How Does Economic Growth React to Fiscal Deficit and Inflation? An ARDL Analysis of China and India

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Abstract

The current analysis strived to unearth the impact of inflation and fiscal deficit on economic growth and conduct a comparative review between the world's two fastest - growing economies, China and India. The present empirical investigation exerted multivariate time series modeling, such as auto-regressive distributional lag (ARDL) model and Granger causality test for accomplishment of the data analysis. The empirical outcome revealed that there was an adverse impact of inflation and fiscal deficit on the economic growth of China. The coefficients of these two variables were negative as well as significant. As far as India is concerned, the cointegration result unearthed that the fiscal deficit positively impacted economic growth, while inflation hurt the same. The outcome of causality unveiled that there was no causality running from inflation as well as fiscal deficit to the economic growth in case of the Chinese economy. On the contrary, unidirectional causality was found from inflation and budgetary deficit towards the economic growth individually as well as jointly in the case of the Indian economy.

Keywords : **fiscal deficit, inflation, economic growth, auto-regressive distributional lag**

JEL Codes : C12, C51, E62, F21, F32, F47, F62

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Fiscal deficit, economic growth, and inflation have become critical issues for every economy of the world. The government of every nation is striving hard to combat the level of fiscal deficit and inflation while giving pace to economic growth. According to the traditionalists, the increase in the fiscal deficit is unfavorable to a country. The macroeconomic theory indicates that the fiscal deficit has a direct link with other macroeconomic variables (Nikolaos & Katrakilidis, 2013 ; Saleh, 2003). The fiscal deficit of a nation directly affects its aggregate demand, which in turn affects the other prominent core issues of macroeconomics such as inflation and economic growth. Much empirical analysis reveals that a substantial fiscal deficit creates a debt trap for the economy, which further creates a gloomy economic outlook.

Generally, ample empirical researchers have claimed that inflation helps to reduce the fiscal deficit of the economy. It has been argued by many empirical analyses that high inflation works as inflation tax, and it helps the

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government to realize more amount of tax that ultimately reduces the fiscal deficit (see, Bleaney, Gemmell, & Kneller, 2001). On the other hand, Keynesian school of thought has argued with empirical evidence that fiscal deficit is highly relevant for the economic growth at the time of recession (see, Brender & Drazen, 2008 ; Cebula, 1995). Furthermore, there are relevant number of empirical investigations which clearly stated that there is no significant impact of the fiscal deficit on economic growth (see, Dalyop, 2010 ; Nelson & Singh, 1994 ; Tan, 2006 ; Rahman, 2012). In elucidating analysis of existing perception, it has been found that there is a dearth of empirical research, which addresses fiscal deficit, inflation, and economic growth altogether, especially in an Asian economic perspective. Additionally, the nature of the relationship and the interlinkages among fiscal deficit, inflation, and economic growth are not unanimously defined. There are many views about the impact of fiscal deficit and inflation on economic growth. It appears that there is privation of unanimity about this relevant issue. Accordingly, the present study attempts to investigate the interdependence among fiscal deficit, inflation, and economic growth concerning the two relevant Asian economies, for instance, Indian and Chinese economies.

This investigation attempts to answer many critical unsolved questions related to the Asian perspective such as, do fiscal deficit and inflation cause economic growth. Is there any significant long-run association among fiscal deficit, inflation, and economic growth, especially with reference to China and India ? The current article examines the relationship among fiscal deficit, inflation, and economic growth for these two nations based on the yearly time - series data from 1991 to 2015. The primary inclination of adopting China and India for this study is because these are the world's two most relevant emerging economies. The Chinese economy has become the world's fastest-growing economy followed by India. The gross domestic product of China ranks first in terms of PPP and second in terms of nominal GDP ; whereas, India stands third in terms of PPP and sixth in terms of nominal GDP. China and India collectively account for 40% of the planet's population (United Nations, n.d.).

According to the outcome of various economics forecasts, by the middle of the century, the two countries could account for half of the total global output (Engardio, 2005). Hence, any fluctuation in the macroeconomic variables like GDP growth, fiscal deficit, and inflation in these two nations will have a spillover impact on various other Asian economies and even globally. Therefore, it is relevant to know how fiscal deficit and inflation impact GDP growth in these two countries. The present empirical analysis attempts to scrutinize the above issue through a comparative analysis. It attempts to investigate the long-run co-integration among fiscal deficit, economic growth, and inflation to construct a comparative interpretation between China and India.

