Research Article

The Tripartite Interaction of Capital Formation, Economic Growth, and Unemployment in India's Post-Liberalization Era: A Quantitative Investigation

Jitendra Kumar Sinha*

Retired Senior Joint Director Head, DES, Bihar (INDIA).

Corresponding Author: Jitendra Kumar Sinha, Retired Senior Joint Director Head, DES, Bihar (INDIA).

Abstract

Gross Fixed Capital Formation (GFCF) represents a critical element of domestic investment essential for fostering economic growth and addressing unemployment challenges. However, the relationship between investment and economic growth remains a subject of ongoing debate in empirical studies, yielding divergent findings. Similarly, the nexus between employment and economic growth remains inconclusive. Despite moderate rates of investment and economic growth, the Indian economy grapples with elevated levels of unemployment. This study delved into the dynamics of investment, economic growth, and employment in India, utilizing data from reputable sources such as the Ministry of Statistics and Programme Implementation (MoSPI) and the Government of India. Employing the Johansen Co-integration and Vector Error Correction Model (VECM) framework, the investigation aimed to elucidate the nature of these interrelationships. The findings revealed the existence of a long-term relationship among these variables, providing evidence supporting bidirectional causality between employment and economic growth. Notably, economic growth was observed to precede investment, indicating its pivotal role as a driver of investment and employment over the long term within the Indian context. Moreover, the study corroborated the hypothesis of jobless growth during the post-economic reform period. It underscored the necessity of fostering a more conducive economic environment through enhanced infrastructural development and diversification of the economy, particularly into labor-intensive sectors such as agriculture and allied industries. Such measures are deemed essential for stimulating investment levels and mitigating unemployment challenges in the country.

Keywords: Gross Fixed Capital Formation, Investment, Economic Growth, Employment Granger Causality and VECM.

1. Introduction

Gross Fixed Capital Formation and economic development are mutually related. While capital formation helps reduce unemployment, realize economic stability, and improve the standard of living of all citizens; economic development accelerates the process of capital formation. Thus, capital formation, as the major component of domestic investment, is regarded as an important instrument to accelerate economic growth and employment in terms of macroeconomic policy. Theoretically, an increase in investment is expected to provide more jobs or increase employment levels. Meanwhile, the higher growth rate of the economy has also been argued to stimulate domestic investments. Thus, there exists bi-directional causality between investment and economic growth. However, improvements in innovations, science technology, which have resulted in manpower being displaced by machines and leading to a situation known as 'Jobless Growth' may undermine the role of investment in accelerating the growth of an economy [1, 2]. Computerization and mechanization help to perform certain types of work more efficiently, enhancing productivity, but may result in job losses in the economy and consequently lead to jobless growth [3]. Literature has limited empirical studies that consider the impact of investment on employment generation [4, 5, 6]. Established a positive relationship between investment and economic growth but asserts that the positive linkage represents a causal link running from investment to economic growth, that is, increased growth is triggered by higher investment rates in the form of investment in equipment [6]. Summers investigated 101 OECD countries and observed that an increase in the level of investment is preceded by steady and long-term economic growth [7]. found that economic growth Granger-cause investment, but investment does not Granger-cause economic growth [8, 9].

1.1. Indian Economic Scenario

The Indian economy has been growing smartly at an average

of over six percent per annum during the last three decades when much-needed economic reform was introduced. The unemployment rate was supposed to decrease, but the formal sectors failed to provide jobs and unemployment surged alarmingly within that period with a ripple effect in most of the sectors. India's macroeconomic challenges continue to be stagnant economic growth and high unemployment. According to the latest employment data, employment growth in India slowed dramatically from 2012 to 2016, while an absolute decline in employment was recorded for the first time from 2013-14 to 2015-16. Who conducted an independent survey reported a net decline in employment and an increase in unemployment [10]. United Nations also reported an increment in unemployment in India from 17.6 million in 2016 to 18.0 million in 2018 [11, 12].

