

Is Inflation a Growth killer? Evidence from Sub-Saharan Africa

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Abstract

This paper examines the impact of inflation on economic growth in Sub-Saharan Africa in order to provide an empirical evidence whether inflation hinders or boost economic activities in the region. The paper found that inflation exhibits a reducing-growth effect in both short-term and long-term periods using Panel Autoregressive Distributed Lag (PARDL) model. Therefore, the study recommends that African government needs to address the issues of inflation especially imported inflation in order to stimulate sustainable economic growth in the region. In addition, strengthening political commitment to ensure conducive business environment has to be paramount rather than depending on the traditional model of bring your own infrastructure.

Keywords: Inflation, Sub-Sahara Africa, Panel Autoregressive Distributed Lag.

Introduction

Inflation and economic growth are among the key pillars of economic issues in any region or any country. The importance of these two macroeconomic variables is also established as the parts of the macroeconomic policy objectives. Ensuring price stability in an economy by addressing inflation rate could lead to sustained economic growth. This implies that sustained economic growth is partly driven by inflation.

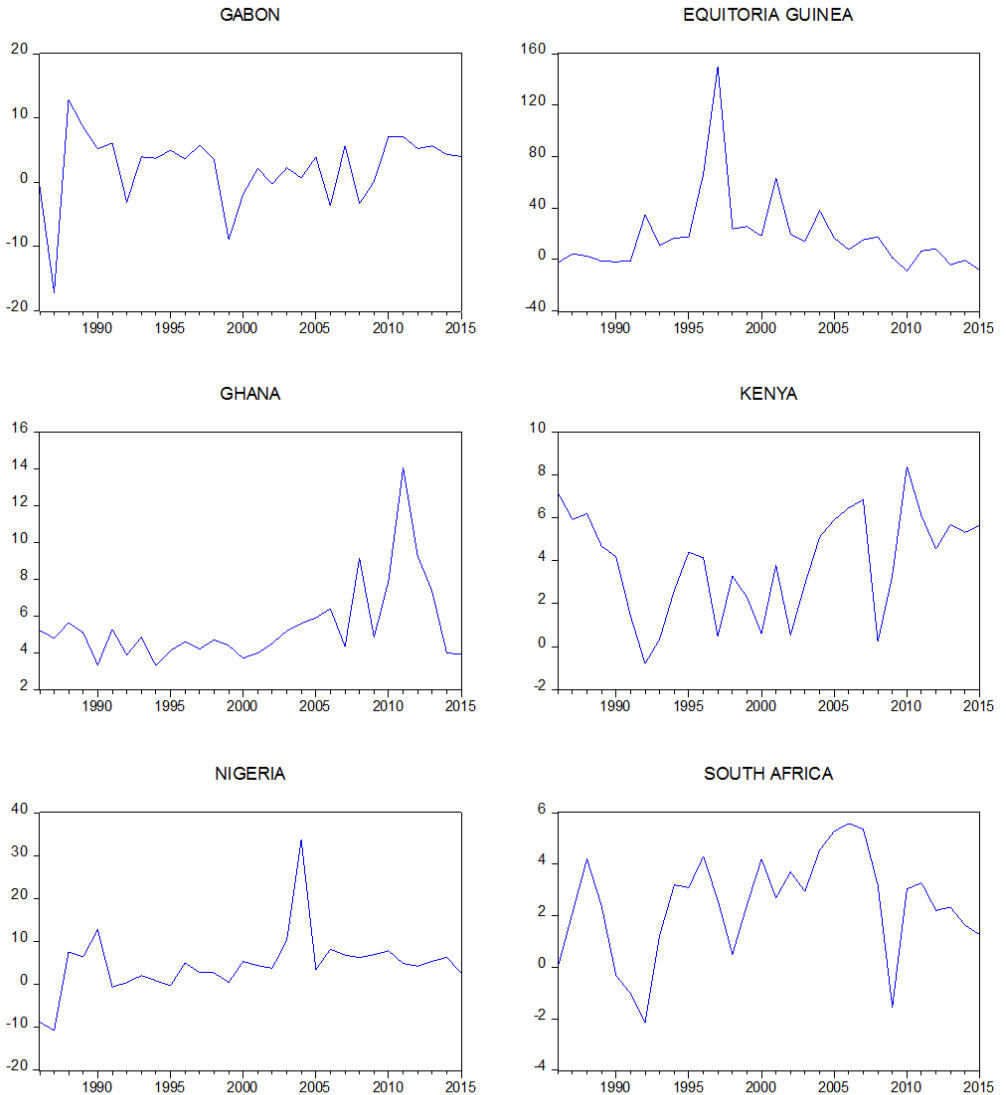
Therefore, the need to examine the extent at which inflation rate is unfavourable for economic growth in Sub-Saharan is a rationale behind this paper. The focus of the paper has been an ongoing debate in the global spectrum as well as in the regional context because of the importance of inflation rate in any economy. Inflation-growth nexus is interesting for several reasons. Its policy importance is linked to the process of making decisions about interest rates. Also, it serves a comprehensive platform for understanding how economic growth responds to inflation. It is critically significant to determine what rate of

