Does the Level of Inflation Matter in the Inflation-Growth Nexus in Ghana?

Prempeh, Kwadwo Boateng and Kyeremeh, Kwadwo and Peprah-Amankona, Godfred

Department of Accountancy, Sunyani Technical University, Department of Accountancy, Sunyani Technical University, Finance Directorate, Sunyani Technical University

7 March 2022

Does the Level of Inflation Matter in the Inflation-Growth Nexus in Ghana?

Kwadwo Boateng Prempeh[1], Kwadwo Kyeremeh[2], Godfred Peprah-Amankona[3]
Department of Accountancy, Sunyani Technical University[1,2]
Finance Directorate, Sunyani Technical University[3]

Abstract
The study uses a threshold regression model to provide new evidence that the deleterious effects of inflation on growth only "kick in" once inflation hits a certain level. Until then, inflation is beneficial to growth.

Introduction

Most macroeconomic policies worldwide have two primary goals: sustained high economic growth and price stability. Since price stability is a significant predictor of an economy's growth rate, many central banks formulate monetary policies to keep inflation at a sustainable rate. A widespread view is that inflation harms growth (Aydin *et al.*, 2016). The optimum inflation rate, whether or not there is a threshold, and the time it takes to attain stability once the level of costs of goods and services fall to the desired level, however, are always on the agenda. Several models have proposed that the exact impact of inflation on growth may be conditioned on other intervening factors. For instance, Eggoh and Khan (2014) envisaged that the exact impact of inflation on growth is contingent on the level of financial development, inflation, capital accumulation, trade openness and government expenditures.

Unfortunately, literature on how the level of inflation mediates the inflation-growth nexus in developing economies is scant. An exception is a study by Frimpong and Oteng-abayie (2010), who using a linear regression model, established that the level of inflation is a crucial pre-condition for a deleterious or beneficial impact of inflation on growth. A major drawback of this modelling technique is that the inadequate knowledge of the number of thresholds and their values hamper the estimation and interpretation. Also, such techniques might impose *a priori* restrictions that the impact of inflation on growth monotonically rise (drop) with inflation. However, it might be the case that a certain level of inflation is reached before economies might experience the deleterious effect of inflation on growth. Thus, findings from such studies might not be instructive. This supports our choice of using a much more flexible specification that can capture the dynamic impacts of inflation on growth.

In this study, we use a different approach to examine how the level of inflation mediates inflation's effects on growth. We adopt a regression model based on the concepts of threshold effects. Our specified model allows the nexus to be piecewise, with inflation acting as a regime-switching trigger. We use time-series data for Ghana, a country with a relatively weak financial system compared to advanced economies. Therefore, this study will contribute to knowledge regarding economic growth models in developing economies and serve as a bedrock for future works on this subject matter in developing economies, which is currently based on mostly false empirical and theoretical premises. We establish robust evidence of threshold effects in the inflation-growth link. Moreover, we show that inflation's deleterious influence on growth only "kicks in" once inflation reaches a certain level. Until then, inflation is beneficial to growth.

Model Specification and Data

We argue that the sample splitting model developed by Hansen (1999, 2000) is adequate in capturing the dynamic association between inflation and growth in Ghana. The study further proposes that the exact impact of inflation on economic growth is contingent on the level of inflation (i.e., below or above a certain threshold). Therefore, we specify Model 1such that the level of inflation mediates the impact of inflation on growth. Accordingly, the sample splitting model, which divides the sample into a low(high) inflationary regime, is specified as follows:

$$EG_t = \begin{cases} (\beta_{11} + \beta_{21}INF_t + \varepsilon_t) & \text{for} \quad d_t\ \{INF_t \leq \gamma\} \\ (\beta_{12} + \beta_{22}INF_t + \varepsilon_t) & \text{for} \quad d_t\ \{INF_t > \gamma\} \end{cases} \qquad (1)$$

Where *EG* is economic growth proxied by the natural logs of real GDP and GDP per capita; *INF* represents inflation proxied by the annual percentage change in consumer prices. All the data used in this study, covering the period 1970 to 2020, were obtained from the World Development Indicators (WDI) database[1]. *d(.)* is a dummy variable. *d(.)* = 1 if all assumptions are satisfied and *d(.)*=0, if otherwise; γ and t represent the threshold value and time index, respectively. The next step is to estimate the parameters β_{21} and β_{22} which represents the impact of inflation on economic growth below and above the inflation threshold.

