The Impact of Inflation on Economic Growth in Afghanistan

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Abstract

This study probes the short run and long run nexus between inflation and economic growth in Afghanistan. The present study tries to fill the mentioned research gap and figure out the linkage by the ARDL method using monthly data spanning from January 2010 to December 2016. A major outcome of this paper is that there is evidence of short run nexus between inflation and economic growth explicitly low episodes of inflation rate increases economic growth in the country. No clear interconnection in the long run between the two focal variables found. Thus, the government to be vigilant to formulate policies to sustain the economic growth and to target inflation rate at its possible minimum rate by doing the following core policy measures. First, to control over the market prices via coordination with the domestic trade unions. Second, establishing intra governmental or regional cooperation to coordinate their fiscal, monetary, and exchange rate policies to stabilize the inflation and boost the GDP growth.

Keywords: *Inflation, GDP, Economic Growth, ARDL*

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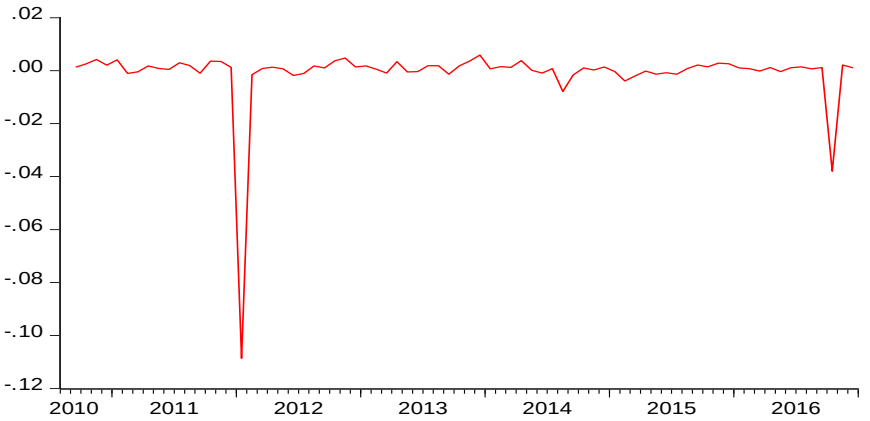
Introduction

The nexus between inflation and economic growth is one of the controversial topics among researchers, economists, and monetary authorities around the globe (Mallik & Chowdhury, 2001). Particularly, on a question that whether inflation is necessary or harmful to the economy and its growth Both theoretically and empirically the relationship between inflation and growth is vastly scrutinized and debated in the literature. Theoretically, the Keynesian policies support the inflation phenomena as a way towards economic growth via promoting expansionary policies. Similarly, the same concept is hypothesized by the Philips curve the mentioned trend lowers the unemployment rate and generates employment. From the standpoint of the Tobin effect which suggests that inflation is the reason that people do diversification form money to asset market. This accumulates capital and thus enhances growth, a positive relationship (Jayathileke & Rathnayake, 2013). However, in the 1970s when the world experienced hyper and sustained inflation and unemployment then the positive nexus of inflation-growth is massively questioned and addressed inflation as an adverse component of growth in the Classical approach. This positive nexus is also empirically tested by Karahan and Çolak (2020). In summary, over the years the views of the Keynesian and Classical concerning the nexus between inflation and economic growth confirmed in the literature focusing their hypothesis of the negative and positive relationships.

Importantly, there is no explicit study available in the literature that sheds light on the nexus between inflation and economic growth in Afghanistan. The reason for exploring the study is the pressure of the IMF on the Da Afghanistan Bank on boosting economic growth with such an economic situation that the country is solely reliant on US financial aids and analyzing the inflation parameter thereof has importance to analyze. The Afghan economy is too fluctuant and the prices are changing very rapidly. Here, this paper explores the impact of inflation on economic growth in the short-run and as well as in the long-run for the first time in Afghanistan. The trend in inflation rates of Afghanistan is shown in Fig. 1.

