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FACTORS DETERMINING INCLUSIVE GROWTH IN INDIA: AN EXPLORATIVE EMPIRICAL STUDY

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ABSTRACT

The present study tries to identify the determinant factors of inclusive growth in India. More specifically, the purpose of this study is to analyses the long-run and short-run impact of different factors viz. road infrastructure, Foreign Direct Investment (FDI), exports, and inflation on inclusive growth over the period of 1990 - 2019. To analyse such impact, Johansen cointegration test and Vector Error Correction Model (VECM) have been used. The Results indicate that road infrastructure, FDI, and exports have significant positive effect on inclusive growth in the long-run while inflation has a negative long-run effect on inclusive growth. However, in the short-run, change of FDI has a positive effect on change of inclusive growth among the other factors. Finally, the results of the Granger-causality test indicate that there exists bidirectionally causality between FDI and inclusive growth whereas unidirectionally causality runs from exports to inclusive growth. Based on the findings, our study suggests that policymakers should adopt liberal trade policies that encourage exports and attract more FDI as well as promote better transport facilities in order to make growth more inclusive in India.

Keywords: Inclusive Growth, Road Infrastructure, Export, FDI, Inflation, Johansen Cointegration, VECM, Granger causality

JEL Classification Numbers: C180, C32, Q57, R40

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1. INTRODUCTION

Over the last two decades, inclusive growth[1] has been an alternative growth strategy for many developing economies to eradicate poverty and reduce inequality in all sphere of economic activities. This was basically due to the growing concern in the early 2000s that rapid economic growth is insufficient in the context of maximising the welfare of the poor, or/and the benefits of economic growth are not shared equitably. Inclusive growth is a strategy that is based on inclusiveness and ensures that the benefits of economic growth are shared not only to the poor but to all members of society. Several literatures have emerged in the area of inclusive growth that aimed to address different issues related to inclusive growth. The first issue was related to the definition of the term inclusive growth. In this context, literature concluded that for growth to be inclusive, it needs to be broad-based across sectors, create new employment opportunities, and ensure equal access to basic socio-economic opportunities for all particularly, to the poor (Ali, 2007; Ali and Son, 2007; Habito, 2009; Ianchovichina and Lundstrom, 2009; Klasen, 2010 etc.). Second issue was based on the measurement of inclusive growth where many attempts have been made to measure inclusiveness[2] in growth. Traditionally, two possible methods namely, the unified measure[3] and the composite index[4] measure have been used to measure inclusive growth both at the national and programme level. Finally, some recent studies have addressed the issue of the determining factors of inclusive growth i.e., the factors that promotes greater inclusiveness and make growth faster. They have identified several factors namely, Foreign Direct Investment (FDI), exports, trade openness, infrastructure, macroeconomic stability, financial development, government expenditure, etc. that have close association with inclusive growth (Munir and Ullah, 2018; Aoyagi and Ganelli, 2015; Khan et al., 2016; Oluseye and Gabriel, 2017, etc.).

First two issues are quite settled and have sufficient evidences in the development literature. But there are still some areas where empirical evidences are limited particularly, the analysis on the effect of different macro factors on inclusive growth. Knowing such effect would be vital in the effective design of appropriate policies for achieving inclusive growth. Another issue that the existing literature did not pay adequate attention on the direction of causality between inclusive growth and its determining factors. This dependency is the key to understand the nexus between inclusive growth and its determining factors. Based on the issues mentioned above, our study addresses two specific questions; (i) whether road infrastructure, FDI, exports, and inflation impact inclusive growth; and (ii) whether these factors cause inclusive growth. So, the objective of this study is to estimate the long-run and short-run effect of different factors viz. road infrastructure, FDI, exports, and inflation on inclusive growth in India during 1990 – 2019.

While addressing these research questions, the present paper makes a number of contributions to the inclusive growth literature.

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[1] Inclusive growth can be defined as, economic growth that creates new economic opportunities, broad-based across sectors, and ensure equal access to socioeconomic opportunities to all, particularly to the poor (Ali, 2007)

[2] Commission on Growth and Development (2008) notes that inclusiveness; a concept that encompasses equity, equality of opportunity, and protection in market and employment transitions is an essential ingredient of any successful growth strategy.

[3] In unified measures, utilitarian social welfare function is used to integrate equity and growth to measure inclusive growth. See, Ali and Son, 2007; Ananad et al., 2013; Khan et al., 2016 etc.

[4] In composite index measure, all aspects (dimensions) of inclusiveness are combined into a single dimension, called inclusive growth index (IGI). To aggregating the dimensions in a meaningful manner, principal component analysis (PCA) and ad-hoc weightage methods are used to assign the weights of the dimensions. See, McKinley, 2010; Udah and Ebi, 2013; Vellala et al., 2016; Mitra and Das, 2018; Aggarwal, 2021, etc.

The term inclusive growth is a multidimensional phenomenon consisting both income-based dimension viz. economic growth, productivity, employment, poverty, inequality, etc. and non-income-based dimension viz. gender equity, human capability, financial inclusion, social protection, good governance, etc. An index measure should incorporate indicators of both dimensions to capture inclusiveness in growth, and any separation of these components from inclusiveness would be a big mistake and may misled economic policies (Mckinley, 2010). Earlier studies on the nexus between inclusive growth and its determining factors haven't addressed this issue rather they have considered inclusiveness as a unidimensional[5] phenomenon. In most of the cases, they have combined GDP per-capita or labour productivity or social protection with poverty (or inequality) to measure inclusive growth. The present study contributes to the inclusive growth literature by directly incorporating both income-based and non-income-based indicators to measure inclusive growth. In doing so, we construct an Inclusive Growth Index (IGI) by using 9 developmental indicators, under the dimension of economic inclusion, gender equity, human development, financial inclusion, and social protection, as its components. An ad-hoc weighted method, as used by the United Nations Development Programme (UNDP, 1990) for constructing Human Development Index (HDI), is used to assign the weight of the indicators.