Literature Review

The research presented by Buiter and Patel (1992) suggested that sizeable fiscal reduction is harmful to the economy. The study was conducted in context of the Indian economy and concluded that fiscal deficit leads to a rapid increase in the internal public debt that is a sign of gloom for the economy that is about to come. The empirical research of Zhang and Zou (1998) indicated that high fiscal decentralization of government spending leads to lower economic growth in the context of China. They were utterly amazed at their obtained results.

Solomon and Wet (2004) tried to find out the nexus between fiscal deficit and inflation in Tanzania for the period of 34 years from 1967 to 2001. The authors concluded that due to monetization of the budget deficit, significant inflationary effects were responsible for increases in the budget deficit. They also indicated that there was a considerable impact of the budget deficit on inflation in Tanzania. The conclusions were drawn using the cointegrating vector approach.

Taylor, Proano, Carvalho, and Barbosa (2011) conducted research relating to the fiscal deficit, economic growth, and government debt in the U.S. They concluded that the impact of the fiscal deficit on economic growth was positive when the government took consideration of the interest rate in the economy. Madhukar and Nagarjuna (2011) analyzed inflation and economic growth between India and China. The research indicated that both the Chinese and Indian economies were against inflationary capacity constraints. It further discussed that

both the countries' inflation and growth rate had a negative correlation. The study finally concluded that the impact of inflation was different in these two countries. Datta and Mukhopadhyay (2011) tried to find out the relationship between budget deficit and inflation in Indonesia for 28 years. The authors claimed through their study that there was an existence of a stable long - run relationship between inflation and budget deficit. Their research also highlighted the presence of unidirectional causality from inflation to budget deficit throughout the study. Hence, economic policy supports a tight fiscal policy to curb inflation.

On the other hand, Fatima, Ahmed, and Rehman (2011) tried to investigate the impact of fiscal deficit in Pakistan. The study concluded that fiscal deficit adversely affected economic growth of Pakistan. The effect of a continuous increase in fiscal deficit led to the plunge of economic growth of Pakistan. Dao (2013) studied budget deficit and economic growth in Vietnam. The study used quarterly data for a period of 9 years from 2003 to 2012. The authors applied ARDL method for finding cointegration between fiscal deficit and economic growth. The authors concluded that there was a long-run causality running from budget deficit and government expenditures to economic growth. The budget deficit was found to have a negative, but insignificant effect on economic growth in Vietnam.

In the study by Hassan, Nassar, and Liu (2014), the authors tried to reveal the impact of government spending on the GDP in the U.S. The authors found that the government deficit spending hurt GDP and inflation rate, while interest rate did not affect the GDP of United States. Satish and Satyanarayana (2015) endeavored to reveal the economic vulnerability and resilience to external shocks by considering various cross - countries for their analysis. The outcome of the analysis unearthed that there is a need to change into the existing ones based on economic and social indicators.

The study conducted by Umaru and Gatawa (2014) was related to fiscal defect and economic growth in Nigeria. They concluded that there was unidirectional causality running from capital expenditure to economic growth. They also confirmed that there was no causality between current spending and economic growth and between fiscal deficit and economic growth. Finally, they concluded that fiscal deficit led to economic growth in Nigeria due to capital expenditure. Agarwal and Prakash (2015) investigated the relationship between fiscal deficit and economic growth in India using VAR and VECM models. The authors concluded that high fiscal deficit did not cause the economic growth in India. Kubendran (2018) investigated the fiscal deficit, current account deficit, and capital flows together in order to reveal the impact of fiscal deficit on current account deficit and capital flows in the Indian perspective. The author found the appositeness of the twin deficit model for India. The study also demonstrated that there was unidirectional causality running from fiscal deficit and current account deficit and likewise, from current account deficit and capital flows.

