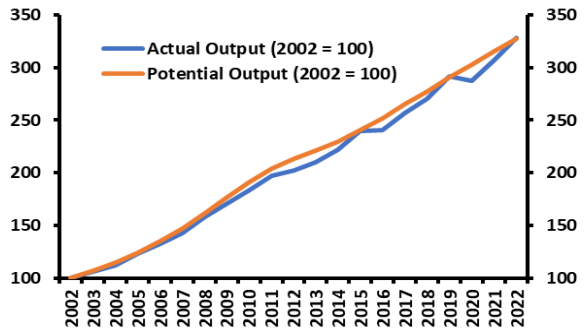
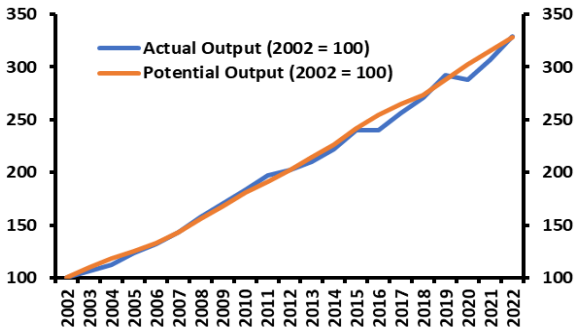


Figure C: Actual & Potential Output (Production Function Approach)



1. Background and Introduction:

Even before the Covid-19 pandemic, the Ugandan economy had experienced a marked slowdown in economic growth. Between 2000 and 2009, real GDP growth averaged a rapid 7.5%[1]. However, in the following decade (from 2010 to 2019) the pace of expansion slowed to just 5.5%, prompting discussion among policymakers, academics and practitioners about whether this amounted to a structural slowdown and if Uganda had experienced a permanent drop-off in its potential growth rate.

One way to think about potential GDP growth is as a combination of working age population growth and productivity growth, where the latter is driven by improvements in human capital development and technological advancements. The Conference Board Total Economy Database[2] breaks down GDP growth using this approach. It is a similar method to the production function approach, which calculates potential real GDP growth by summating growth in the labour force, capital stock and total factor productivity.

There are concerns that recent economic shocks – Covid-19 and the Russian invasion of Ukraine – may have exacerbated any reduction in potential growth. After all, there is a real risk that the lengthy school closures[3] prompted by the coronavirus could have delivered a long-lasting blow to human capital development, weighing on long-run productivity growth. Meanwhile, the surge in food inflation triggered by the Russian-Ukraine conflict appears to have disproportionately hit the poorest segments of the Ugandan population, which may have long-term implications for the health and education levels of members of households living around the poverty line. It is possible that this could act as another negative shock to human capital development.

The long-run effects of climate change may dampen potential growth further. This is likely to occur predominantly via a structural hit to agricultural production caused by increasingly variable rainfall patterns and rising temperatures. In FY 2021/22, agriculture accounted for a sizeable 24.1% of GDP[4]. The upshot is that even a relatively small downward deviation in the long-run growth path of the Ugandan agricultural sector could have a profound impact on the country's potential growth rate.

A change in potential growth has important implications for the Bank of Uganda. When formulating monetary policy, a key factor that policymakers at the central bank consider is the size of the output gap – the difference between potential and actual output. When output is running above its potential level, demand is outstripping supply at an economy-wide level, resulting in inflationary pressures.

---

[1] *Data on real GDP growth are taken from the IMF WEO database (April 2023)*
[2] *https://www.conference-board.org/data/economydatabase*
[3] *Schools in Uganda were closed for almost two years in response to the Covid-19 pandemic - the longest period in the world. There is some evidence that this led to a deterioration in education levels. For instance, see: (https://www.cgdev.org/blog/ugandas-record-breaking-two-year-school-closure-led-to-no-decline-number-kids-who-can-read)*
[4] *Data on the sector composition of annual GDP sourced from UBOS*

On the other hand, if output is below its potential level, there is scope for policymakers to ramp up demand via monetary or fiscal stimulus without generating undue inflationary pressures. All else equal, then, if the Ugandan economy has a positive output gap (actual output is above potential), the MPC is more likely to raise the benchmark interest rate. If there is a negative output gap, the MPC is more likely to lower this rate.

However, when estimating the size of the output gap, the problem for policymakers is that potential output can not be directly observed. Accordingly, any output gap figure is an estimation premised largely on assumptions of what has happened to potential growth in an economy (as well as determining a point in time when there was neither a positive nor negative output gap to act as a base year).

Accordingly, accurately estimating potential growth – and how it has changed over time – is of utmost importance to the Bank of Uganda. While there are clearly important long-run implications associated with the accuracy of these calculations, it is also a key issue for monetary policymaking right now. After all, a crucial factor influencing the decision-making of the MPC is related to the size of the output gap. While the MPC appears to believe that there is a negative output gap in Uganda, potentially paving the way for a loosening of monetary policy over the next year or so as headline inflation continues to ease downwards, the extent to which interest rates can be lowered will depend on the size of the output gap.

This paper uses several different approaches to estimate the current rate of potential GDP growth in Uganda, as well as historical rates of potential growth.

We will first discuss the literature on potential growth with a focus on Uganda, and then move on to explain recent monetary policy developments in Uganda. We will continue by examining the extent to which the output gap feeds into interest rate decisions made by the MPC, before creating new historical and future potential growth calculations using a range of methodologies. Considering these fresh estimates of potential growth, we will conclude by assessing the size of the current output gap in Uganda based on a number of different quantitative approaches.