Economists point out that the reason behind this scenario was not to link economic growth with proportionate employment expansion. The expansion of the Indian economy has created just a limited number of well-paying employees. India's workforce increased by 63 million between 1990- and 2000, while employment in the organized sector fell by three million, and 22 million of the workforce became unorganized workers in the organized sector. India's labor force participation rate was 58.3% in December 1990, which declined to a record low of 36.9% in December 2018, though increased to 41.6% in December 2021. Lack of job possibilities may strife long-term economic growth by lowering the purchasing power of the common people, which would lead to a drop in their consumption demand. Used a log linearized model to reveal that the employment elasticity of economic growth was negative and significant which indicates the notion of jobless growth applied to the Indian economy during the post-economic reform period [13-20]. The high level of unemployment currently experienced in India can be attributed to the low employment intensity of GDP growth. The negative relationship between the level of employment and GDP growth rate is a pointer that investments are capital-intensive and need to be reversed with a policy of labor-intensive investment to contribute significantly to employment generation. Thus, unemployment has been a challenging phenomenon in the Indian economy.

This paradoxical situation has led to several studies aimed at providing explanations and solutions to the phenomena. As with macroeconomics, an increase in unemployment reduces output and consequently retard growth. On the social side, it provides ideal minds and hands for indulging in criminal activities. Meanwhile, a reduction in the unemployment rate justifies public expenditure in social and economic infrastructure like education, health, transport, and communication because it is believed that this reduction has the potential of contributing positively to the performance of the economy and promoting higher productivity. Public expenditure has an active role to play in reducing regional disparities, creating infrastructure for economic growth in the form of transport and communication, education and training, growth of capital goods industries, basic and key industries, research and development, and many others.

Economic growth comes from technological progress, which is essentially the ability of an economic organization to utilize its productive resources, especially manpower more effectively over time. The underlying reason for government intervention in the country is based on the recognition that the market mechanism, which is supposed to guide the private economic agents, has several inadequacies. One of the major purposes of public sector investment is to guarantee an economic climate in which the labor needed to produce goods and services will be fully employed in various sectors of the economy.

The goal of achieving employment is the most important among the macroeconomic goals in India, where unemployment and underemployment have been major causes and consequences of widespread poverty. Despite the high-sounding electioneering promises of political leaders, the achievement of employment remains a mirage. The high rate of unemployment and poverty among the other miseries of the populace are the order of the day. Economic growth generally ameliorates unemployment concerns. India pushed the economy to grow at a faster rate by suitably structured policy to help employ its millions of workforce every year. Economic reforms introduced in 1991 were seen as a breakthrough in this strategy. Even while all growth indicators including the gross domestic product (GDP) imply a strong economic improvement, unemployment in the country continues to rise. While major economic indicators point to a fast rebound, the employment market as a whole is struggling hard and has not helped to alleviate its unemployment problem.

Unemployment in India is attributed to the negative development of economic activities; the substitution of labor for capital; and an increase in workforce supply. The country was facing the challenge as early as the 1980s when it was operating under a 'one-sector growth model. India took initiative in the 1990s in the form of Economic Reforms that characterized pro-market orientation that includes: (i) fiscal policy reforms, aimed at rationalization of the tax structure, and reduction of subsidies fiscal deficit; (ii) financial sector reforms that included liberalization of interest rates, relaxation of controls on capital issues, freer entry for domestic and private foreign banks, and opening up of insurance sector; (iii) liberalization of industrial policies and the abolition of industrial licenses; (iv) reforms in foreign trade and investment, liberalizing foreign trade in goods, services, and technology, eliminating import licensing, reducing non-tariff barriers ad liberalizing foreign direct and portfolio investment; (v) infrastructure sector reforms, encouraging private investment in infrastructure and telecommunication; and (vi) reforms in agriculture, relating mainly to both internal and external trade in agricultural commodities. Thus, the thrust of the reforms had been to open the Indian market to international competition, reduce government control, encourage private investment participation, liberalize access to foreign capital, and attract foreign capital. These reforms were aimed to curb the problem of capital inadequacy in the country for the stagnant growth, but the implication of these policies lagged

behind the economic and employment growth leading to more unemployment, which economists are more concerned with portraying the recent experience of one of the jobless growth [21].Provide results regarding Granger causality between economic growth and unemployment in Nigeria [22]. This study revisits the relationship as the direction of causality between investment and economic growth on the one hand and between investment and employment on the other. Thus the study would be contributing to empirical studies on the relationship between domestic investment, employment, and economic growth.