The empirical analysis of Swamy (2015) was a comprehensive study of government debt and economic growth. For this study, the author classified various nations into three categories, high - income countries, middle - income countries, and low - income countries. The author concluded that there was unidirectional causality running from capital expenditure to economic growth. The author also confirmed that there was no causality between current spending and economic growth and between fiscal deficit and economic growth in the sampled nations. Nayab (2015) tried to reveal the nexus between fiscal deficit and economic growth. The author applied VAR cointegration as well as Granger causality test for her analysis. The author claimed that there was a significant impact of the budget deficit on the economic growth of Pakistan. The results showed that GDP caused investment while investment caused deficit. However, the budget deficit did not cause GDP growth in Pakistan.

Mohanty (2015) concluded that there was a significant negative long - run relationship between economic growth and fiscal deficit in India. The Granger causality test also discarded short-run relationship between fiscal deficit and economic growth in India. On the other hand, Dash and Rath (2016) investigated the fiscal deficit performance among the seven North Eastern and major states of India. The empirical outcome revealed that the overall fiscal performance of the North Eastern Indian states was better than the general category states.

The review of literature about fiscal deficit and economic growth as well as inflation indicates that the

approach of investigation is almost the same and single nation - centric. It is also observed that there is no empirical research which has addressed fiscal deficit, inflation, and economic growth together. Therefore, the presented empirical investigation bridges the gap between previous studies taking fiscal deficit, inflation, and economic growth together by considering the world's two relevant economies together. The present study attempts to investigate the interdependence between fiscal deficit, inflation, and economic growth with a particular focus on China and India. This paper attempts to answer a critical question : Do fiscal deficit and inflation cause economic growth or not.

Data and Methodology

(1) Data Description : The data for the current study were collected from different data sources. Data of fiscal deficit of China were obtained from National Bureau of Statistics of China, while for India, it were collected from Reserve Bank of India, and finally, data for economic growth and inflation of both nations were collected from the database of World Bank. The present study uses yearly time series data of 25 years from 1991 to 2015.

From Table 1 and Table 2, it can be seen that the mean fiscal deficit growth rate in China was 26.11% while in India, it was 14.43%. The inflation and economic growth rates in China had an average of 4.40 and 9.98, while in India, these had an average of 7.79% and 6.47%, respectively. The fluctuation in the fiscal deficit in China was much higher than what it was in India. In China, the variation of fiscal deficit was about 123% of its mean value, but in India, it was only 29%. Hence, it can be concluded that in China, fiscal deficit was very volatile. In China,

Table 1. Descriptive Statistics of China and India

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
China					
Fiscal Deficit *(FD)*	25	26.11	123.40	-192.6	516.45
Inflation *(INF)*	25	4.40	6.03	-1.55	24.237
Economic Growth *(EG)*	25	9.98	2.18	6.91	14.231
India					
Fiscal Deficit *(FD)*	25	14.43	28.99	-14.42	134.61
Inflation *(INF)*	25	7.79	3.22	3.68	13.87
Economic Growth *(EG)*	25	6.47	2.19	1.05	10.26

Source : Computed based on data on fiscal deficit, inflation, and economic growth published by People's Bank of China & Reserve Bank of India from 1991 to 2015.

Table 2. Pairwise Correlation Between Variables

	Fiscal Deficit	Inflation	Economic Growth
China			
Fiscal Deficit *(FD)*	1		
Inflation *(INF)*	-0.143	1	
Economic Growth *(EG)*	-0.268	0.562	1
India			
Fiscal Deficit *(FD)*	1		
Inflation *(INF)*	0.083	1	
Economic Growth *(EG)*	0.038	-0.244	1

Source : Computed based on data on fiscal deficit, inflation, and economic growth published by People's Bank of China & Reserve Bank of India from 1991 to 2015.

the average inflation rate was 4.40%, which is much lower than what it was India, which was 7.8% on an average. It demonstrates how China has succeeded in combating inflation, but in India, it seems that the government does not have an active policy to prevent inflation.

Most importantly, on the economic growth front, the Chinese economy grew by an average 9.98% since 25 years, which is much higher than the growth rate for India, which was 6.47%. The pairwise correlation shows that in China, there is a negative relationship between fiscal deficit and economic growth and positive relationship between inflation and economic growth. As far as India is concerned, both the variables - inflation and fiscal deficit have a positive association with economic growth, but the coefficient is quite low.