2. Literature Review – Potential Growth in Uganda

There has been some prior research on the potential growth rate in Uganda. Starting with potential growth, Brownbridge and Bwire (2016)[5] found that labour productivity growth had been stuck at around 2.0% between FY 2002/03 and 2012/13. One implication of the paper was that unless policymakers can enact reforms that trigger a structural transformation in the composition of the Uganda labour force – involving moving workers to higher-productivity sectors – there was unlikely to be a sustained acceleration in this growth rate. If we consider that the working-age

[5] *https://archive.bou.or.ug/archive/opencms/bou/bou-downloads/research/BouWorkingPapers/2016/All/Structural-Change-and-Economic-Growth-in-Uganda.pdf*

population growth is estimated to be around 3.5% in 2023[6], the findings of Brownbridge and Bwire would imply that potential growth now stands at around 5.5% in Uganda[7].

Mugume and Anguyo (2019) also attempted to estimate potential GDP growth in Uganda using a production function approach. Output growth is decomposed into growth of factor inputs (labour and capital) and total factor productivity – a combination of technological advancement and labour productivity growth. Based on this methodology, the authors' results suggested that potential output growth had declined from an average of 6.6% between 2000-2006 to an average of 5.6% between 2013-2016. Mugume and Anguyo pin the drop-off in potential growth on a substantial decline in factor productivity growth.

Meanwhile, the IMF projects that the Covid-19 pandemic will cause potential growth in Uganda to be weaker than it would have otherwise been in the coming years. According to the 2021 IMF Article IV publication[8] (published in March 2022), this "scarring" effect will manifest itself in average potential real non-oil GDP growth of 4.9% between FY 22/23 and FY 25/26 – as opposed to a rate of 5.4% in a scenario in which Covid-19 never occurred. This is consistent with the effects of the pandemic knocking 0.5%-pts off potential growth in Uganda. Even in FY 25/26, the IMF projections are still consistent with non-oil potential growth being 0.6%-pts lower than would have been the case if the global outbreak of the coronavirus had not happened.

More generally, a recent World Bank research publication[9] argues that long-term growth prospects have declined across the world. The report makes the case that most of the forces which have driven growth and prosperity since the 1990s have faded. In particular, the authors cite weaker international trade growth and a slowdown in investment as key factors that have caused potential growth to weaken at a global level in recent years. This has been exacerbated by the economic shocks – namely Covid-19 and the Russian invasion of Ukraine – experienced since 2020.

As part of this project, the World Bank uses a range of different measures to calculate potential growth at an economy-level in a newly created database[10]. These approaches include the use of the following filters: Baxter-King, Butterworth, Christiano-Fitzgerald, Hodrick-Prescott and a multivariate filter. They provide a measure of potential output over time based on what has happened to real output. In a similar vein to Mugume and Anguyo, the World Bank database includes a measure of potential growth based on the production function approach. The database also estimates potential growth by adopting an Unobserved Components Model, which involves breaking down a time series of real output into different underlying elements – such as trend, seasonal, cyclical and irregular components.

---

[6] Estimates of working-age population growth are taken from the UN World Population Prospects 2022 database. Working-age population is assumed to be the 15-64 age group

[7] This estimation of course assumes that labour productivity growth has remained the same since the period under observation in the Brownbridge and Bwire (2002/03 to 2012/13)

[8] This projection is based upon data used in the 2020 World Bank Global Economic Prospects report

[9] https://www.worldbank.org/en/research/publication/long-term-growth-prospects

[10] These estimates are captured in a newly-created database: Kilic Celik, S., M. A. Kose, F. Ohnsorge, and F. U. Ruch. 2023. "Potential Growth: A Global Database." Policy Research Working Paper 10354, World Bank, Washington, DC.

At a global level, the World Bank study estimates that potential growth will slow from an average of 2.6% between 2011 and 2021 to 2.2% from 2022 to 2030[11]. The projected drop-off is larger, from 5.0% in 2011-2021 to 4.0% in 2022-2030, for EMDES[12]. In 2021 (the most recent date included in the database), these estimates were 2.6% for global potential growth and 4.5% for aggregate EMDE growth (with ranges of 1.9-3.6% and 3.6-5.5% respectively[13]).

Unfortunately, the new World Bank database does not include potential growth estimates for Uganda[14]. However, the methodologies adopted can provide lessons for how we can think about calculating potential growth in the East African country, allowing us to generate a broader range of estimates of this unobserved rate. We use some of these approaches later on in this paper.

3. Recent Monetary Policy Developments in Uganda

The Bank of Uganda raised the Central Bank Rate (CBR) by 350bps between June 2022 and October 2022. This came against the backdrop of the surge in global commodity prices triggered by pent-up demand in advanced economies in the aftermath of the Covid-19 pandemic and the Russian invasion of Ukraine, which caused the prices of fuel and several food items to soar. Between January and October of 2022, headline inflation climbed from 2.7% y-o-y to 10.7% y-o-y[15]. While this was initially driven by high imported inflation – manifesting itself via a sharp rise in domestic food and fuel inflation in Uganda – underlying price pressures also intensified. Core inflation in Uganda accelerated from 2.3% to 8.9% y-o-y over this period as the initial bout of imported inflation led to second-round effects and caused inflation expectations to mount, prompting the Bank of Uganda to respond by tightening monetary policy.