Secondly, existing literature[6] relating to the impact of different macro and structural factors on inclusive growth indicates that initial income, trade openness, fixed investment, financial deepening, FDI, exports, infrastructure, and inflation are important drivers of inclusive growth. However, most work in this area has used cross-country panel data model which failed to address the role of different macro factors in shaping inclusive growth in a given country. These cross-country studies have also been criticized for not giving enough guidance to policy makers (World Bank, 2009). The present study attempts these issues by empirically investigating the effect of different macro and structural factors on inclusive growth in India during 1990 – 2019. We use a dynamic time series model to examine the link between inclusive growth and its factors with the aid of cointegration and error correction model (ECM), and makes a notable contribution to the inclusive growth literature.

Finally, the issue of causality between inclusive growth and its determining factors is addressed in the present paper. The existing studies totally ignored whether the said factors help the economy to grow more inclusively or inclusiveness in growth creates demand for these factors. It would help to formulate inclusive growth policies. We contribute further to this literature by investigating the causal direction in three ways: unidirectional, bidirectional and no causality between inclusive growth and its determining factors.

Using annual time series data, we examine nature of data applying econometric techniques like, unit root tests, cointegration test, etc. The choice of variables and methods are consistent with the existing literature. The detail description of data and methods are given in methodology section. Our analysis has important policy implications in the context of developing nations in general, and India in particular. Our findings suggest that policy makers should formulate policies facilitating transportation, attracting more foreign investment and encouraging exports to make growth faster and inclusive.

[5] See, Oluseye, 2017; Alekhina and Ganelli, 2020; Hidayat et al., 2020; Rini and Tambunan, 2021; Hazmi et al., 2022.

[6] Anand et al., 2013; Khan et al., 2016; Hidayat et al., 2020; Alekhina and Ganelli 2020; Stawska and Jablonska, 2022; Dorffel and Schuhmann, 2022.

The paper is structured as follows. In section two, we provide a brief review of the existing literature. Section three describes the data and methodology to investigate these issues. Section four summarises empirical evidence based on time series data of India. Finally, section five concludes and gives potential policy suggestions.

2. DETERMINING FACTORS OF INCLUSIVE GROWTH: AN EXTENSIVE LITERATURE REVIEW

Most of the existing studies in the development literature have paid a significant attention to the definition of inclusiveness (Ali and Son, 2007; Habito, 2009; Ianchovichina and Lundstrom, 2009; Klasen, 2010, etc.) and its measurements (Ali and Son, 2007; Mckinley, 2010; Anand et al., 2013; Udah and Ebi, 2016; Vellala et al., 2016; Mitra, 2017; WEF, 2017; Mitra and Das, 2018; Aggarwal, 2021, etc.) both at the national and international level. However, studies focusing on the nexus between inclusive growth and its determining factors have remained limited. In this section, we go through those studies that have examined the relationship between different macro-factors and inclusive growth.

A number of studies have specifically identified several macroeconomic factors as the key determinants of inclusive growth both in the context of developed and developing countries. Considering the macro determinants of inclusive growth in emerging markets and low-income countries from 1970-2010, Anand et al., (2013) posited that macroeconomic stability, human capital, and structural changes are the key determinants for achieving inclusive growth. Their results also indicated a positive role of education levels, fixed investments, trade openness, and FDI in fostering greater inclusiveness. In line with Anand et al., (2013), Munir and Ullah (2018) pointed out that macroeconomic stability, structural changes, and financial deepening are foundations for fostering greater inclusiveness in Pakistan. Jalili et al., (2018) applied same methodology as used by Anand et al., (2013) and identified that inflation control, human capital improvement, investment, government consumption and trade openness positively affect inclusive growth in Islamic countries. Alekhina and Ganelli (2020) suggested that fiscal redistribution, female labour force participation, productivity growth, FDI inflows, digitalization, and savings significantly accelerate inclusive growth in the ASEAN countries.

A few studies have suggested that monetary policy, fiscal redistribution policies, and more long-term structural policies can foster both growth and equality. The believer of fiscal policies suggested that, redistributive fiscal policies, especially higher spending on health and education enhance growth potential through improved human capital (Benabou 2000; Wang and Caminada 2011; OECD, 2014, etc.). They also concluded that inequality can be tackled through tax and transfer polices such as old age pensions and the survivors' scheme. On the other hand, the believer of monetary policies argued that credible monetary policies aimed at maintaining price stability, restraining inflation and minimizing output volatility could have direct and indirect positive effect on inclusive growth (Romer and Romer, 1998; Coeure, 2012; Albanesi, 2007, etc.). In addition to the fiscal and monetary policies, some studies also suggested that policies related to labour market reforms and competitive business environment could have a substantial effect on reducing inequality (Zhuang et al., 2014; Jain-Chandra et al., 2016, etc.).

Some studies have empirically examined the relationship between inclusive growth and its determinants and assessed their impact on growth inclusiveness. Aoyagi and Ganelli (2015) empirically analysed a cross-country panel data in Asian context over 1992-2011 and examined the role of some macroeconomic factors including fiscal redistribution, unemployment, productivity, trade openness, GDP per-capita, share of employment in agriculture, etc. in the process of inclusiveness. Their results suggested that redistributive fiscal and monetary policies aimed at macro-stability and structural reforms would help improve growth inclusiveness.