inflation is optimal. The welfare cost of inflation below or above optimal level needs to be thoroughly investigated.

Stylized Facts

Sub-Saharan Africa recorded an average growth rate of 1.4 percent in 2016, representing the lowest in 20 years. Most countries in the region experienced a sharp decline in real GDP growth rate. However, the region is expected to attain a growth rate of 2.6 percent by the end of 2017, as a result of a recovery in oil production in Nigeria, increasing government spending ahead of the elections in Angola, the disappearing of drought effects in South Africa, and the modest improvement in the terms of trade. Even if improvements in commodity prices might not sufficiently address the large disequilibrium in her resource-rich countries. This calls for a need to ensure macroeconomic stability that would restore the conditions for strong and sustainable growth (IMF, 2017). The historical trend of economic growth rate in selected African countries is depicted in figure 1.

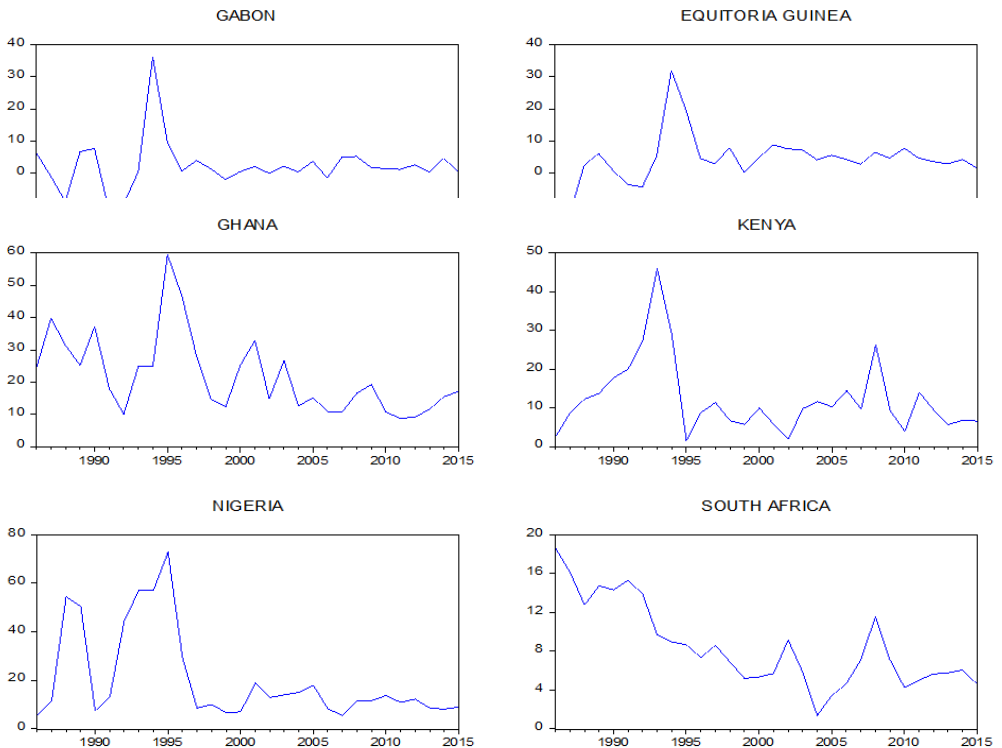
Figure 1: GDP growth rate (%) of selected African Countries 1986-2015