Inflation is now on a downward path. The stringent monetary response by policymakers on the MPC has helped to bring inflation back under control. The headline rate eased to a thirteen-month low of 3.9% y-o-y in July 2023 and, crucially, core inflation also dropped to 3.8% y-o-y[16] – the slowest rate since June 2020. Looking ahead, the most recent Bank of Uganda *State of the Economy Report*[17] projects that both core and headline inflation will end 2023 at the central bank's 5.0% target.

With inflation now seemingly under control, the MPC has begun to loosen monetary conditions, with the first 50bp interest rate cut delivered in August 2023. When determining if, when, and by how far the CBR might be cut over the coming quarters, the MPC will reckon with several factors. The MPC is likely to be concerned about the sharp rise in government debt servicing costs experienced over the past few years, causing fiscal risks to mount. Given that the majority of Uganda public debt is held domestically, a reduction in the CBR should help to lower these costs. At the same time,

---

[11] *This potential growth number is based on an unweighted average of seven of the measures discussed above.*
[12] *EMDEs: Emerging Markets and Developing Economies*
[13] *The ranges show the gap between the highest and lowest estimates of potential growth using the seven aforementioned approaches.*
[14] *Given that there are specific estimates of potential growth in the database for 87 different economies, it is likely that the lack of potential growth estimates for Uganda are due to data limitations.*
[15] *https://www.bou.or.ug/bouwebsite/Statistics/*
[16] *https://www.bou.or.ug/bouwebsite/Statistics/*
[17] *April 2023 is the most recent version of the State of the Economy Report (link here).*

private sector credit growth is weak - in nominal terms, it came in at just 1.1% y-o-y in June 2023. A combination of these factors would suggest that a substantial reversal of the monetary tightening cycle of 2022 is now on the cards.

However, another important consideration for the BoU is the output gap. If policymakers in the MPC believe that output is running close to its potential level, this will limit the extent to which interest rates can be lowered. The next section of this paper will explore the extent to which concerns about the output gap have historically affected monetary policy decisions in Uganda.

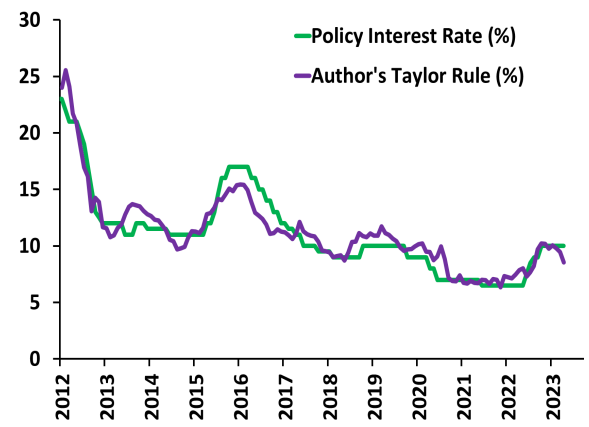
4. How does the Size of the Output Gap Affect Interest Rate Decisions in Uganda?

Studies attempting to explore the monetary policy reaction function of the Bank of Uganda have found that the output gap does not have a particularly strong direct influence on the central bank's interest rate decisions. Okot (2020) uses a Generalised Methods of Moments (GMM) estimation to analyse this function between 2000 and 2017, and finds that the central bank attaches more weight to inflation deviations than to the output gap. Following the introduction of inflation targeting in 2011, Okot's results suggest that this relationship became more pronounced. This is supported by Mugume and Namanya (2014), who state that the BoU pays less attention to the output gap than inflation developments. Mugume and Namanya argue that this is largely due to the measurement issues in calculating not just potential output, but also actual output, meaning that output gap estimates can be limited in their usefulness. A similar outcome is also made by Ngubane, Mndebele and Ilesamni (2023), whose study finds that the output gap has a statistically insignificant impact on the monetary policy function of the central bank.

Undertaking some basic time series multiple regression analysis, we also reach inconclusive outcomes on the influence of the output gap in monetary policy decisions. As part of this study, we create an adjusted Taylor Rule to estimate the weights that the Bank of Uganda has historically placed on variables that influence monetary policy decisions. Figure 1 shows this Taylor Rule plotted against the policy interest rate.

Table 1, meanwhile, shows the relative weight of a number of factors that appear to influence the BoU decision-making progress using a basic multiple regression technique. The standardised regression coefficients shown in the table can be thought of as the weights. While these standardised coefficients do not sum to a specific number (in the same sense that traditional weights sum to 100%), we can think of a larger absolute value of the standardised coefficient as meaning that the factor has historically been a more important driver of productivity growth in Uganda. We denote the statistical significance of our results by * if p value < 0.10, ** if p value < 0.05 and *** if p value < 0.01. We try to limit the amount of variables included in any given specification to avoid multicollinearity issues.)

Figure 1: Policy Interest Rate & Taylor Rule (%)



Source: Bank of Uganda, UBOS. Notes:Taylor Rule in this chart is based on specification (1) outlined in Table One

Table 1: Taylor Rule Variables - Standardised Regression Coefficients

Variable	(1)	(2)	(3)
Headline Inflation [(a)]	9.41***	5.96***	9.34***
Change in FX Reserves	-5.37***	-5.18***	–5.35***
Priv. Sect. Credit Growth	5.31***	5.64***	5.24***
Output Gap (% of GDP)	**1.61**	**1.85***	**1.61**
Net Credit to Govt.	-14.31***	-14.37***	-14.21***
Food Inflation		9.36***	
MoM Change in Ex Rate			-0.22

Notes: Multiple R^2 statistics for specifications (1), (2) and (3) are 0.93, 0.94 and 0.93; (a): in specif. 2 (when we include food inflation in the equation), this variable is actually non-food inflation - rather than headline inflation

In some specifications of the regression equation, it appears that the output gap is positively correlated with the policy interest rate (i.e. a positive output gap is associated with monetary tightening and a negative output gap is associated with monetary loosening, which is an intuitive result) at a statistically significant level. However, in other specifications such as the first specification shown in Table 1, we do not find a statistically significant relationship[18] (the p-value is actually 0.11 in this specification). Even when our results suggest that the output gap does have a statistically significant direct impact on the MPC's decision-making process, this is only at the 10% significance level. In other words, the finding that the MPC is directly influenced by the output gap when setting policy is not robust.