They concluded that Asia should improve monetary policy to contain inflation and growth volatility and pursue structural reforms to stimulate trade, reduce unemployment, and increase productivity to improve growth inclusiveness. Khan et al., (2016) empirically examined the role of financial development, globalization, and macro stability in explaining growth inclusiveness in Pakistan from 1990-2012 using ARDL bound testing procedure. They concluded that lower inflation rate, globalization through technological innovation, and financial development reduce poverty and inequality and increases inclusive growth. Oluseye and Gabriel (2017) empirically investigated the relationship between inclusive growth and its determinants using annual data of Nigeria from 2007-2018. They have employed ARDL bound testing approach to cointegration to assess the long-run and short-run association among the variables. Their finding suggested that government expenditure, inflation, population growth and education expenditure have negative long-run effect on inclusive growth while FDI has positive long-run effect on inclusive growth in Nigeria. Sakanko et al., (2020) has also employed ARDL bound testing approach to examine the effect of financial inclusion on inclusive growth in Nigeria. Their results demonstrated that financial inclusion indicators such as account ownership, access to bank, ATM and credit, loans to SMEs and internet usage are cointegrated with inclusive growth indicators such as poverty, household expenditure, employment and per-capita income.

3. DATA AND METHODOLOGY

3.1. Data Source

The present study uses annual time series data to measure the effect of different factors viz. transport infrastructure, FDI, export, and inflation on inclusive growth for India over the period 1991 to 2019. All the indicators are obtained from various national and international sources such as World Bank, Centre for Monitoring Indian Economy (CMIE), EPWRF - India Time Series, etc. The complete list of indicators used by the present study along with their sources are reported in Table A.1, & A.2.in the Appendix. Table 1 below briefly describes the scenario of the indicators of inclusive growth. This will help us to understand the nature of the indicators and their expansions over time.

Table 1: Indicators of Inclusive Growth in India, 1990-2019

Year	1990	1995	2000	2005	2010	2015	2019
GDP per capita (constant 2015 US$)	534	618	755	948	1238	1590	1942
GDP per person employed (constant 2017 PPP $)	5095	6093	7328	8840	12073	16105	19742
Mortality rate, infant (per 1,000 live births)	89	78	67	56	45	35	28
School enrolment, primary (% gross)	91	94	94	109	109	100	97
Domestic credit to private sector (% of GDP)	25	23	28	40	51	52	51
C-D ratio	60	56	54	63	74	76	74
Ratio of female to male labour force participation rate (%) (modelled ILO estimate)	35	36	37	39	36	31	32
School enrolment, primary (gross), gender parity index (GPI)	1	1	1	1	1	1	1
Total expenditure on social security and welfare by govt. (crores)	2448	5455	8382	11991	41902	135866	170499

Source: Author's computation based on the data source mentioned.

It is observed that most of the indicators have shown a rising trend throughout the study period. Indicators like GDP per-capita, employment, school enrolment, c-d ratio, social security expenditure etc., have exhibited a sustained and continuous rise over the last two decades while indicator like IMR is showing a continuous declining through the period. However, domestic credit to privet sector and female to male participation rate have fluctuated while gender parity index remains constant during 1990 to 2019.

3.1.1. Index Construction: Normalization and Weights of Indicators

Prior to empirical analysis, we measure the multidimensionality nature of inclusive growth by constructing a composite inclusive growth index. To measure the multidimensional facet of inclusiveness, we consider two important aspects:

(a) Choice of appropriate variables or indicators, and
(b) The weighted method of combining them into indices.

The concept of 'inclusiveness' has several dimensions (or aspects). Sometimes it's difficult to identify the complete list of the indicators falling under different dimensions. This is because the choice of the indicators may vary across countries and time and also with the objective of the study. To settle this issue, the present study uses nine developmental indicators and categorized them into five different dimensions (see Table A1 in Appendix). These indicators were also used in the literature to construct other useful developmental indices like Human Development Index (HDI), Financial Inclusion index (FII), Economic Inclusion Index (EII) etc. Therefore, the choice of appropriate variables for measuring inclusive growth are beyond any doubt.

The second issue is settled by using an ad-hoc weighting method to assign weight of the indicators. Unlike Principal Component Analysis (PCA), this method assigns equal weight to each indicator and any index measure constructs using this method satisfies some inherent properties of a good composite index namely, homogeneity[7], monotonicity[8], boundedness[9] (Sarma, 2015). This method is not biased towards one or more of the indicators and comprises important information from all the indicators. However, index measure based on PCA is useful only when we are concerned about capturing the levels of variance-covariance of many dimensions rather than capturing the levels of achievement in various dimensions. In case of risk or crisis measure, volatility and co-movements may be of concern and hence, PCA could be an appropriate method. In the present study, we apply an equal-weighted indexed method to construct inclusive growth index (IGI).

First, we normalised all the indicators using the following formula

$$NV_{it} = \left[\frac{Y_{it} - \min Y_{it}}{\max Y_{it} - \min Y_{it}} \right] \quad (1A)$$

$\forall i = 1, 2, \ldots, 9; t = 1, 2. \ldots .28$ for the *i*th indicator and *t*th time period. Here, the calculated normalized values vary from zero (when $Y_{it} = \min Y_{it}$) to one (when $Y_{it} = \max Y_{it}$). For some variables like, GDP per-capita, zero indicates the worst value and one indicates the highest value.