On the other hand, end of year inflation attained 42 percent in Angola, 18.5 percent in Nigeria, and remains slightly above the upper target band in South Africa. Countries like Zambia and Ghana experienced a fall in inflation rate as a result of tight monetary policy over the past year. Policy rates were very low and negative in real terms in Angola (despite tightening the base money growth, and narrowing the policy interest rate) and in Nigeria (even after a 3

percentage point rise in the monetary policy rate in early 2016). In resource-poor countries, Tanzania slashed the discount rate in March 2017 by 400 basis points while Kenya cut the policy rate by 150 basis points to 10 percent by the end-2016 with the aim of addressing the ongoing slowdown in private sector credit growth (IMF, 2017). Historical patterns of inflation rate in selected African countries are pictorialized in figure 2.

Figure 2: Inflation rate (%) of selected African countries 1986-2015



Considering the relevance of this nexus, it is urgently pivotal to examine the relationship between economic growth and inflation in Sub-Saharan Africa. Previous research on inflation–growth nexus reveals inconclusive outcomes on the extent at which inflation rate subtracts from economic growth. According to a Mundell-Tobin theory, a growth-inducing impact occurs where inflation expectations shift investments away from money balances into other types of capital. In such a situation, one might make argument for increasing the inflation target. In addition, several studies have found that inflation reduces overall welfare in any economy (see Miller et al., 2014; Ireland 2009; Serletis and Yavari, 2004; Fischer 1981). Miller et al. (2014) revealed that the welfare cost of 10 percent inflation in terms of GDP is between 0.025 and 0.75 percent, with a mean of 0.27 percent.

Conversely, some other research focus on determining the inflation threshold as well as the optimal inflation in the long run (see Billi, 2011; Reifschneider and Williams, 2000; Krugman, 1998; Khan and Senhadji, 2001; Burdekin et al., 2004; Barro, 1995; Bruno and Easterly (1998), Vaona and Schiavo (2007); Roubini and Sala-i-Martin 1992; Fischer 1993 and Chari et al. 1995). Bruno and Easterly (1998) postulated the difficulty in establishing the negative relationship between inflation and economic growth for the case of low and moderate levels of inflation while exploring a panel of 31 countries.

In light of this, this paper intends to investigate the relationship between inflation and economic growth in sub-Saharan Africa.

The rest of the paper is structured into three sections. Section 2 presents methodology employed to examine economic growth–inflation nexus in sub-Saharan Africa, while empirical estimation and discussions are captured in Section 3. Section 4 entails conclusion.

Methodology

The impact of inflation on economic growth is empirically presented in this section. This is conducted by connecting an empirical model of economic growth to inflation.

Model Specification

The model utilized to investigate inflation–economic growth nexus is specified as:

$$RGDP_{it} = \alpha + \pi_{i,t} + \varepsilon_{it}$$

Where $RGDP$ notes the growth rate of real gross domestic product, α represents constant; π is the inflation rate; while ε is the error term. i and t represent cross-section and time-dimension respectively.