It is worth noting that, irrespective of the exact specification of the regression, we consistently find that several economic variables have a statistically significant impact on the MPC's decision-making process. These are inflation, the change in FX reserves, private sector credit growth and the stock of net credit to the government provided by the domestic banking sector. As one would expect, faster nflation and private sector credit growth are associated with higher interest rates, whereas an increase in the stock of domestic government credit is associated with lower interest rates. Meanwhile, a fall in the stock of FX reserves is correlated with a tendency by the MPC to raise interest rates. This is also to be expected; in this scenario, policymakers are presumably incentivised to raise interest rates in an attempt to stem capital outflows, reducing the need to further drawdown from an already-diminishing pot of international reserves.

In any case, the output gap does indirectly affect monetary policy via its impact on inflation. Even if

[18] Note that in all of these regressions, we calculate the size of the output gap using the HP filter method to estimate potential output. This may be problematic in the event of major economic shocks that result in a temporary drop in actual output but don't necessarily cause potential growth.

there is limited evidence that the output gap is a first-order concern of the Bank of Uganda when setting monetary policy, a positive output gap (which is reflective of demand outstripping supply) will ultimately prove to be inflationary. Admittedly, as a small economy with an open capital/financial account and a large agricultural sector, other factors have historically had a larger impact on Ugandan inflation than the size of the output gap - i.e. exchange rate movements, global energy prices and both domestic and global food prices. Nonetheless, policymakers on the MPC will be keen to have the most accurate picture of the size of the output gap.

5. A Fresh Estimation of Potential Growth in Uganda

In this chapter, we use a range of different approaches to estimate potential growth in Uganda. We largely follow the approach of the World Bank paper published earlier this year and cited in Chapter 2 of this paper (*"Potential Growth: A Global Database"*). As explained in that chapter, this publication does not provide potential growth estimates for Uganda using the full range of methodologies that the paper utilises for several other economies. Accordingly, we build upon this study by creating our own estimates of potential growth for Uganda using several of the approaches adopted in the World Bank report. More specifically, we calculate potential growth using the following filters: Baxter-King, Butterworth, the Hodrick-Prescott (HP) and a filter created from the Unobserved Components Model (UCM). We then estimate potential growth in Uganda by using a production function approach.

5.1 Filter Approach

A filter approach adjusts a measure of real GDP to allow us to understand the underlying trend in actual output (i.e. the real GDP or other output series) over time. We can think of the underlying trend created using a filter as potential output and the change in this underlying trend as potential growth. The deviation between actual output and this measure of potential output is therefore the output gap.

We use the filter approach to calculate potential output using a seasonally-adjusted series of quarterly GDP from UBOS[19]. The latest version of these data (which use 2016/17 as a base year) run from Q3 2009 to Q1 2023. We merge these data with a previous version of the GDP data using an older base year of 2008/09 (this previous dataset runs from Q3 2008 to Q2 2018), ensuring that we make the appropriate adjustments to allow these data to merge seamlessly. Before Q3 2008, we apply a quarterly interpolation technique to annual data to allow the GDP data series to begin in Q1 1999. While the data from Q3 2008 are already provided by UBOS in seasonally-adjusted terms, we manually apply seasonal adjustment techniques to the generated data from Q1 1999 to Q2 2008. All told, our quarterly series of seasonally adjusted real GDP runs from Q1 1999 to Q1 2023, amounting to 97 data points.

[19] https://www.ubos.org/explore-statistics/9/

We now outline how each of the various filter approaches work and how these techniques differ from one another.

5.1.1 Filter Approach - Hodrick Prescott Filter

Using a HP filter approach yields an estimate that potential GDP growth slowed in the second decade of the 2000s. This technique suggests that potential growth averaged 8.1% between 2000-2009, before slowing to 4.9% during the following ten year period. The positive story is that the HP filter methodology yields the result that potential growth has strengthened a little, to 5.2%, in 2022-2023. (Note that, due to the distortions caused by the Covid-19 pandemic, we do not pay attention to results for 2020 and 2021.)

5.1.2 Filter Approach - Baxter-King Filter

The Baxter-King approach to filtering paints a gloomier picture with regards to the current rate of potential growth. Based on this methodology, it is estimated that potential growth averaged 8.3% in the first decade of the 2000s - similar to the 8.1% average rate found using the HP approach. Between 2010 to 2019, this rate is estimated to have strengthened to 4.4% - a touch weaker than the 4.9% rate calculated under the HP approach. The major divergence, though, occurs in the 2022-2023 period, when potential growth is projected at just 2.4% - far weaker than the 5.2% rate estimated by the HP filter approach.

5.1.3 Filter Approach - Butterworth Filter

The Butterworth filter approach provides the most upbeat estimates of potential growth. While the estimated average potential growth rate of 8.3% between 2000 and 2009 is the same as under the Baxter-King approach, the average rate of 5.3% during 2010-2019 is markedly higher than estimates attended based on the Hodrick-Prescott and Baxter-King methodologies. Of far more significance, though, is the 6.8% projection for potential growth in 2022 and 2023 - this is far higher than any of the other approaches.