[7] Homogeneity property indicates that if we change any dimension of a composite index by a constant amount, then it should not change the value of the whole.
[8] Monotonicity property states that a composite index should be an increasing function of its dimensions i.e., a higher achievement in any given dimension should give rise to higher value whole index *ceteris paribus*.
[9] Boundedness property indicates that a composite index should be a bounded function. In simple words, it is bounded below by a number and bounded above a number characterized as lower value and higher value.

However, for IMR one indicates the worst value and the minimum value zero indicates the best value. In this case we use the following formula to calculate the normalized values (see eqn. 1B)

$$NV_{it} = \left[\frac{maxY_{it} - Y_{it}}{max\,Y_{it} - min\,Y_{it}}\right] \quad (1B)$$

After normalizing the indicators, we use the following arithmetic average method to construct the IGI:

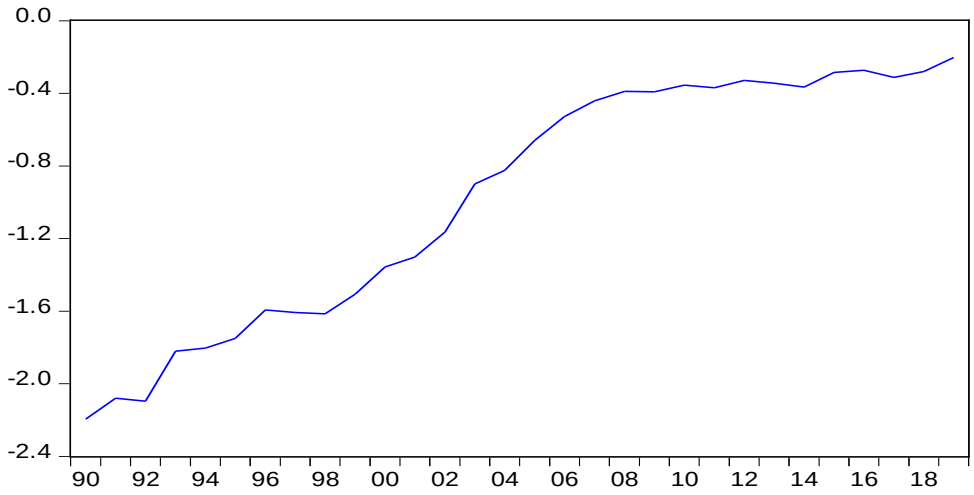
$$IGI_t = \frac{1}{n}\sum_{i=1}^{n} NV_{it} \quad (2)$$

Where NV_{it} is the normalized values of the indicators of inclusive growth and 'n' is the total number of indictors. The Eqn. (2) gives us the index value of inclusive growth over the study period. The calculated IGI value will be in the range of 0 to 1. The value close to 1 indicates greater inclusiveness compared to the value close to 0, which indicates less inclusiveness. In this way, our present index may help researchers and policy makers to diagnose the performance of Indian economy in terms inclusive growth in the post-globalization period.

3.1.2. Trends in Inclusive Growth and its Determinants

The scenario of inclusive growth in India are presented with the aid of calculated composite inclusive growth index. Here, we also analyse the time trends of the underlying variables to determine their time-path and their pattern of change during the study period.

Figure 1: Inclusive Growth Index (IGI)