The rest of this study is as follows; the second section reviews the literature; the third section determines data and methodology; the fourth section discusses the results. Lastly, the conclusion is presented.

Fig 1: Trend in monthly inflation ra



Source: NSIA

2. Literature Review

Empirically, bundle of studies explores the inflation and economic growth dynamics for developed and developing economies in an open dimension of interconnections (i.e. positive, negative, and even no relationship) between the two. For instance, Paul *et al.* (1997) ascertain that there is no meaningful nexus established between inflation and economic-growth in 70 countries in the period of 1960-1989. Later on, Omoke (2010) unveils that there is no co-integration between inflation and growth in Nigeria. Besides, Barro (1995) studies 100 countries covering the period of 1960-1999. The result suggests that there is a prevailing positive nexus between inflation and growth. Consistent with the prior study, Majumder (2016) investigates the long-run positive nexus in Bangladesh. In the last strand, Turkey's economy is negatively affected by the short-run fluctuations in the inflation rate (Erbaykal & Okuyan, 2008). Saaed (2007) finds that Kuwait's economic growth is negatively influenced in the long run by inflation. Intuitively, recent studies dissect the nexus and support the negative effect of inflation on growth. Aloui *et al.* (2018) test the oil price, inflation, exchange rate, and economic growth. They use Wavelet analysis for the data spanning from 1969-2014. Their result proposes a negative relationship between inflation and growth. Further, Tran (2018) shows that inflation above the threshold of 3-4% affects negatively the economic growth of Vietnam.

3. Data and Methodology

3.1 The Model

To dissect the interconnection between economic growth and the inflation rate, we are stating the following model (see, for example, Fischer, 1983; Hayat *et al.*, 2018; Temple, 2000).

$$GDP = f\ (Inf) \quad (1)$$

The dependent variable is economic growth (GDP) and the independent variable is the inflation rate (Inf). The log-linear model of GDP and inflation can be shown as follow;

$$ln(GDP_t) = \alpha_0 + \alpha_1 \ln(Inf_t) + \varepsilon_t \quad (2)$$

Where, α_0 and $\alpha_1$are parameters to be estimated, t is time (63 observations after adjustments), and ε_t is a stochastic term.

3.2 Data description

Monthly time series data covering the period of January 2010 to December 2016 is used for the economic growth and inflation of Afghanistan. Using GDP and CPI as a proxy for economic growth and inflation rate respectively. The data of the two mentioned variables are retrieved from the National Statistics Information Authority (NSIA) of Afghanistan. The GDP is available on an annual basis so it is converted into higher frequency by E-views 10. The monthly GDP is obtained by the interpolation method of Cubic which is then matched on the first basis.

3.3 Estimation Methodology

To test the long-run and short-run linkages between economic growth and inflation, we use the autoregressive distributive lag (ARDL)[1] model of Pesaran *et al.* (2001). The following steps are needed to estimate the ARDL model:

3.3.1 Augmented Dicky Fuller (ADF) Test

The ADF unit root test is used to check whether the variables are stationary at their levels or first differences (i.e. I(0) or I(1)). The optimal lag length is chosen by applying Akaike Information Criteria (AIC) as it is the most parsimonious method in the lag length selection (Lütkepohl, 2006).

3.3.2 Bounds Testing

Bound testing is used to configure the long-run relationship between the variables which is only possible when the upper-bound value is less than the F-statistic of equation 3. This is tested based on the following hypothesis.