(2) Methodology

(i) Test of Stationarity

For China : By plotting all the variables, it is found that there is no trend in the variables. So, doing the unit root test through ADF and PP, only the constant term for checking the unit root of all the variables has been taken :

$$\Delta FD_t = \lambda^1 + \Delta\gamma_1 FD_{t-1} + \upsilon^1_t$$

$$\Delta INF_t = \lambda^2 + \Delta\gamma_2 INF_{t-1} + \upsilon^2_t$$

$$\Delta EG_t = \lambda^3 + \Delta\gamma_3 EG_{t-1} + \upsilon^3_t$$

In the current model, λ is a constant term, and υ is the white noise error term which is *iid* independently and identically distributed. In the model, we can write down all $(\gamma - 1)$ = to α where the test of hypothesis is $\alpha = 0$ against $\alpha < 0$, which is based on the test of DF statistics $\alpha / SE(\alpha)$.

For India : By plotting all the variables, it is found that there is an upward trend in the economic growth rate of India. So, doing the unit root test through ADF and PP, the trend has taken trend variable in economic growth stationary test and in case of rest of the variables, only the constant term is taken for checking the unit root.

$$\Delta FD_t = \Omega^1 + \Delta\eta_1 FD_{t-1} + \xi^1_t$$

$$\Delta INF_t = \Omega^2 + \Delta\eta_2 INF_{t-1} + \xi^2_t$$

$$\Delta EG_t = \Omega^3 + \lambda t + \Delta\eta_3 EG_{t-1} + \xi^3_t$$

In the current model, Ω is a constant term, and ξ is the white noise error term, which is *iid* independently and identically distributed. In the model, it can be written down all $(\eta - 1)$ = to β, where the test of hypothesis is $\beta = 0$ against $\beta < 0$, which is based on the test of DF statistics $\beta / SE(\beta)$. λt shows the trend term in the model.

The unit root test results of Augmented Dickey - Fuller test as well as Phillips - Perron (PP) test (see Table 3) show that in China, fiscal deficit growth rate is stationary, but rest of the two variables are non - stationary at level, but their first difference is stationary. In case of India, two variables : fiscal deficit growth as well as economic growth are stationary at level, but inflation growth is not stationary at the level, its first difference is stationary. So, in the current scenario, an outcome for both nations with reference to the long-run relationship between these variables in China and India, the findings can be obtained by applying the auto regressive distributed lags (ARDL) econometrics model.

Table 3. Results of Unit Root Test

	ADF Unit Root Test		Phillips - Perron (PP) Unit Root	
	No Trend	Trend and Cons	No Trend	Trend and Cons
China				
Fiscal Deficit	-5.534*	-5.68*	-5.746*	-5.94*
∆ Fiscal Deficit	-10.25*	-9.35*	-8.78*	-8.36*
Inflation	-1.766 *	-1.69**	-1.938*	-1.52**
∆ Inflation	-2.36*	-2.89**	-2.36*	-3.69*
Economic Growth	-1.727	-1.65	-1.727	-1.87
∆ Economic Growth	4.36**	3.69**	5.36**	6.69*
India				
Fiscal Deficit	-4.865*	-5.68*	-4.896*	-5.94*
∆ Fiscal Deficit	-9.25*	-8.36*	-8.48*	-8.89*
Inflation	-2.388	-1.69**	-2.923	-1.52**
∆ Inflation	-5.85*	-4.36**	-6.01*	-4.36*
Economic Growth	-3.707**	-1.65	-3.656**	-1.87
∆ Economic Growth	-6.36**	-4.24**	-6.39*	-3.85*

Note. * is significant at 1% and ** is at 5%, the variables with no stars are not significant at the 5% level.

Source : Computed based on data on fiscal deficit, inflation, and economic growth published by People's Bank of China & Reserve Bank of India from 1991 to 2015.

(ii) Test of Structural Break of Data

Chow Test : The unit root test shows that some of the variables are stationary at the level, while others are stationary at first difference. So, in this scenario, it is necessary to apply the ARDL model for finding the long-run association between the variables. However, before we proceed for the application of the ARDL model, it is also essential to investigate if there are any structural breaks in the data or not. For confirming the structural break, we have applied the Chow test separately for China as well as India.