1.2. Literature Review

The theoretical position of the central role of domestic investment as the growth engine of the economy is mentioned in the Keynesian view of growth (Harrod - Domar model); the neoclassical growth theory (Solow Denison) and the endogenous growth theories. These were also examined in the light of empirical studies. Investigated 94 non-OECD countries to conclude that a major share of investment and economic growth generates a higher level of output per worker, as well as a higher rate of growth in the long term but mentioned that investment does not Granger cause economic growth, such as Jones [8, 23, 24]. It merely says that investment is important in explaining the growth pattern of the economy but causality does not move from investment to economic growth, because investment levels depend on the preceding business cycle [25]. Examined private investment in Bolivia to argue that investment affects economic growth positively and depends on the expected rate of return on capital [26]. However, in developing countries with less developed financial markets, the level of interest rates is not a significant determinant of investment. But provide evidence that investment Granger causes economic growth and suggested that a major share of investment in GDP generates a higher level of output per worker as well as a higher rate of growth in the long-run [23, 27]. Examined 188 rich and poor countries and suggested a negative association between investment and economic growth – particularly in developing countries [28]. Found that investment depends crucially on economic growth in real wages in Mexico [29]. Found a long-term relationship between economic growth, investment, and employment in Uruguay and suggest that economic growth precedes investment and employment, while investment also precedes employment [25]. Used panel data in European countries to establish the causality between investment and economic growth is bi-directional [30, 31].

The impact of capital formation on economic growth was investigated by employing multiple regression analysis and a VAR model and found that total export, domestic investment, and lagged value of economic growth had a positive relationship with economic growth in the long-run, though no such relationship exists in the short-run; which was further confirmed by [32-34]. The empirical investigation by for the Middle East and North African countries suggests

strong causality from economic growth to investment, but investment has no significant effects on economic growth in the short-run and long-run; that is, the finding suggests that economic growth is the driver of investment [35]. However, argued that a bi-directional causality between gross domestic capital formation and export growth in India is evidence of unidirectional causality from capital formation to changes in exports [36]. The relationship between net capital investment and employment in Romania was examined by who concluded that net capital formation positively and significantly affects employment [37]. Investigated within the framework of Structural Vector Analysis the relationship between economic growth, fixed investment, and household consumption in Malaysia and confirmed that fixed investment significantly affects economic growth in the short run [38]. Studied the impact of investment on economic growth in South Africa and revealed that gross fixed capital formation has a positive relationship with economic growth in the short run as well as the long run and the causality was bi-directional [39]. Also revealed bi-directional causality relations between infrastructural investment and economic growth in South Africa [40]. Examined South African data within the framework of the Johansen Cointegration and Vector Error Correction Model to conclude that a long-term relationship exists between domestic investment, employment, and economic growth with causality running from economic growth to investment and not vice versa [41]. It also shows that investment has a positive long-run impact on employment and suggests a bi-directional causality between employment and economic growth, while evidence of unidirectional causality from investment to employment was found. Thus, there is no conclusive evidence of the direction of causality between investment, economic growth, and employment. Lack of consensus in the literature between investment, economic growth, and employment motivated the investigation of the nature of the relationship between these variables in India within the framework of the Vector Error Correction Model for the post-economic reform period, that is, 1990-2023.

1.3. Variables Data

The variables used in the study include economic growth with the real gross domestic product as the measurement; gross fixed capital formation for domestic investment; and the number of people employed as employment. Data are the backbone of the whole structure, and collected and analyzed was secondary data from secondary and reliable sources like the WDI(World Development Indicators) databank, IFS (IMF's International Financial Statistics), and the MOSPI and various related concerned Departments of the Government of India from 1990-91 to 2022-23 (33 observations). These data were converted to logarithms. Thus, the variables with abbreviations were listed as the log of real GDP (LRGDP); log of investment (LINV), and log of employment (LEMPLOY) (see Table 1). Besides, reliable methods have been chosen to carry out the analysis, so that chances of misinterpretations and errors are limited.