Method of Analysis

Panel unit root

Several approaches have been applied to test the order of integration of series in panel data. Levin et al. (2002) extended the technique of the augmented Dickey-Fuller (ADF) with introduction of his panel unit root test. The Levin unit root test is specified as:

$$\Delta y_{it} = \phi_{it}\psi_i + \rho y_{it-1} + \sum_{j=1}^n \varphi_{ij} \Delta y_{i,t-j} + \xi_{it}$$

Where ϕ_{it} entails individual deterministic components like fixed effect, trend or a mixture of fixed effects and trend; ρ represents the autoregressive coefficients; ξ_{it} is the error terms; and n denotes the lag order.

The LLC test makes assumption of the constant value for ρ across panels; this may lead to loss of power (Breitung, 2000). Therefore, Im et al. (2003) correct this assumption by allowing ρ to change across panels:

$$\Delta y_{it} = \phi_{it}\psi_i + \rho_i y_{it-1} + \sum_{j=1}^n \varphi_{ij} \Delta y_{i,t-j} + \xi_{it}$$

Breitung (2000) addresses the issue of bias generated in applying LLC or IPS arising from the difference in size (between N and T because LLC and IPS are stronger when T is larger than N) or from the inclusion of an individual deterministic trend in the tests. However, the Fisher tests (ADF and PP) as noted by Choi (2001) apply the time series ADF and PP tests framework to panel data. The unique of this test is the combination of each series p-value generated from their unit root tests rather than the averaging individual test statistics. The Hadri(2000) unit root technique depends in the Lagrangian multiplier and residuals obtained from individual ordinary least square regression on deterministic components to compute the statistics. In addition, Hadri tests unlike other tests are based on the homogeneity in the unit root process ($\rho_i = \rho$) across the panels.

The panel unit root tests used in this study entail individual effects and the deterministic time trend. The Akaike information criterion (AIC) and the Schwann information criterion (SIC) are utilized to determine the optimal lag length. The shadowy estimation is based on Bartlett kernel and the bandwidth is determined by Newey and West automatic lag selection.

Panel Co-integration

The panel co-integration is carried out using the ARDL approach. The ARDL model used to analyze the link between financial stability and macroeconomic variables:

$$\Delta y_{it} = c + \delta y_{i,t-1} + \theta x_{i,t-1} + \sum_{i=1}^n \beta_i \Delta y_{i,t-1} + \sum_{i=1}^n \gamma_i \Delta x_{i,t-1} + \xi_{it}$$

Pesaran et al.(2001) suggest the fpss test based on F-test on the joint null hypothesis.

Null hypothesis is expressed as $H_0: \delta = \theta = 0$

against the alternative hypothesis as

$$H_1: \delta \neq \theta \neq 0.$$

When the computed test statistic is higher than the upper critical bounds value, the null hypothesis is rejected. If the F statistic lies into the bounds, then the co-integration test is inconclusive. If the F statistic is below the lower bound values, this implies that the null hypothesis of no cointegration cannot be rejected irrespective of the stationarity of the concerned variables.

Data Source

The dataset on inflation and economic growth is obtained from the World Bank's World Development Indicators (2016). The scope of the timeframe and the countries included, are influenced by data availability.

Empirical Estimation and Discussions

This paper employs a panel dataset on real GDP growth and inflation from 1986 to 2015. Both real GDP growth and inflation data come from the World Development Indicator (2016). In addition, data availability purely constrains the commencement and the endpoints of its sample including the number of countries. The mean of inflation and GDP growth for the sample period was 4.22 percent and 72.46 percent respectively (see Appendix Table A.1). In addition, Equatorial Guinea takes a leading role in terms of economic growth rate whereas Democratic Republic of Congo has the highest average inflation of 1167.1 percent in the sample. It can be induced from the table, that countries with low economic growth rate have the high inflation rate.

As presented in Appendix Table A.2, the average economic growth rate of high income countries is higher than other income level countries in the region. Also, the lowest average inflation rate is attributed to high income African countries. This provides a descriptive evidence of an inverse link between inflation rate and economic growth rate.