The following model is regressed using data in a quarterly form from 1991 to 2015 for Chinese and Indian economic growth against the fiscal deficit as well as inflation.

$$EG = \alpha + \beta FD_t + \delta INF_t + \varepsilon_t$$

$$F = \frac{RSS_c - (RSS_1 + RSS_2)/K}{(RSS_1 + RSS_2)/n - 2K}$$

RSS_c – Combined _ RSS

RSS_1 – Pre - break _ RSS

RSS_2 – Post - break _ RSS

The null hypothesis, in this case, is structural stability. If we reject the null hypothesis, it means we have a structural break in the data. We then need to decide how to overcome this break.

The results of Chow test show that the calculated F statistics are not significant at the 5% level of significance (see Table 4). It means we cannot reject the null hypothesis of structural stability, which indicates that there are no structural breaks existing for the sample period in both the selected countries. The current result endorses the ARDL model for finding the long-run association.

Table 4. Results of Chow Test

Country	*F* - Statistics	Probability Value
China	2.16	0.35
India	3.45	0.16

(iii) ARDL Model for Analysis : For analysis of fiscal deficit (FD), inflation (INF), and economic growth (EG) in China and India, the autoregressive distributed lags (ARDL) econometrics model has been applied. This method is a robust econometric technique developed by Pesaran, Shin, and Smith in 2001 for estimating the level of a relationship between a dependent variable and a set of independent variables that may not necessarily be integrated on the same order. The ARDL model provides consistent estimation for observations with small or finite sample size ; it also allows simultaneous estimation of both the long run and short-run relationship in the presence of a mixture of stationary and non-stationary series (Pesaran, Shin, & Smith in 2001). However, the mix of the string must not go beyond $I(1)$. Consequently, a unit root test using Augmented Dickey-Fuller and Philips - Perron stationarity testing approaches are carried out to address spurious estimation associated with time-series data and also to ensure that none of the variables are $I(2)$ or beyond,which has already been confirmed through the unit root test.

(iv) Model Specification

$$EG = \alpha + \sum_{i=1}^{q} \partial EG_{t-i} + \sum_{i=1}^{q} \partial FD_{t-i} + \sum_{i=1}^{q} \partial INF_{t-i} \quad (1)$$

From the applied ARDL model, it can be seen that economic growth (EG) depends upon the past lag of its past as well as the lag of other independent variables like fiscal deficit (FD) and inflation (INF). α is a constant term where ∂s coefficients show the relationship. ε is white noise error term.

The above model can be written in the error correction form as below :

$$\Delta EG = \alpha + \sum_{i=1}^{q} \Delta\partial EG_{t-i} + \sum_{i=1}^{q} \Delta\partial FD_{t-i} + \sum_{i=1}^{q} \Delta\partial INF_{t-i} + \eta EG_{t-1} + \eta FD_{t-1} + \eta INF_{t-1} + \varepsilon \quad (2)$$

α is a constant term where ∂s coefficients show the short-run relationship. η is the coefficient of error correction term which shows the speed of adjustment towards the equilibrium. The null hypothesis of the cointegrating relationship between EG_t , FD_t , and INF_t is detected by testing the F - statistic bound test for $H_0 : \eta_1 = \eta_2 = \eta_3 = 0$ against the alternative hypothesis $H_1 : \eta_1 \neq \eta_2 \neq \eta_3 \neq 0$. If the tested F - statistic value lies below the lower bound critical value, then the null hypothesis of no cointegrating relationship cannot be rejected, and if it exceeds the respective upper bound critical value, the null hypothesis is rejected. If the tested F-statistic value falls within the lower and upper critical value bounds, the inference is inconclusive.

The present model can be simplified as below :

$$\Delta EG = \alpha + \sum_{i=1}^{q} \Delta\partial EG_{t-i} + \sum_{i=1}^{q} \Delta\partial FD_{t-i} + \sum_{i=1}^{q} \Delta\partial INF_{t-i} + \psi\chi_{t-1} + \varepsilon \quad (3)$$

where, ψ is error correction term which shows the speed of adjustment towards the equilibrium and it is expected to be negative.