Volume - 1 Issue - 2

Citation: Sinha., J. K. (2024). The Tripartite Interaction of Capital Formation, Economic Growth, and Unemployment in India's Post-Liberalization Era: A Quantitative Investigation. Open Access Journal of Economic Research. 1(2), 1-9.   **Page 3 of 9**

Table 1: Description of Variables.

Acronym of variable	Variable	Measurement of variable
LINV	Investment	Gross Fixed Capital Formation
LRGDP	Real GDP	The GDP is at a constant price.
LEMPLOY	Employment	The number of people employed.
Source: Researchers' Compilations (MOSPI Related Government Departments).		

2. Methods Procedures

A Vector Autoregressive (VAR) model with an error correction mechanism (VECM) was used to carry out the study. All three data series after being converted to logarithms were subjected to find the integrated degree of the series. This was done through the augmented unit root testing using the Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for both levels and the first difference of all the variables. Both the ADF and PP unit root tests utilize the specifications of the following regression model used by [42].

$$\Delta x_t = \alpha + \beta x_{t-1} + \lambda_t + \Sigma_s \Delta x_{t-s} + \varepsilon_t \qquad (1)$$

Where x_t is the variable of interest, ε_t is the disturbance term, and t is the time trend. α, β, λ are parameters and summation extends over 1 to n Assuming that each of the variables contains unit roots in levels, but not in the first difference, we may proceed to determine the number of cointegrating vectors among the variables under consideration. Suggested a method to test for cointegration by suggesting the following p-variable VAR model [43].

$$X_t = \mu + \Sigma \theta_i x_{t-i} + \eta_t \qquad (2)$$

Where X_t is the (p,1) vector of the variables under consideration, which is (3,1) in this case. Summation extends over 1 to k. η_t is the disturbance term assumed to be a normally and independently distributed Gaussian process with zero mean and variance ϕ. Although these variables are individually non-stationary, if there is a linear combination of these stationary variables, then they form a meaningful and stable long-run relationship. Thus exploiting the notion that they are cointegrated, we may parameterize equation (2) to obtain the VECM:

$$\Delta x_t = \mu + \Sigma \Gamma_i \Delta x_{t-i} + \pi x_{t-k} + \eta_t \qquad (3)$$

Where Γ_i is the parameters; and π is the parameter matrix whose rank defines the long-run relationship between the various variables included in the model. Formulated the test statistic to determine the r based on the maximum likelihood estimation method, the trace test, and the maximum eigenvalue test [43]. The causal relationship between investment and economic growth on one hand and between investment and employment, on the other hand, were examined with the help of the Granger causality

procedure based on VECM, which is attractive over VAR as it permits temporary causality to emerge from the sum of lagged coefficients if the explanatory differenced variables and the coefficient of the error correction terms. The VECM allows causality to emerge, even if the coefficient of the π is the parameter matrix whose rank defines the long-run relationship between the various variables differences of the explanatory variables are not jointly significant [44].

3. Result Discussion
3.1. Descriptive Statistics

Descriptive statistics including the mean, median, standard deviation, skewness, and kurtosis were calculated for Employment, Gross Fixed Capital Formation (GFCF), and real Gross Domestic Product (GDP) for the post-reform period spanning from 1991-92 to 2022-23 (refer to Table 2).

Throughout the entire period from 1990-91 to 2022-23, economic growth in India has centered around a mean value of 5.788, indicating a significant positive change in the growth rate of real GDP during the post-reform period. Similarly, the employment rate has clustered around a mean value of 2.760, reflecting a notable increase in employment rates over the post-reform period. Public investment, as measured by Gross Fixed Capital Formation, has also converged around a mean value of 5.267 during the post-reform period, suggesting a significant rise in public investment. The trends observed in these series suggest that economic reforms have achieved their fundamental objectives of fostering economic growth, augmenting public investment, and bolstering employment. However, the level of employment generated falls short in comparison to the pace of economic growth and investment, thereby contributing to persistent challenges in the employment landscape and giving rise to various social issues in the long term. Furthermore, the standard deviation of the economic growth series exceeds that of the employment and public investment series, indicating greater volatility in economic growth compared to employment and public investment. Moreover, the skewness and kurtosis coefficients for all three series (growth rate, public investment, and employment) deviate from the normal distribution, signifying asymmetry in their distributions. These deviations from normality suggest that the distribution of these variables is not symmetrical, with skewness and kurtosis coefficients deviating from their absolute values.