Based on a sub-regional comparison, Central African countries account for the highest economic growth rate among their counterparts but battle with high inflation rate of about 236.43 percent (see Appendix Table A.3).

The study commences its empirical analysis by estimating the Autoregressive Distributed Lag (ARDL) model, having subjected to unit-root test. The estimation result is reported in Table 5 using economic growth as a dependent variable. The result of the panel unit root test reveals that economic growth rate and inflation are stationary at level (see Table 1).

on short-term economic growth is negative but statistically insignificant. The speed of adjustment (-0.75) is statistically significant and negative, conforming to theoretical expectation. Furthermore, it indicates that if there is imbalance in the economy, it would take 1 ¼ year to normalize the situation back to equilibrium.

Based on the above findings, inflation is a critical driver of economic activities in the region. Inflation influences economic growth through different channels. For instance, a rise in the price level by 100 basis points in the short run would lead to a reduction of Africans'

Table 1: Panel Unit Root Tests

Statistics	None		Individual Intercept		Individual Intercept & Trend	
	GDPGRT	INFL	GDPGRT	INFL	GDPGRT	INFL
LLC t	-8.88	-10.14	-7.67	-10.51	-6.83	-10.88
ADF-Fisher	213.07	272.16	251.88	265.98	216.55	231.84
PP-Fisher	355.58	363.71	454.35	379.68	640.50	579.08

Note: all values are significant at 1%.

With the reference to Table 2, inflation rate has a significant and negative long-run influence on growth rate in the region. This implies that a 1 percent rise in inflation leads to a drop in economic growth rate by 0.003 percent on average. This indicates that inflation rate is a growth-reducing variable in the long term situation. In the same vein, the effect of inflation

purchasing power, thus resulting into a fall in demand for goods. Producers in the region slide the volume of production and retrench their workers as a result of low demand in the economy. This finally leads to a decline in the growth rate of economic activities by nearly 2 basis points.

Table 2: Autoregressive Distributed Lags (ARDL (1, 1,))

Series	Coefficient	t-Statistic	Prob.
<i>Dependent Variable: D(GDPGRT)</i>			
Constant	3.28	8.26	0.00
<i>Long run Estimates</i>			
INFL	-0.003	-3.22	0.00
<i>Short run Estimates</i>			
Co-integrating Equation(ECT-1)	-0.75	-13.24	0.00
D (INFL)	-0.02	-0.57	0.57

However, in the long run, the African economy's growth rate would be reduced by 0.3 basis points. This might happen because of government responses to short-run inflationary effect. In addition, any shock that creates imbalance between inflation and economic growth rate in establishing the long run relationship, can be handled within two years in the region. This implies that 75 percent of adjustment takes place on yearly basis in order to normalizing the situation. However, this speed of adjustment might not be applicable to country-specific case.

Conclusion

The relevance of inflation in policymaking and macroeconomic stability, has triggered this paper to examine the connection between inflation and economic growth in selected African countries, using a more recent panel dataset. The paper finds that inflation rate significantly and negatively affect the growth rate of African economy in the long-run but not significant in the short-run.

African as a whole has identified five key priorities that can transform the continent into the world's economic power. These priorities are feed Africa; light up and power Africa; integrate Africa; Industrialize Africa; and improve the quality of life of people in Africa. These key objectives identified by African Bank Development, are needed to attain inclusive economic growth. None of these key priorities

could be achieved if there is persistent high rate of inflation in the continent. However, the question of why these priorities are difficult, needs to be addressed. For instance, the African continent is blessed with fertile land resources that are well suitable for food and crop farming, but the prices of food especially rice remain a big challenge in the continent. Food price is among the major contributors to high inflation among African countries. The study could not examine the root causes of inflation in the region. However, the study suggests that African government needs to address the issue of imported inflation, through adapting a Chinese-growth model. The Chinese model stimulated its economic activities by implementing a policy "If it is not made in China, it is not for the Chinese". Similar policy can be implemented for the case of Africa without any double-standard for any politician or elite.