[1] *Advantages of the ARDL model: First, this method is one of the most parsimonious techniques for specifying the co-integration in small samples, whereas other co-integration methods (i.e. Engle and Granger (1987) and-Johansen (1995)) require large samples for the robustness of their findings (Ghatak & Siddiki, 2001). Second, there is no need of the same order of integration for the regressors, it can be I(0), I(1) or both, however (M. H. Pesaran et al., 2001). Third, ARDL model is set up in a single equation which makes it easy to implement and interpret, and the ARDL model assigns different lag lengths to different variables while they enter into the model (Shimizu & Sato, 2015). Fourth, the error correction model can be driven very easily by a linear transformation of the ARDL technique (Banerjee et al., 1993). Fifth, ARDL bound testing procedure's result is robust than any other co-integration approaches, especially for small samples (Pesaran & Shin, 1998). Sixth, estimation of the ARDL model can be done even if there is indigeneity among the supplementary variables (Pesaran & Pesaran, 1997).*

H_0: $\theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = 0$ $(No\ levels\ relationship\ exist)$

H_1: $\theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq \theta_6 \neq 0$ $(Levels\ relationship\ exist)$.

The F-statistic is compared with the critical values of Pesaran *et al.* (2001) to accept or reject the null hypothesis of no co-integration.

3.3.3 Unrestricted Error Correction Model (UECM)

` The UECM finds out the long-run equilibrium nexus of the variables. Modeled bellow.

$$\Delta LGDP_t = \alpha_0 + \sum_{i=1}^{a} \alpha_{1i} \Delta LGDP_{t-i} + \sum_{i=0}^{b} \alpha_{2i} \Delta LInf_{t-i} + \theta_1 LGDP_{t-1} + \theta_2 LInf_{t-1} + U_{1t} \quad (3)$$

L denotes log of the variables, Δ shows the first difference, a and b are lag-lengths. $\alpha_0\ and\ \alpha_1$ indicate short-run dynamic, and $\theta_1\ and\ \theta_2$ represent long-run dynamics. U an error-term. Importantly, lag length is determined through AIC.

3.3.4 Restricted Error Correction Model (RECM)

The RECM is estimated for the short-run dynamics of the aforementioned variables. Formulated bellow:

$$\Delta LGDP_t = \beta_0 + \sum_{i=1}^{a} \beta_{1i} \Delta LGDP_{t-i} + \sum_{i=0}^{b} \beta_{2i} \Delta LInf_{t-i} + \lambda ECT_{t-1} + U_{2t} \quad (4)$$

ECT refers to the error correction term. λ is adjustment speed which must be signed negative and significant and lies between 0 and 1. Now we proceed to the estimation of the model.

4. Results and Discussion

The empirical results of our study are presented below.

4.1 Results of ADF Test

The results of the ADF unit root test are shown in Table 1, which indicates both the focal variables are stationary at their levels. No variable is found to be I(2). Hence, the ARDL model can be applied.

Table 1: Results of ADF Unit Root Analysis

Variables	AIC Lags	ADF test statistics		Critical Value at 5%	Order of Integration
		Level	1st Difference		
LGDP	11	-7.8886^{***} (0.0000)		-3.4852	I(0)
LINF	0	-8.5058^{***} (0.0000)		-3.4706	I(0)

Notes: 1. ADF is tested by inclusion of trend and intercept; 2. The parenthesis values are the one-sided p-values of MacKinnon (1996); 3. Null hypothesis: The variable has a unit root;

4. The lag lengths are determined automatically by AIC based on a maximum of 11 lags; 5. *** indicate the significance 1% level.

4.2 Results of Bounds Testing

The ARDL bounds testing is tabulated as follows.

Table 2: Results of Bounds Testing.

Estimated Model	U-ECM/ Eq. (3)	
F-statistic	2.0433	
Critical values bound	Lower critical bound	Upper critical
1% *level*	4.94	5.58
2.5% *level*	4.18	4.79
5% *level*	3.62	4.16
10% *level*	3.02	3.51

Notes: U-ECM: $F_{GDP}(LGDP_t/LInf_t)$; Null hypothesis: No long-run relationship exists.

Source: Eq. 3 estimation

As both the upper and lower critical values exceed the calculated F-statistics of the unrestricted error correction model (U-ECM). Therefore, we accept the null hypothesis of no long-run co-integration or relationship between economic growth and inflation rate.