5.1.4 Filter Approach - Unobserved Components Model

The Unobserved Components Model (UCM) is slightly different to the other filters included in this section. It is used to decompose a series down into its trend, seasonal, cyclical and irregular components. Academics and practitioners often use the change in this trend component as one measure of potential growth.

Based on the results from the UCM model, the results are similar to those derived from the Butterworth model. Based on the UCM framework, potential growth averaged 8.3% between 2000-2009, before slowing to 5.3% during 2010-2019. The UCM approach also suggests that the current rate of potential growth is fairly strong, at 6.2%. (*All of these results are shown in Table 2.*)

Table 2: Average Potential Growth Rate (%, By Period Estimated Using Filter Approaches)

Filter	2000-04	2005-09	2010-14	2015-19	2022-23
Hodrick-Prescott	6.8%	9.3%	4.9%	4.9%	5.2%
Baxter-King	7.3%	9.4%	4.3%	4.5%	2.4%
Butterworth	7.3%	9.4%	5.1%	5.5%	6.8%
UCM	7.0%	9.2%	5.2%	5.4%	6.2%
Simple Average	**7.1%**	**9.3%**	**4.9%**	**5.1%**	**5.1%**

Attempting to determine which of these filtering methods is most appropriate is challenging - every technique is fraught with different methodological shortcomings. The simple average of all of the results obtained from the various filters might provide a better guide to the current rate of potential growth in Uganda than focusing too heavily on any single filter. This average suggests that the rate of potential growth stands at around 5.1%.

One major issue with any filtering approach is that there is a dependence on recent data points. This has become particularly problematic in light of the recent Covid-19 pandemic. The outbreak of the virus, and the various containment measures put in place to combat its spread, initially delivered a sharp blow to economic growth. In year-on-year terms, real GDP plunged by a record 5.6% in Q2 2020 (this marked a trough) before extremely favourable base effects were largely responsible for the multi-year high 13.1% y-o-y rate recorded in Q2 2021. These distortions have probably led to the Baxter-King filter underestimating the current rate of potential growth (focusing too heavily on the downturn in Covid-19) and the Butterworth filter overestimating potential growth (focusing too heavily on the subsequent sharp bounceback in year-on-year terms).

Moreover, estimates of potential growth derived from filtering techniques will be highly correlated with actual GDP growth. It may not always be the case that what has happened to GDP growth in the recent past provides a particularly accurate reflection of the productive capacity of an economy (particularly in the event of external shocks and/or poor policy decisions).

The production function approach to estimating potential growth is less affected by short-term changes in actual growth rates, and the potential growth rates generated by this methodology tend to be less correlated with actual growth.

5.2 Production Function Approach

The production function approach to estimating potential growth is based on the assumption that an economy's potential growth rate is a function of working-age population growth, investment growth

and productivity growth. It is simple to calculate the first part of this equation - the UN World Population Prospects database provides annual historical data, as well as forecasts. Moreover, we can use annual GDP data to determine the yearly change in the capital stock.

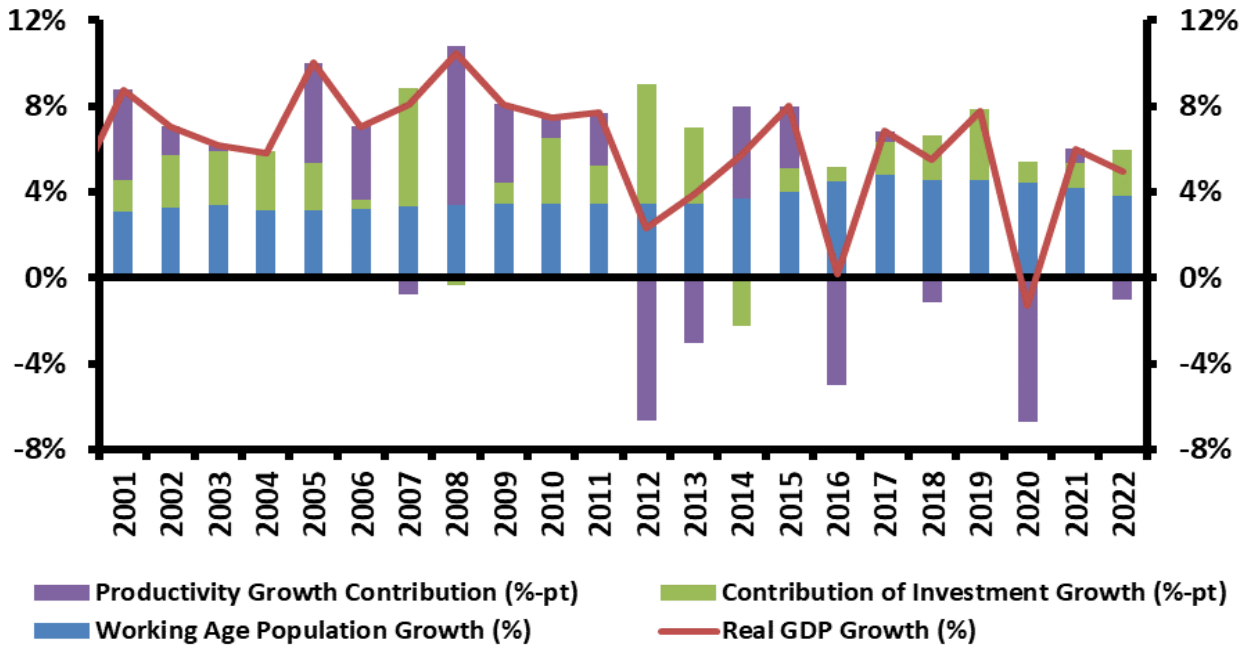
It is, however, far more challenging to estimate productivity growth. We can think of productivity growth as being driven by internal and external developments that improve or dampen the efficiency of both labour and capital inputs. Our approach to estimating historical rates of productivity growth is as follows:

- Strip out working-age population growth and the contribution of real investment growth (which we calculate by multiplying annual growth rates of investment by nominal investment as a share of nominal GDP) from real GDP growth, leaving us with an unexplained contribution to growth. We think of this unexplained component as changes in productivity.

- Undertake basic multiple regression analysis to determine the drivers of the unexplained portion. In this model, we consider real credit growth and rainfall patterns

Before delving into the analysis, it is important to first point out that productivity growth appears to have slowed markedly in Uganda in recent years. The breakdown of these three components to real GDP growth (working age population growth - as well as the contributions of both investment and productivity growth) are shown in Figure 2 below.

Figure 2: Real GDP Growth, Component Breakdown



The chart shows that productivity growth has made a decreasingly important contribution to real GDP growth in Uganda in recent years, with working age population growth emerging as the key driver of growth. Table 3 demonstrates this trend. We observe that, after averaging 3.4% between

2001 and 2009, the average rate of productivity growth between 2010 and 2019 was actually negative, coming in at -0.7% over the ten-year period. Across the 2021 and 2022 period, productivity growth was also negative, at -0.3%. It is worth pointing that Uganda appears to have experienced particularly strong productivity growth, averaging 4.7%, over the 2005-2009 time period.

Table 3: Average Rate of Productivity Growth Over Period

2001-04	2005-09	2010-14	2015-19	2022-23
1.8%	4.7%	-0.6%	-0.8%	-0.3%

Moving on to the analysis to assess the drivers of productivity growth in Uganda, we build a simple model in which we assume that productivity is driven by two key factors (note that we do not find any other variables to be statistically significant in determining productivity growth).

- **Rainfall variation:** We measure the deviation of the average annual level of precipitation compared to a 21-year average from 2000-2020.

- **Real credit growth**: Access to credit is important to ensure an efficient allocation of resources in the economy, helping investors to make productive investments. For the importance of our broader production function model - which assumes that potential growth is a function of the growth rates of the working age population, investment and productivity - we checked the statistical relationship between credit growth and investment. We find there to be no correlation between these two variables.

Ideally, we would also factor in external developments in the global economy into our model. However, in our analysis, neither global GDP nor trade volume growth were found to have a statistically significant impact on productivity growth. We also failed to find any impact that exchange rate movements impact upon on the productivity of domestic firms (the theory being that a weaker exchange rate might boost firm competitiveness and thus productivity).

We show the standardised coefficients in Table 4. (Note that *, ** and *** denote that p-values are statistically significant at 10%, 5% and 1% confidence levels respectively.) It is worth pointing out that the model has a multiple R^2 coefficient of 0.68, suggesting that these three factors can explain 68% of the variance in productivity growth. In other words, there is still a large unexplained element of the production function.

Table 4: Standardised Coefficients of Drivers of Productivity Growth

Variable	Standardised Coefficient
Real Credit Growth	3.12***
Rainfall Deviation	-2.28**

Taking into account the production function approach - and the drivers of productivity - we can make some assumptions to estimate potential growth in Uganda over the coming years. We do this by using the UN projections for the working age population in Uganda, as well as assuming that investment growth remains unchanged. We also estimate what will happen to productivity growth based on the MoFPED targets for domestic credit growth as outlined in the 2nd National Strategy for Private Sector Development (2022/23-2026/27) and the World Bank precipitation projections.

Using these forecasts paints a fairly upbeat picture of what is likely to happen to potential growth in the coming years. The target set out in the strategy discussed above makes an ambitious projection that private sector credit will increase from 12.6% of GDP in FY 2022/23 to 27.1% of GDP in FY 2026/27. This would mean that real private sector credit growth would need to average 33.9% a year over this period - above the 11.1% average seen between 2000 and 2022, and significantly faster than the average growth rate of 5.3% seen over the past decade (2013-2022).

Moreover, the World Bank precipitation forecast that we depend upon - the SSP 3-7 scenario - is consistent with the average deviation of rainfall from the 2001-2020 twenty-year trend coming in at 6.7% over the 2021-2030 period. This would be a much lower deviation than the 14.6% and 18.9% deviations recorded in 2019 and 2020 - the two most recent data points. It is therefore possible that both the MoFPED target and the World Bank projection could prove too optimistic.

For that reason, we create a core scenario based on these targets and forecasts, but also generate a pessimistic scenario which assumes that private sector credit growth and precipitation continue to follow the trends of recent years. We then feed these two productivity growth forecasts into the broader production function model to not only estimate the current rate of potential growth, but also the likely path of potential growth in the coming years. A number of assumptions are made regarding how we calculate historical and future rates of potential growth using the production function approach. These are outlined in the footnote below[20]. The forecast scenarios are shown in Figure 3 and Figure 4.