All in all, Africa's economic growth is killed by imported inflation. This calls for designing and implementing robust economic policies to control the level of inflation in the region if the continent is intending to achieve a strong, sustainable and inclusive growth. Future research needs to be done on the root-causes of inflation in the continent. Decomposition analysis of Africa's inflation is another area of further study.

References

- Billi, Roberto M (2011). Optimal inflation for the U.S. economy. *American Economic Journal: Macroeconomics* 3: 29–52.
- Barro, Robert J (1995). Inflation and economic growth. Working Paper 5326. Cambridge, MA, NBER.
- Bruno Michael, and William Easterly (1998). Inflation crises and long-run growth. *Journal of Monetary Economics* 41:3–26.
- Budekin, Richard C.K., Arthur T. Denzau, Manfred W. Keil, Thititthep Sitthiyot, and Thomas D. Willett (2004). When does inflation hurt economic growth? Different nonlinearities for different economies. *Journal of Macroeconomics* 26: 519–532.
- Chari, V.V., Larry E. Jones, and Rodolfo E. Manuelli (1995). The growth effects of monetary policy. *Quarterly Review* 19: 18–32. Federal Reserve Bank of Minneapolis.
- Fischer, Stanley (1981). Towards an understanding of the costs of inflation: II. *Carnegie-Rochester Conference Series on Public Policy* 15: 5–41.
- Fischer, Stanley (1993). The role of macroeconomic factors in growth. Working Paper 4565. Cambridge, MA, NBER.
- Granger, Clive W. J. and Timo Teräsvirta (1993). *Modelling nonlinear economic relationships*. Oxford University Press, Oxford.
- Ireland, Peter N. (2009). On the welfare cost of inflation and the recent behavior of money demand. *American Economic Review* 99: 1040-1052.
- Khan, Moshin S.. and Abdelhak S. Senhadji (2001). Threshold effects in the relationship between inflation and growth. *IMF Staff Papers* 48: 1–21.119
- Krugman, Paul.R. (1998). It's baaack: Japan's slump and the return of the liquidity trap. *Brookings Papers on Economic Activity* 29: 137–206.
- Li, Qi, Juan Lin, and Jeffrey S. Racine (2013). Optimal bandwidth selection for nonparametric conditional distribution and quantile functions. *Journal of Business and Economic Statistics* 31: 57–65.
- Miller, Stephen M., Luis Filipe Martins, and Rangan Gupta (2014). A time-varying approach of the U.S. welfare cost of inflation. Department of Economics, University of Connecticut, Working Paper No. 2014-11.
- Park, Sanjin (2003). Semiparametric instrumental variable estimation. *Journal of Econometrics* 112: 381–399.

Reifschneider, David, and John C. Williams (2000). Three lessons for monetary policy in a low-inflation era. *Journal of Money, Credit and Banking* 32:936–966.

Roubini, Nouriel, and Xavier Sala-i-Martin (1992). A growth model of inflation, tax evasion, and financial repression. National Bureau of Economic Research. Working Paper 4062. Cambridge, MA, NBER.

Rousseau, Peter L., and Paul Wachtel (2001). Inflation, financial development and growth. In T. Negishi, R. Ramachandran, K. Mino, editors, *Economic theory, dynamics and markets: Essays in honor of Ryuzo Sato*. Kluwer. Available at SSRN:<http://ssrn.com/abstract=252929>.

Serletis, Apostolos, and Kazem Yavari (2004). The welfare cost of inflation in Canada and the United States. *Economics Letter* 84: 199–204.

Teräsvirta, Timo, and Heather M. Anderson (1992). Characterizing nonlinearities in business cycles using smooth transition autoregressive models. *Journal of Applied Econometrics* 7: S119–S136.