ARDL (4, 1, 4) Model for China

$$\Delta EG = \alpha + \sum\Delta\varphi_1 EG_{t-1} + \sum\Delta\varphi_2 EG_{t-2} + \sum\Delta\varphi_3 EG_{t-3} + \sum\Delta\varphi_4 EG_{t-4} + \sum\Delta\varphi_5 FD_{t-1} +$$
$$\sum\Delta\varphi_6 INF_{t-1} + \sum\Delta\varphi_7 INF_{t-2} + \sum\Delta\varphi_8 INF_{t-3} + \sum\Delta\varphi_9 INF_{t-4} + \beta\zeta_{t-1} + \varepsilon \quad (4)$$

ARDL (4, 4, 4) Model for India

$$\Delta EG = \chi + \sum\Delta\omega_1 EG_{t-1} + \sum\Delta\omega_2 EG_{t-2} + \sum\Delta\omega_3 EG_{t-3} + \sum\Delta\omega_4 EG_{t-4} + \sum\Delta\omega_5 FD_{t-1} + \sum\Delta\omega_6 FD_{t-2} + \sum\Delta\omega_7 FD_{t-3} + \sum\Delta\omega_8 FD_{t-4} + \sum\Delta\omega_9 INF_{t-1} + \sum\Delta\omega_{10} INF_{t-2} + \sum\Delta\omega_{11} INF_{t-3} + \sum\Delta\omega_{12} INF_{t-4} + \delta\gamma_{t-1} + \varepsilon \quad (5)$$

In the current ARDL models of China and India, the terms of α and χ are the constant and all φ_s as well as ω_s are the short - run coefficients. The terms of β and δ are the coefficients of error correction term, which disclose the speed of adjustment towards the equilibrium. The error correction term is supposed to be highly significant and negative for inferring the long-run association among the variables. The lag of applied model has been selected based on lag selection criteria of AIC and SIC lag selection criterion.

Analysis and Results

The analysis begins with the analysis of the outcome of bound test. The outcome of bound test helps to recognize the existence of the log run relationship among the key variables of the analysis.

(1) Results of Bound Test : The results of the bound test confirms that there is a long-run association between the above variables. The value of *F* statistic in the bound analysis is more than the critical point of all levels of significance, which rejects the null hypothesis of no co-integration among inflation, economic growth, and fiscal deficit (Table 5). After having the significant result of bound test, we compute the long-run coefficients by using the ARDL model.

The outcome of the error correction model reveals that it is significant for both nations. It can be seen from the Table 6 that the coefficient of error correction term in case of China is -0.63, which is highly significant. On the basis of this outcome, it can be inferred that any discrepancy in the long-run equilibrium in the past lag period among these critical variables gets adjusted at the rate of 63% in the current period towards the equilibrium in China. On the other hand, it can also be seen that the coefficient of the error correction term for India is -0.717, which is highly significant. It further reveals that in the Indian economy, any discrepancy happens among the critical variables in the long-run equilibrium, and that discrepancy gets adjusted at the speed of 71%, which leads towards an equilibrium (Table 7). The result of the error correction term demonstrates that the speed of adjustment of any discrepancy in the long-run equilibrium among these relevant macroeconomic variables is faster in the Indian economy as compared to the Chinese economy. After analysis of the outcome of the error correction model, the results of short-run causality are discussed.

Table 5. Results of Bound Test

	F - Statistics	Significance	*I*(0)	*I*(1)
China	6.356*	10%	3.38	4.02
		5%	3.88	4.61
		1%	4.99	5.85
India	7.542*	10%	2.63	3.35
		5%	3.1	3.87
		1%	4.13	5

Note. * is significant at 1%, and ** is significant at 5%, the variables with no stars are not significant at the 5% level.

Source : Computed based on data on fiscal deficit, inflation, and economic growth published by People's Bank of China & Reserve Bank of India from 1991 to 2015.