[20] *When estimating the impact of investment growth on potential growth, we take five-year averages of investment growth (for the prior five years). Meanwhile, when estimating historical rates of productivity growth, we take a three-year average. In the pessimistic scenario, when we calculate productivity growth, we assume that both deviation of rainfall and real credit growth follow the patterns of the past five years of available data (2016-2020 for rainfall and 2018-2022 for real credit growth). In both forecast scenarios, we assume that investment growth remains unchanged from its 2022 five-year average.*

Figure 3: Estimate of Potential Growth by Component (Core Forecast Scenario)

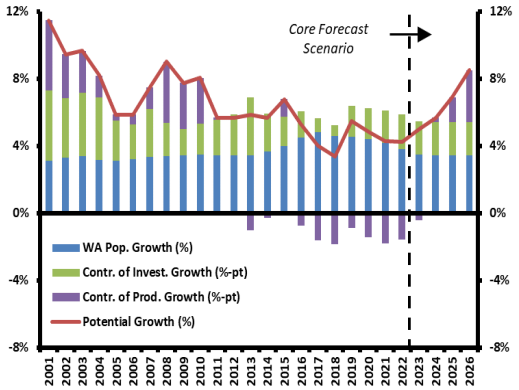
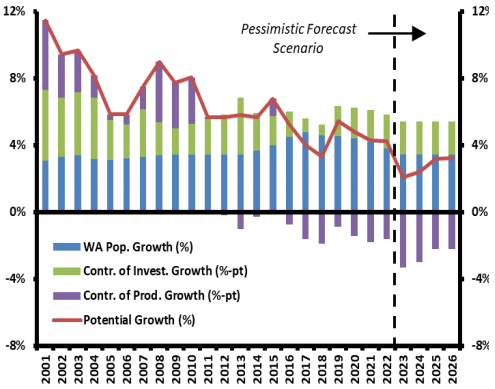


Figure 4: Estimate of Potential Growth by Component (Pessimistic Forecast Scenario)



Our production function model estimates that potential growth averaged 8.4% between 2001-2009, before slowing to 5.6% between 2010-2019. These results are relatively similar to those provided by the various filters discussed in the previous section.

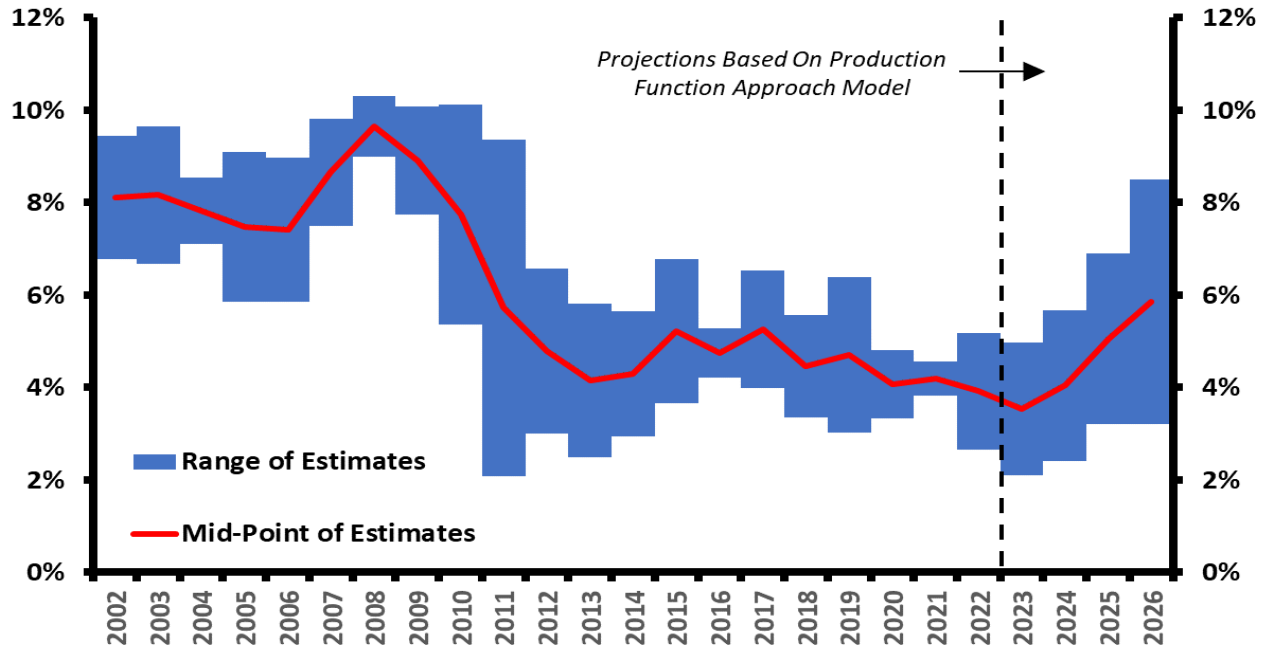
In terms of the most recent rate of potential growth, i.e. for 2022, our model suggests that this stands at 4.2%. This rate is markedly weaker than the simple average of 5.1% estimated using the filter approach. Taking into account all of this, it seems reasonable to suggest that Uganda's potential growth rate currently stands at around 4-5%. Looking ahead, our model suggests that whether policymakers can boost this relatively weak potential growth rate will depend on the extent to which climate change distorts weather conditions and the extent to which credit markets can be deepened.

In our core scenario, which assumes that the government's objective of rapidly raising the private sector credit-to-GDP ratio is achieved, it is projected that potential growth could reach 8% by the end of 2026. Over the course of 2023-2026, this hypothetical situation estimates that potential growth will average 6.5%. It is important to recall that this scenario also assumes that the deviation of rainfall from historical levels will be relatively small in the context of the sharp deviations recorded in 2019 and 2020 (the two most recent data points).