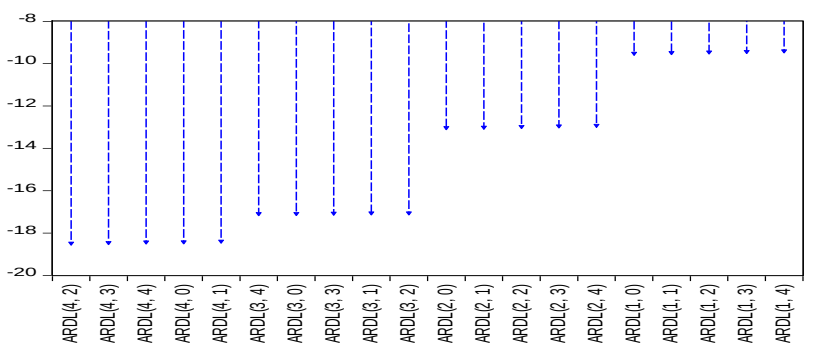
4.3 Formation of U-ECM

The U-ECM is scrutinized and estimated based on the following steps:

4.3.1 Results of Lag Selection Criteria

Our ARDL model is selected grounded on AIC. We use the default four lags for the dependent and independent variables. E-views after evaluating 20 models selects the best specification model with four lags for GDP and two lags for inflation (see Fig. 2.)

Fig. 2: Summary of Top 20 Models Selected by AIC



Source: Eq. 3 estimation.

4.3.2 Diagnostic and Stability Tests

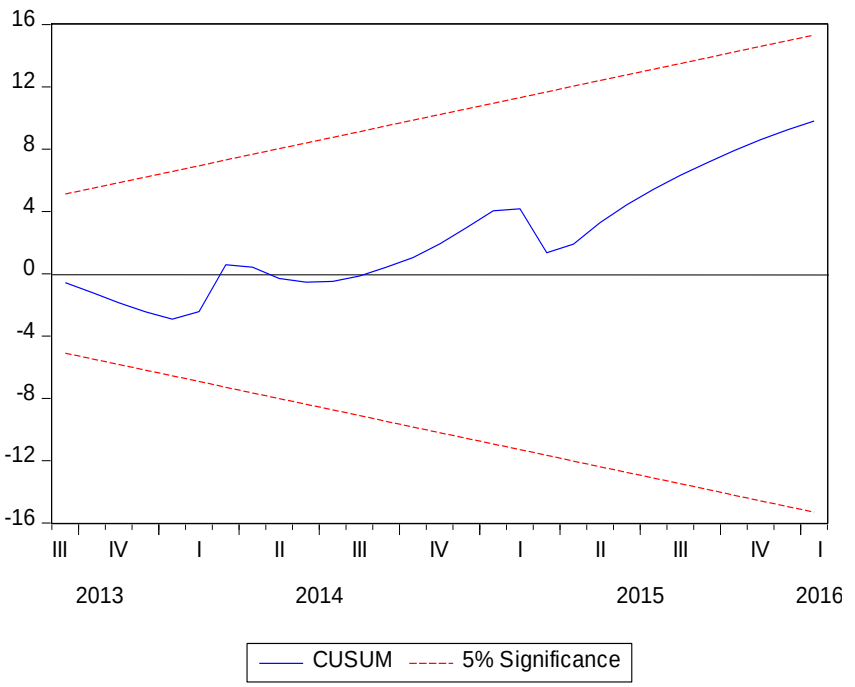
The errors of the model are serially independent and the coefficients of the model are stable. We use the LM test for the serial correlation of the errors of the ARDL model (see Table 3) and CUSUM and CUSUMSQ tests for the stability of the coefficient of GDP and inflation (see Fig. 3. and 4). Ideally, now we can estimate the U-ECM.