Results

Figure 1 demonstrates plots of inflation and proxies of economic growth. Most of the observations are clustered around the low inflation periods, as shown by the graphs. Also, in some years, a lower (higher) economic growth was experienced on the back of a lower (higher) level of inflation.
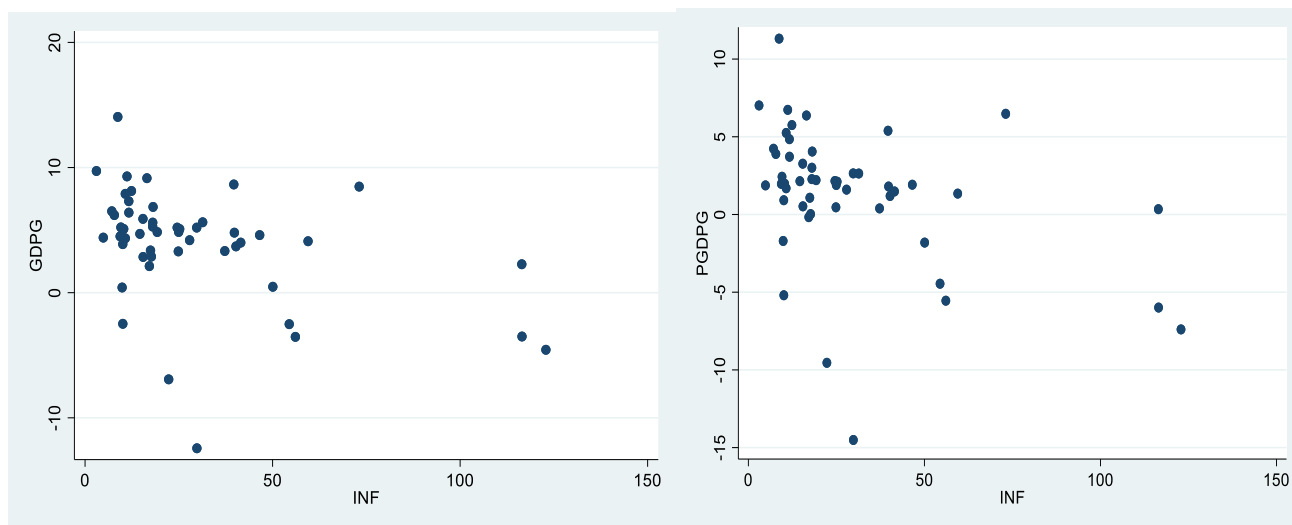

Figure 1: Time Series Plots Depicting the Inflation-Growth Nexus.

Table 1 shows a nonlinear link between inflation and growth based on threshold testing. This suggests that the data can be classified into two distinct sub-samples (regimes), with the level of inflation mediating the overall influence of inflation on economic growth. As seen in the Table, the threshold

---

[1] The data is openly accessible at https://databank.worldbank.org/source/world-development-indicators

estimated for inflation was found to be 17.45% via the sample splitting approach. Figure 2 graphically supports the tests of threshold effects.

Table 1: Threshold estimation using *INF* as a threshold variable

DEPENDENT VARIABLE	PGDP	GDP
INF	-.004(-4.854)	-.008 (-4.255)
Impact of FDI		
LOW-*INF* ($INF \leq \gamma$)	.013 (2.353)	.059 (4.621)
HIGH-*INF* ($INF > \gamma$)	-.002 (-2.098)	-.004 (-3.372)
Threshold estimate (γ)	17.45	17.45
Confidence Interval	[17.150,19.247]	[17.455,17.454]
LM-test Statistic	15.68	11.264
p-value	.0001	.0064
Observations in low-*INF* regime	27	27
Observations in high-*INF* regime	29	29
Test for Heteroskedasticity (*P*-Value)	.2283	.1341