Table 6. Results of ARDL - ECM Model of China

Variables	Coefficient	*t* - Statistics	Probability Value
Constant	1.45*	4.3	0.003
ΔEG	-1.08**	-3.26	0.013
ΔEG_1	-0.01	0.22	0.96
ΔEG_2	-0.23	-0.05	0.12
ΔFD	-0.002	-0.76	0.47
ΔINF	-0.46**	-2.54	0.03
ΔINF_{-1}	-0.011	-0.08	0.93
ΔINF_{-2}	0.02	0.3	0.76
ΔINF_{-3}	0.21**	2.97	0.02
Error Correction Term	-0.63*	-6.02	0.0005

Note. * is significant at 1%, and ** is at 5%, the variables with no stars are not significant at the 5% level.

Source : Computed based on data on fiscal deficit, inflation, and economic growth published by People's Bank of China from 1991 to 2015.

Table 7. Results of ARDL - ECM Model of India

Variables	Coefficient	*t* - Statistics	Probability Value
ΔEG_{-1}	0.069	0.65	0.54
ΔEG_{-2}	0.32**	3.74	0.013
ΔEG_{-3}	-0.083	-1.2	0.27
ΔFD	-0.014**	-3.49	0.017
ΔFD_{-1}	0.029**	3.31	0.021
ΔFD_{-2}	0.035*	5.29	0.0032
ΔFD_{-3}	0.030*	6.04	0.0018
ΔINF	-0.24*	-4.49	0.0064
ΔINF_{-1}	-0.97*	-6.24	0.0015
ΔINF_{-2}	-0.33**	-2.59	0.048
ΔINF_{-3}	-0.13	-2.067	0.09
Error Correction Term	-0.717*	-6.94	0.0009

Note. * is significant at 1%, and ** is at 5%, the variables with no stars are not significant at the 5% level.

Source : Computed based on data on fiscal deficit, inflation, and economic growth published by Reserve Bank of India from 1991 to 2015.

(2) Results of Short - Run Causality : The outcome of applied Granger causality test model reveals different results for India and China. The outcome of Table 8 reveals that in China, there is no unidirectional causality running from fiscal deficit to economic growth as well as from inflation to economic growth. The fiscal deficit, as well as inflation, jointly do not cause economic growth in China. As far as India is concerned, the findings are different from China. According to the outcome of short-run causality, there is unidirectional causality running from fiscal deficit to economic growth as well as from inflation to economic growth in the Indian economy. The Table 9 reveals that the fiscal deficit, as well as inflation, jointly cause economic growth in India. It means inflation is desirable for providing the benchmark for economic growth in India. The same things are also applicable in terms of the fiscal deficit.

Table 8. Results of Short-Run Causality Test of China

Null Hypothesis	*F*-Statistic	*P*-value	Result
FD does not Granger cause *EG*.	2.11	0.34	Non - rejection of null
INF does not Granger cause *EG*.	2.18	0.09	Non - rejection of null
FD & *INF* jointly do not Granger cause *EG*.	3.37	0.41	Non- rejection of null

Source : Computed based on data on fiscal deficit, inflation, and economic growth published by People's Bank of China from 1991 to 2015.

Table 9. Results of Short-Run Causality Test of India

Null Hypothesis	*F* - Statistic	*P*- value	Result
FD does not Granger cause *EG*.	10.51	0.011	Rejection of null
INF does not Granger cause *EG*.	10.46	0.012	Rejection of null
FD & *INF* jointly do not Granger cause *EG*.	16.94	0.003	Rejection of null

Source : Computed based on data on fiscal deficit, inflation, and economic growth published by Reserve Bank of India from 1991 to 2015.

(3) Diagnostic Checking of the Applied Model

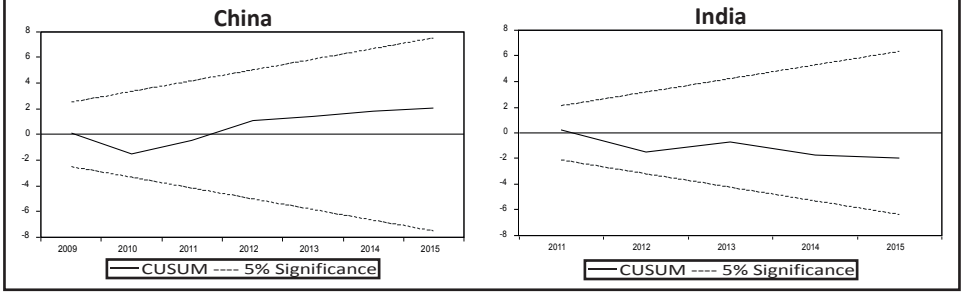
(i) Test for Serial Correlation : After analyzing the outcome of the error correction model and causality analysis, it is pertinent to test the robustness of the applied model. For accomplishment of testing the robustness of the analysis, two types of tests, such as LM test and CUSUM test have been applied. For checking the autocorrelation of the applied model, the Lagrange multiplier (LM) test has been applied. The null hypothesis in this test process is that there is no autocorrelation. The outcome of the serial correlation test has been shown in the Table 10.