In our pessimistic scenario, where we assume that rainfall patterns and the pace of the expansion of credit follows recent trends, the forecast is far more downbeat. In this scenario, the projection is for potential growth to average just 2.7% over the 2023-2026 period.

We bring together all of the potential growth estimates since 2001 together in Figure 5. This chart also shows the two forecast scenarios derived from the production function based model - one based on the targets of MoFPED projections provided by the World Bank and the gloomier scenario where we assume that credit growth and rainfall patterns will follow the trends of recent years.

Figure 5: Potential GDP Growth Estimates & Forecasts (Based on Several Filtering Techniques & Production Function Approach)



6. What is the Size of Uganda's Output Gap?

Based on the various estimations of potential growth, it appears that the negative output gap that opened up during the Covid-19 pandemic has now closed up. Based on average potential growth rates taken from the filter approaches, we estimate that there was a negative output gap of 5.0% of GDP in 2020 - the point in time when the pandemic and resulting social restrictions delivered the largest blow to economic activity. Following a couple of years of robust growth, using this methodological approach suggests that there was a very small positive output gap of 0.3% of GDP in the Ugandan economy in 2022. It is a similar story when we use the production function approach to estimate the size of the output gap in Uganda - based on this technique, we estimate that the gap was negative at 4.8% of GDP before closing up by the end of 2022. (See Figure 6 and Figure 7.)

Figure 6: Actual & Potential Output (Avg. of Filtering Approaches)

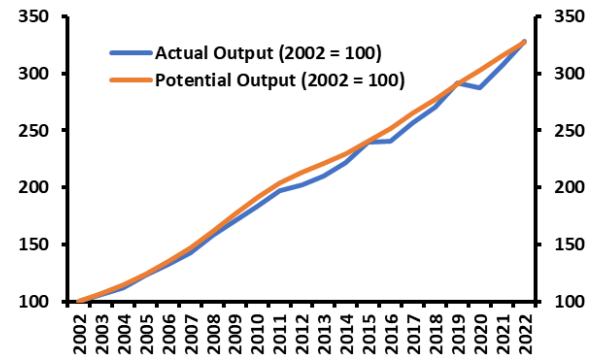
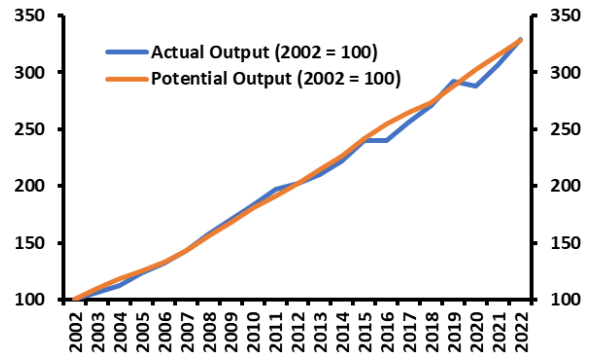


Figure 7: Actual & Potential Output (Production Function Approach)



7. Concluding Remarks & Policy Implications

There are several important conclusions and policy considerations to arise from this study:

- **The most crucial point to make is that the pace of productivity growth (and, as a result, potential growth) has slowed markedly in Uganda in recent years.** Long-run growth is now predominantly being driven by changes in the size of the labour force - not improvements in the productivity of the labour force. During the first decade of the 2000s, Uganda enjoyed rapid productivity growth as several measures were enacted to improve macroeconomic stability and boost the attractiveness of Uganda to investors. These first-generation reforms were sufficient to increase the productivity of the Ugandan economy. However, since then, policymakers have struggled to enact second-generation reforms that can drive productivity further. This is demonstrated by the economy's relatively low ratios of domestic revenue, exports and private sector credit to GDP.

- **Our model to estimate potential growth using the production function approach suggests that accelerating the pace of credit growth is vital to boosting productivity and potential growth.** Policymakers at MoFPED have set ambitious targets in the 2nd National Private Sector Development Strategy regarding improvements in credit conditions. MoFPED, in collaboration with the Bank of Uganda, must do all it can to ensure that these goals are ultimately achieved - or at least come close to being realised.

- **Our model highlights that poor rainfall patterns have historically weighed on productivity.** This is not surprising - agriculture accounts for around 24% of GDP and roughly 70% of the labour force, with the vast majority of irrigation rain-fed. This finding emphasises the damage that changing climatic conditions could inflict on the economy. Climate change is leading to increasingly unpredictable weather, meaning that in the face of inaction, long-run agricultural productivity growth will decline. The good news is that policymakers have tools available to lessen the impact of unpredictable rainfall patterns. There is great scope to increase the prevalence of micro-insurance among farmers, as well as the use of machinery irrigation. Extension services informing farmers about changing climatic conditions and potential adaptation techniques can also be more widely and efficiently rolled out.

- **There is probably scope to loosen monetary policy a little further.** Following a sharp tightening cycle in 2022, a drop in inflation allowed the Bank of Uganda to cut the policy interest rate for the first time in this loosening cycle in August 2023, reducing the Central Bank Rate from 10.00% to 9.50%. With the negative output gap having only just closed up, the MPC should be able to lower the policy rate further without causing undue inflationary pressures in the very near-term. At present, there is little evidence of a significant positive output gap (i.e. demand is not significantly outstripping supply). Our finding that improving access to credit is vital to boosting productivity supports the argument for further rate cuts.

theigc.org