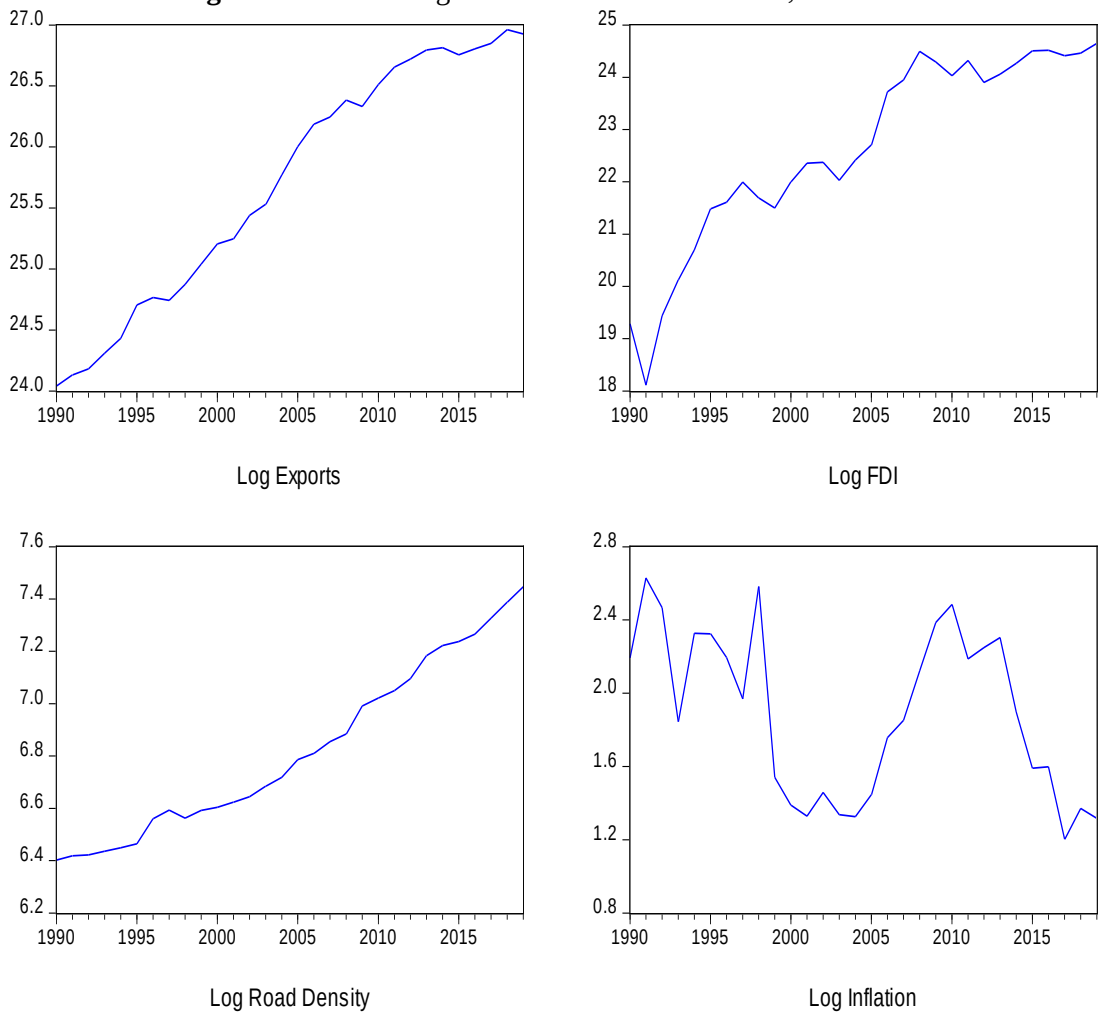


Source: Author's computation.

Figure 1 shows the time trend of IGI between 1991 to 2019. The Y – axis measures the index scores of IGI and X – axis shows the years under review. The IGI has shown a rising trend, but fluctuated during the study period. The index scores have increased more during 2015 - 2019 and less during 1990 -1998. The highest and the lowest IGI values are reported in the year 2019 and 1990, respectively. In case of FDI (see Figure 2), it has first decreased and then increased up to 1997, but fluctuated thereafter. However, similar trends have seen in case of exports and road infrastructure.

Both the variables have shown a continuous and steady rise during the study period. Finally, for inflation, we observed a decreasing trend during the study period with some fluctuations.

Figure 2: Determining Factors of Inclusive Growth, 1990-2019



Source: Author's computation.

3.2. Econometric Methodology

For estimating the effect of different determining factors on inclusive growth, the study first transformed the underling variables into natural logarithmic form. This transformation will help us to estimate the elasticity coefficients of the determining factors. The econometric analysis of the study starts with testing the stationarity nature of the underlying timeseries variables. In this context, we employ the unit root tests viz. the Augmented Dickey Fuller (1981, ADF) test and Phillips-Perron (1988, PP) test. The choice of using both the ADF and PP is motivated by their methodological differences. The ADF test parametrically correct the autocorrelation and heteroscedasticity in the residuals of error terms by incorporating augmented terms while in the PP test, it is done by a nonparametric way by modifying the ADF statistics (Das, 2019, pp-326-327). Next, the study examines the cointegrating relationship between IGI and its determining factors. For the said purpose, we apply Johansen test of Co-integration (1988) in which Trace test and Maximum eigen value test are used to check whether the underlying variables are cointegrated or not. Eqn. (3) shows the cointegrating relationship between the variables where $\sum_{i=1}^{4}\alpha_i$ is the long-run coefficients. An VECM is then used to estimate the long-run and short-run effect of the determining factors on inclusive growth.

Speed of adjustment parameter is also estimated in this context. The following VECM is used to estimate the long-run and short-run coefficients ($\sum_{i=1}^{4}\beta_i$) along with the speed of adjustment parameter (ρ) (see Eqn. 4).

$$IGI_t = \alpha_0 + \alpha_1 RODN_t + \alpha_2 FDI_t + \alpha_3 EXPT_t + \alpha_4 INFLA_t \quad (3)$$

$$\Delta IGI_t = \beta_0 + \sum_{i=1}^{p}\beta_{1i}\Delta IGI_{t-i} + \sum_{i=1}^{p}\beta_{2i}\Delta RODN_{t-i} + \sum_{i=1}^{p}\beta_{3i}\Delta FDI_{t-i} + \sum_{i=1}^{p}\beta_{4i}\Delta EXPT_{t-i} + \sum_{i=1}^{p}\beta_{5i}\Delta INFLA_{t-i} + \rho\, ECT_{t-1} + \varepsilon_t \quad (4)$$

Finally, the study employs Granger Causality test (Granger, 1969) to assess the direction of causality between the variables. The results of all the tests are discussed in the next section.

4. RESULTS AND DISCUSSION

Prior to any time-series estimation, it is necessary to check the stationarity[10] nature of the underlying time series and the order of integration. of the variables. Conventionally, there are several methods to address these issues. Such methods include visual inspection of the data plot, autocorrelation function (ACF), and partial ACF (PACF). In the first case, if the data plot does not show any tendency to drift either upward or downward and fluctuates around its mean then it is stationary in mean otherwise, non-stationary. On the other hand, if the ACF shows a gradually decreasing tend and the PACF cuts immediately after one lag then the underlying series is non-stationary and should be differenced.

Another way to check the stationarity nature of the time series variables is to perform unit root tests. In the present analysis, we perform the Augmented Dickey Fuller (1981, ADF) test and Phillips-Perron (1988, PP) test to check the stationarity nature of the underlying variables and their order of integration.