Note: This Table presents the threshold regression results where the threshold variable is inflation *(INF)*. The outcome variables are the natural logs of GDP per capita and real GDP. The *p*-value was estimated using 5,000 replications and a trimming rate of 15%. Values in parentheses (#) denote *t*-values.
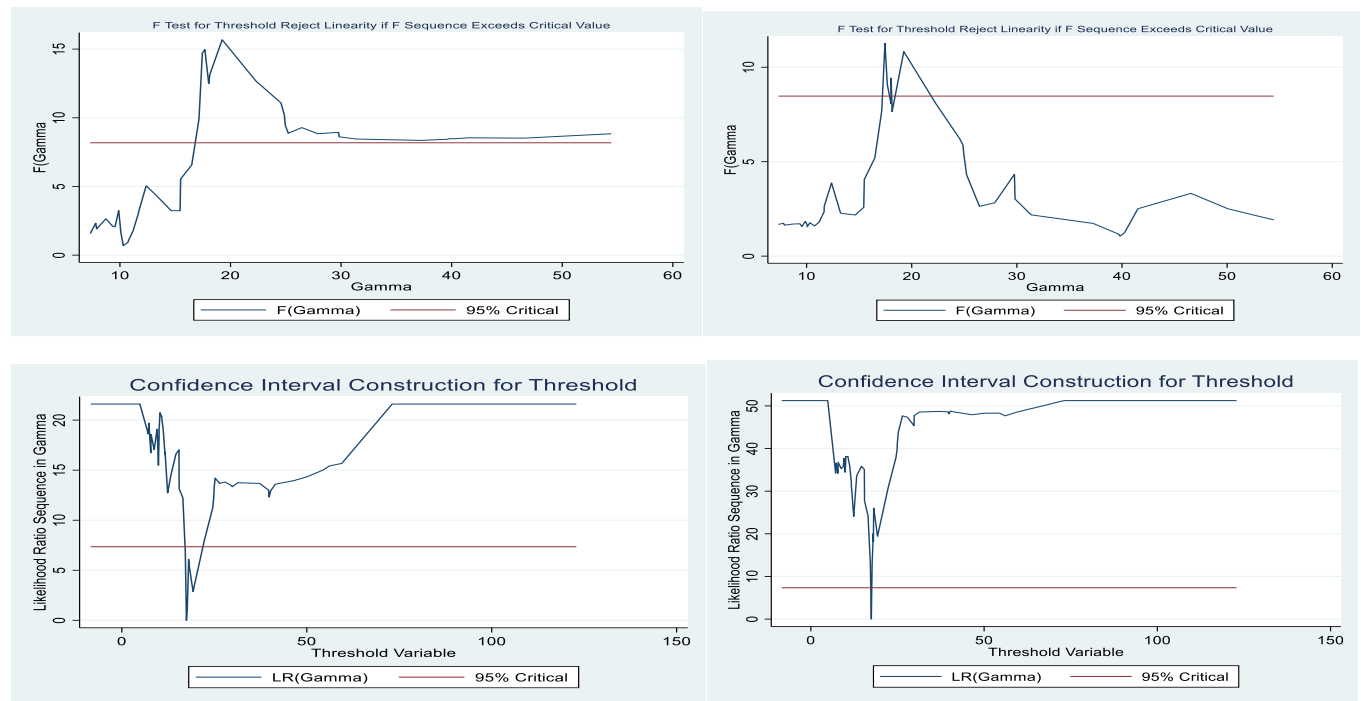

Figure 2: Plots of F-Test for Threshold and Confidence Intervals for Threshold Effects