It can be concluded from the result of Breusch - Godfrey serial correlation test (Table 10) that the value of *F* statistics is not significant at the 5% level of significance for China and India. So, this clearly states that we cannot reject the null hypothesis of no serial correlation among the error term. Therefore, it can be inferred that in both these countries, the applied model is free from the autocorrelation problem.

Table 10. Result of Breusch - Godfrey Serial Correlation LM Test

	F - Statistics	*P* - value
China	0.285	0.761
India	0.944	0.488

Figure 1. Results of CUSUM Test



(ii) Test for Normality in the Distribution : After ascertaining the no autocorrelation in the model, it is desirable to detect the stability of the model. For testing the stability of the model, the CUSUM test has been applied. The outcome of the test has been demonstrated in the Figure 1.

Based on the outcome of CUSUM test (Figure 1), it can be seen from the outcome of the CUSUM test that the line starting from 0 is not outside the boundary of the level of significance in both the nations. The outcome reveals that the model is normally distributed and stable, which is further essential for a robust model.

Conclusion and Policy Implications

It has already been stated that there is a deficiency of empirical research which addresses fiscal deficit, inflation, and economic growth altogether, especially in an Asian economic perspective. Additionally, the nature of relationship and interlinkages among fiscal deficit, inflation, and economic growth are not unanimously defined. There are many views about the impact of fiscal deficit and inflation on economic growth. It appears that there is privation of unanimity about this relevant issue. Accordingly, the present study attempts to investigate the interdependence among fiscal deficit, inflation, and economic growth concerning the two relevant Asian economies, that is, Indian and Chinese economies. Hence, the present empirical investigation endeavors to bridge the gap of previous analyses by examining fiscal deficit, inflation, and economic growth together in an Asian perspective.

The study attempts to investigate the interdependence among fiscal deficit, inflation, and economic growth, specifically in Chinese and Indian economies. Based on the outcome of the investigation, the following conclusions are drawn. Firstly, based on the ARDL result, it is found that both inflation as well as fiscal deficit have a negative impact on the economic growth of China, even the coefficients of these two variables are negative as well as significant. As far as India is concerned, it has been investigated that fiscal deficit positively affects the economic growth while inflation hurts the same. Secondly, the outcome of Granger causality analysis reveals that there is no causality running from fiscal deficit as well inflation towards economic growth in China. Furthermore, it can be surmized that in China, the amount of fiscal deficit takes place because of unproductive expenditure. In the context of India, the result is opposite in case of both inflation and fiscal deficit, and as a result of this, it causes economic growth in the short run ; so, it is desirable to keep accelerating the inflation at a moderate level.

The policy implications of the analysis are that the Chinese government should try to minimize the amount of fiscal deficit with this, keeping the inflation level in the comfortable zone as it influences economic growth negatively. Now, in context of the Indian economy, the policymakers should be uninvolved about the rate of inflation as it seems desirable for economic growth. Simultaneously, the Indian government can also think about the rise in fiscal deficit if it is happening due to capital expenditure as it accelerates economic growth.

Limitations of the Study and Scope for Further Research

Despite our encouraging results, the present investigation is not free of some limitations. First, this study discusses the outcomes of the analysis limited to only the Chinese and Indian economies. Hence, further analysis can be done by inclusion of more Asian economies such as Japan, Malaysia, Indonesia, and Gulf nations together for making the analysis more robust. This paper analyzes the impact of inflation and fiscal deficit on economic growth, but at the same time, it does not comment upon the way through which shocks are transmitted from one variable to others, while there is a possibility of finding the channel of shock transmission by exerting the SVAR approach.

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