Table 3: Diagnostic Tests of Equation 3

Test	F-statistic	p-value
χ^2_{SC}	5.3902	0.007
χ^2_{NORM}	102.971	0.000
χ^2_{HET}	0.4867	0.812
χ^2_{FF}	0.001	0.975

Notes: χ^2_{SC}, χ^2_{NORM}, χ^2_{HET}, and χ^2_{FF}[2] represent serial correlation (LM test), normality, heteroscedasticity, and functional form, respectively.

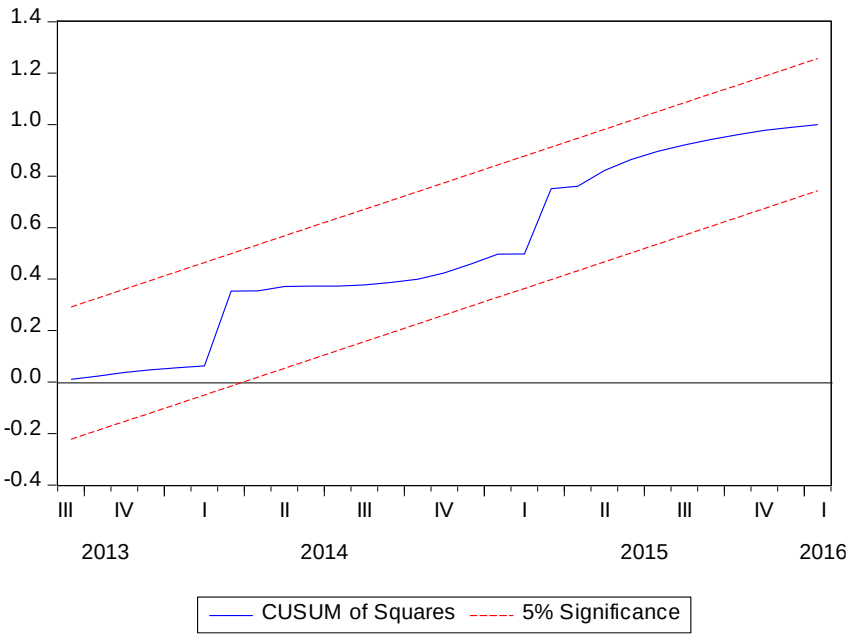
Figure 3: Plot of the Cumulative Sum of Recursive Residuals for Eq. (3)



Source: Eq. 3 estimation.

[2] *Breusch Godfrey serial correlation for LM, Jerque Bera test for normality, Breusch Pagan-Godfrey test for heteroskedasticity, and Ramsey RESET test for the functional form are tested.*

Fig. 4: Plot of the Cumulative Sum of Square Test of Recursive Residual for Eq. (3)



Source: Eq. 3 estimation.

4.3.3 Estimation Results of U-ECM

The U-ECM model is estimated with an R-squared of 99.9%. Tabulated down below:

Table 4: Estimation Results of U-ECM

Dependent Variable: $\Delta LGDP_t$			
Variable	**Coefficient**	**t-stat**	**p-value**
$\Delta LGDP_{t-1}$	2.7807^{***}	43.5883	0.0000
$\Delta LGDP_{t-2}$	-2.6106^{***}	-21.1921	0.0000
$\Delta LGDP_{t-3}$	0.8248^{***}	13.4929	0.0000
$\Delta LInf_t$	0.0001	0.3744	0.7096
$\Delta LInf_{t-1}$	0.0005^{***}	2.6794	0.0097
C	0.0024	2.0257	0.0477
$LInf_{t-1}$	-0.0005	-1.3844	0.1718
$LGDP_{t-1}$	-0.0002^{**}	-2.0235	0.0479
R^2	0.999	R^2_{Adj}	0.999
S.E of Regression	0.0002	R.S.S	0.0000
F-statistic	1555510 (0.000)	L.L	591.666
AIC	-18.59	D.W test	1.3439

Notes: The UECM is estimated on the ground of Akaike Information Criteria (AIC). Δ indicates the change in the variable. *** and ** show the significance at 1% and 5% levels, respectively. Moreover, R^2, R^2_{Adj}, S.E, R.S.S, L.L, and D.W represent R-squared, Adjusted R-squared, Standard Error, Residual Sum of Square, Log-Likelihood, and Durbin Watson test, respectively.

source: Eq. 3 estimation.