Table 2: Results of Unit root test

Variable	Model	Augmented Dickey Fuller (ADF) test		Phillips-Peron (PP) test		Decision
		Levels	First Difference	Levels	First Difference	
IGI	Constant	-1.759	-4.793***	-1.833	-4.978***	*I* (1)
FDI	Constant	-1.565	-6.482***	-1.863	-6.189***	*I* (1)
EXPRT	Constant	-1.814	-4.219***	-1.787	-4.219***	*I* (1)
INFLA	Constant	-1.842	-4.317**	-2.225	-6.602***	*I* (1)
RODN	Constant, Trend	-1.545	-5.371***	-1.316	-10.077***	*I* (1)

Note: Numerical figures reported in Table 2 are the t-statistics. **, and * denote significance level at 5%, and 10%, respectively.

Source: Author's computation.

Results of ADF and PP tests are reported in Table 2. Results indicate that the null hypothesis of having unit root for all the variables cannot be rejected at their levels for both the tests as the calculated t-values are not significant at 5% level. However, they are significant when the variables are taking their first differences. This indicates that all the variables are first difference stationary with the integration of order one i.e., *I* (1).

[10] Stationarity property indicates that the statistical properties i.e., mean and variance of the time series variables will not change over time.

Once the issues of stationarity and order of integration are settled, our next task is to find out whether the variables are cointegrated or not. If they found to be cointegrated then error correction model (ECM) can be applied to estimate the long-run and short-run coefficients of the variables otherwise, vector autoregressive (VAR) model can be employed at their first difference of the variable to estimate only the short-run coefficients. Engel and Granger (1987) pointed out that two *I* (1) time series may be cointegrated if their linear combination is *I* (0). In such situation a long run equilibrium relationship may exists between them and Granger causality test can be applied to assess the direction of short run causality of the underlying series in at least on direction in *I* (0) variables. For the said purpose, we employ Johansen Co-integration test (1988) to find the long run relationship between the variables. Johansen test of Co-integration proposes two different likelihood ratio tests namely, the Trace test and Maximum Eigen value test. The results of both the tests are presented at Table 3.

Table 3: Results of Johansen Cointegration Test

No. of Co-integrating equations	Trace statistics	5%critical value	No. of Co-integrating equations	Max Eigenvalue Statistics	5%critical value
None*	140.769	88.803	None*	60.343	38.331
At most 1*	80.425	63.876	At most 1*	35.157	32.118
At most 2*	45.268	42.915	At most 2*	29.216	25.823

Note: Both the Trace and Max-Eigen value tests indicate 1 cointegrating equation at the 0.05 level.

* Denotes rejection of the hypothesis at the 0.05 level.

Source: Author's computation

Both Trace and Max Eigen value tests suggest the existence of two cointegrating equation between inclusive growth index and its determining factors. This indicate that IGI, FDI, RODN, INFLA, and EXPRT are cointegrated and a long-run equilibrium relationship may exist between them. In this context, we apply an ECM to estimate the long-run and short-run relationship along with the short-run dynamics.

Estimated long-run relationships are presented in Table 4. Results show that all the coefficients are significant at 1 percent level. For road infrastructure, FDI, and export, the coefficients are positive while it is negative for inflation. The long-run elasticity of inclusive growth with respect to road infrastructure is 70.596, with respect to FDI is 1.09, and with respect to export is 17.058. This indicate that an increase of 1 percent of road infrastructure, FDI, and export will increase inclusive growth index by 70.596 percent, 1.09 percent, and 17.058 percent in long-run. The long-run elasticity of inclusive growth with respect to inflation is -6.244 indicating that an increase of 1 percent of inflation will decrease inclusive growth index by 6.244 percent. Overall, results show that road infrastructure, FDI, and exports have positive long-run effect on inclusive growth while inflation has negative effect in India.

Table 4: Estimated Long Run Relationship

Variable	Coefficient	Std. Error	t-statistics
IGI (-1)	1.000		
RODN (-1)	70.596***	6.214	11.359
FDI (-1)	1.090***	0.313	3.480
EXPT (-1)	17.058***	1.656	10.297
INFLA (-1)	-6.244***	0.714	8.737
Trend	-4.782***	0.424	11.276
Constant	-859.913		

Note: *** denotes the significance level at 1%.

Source: Author's computation

The short-run relationship and the speed of adjustment parameter are estimated and reported in Table 5. In short-run, first difference of IGI is regressed on lagged first difference of IGI, road infrastructure, FDI, exports, and inflation. This will us to capture whether the past values of the independent variables affect the current value of dependent variable under study. Results show that an increasing 1 percent of FDI in the previous year will increase inclusive growth in the current year by 0.068 percent. This indicates that, FDI plays a significant role in fostering inclusive growth in short-run too. No short-run effect has seen in case of road infrastructure, exports, and inflation on inclusive growth. The coefficient of error correction term (ECT) is positive and significant indicating that the system will diverge from its long-run equilibrium if there induce any shock to the system in short-run.

Table 5: Estimated Short-Run Relationship

Variable	Coefficient	Std. Error	t-statistics
ΔIGI (-1)	-0.016	0.186	-0.090
ΔRODN (-1)	0.149	0.620	0.240
ΔFDI (-1)	0.068**	0.032	2.132
ΔEXPT (-1)	0.312	0.190	1.645
ΔINFLA (-1)	-0.057	0.046	-1.245
Constant	0.015	0.036	0.439
$ECT_{(t-1)}$	0.017*	0.009	1.902

Note: ** and * denote the significance level at 5%, and 10%, respectively.