Vaona, Andrea, and Stefano Schiavo (2007). Nonparametric and semiparametric evidence on the long-run effects of inflation on growth. *Economics Letters* 94: 452–458.

Vaona, Andrea (2012). Inflation and growth in the long run: A new Keynesian theory and further semiparametric evidence. *Macroeconomic Dynamics* 16: 94–132. 120

International Monetary Fund (2017). *Sub-Saharan Africa Restarting the Growth Engine*. World Economic and Financial Survey

Appendix

Table A.1: Summary of GDP growth and Inflation by countries

Country	GDP Growth (%) 1986-2015		Inflation (%) 1986-2015		Obs.
	Average	Std. Dev.	Average	Std. Dev.	
Botswana	5.79	4.85	9.04	2.78	30
Burkina Faso	5.17	2.88	2.70	5.27	30
Burundi	1.57	4.09	10.75	7.85	30
Cabo Verde	6.75	5.26	3.93	3.41	30
Cameroon	2.09	4.12	3.88	6.69	30
Central African Republic	0.50	7.88	4.61	9.66	30
Chad	5.64	8.64	3.43	10.40	30
Congo, Dem. Rep.	1.01	6.20	1167.10	4358.99	30
Congo, Rep.	2.69	3.72	5.03	8.35	30
Cote d'Ivoire	2.45	3.73	4.20	5.14	30
Equatorial Guinea	18.38	30.79	4.20	8.39	30
Ethiopia	6.47	6.25	9.27	12.21	30
Gabon	2.24	5.66	2.37	7.91	30
Gambia, The	3.48	2.89	8.44	10.36	30
Ghana	5.45	2.22	21.82	12.15	30
Kenya	3.93	2.42	12.24	9.48	30
Lesotho	4.28	2.14	9.32	7.08	30
Madagascar	2.41	4.17	12.94	10.03	30
Malawi	3.92	5.17	21.58	15.43	30
Mauritania	3.87	4.39	6.04	2.94	30
Mauritius	5.04	2.12	6.04	3.17	30
Niger	3.60	3.96	2.11	7.72	30
Nigeria	4.71	7.27	20.43	19.13	30
Rwanda	5.11	12.70	6.70	4.96	30
Senegal	3.48	2.13	2.36	6.23	30
Seychelles	4.00	4.62	4.60	8.44	30
Sierra Leone	2.52	9.55	30.39	41.80	30
South Africa	2.41	1.99	8.46	4.32	30
Sudan	5.24	4.05	40.79	40.32	30
Swaziland	4.91	4.46	8.85	3.86	30
Togo	2.83	5.46	3.88	7.57	30
Uganda	6.40	2.44	29.57	55.11	30
Zambia	4.20	4.02	41.95	46.99	30
Zimbabwe	1.00	7.58	934.59	4440.11	30
All	4.22	7.93	72.46	1,078.38	1,020

Table A.2: GDP growth and inflation by income level in Sub-Sahara countries.

Income Level	GDP Growth (%)		Inflation (%)		Obs.
	Mean	Std. Dev.	Mean	Std. Dev.	
Low Income	3.38	6.26	119.5	1439.98	571
Lower-Middle Income	4.64	4.31	17.16	26.42	270
Upper-Middle Income	3.82	4.23	6.52	5.58	119
High Income	11.19	23	4.4	8.35	60

Table A.3: GDP growth and inflation by region in the selected Sub-Sahara countries.

Region	GDP Growth (%)		Inflation (%)		Obs.
	Mean	Std. Dev.	Mean	Std. Dev.	
Central Africa	5.99	16.01	236.43	1978.94	150
Eastern Africa	3.89	5.93	13.58	23.86	360
West Africa	3.81	5.31	83.30	1237.25	390
Southern Africa	4.35	3.77	8.92	4.73	120