The above findings show positive short-run nexus between inflation and economic growth with an effect of 0.005 per cent at the 1 per cent of significance. In the long run, the inflation rate deteriorates the economic growth with the rate of 0.05 per cent but insignificantly. Our result is consistent with the study of Mavikela *et al.* (2018).

4.4 Estimation Results of Restricted ECM

To figure out the short-run dynamics of the model and its convergence behavior towards the long-run equilibrium, the R-ECM is tested.

Table 5: Results of R-ECM.

Dependent Variable: $\Delta LGDP_t$			
Variable	**Coefficient**	**t-stat**	**p-value**
$\Delta LGDP_{t-1}$	2.7805^{***}	49.2484	0.0000
$\Delta LGDP_{t-2}$	-2.6101^{***}	-23.8177	0.0000
$\Delta LGDP_{t-3}$	0.8245^{***}	15.1131	0.0000
$\Delta LInf_t$	0.0007	0.4445	0.6584
$\Delta LInf_{t-1}$	0.0005^{***}	3.1317	0.0028
ECT_{t-1}	-0.0002^{**}	-2.5205	0.0147

Notes: ***, ** show the significance levels at 1% and 5%, respectively.

Source: Eq. 4 estimation.

The short-run dynamics of the model ascertain that the economic growth of the past three months have both incremental and deterioration effects on the current economic growth of Afghanistan at a highly significant level of 1 per cent. More crucially, the inflation rate same as in the previous model boosts economic growth significantly at 0.0005 per cent at 1 per cent level of significance. The coefficient of lagged error correction term (ECT) is negative and significant at 5 per cent level of significance. This shows the convergence behavior of the economic growth to the long-run equilibrium aftershocks by the inflation rate. Although the speed of adjustment is very slow.

Summing up, after applying the ARDL technique to analyze the nexus between inflation rate and GDP we come with an interesting outcome that Afghanistan's inflation rate is positively related to the economic growth at the low level of inflation rates. This was the case for Tanzania too (Epaphra, 2016).

5. Concluding Remarks

The inflation rate is the influential component of an economy's economic growth globally. This paper dissects the impact of fluctuations of inflation rate on the economic growth of Afghanistan in the short and long run in the time of 2010-2016, monthly. This research discloses this linkage by applying a linear ARDL of Pesaran *et al.* (2001).

The main estimated finding of this study is the evidence of the short-run positive relationship between inflation and economic growth in Afghanistan. This means that Afghanistan can sustain growth even in the period of inflation in the short-run, however, the influence of inflation rate to enhance growth is too low. Intuitively, in the long-run, there is no co-integration between the inflation rate and economic growth in Afghanistan. Nevertheless, there is a hint of an insignificant relationship prevailing in the long-run. Indeed, the policymakers are needed to be vigilant to make policies that could target the inflation rate at its possible minimum rate. In the meantime, to have a sustainable economic growth. The inflation targeting policy is one of the fruitful policies that could be formulated by the Afghan government. The government to establish new forms of cooperation with the national and regional levels. For instance, the Ministry of Industry and Commerce to work closely with the trade unions in the country to contain the prices. Likewise, to work with the regional unions of the other countries to coordinate in the fiscal, monetary, trade and exchange rate policy to achieve low and stable inflation rate domestically and regionally, and importantly to stabilize GDP growth.

Moreover, the future study can be extended by incorporating multivariate nexus of economic growth with the other relevant variables based on a framework, like investment, population growth, government expenditures, terms of trade, and so on for Afghanistan.