Source: Author's computation

The direction of causality among the proposed variables in short-run is examined by applying the VECM Granger causality test. The causality results demonstrate that there is a bidirectional causality between FDI and IGI. A unidirectional causality exists which is running from exports to IGI. However, no causality is detected between road infrastructure and IGI and between inflation and IGI.

Table 6: Results of Short-run Granger causality/Wald test

Dependent Variable	Independent Variables					Direction of causality
	ΔIGI	ΔRODN	ΔFDI	ΔEXPRT	ΔINFLA	
ΔIGI	-	0.975	2.820*	1.028	2.393	IGI → FDI
ΔRODN	0.057	-	1.828	0.711	0.242	-
ΔFDI	4.545**	0.617	-	0.489	0.457	FDI → IGI
ΔEXPRT	2.707*	5.052	0.263	-	0.210	EXPT → IGI
ΔINFLA	1.551	3.22E-05	1.572	0.524	-	-

Note: Numerical figures reported in Table 6 are the F-statistics, **, and * denote significance level at 5%, and 10%, respectively.

Source: Author's computation.

Finally, we check the 'goodness of fit' of our estimated model using several econometric techniques. The Breusch-Godfrey Serial Correlation LM test is conducted to examine whether the residuals are serially correlated, Jerque-Bera Normality test is conducted to examine whether the residuals are normally distributed, and CUSUM of square test is performed to check whether the model is stable. The results (reported in Table A3, and A4 and Figure A1 in the Appendix) indicate the absence of serial correlation and the model is normal as well as stable.

4.1. Validity of the Results

The results of our present analysis reveal that road infrastructure, FDI, and exports make growth more inclusive as they have significant positive effect on inclusive growth in long-run. On the other hand, results also indicate that inflation can hinder the inclusiveness as it has negative long-run effect on inclusive growth in India. In the short-run, FDI has significant positive effect on inclusive growth. Granger causality test shows that among the determinant, exports unidirectionally cause inclusive growth and there is bidirectionally causality between FDI and inclusive growth. These findings support and oppos the view of some previous and concurrent studies. In this section, we present those evidences that supports or oppos the findings of our study. This will strengthen the validity of the results of our present study.

- **Nexus between FDI and inclusive growth:** The positive role of FDI in fostering growth inclusiveness is in line with work of Anand et al. (2013) who concluded that FDI fosters greater inclusiveness in emerging markets. On the other hand, this finding is contrary with the findings of Rasool et al. (2022) who have showed that trade FDI would not be beneficial for India in terms of growth inclusiveness. This finding is also in line with Oluseye and Gabriel (2017) who found the similar results in Nigeria. In addition, the role of FDI as a key driver of inclusive growth is also support the view of Alekhina and Ganelli (2020) who suggested that FDI inflow along with other macro factors significantly drive inclusive growth in ASEAN. It also supports the view of Hidayat et al. (2020) who found a positive effect of foreign investment on inclusive growth in Yogyakarta between 2011-2017.
- **Nexus between road infrastructure and inclusive growth:** The role of infrastructure in fostering greater inclusiveness particularly, road infrastructure is also well supporting the view of Asian Development Bank (2010) who commented that transport and energy infrastructure projects have significant association with inclusive growth. Our empirical findings are also in line with the findings of Mutiitia et al. (2020) who showed that infrastructure namely, energy, transport and ICT infrastructures play an important role in the distribution of income and make growth more inclusive in the context of sub-Saharan Africa.
- **Nexus between exports and inclusive growth:** The evidence on the nexus between exports and inclusive growth is limited. Our present findings suggest that exports positively affect inclusive growth support the view of Hidayat et al. (2020) who found a positive effect of exports on inclusive growth in Yogyakarta between 2011-2017.
- **Nexus between inflation and inclusive growth:** The long-run negative effect of inflation on inclusive growth is in line with the findings of Rasool et al. (2020) who concluded that inflation dampen growth inclusiveness as they found an inverse association between them in India. Oluseye and Gabriel (2017) also found similar relation between inflation and inclusive growth in the context of Nigeria.

Thus, the results of our present study get supported by many national and international studies (Anand et al., 2013; Oluseye and Gabriel, 2017; Hidayat et al., 2020 etc.) in most cases. However, it contradicts with the views of few studies (see Rasool et al., 2022). Therefore, we can conclude that the results of our study are quite robust and may help policymakers to configure comprehensive policies to foster inclusive economic growth.

5. CONCLUSION

The present study has examined the relationship between inclusive growth and its determinants such as road infrastructure, FDI, exports, and inflation in India between 1990 -2019. The study has measured inclusive growth by using major nine developmental indictors which almost capture its multidimensional nature. An ad-hoc weighted method is used to assign the weights of the indicators. The study also estimated the effect of those determining factors on inclusive growth. From VECM, this study observed that inclusive growth, road infrastructure, FDI, exports, and inflation are cointegrated in the long-run in India. All the factors have significant long-run relationship with inclusive growth. Road infrastructure, FDI, and exports are positively related with inclusive growth, while inflation is negatively associated with inclusive growth in long-run. The long-run elasticities of inclusive growth with respect to road infrastructure, FDI, exports, and inflation are highly elastics in long-run. In the short-run, FDI has a significant positive effect on inclusive growth. Finally, the study is observed that among the factors, exports unidirectionally causes inclusive growth while bidirectional causality is found between FDI and inclusive growth in India.