The findings also suggest that inflation hurts growth in general, regardless of the measure of growth. Focusing on the threshold effects, we found that inflation rates below (above) the threshold value of 17.45% promote (harm) economic growth. For instance, when GDP was used as the outcome variable, it was established that an upward percentage change in inflation promotes growth by 0.059% in the low-

inflationary regime and dampens growth by 0.004% in high-inflationary regimes in Ghana, all other things being equal. All the effects were significant at conventional levels. This shows that inflation has a beneficial marginal influence on economic growth under low inflation regimes, but inflation has a deleterious marginal influence on economic growth in high inflation regimes. In other words, although inflation rates below the threshold have a beneficial impact on economic growth, rates beyond the threshold have a negative impact. Furthermore, when evaluating the magnitude of the regime coefficients, it is evident that inflation has a much-pronounced impact on economic growth in low-inflation environments. The findings validate the studies of Frimpong & Oteng-abayie (2010), Bick (2010), Doguwa (2012), Vinayagathasan (2013), Eggoh and Khan (2014), Aydin *et al.* (2016) and Azam and Khan (2020).

Conclusion

The current study analysed how the inflation threshold mediates the nonlinear association between inflation and growth in the case of Ghana, a developing nation, for the period 1970 to 2020. To this end, the study adopted the sample-splitting approach proposed by Hansen (2000). In addition, the study looked at how inflationary thresholds influenced the inflation-growth nexus and attempted to establish the optimal inflation rate for Ghana.

The findings provide new evidence of a nonlinear inflation-growth link in developing economies, Ghana to be precise. Furthermore, the findings reveal that inflation is detrimental to economic growth when inflation exceeds a specific critical value of 17.45%. The results further lend credence to the assertion that low inflation rates underneath the point of inflexion promote growth. The findings do not imply causality between inflation and growth. It does, however, show that there is a link and emphasises the crucial role of inflation threshold in the inflation-growth nexus. Nevertheless, it should be noted that the concept of inflation targets and inflation thresholds is quite distinct. Inflation targeting is a monetary policy construct whereby the central bank announces a target and then channels its policy tools in achieving the set target. In contrast, inflation threshold is a point of inflexion for the trade-off between inflation and growth where at low levels, inflation may promote growth, and at higher levels, inflation may impede growth. Overall, our findings may offer some relevant policy direction to policymakers. In order to ensure economic stability in Ghana, policymakers should set an inflation target not exceeding 17.45%.

References

Aydin, C., Esen, Ö., & Bayrak, M. (2016). Inflation and Economic Growth : A Dynamic Panel Threshold Analysis for Turkish Republics in Transition Process. *Procedia - Social and Behavioral Sciences*, *229*, 196–205. https://doi.org/10.1016/j.sbspro.2016.07.129

Azam, M., & Khan, S. (2020). Threshold effects in the relationship between inflation and economic growth: Further empirical evidence from the developed and developing world. *International Journal of Finance and Economics*, *July*, 1–20. https://doi.org/10.1002/ijfe.2368

Bick, A. (2010). Threshold effects of inflation on economic growth in developing countries. *Economics Letters*, *108*(2), 126–129. https://doi.org/10.1016/j.econlet.2010.04.040

Doguwa, S. I. (2012). Inflation and Economic Growth in Nigeria : Detecting the Threshold Level. *CBN Journal of Applied Statistics*, *3*(2), 99–124. https://doi.org/https://dc.cbn.gov.ng/jas/vol3/iss2/6

Eggoh, J. C., & Khan, M. (2014). On the Nonlinear Relationship between Inflation and Economic Growth. *Research in Economics*, *68*(2), 133–143. https://doi.org/10.1016/j.rie.2014.01.001

Frimpong, J. M., & Oteng-abayie, E. F. (2010). When is Inflation Harmful? Estimating the Threshold Effect for Ghana. *American Journal of Economics and Business Administration*, *2*(3), 232–239.

Hansen, B. E. (1999). Threshold effects in non-dynamic panels : Estimation, testing, and inference. *Journal*

of Econometrics, *93*, 345–368.

Hansen, B. E. (2000). Sample Splitting and Threshold Estimation. *Econometrica*, *68*(3), 575–603. http://www.jstor.org/stable/2999601

Vinayagathasan, T. (2013). Journal of Asian Economics Inflation and economic growth : A dynamic panel threshold analysis for Asian economies. *Journal of Asian Economics*, *26*, 31–41. https://doi.org/10.1016/j.asieco.2013.04.001