References

Aloui, C., Hkiri, B., Hammoudeh, S., & Shahbaz, M. (2018). A Multiple and Partial Wavelet Analysis of the Oil Price, Inflation, Exchange Rate, and Economic Growth Nexus in Saudi Arabia. *Emerging Markets Finance and Trade* (just-accepted).

Banerjee, A., Dolado, J. J., Galbraith, J. W., & Hendry, D. (1993). Co-integration, error correction, and the econometric analysis of non-stationary data. *Oup Catalogue*.

Barro, R. J. (1995). Inflation ane Economic Growth. *NBER Working Paper* (5326).

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica: Journal of the Econometric Society*, 251-276.

Epaphra, M. (2016). Nonlinearities in inflation and growth nexus: The case of Tanzania.

Erbaykal, E., & Okuyan, H. A. (2008). Does inflation depress economic growth? Evidence from Turkey. *International Journal of Finance End Economics, 13*(17).

Fischer, S. (1983). *Inflation and growth* (0898-2937). Retrieved from

Ghatak, S., & Siddiki, J. U. (2001). The use of the ARDL approach in estimating virtual exchange rates in India. *Journal of Applied statistics, 28*(5), 573-583.

Hayat, Z., Balli, F., & Rehman, M. (2018). Does inflation bias stabilize real growth? Evidence from Pakistan. *Journal of Policy Modeling, 40*(6), 1083-1103.

Jayathileke, P. M. B., & Rathnayake, R. M. K. T. (2013). Testing the link between inflation and economic growth: Evidence from Asia. *Modern Economy, 4*(02), 87.

Johansen, S. (1995). *Likelihood-based inference in co-integrated vector autoregressive models*: Oxford University Press on Demand.

Karahan, Ö., & Çolak, O. (2020). Inflation and Economic Growth in Turkey: Evidence from a Nonlinear ARDL Approach *Economic and Financial Challenges for Balkan and Eastern European Countries* (pp. 33-45): Springer.

Lütkepohl, H. (2006). Structural vector autoregressive analysis for cointegrated variables. *Allgemeines Statistisches Archiv, 90*(1), 75-88.

MacKinnon, J. G. (1996). Numerical distribution functions for unit root and cointegration tests. *Journal of applied econometrics*, 601-618.

Majumder, S. C. (2016). Inflation and its impacts on economic growth of Bangladesh. *American Journal of Marketing Research, 2*(1), 17-26.

Mallik, G., & Chowdhury, A. (2001). Inflation and economic growth: Evidence from four south Asian countries. *Asia-Pacific Development Journal, 8*(1), 123-135.

Mavikela, N., Mhaka, S., & Phiri, A. (2018). The inflation-growth relationship in SSA inflation targeting countries.

Omoke, P. C. (2010). Inflation and economic growth in Nigeria. *Journal of Sustainable Development, 3*(2), 159.

Paul, S., Kearney, C., & Chowdhury, K. (1997). Inflation and economic growth: A multi-country empirical analysis. *Applied Economics, 29*(10), 1387-1401.

Pesaran, & Pesaran. (1997). *Working with Microfit 4.0: Interactive econometric analysis;[Windows version]*: Oxford University Press.

Pesaran, & Shin. (1998). An autoregressive distributed-lag modelling approach to cointegration analysis.

Pesaran, Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics, 16*(3), 289-326.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics, 16*(3), 289-326.

Saaed, A. A. (2007). Inflation and economic growth in Kuwait: 1985-2005-Evidence from co-integration and error correction model. *Applied Econometrics and International Development, 7*(1).

Shimizu, J., & Sato, K. (2015). Abenomics, yen depreciation, trade deficit and export competitiveness. *15) RIETI Discussion Paper Series*.

Temple, J. (2000). Inflation and growth: stories short and tall. *Journal of economic surveys, 14*(4), 395-426.

Tran, T. H. (2018). *The Inflation-Economic Growth Relationship: Estimating the Inflation Threshold in Vietnam.* Paper presented at the International Econometric Conference of Vietnam.