The present study provides insights into the impact of infrastructure, foreign investment, trade, and macro stability on inclusiveness in growth. The findings of the present study are important for policymakers. Specifically, policymakers should embark upon policies that facilitates building infrastructural facilities particularly, transport network to make growth faster and inclusive. They should also proceed with liberal trade policies that increase exports and attract more foreign investment in order to foster more inclusive growth. Negative impact of inflation on inclusive growth should be considered by policymakers, and adopt new policy framework which needs to redesign to tackle such effect and ensure inclusiveness for all.

The main contribution of our present study is (i) appropriate measurement of inclusive growth and (ii) empirical findings of the nexus between inclusive growth and its determining factors in India in the era of post-globalization. However, there are some limitations to the empirical evidence presented in this study. First, due to limited availability of data, we could not use more determining factors of inclusive growth in our exercise. Secondly, we only consider income and employment as proxies for income-based measures and do not take into account indicators of poverty and inequality to measures inclusive growth due to lack of data over time. Thirdly, we did not consider the role of digital financial inclusion and the newly launched GST system in fostering inclusive growth due to their limited information. Information on such variables over time are hard to find and hence their impacts are not assessed in this study. Finally, the present study unable to capture the level of variation of inclusiveness in growth across states in India or different regions and therefore, we could not assess the impact of these factors vary over time and across space. Despites these limitations, the findings of our present study do add to the evidence base within the empirical literature of inclusive growth. There is therefore scope of further research to explore such issues by employing spatial analysis.

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Appendix

Table A.1: Indicators of Inclusive Growth

Dimensions	Indicators	Sources	Time Period
Economic Inclusion	GDP per capita (constant 2015 US$)	World Development Indicators, World Bank Database	1990-2019
	GDP per person employed (constant 2017 PPP $)	World Development Indicators, World Bank Database	1990-2019
Social Protection	Total expenditure on social security and welfare by govt. (combined)	EPWRF- India Time Series	1990-2019
Gender Empowerment	School enrolment, primary (gross), gender parity index (GPI)	World Development Indicators, World Bank Database	1990-2019
	Ratio of female to male labour force participation rate (%) (modelled ILO estimate)	World Development Indicators, World Bank Database	1990-2019
Human Capability	School enrolment, primary (% gross)	World Development Indicators, World Bank Database	1990-2019
	Mortality rate, infant, male (per 1,000 live births)	World Development Indicators, World Bank Database	1990-2019
Financial Inclusion	Domestic credit to private sector (% of GDP)	World Development Indicators, World Bank Database	1990-2019
	C-D ratio (%)	World Development Indicators, World Bank Database	1990-2019

Source: Author's computation.

Table A.2: Determinant Factors of Inclusive Growth

Indicators	Sources	Time Period
Exports of goods and services (constant 2015 US$)	World Development Indicators, World Bank Database	1990-2019
Foreign direct investment, net inflows (BoP, current US$)	World Development Indicators, World Bank Database	1990-2019
Inflation, consumer prices (annual %)	World Development Indicators, World Bank Database	1990-2019
Road Density (Road length per 1000 sq. km area)	Centre for Monitoring Indian Economy (CMIE) data base	1990-2019

Source: Author's computation.

Table A.3: Results of Breusch-Godfrey Serial Correlation LM Test

F-statistic	Probability	Remarks
0.049	0.825	No Serial Correlation

Source: Author's computation.

Table A.4: Results of Jarque-Bera Normality Test

F-statistic	Probability	Remarks
0.730	0.694	Normal

Source: Author's computation.

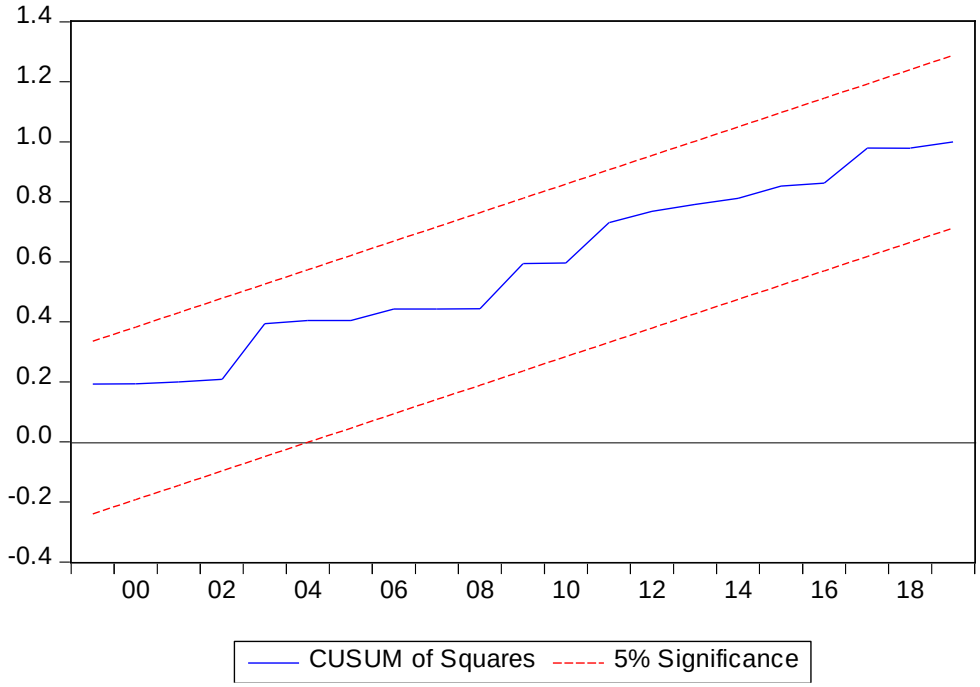

Figure A.1: CUSUM of Square Test for Model Stability

Source: Author's computation.