Table 2: Descriptive Statistics of LRGDP; LEMPL; and LPIV.

Descriptive Statistics	LRGDP	LEMPL	LPINV
Mean	5.788	2.760	5.267
Median	6.596	2.655	5.304
Standard Deviation	3.221	0.308	0.457
Skewness	-2.882	3.567	3.122
Kurtosis	11.130	17.308	15.644
Source: Authors' Computation.			

3.2. The Unit Root test

The study conducted unit root tests on the time series data utilizing the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron test. The outcomes of these tests are summarized in Table 3. The table presents the results regarding the time series properties of the variables, wherein both trend and intercept were found to be statistically significant.

Table 3: Unit Root Results

Variables	ADF test		PP test	
	T-stat	P-value	T-stat	P-value
LINV	-0.96190	0.7635	-1.2073	0.6683
LRGDP	-1.4724	0.5428	-1.3265	0.5921
LEMPL	-0.4683	0.8912	0.4587	0.8931
ΔLINV	-5.2081	0.0001*	-5.2081	0.0001*
ΔLRGDP	-4.6708	0.0002*	-4.5917	0.0003*
ΔLEMPL	-4.6766	0.0002*	-7.4850	0.0001*
Source: Author's Computation. **Note:** * implies the rejection of the null hypothesis at a 1% significance level.				

According to the results, all three variables were non-stationary at level I(0) but exhibited stationarity at level I(1) at a significance level of 5 percent. This indicates that the variables are integrated of order 1 (I(1)), suggesting that they possess a unit root in their first difference, rendering them stationary.

3.3. Long – Run Analysis

Following the confirmation of stationarity in the time series data, the Johansen cointegration test was employed to ascertain potential long-run relationships among the variables by testing for any linear combination possessing a common stochastic trend. Given the sensitivity of the Johansen test to the lag length chosen, a lag selection procedure was undertaken to identify the optimal lag length. Based on various lag selection criteria, a lag length of 2 was determined to be optimal. In a three-variable system comprising economic growth, employment, and investment, the maximum number of cointegrating vectors is expected to be 2. Consequently, the null hypothesis posits no cointegrating vector, while the alternative hypothesis suggests the presence of at least one cointegrating vector. The outcomes of the cointegration analysis are detailed in Table 4.

Table 4: Johansen Cointegrating Results.

Trace Test				Maximum Eigen. Test			
H_0	H_1	Trace Stat.	P-value	H_0	H_1	Max. Eigen Stat.	P-value
r=0	r>0	64.9647	0.0040*	r=0	r>0	36.8905*	0.0035*
r<1	r>1	28.0740	0.2380	r<1	r=1	14.2595*	0.4385
r<2	r>2	13.8146	0.3924	r<2	r=2	10.5980	0.2829
Note: Both the Trace test and Maximum Eigen test results show cointegrating at the 5% significance level. **Source:** Author's Computation.							

The null hypothesis of no cointegration was rejected at a significance level of 5% across all cases. However, the alternative hypothesis, indicating the existence of at most two cointegrating vectors, could not be rejected for any case. This implies that the variables are cointegrating, indicating a long-run equilibrium relationship among them in the time series, with the presence of at least one directional relationship.

The results about the long-run relationships among the variables, at a significance level of 5%, yield the following equations: [proceed to present the equations].

$$LEMPLOY = 7.07 - 0.486\ LRGDP + 0.2763\ LINV \qquad (4)$$

$$LRGDP = 14.53 + 0.567\ LINV - 0.255\ LEMPLOY \qquad (5)$$

Equations (4) and (5) elucidate a positive long-run association between employment and investment, while indicating a negative long-run impact of economic growth on employment. This finding substantiates the hypothesis of jobless growth during the post-economic reform era in India, with the unemployment rate persistently elevated. Equation (5) further unveils a positive long-run linkage between economic growth and investment, aligning with prior research findings [39, 41, 45, 46].

The observed negative correlation between economic growth and employment may stem from inefficient utilization of available fixed factors of production and insufficient technological advancement.

3.4. Causality Tests

The results of the cointegration tests led to the estimation of Equation (3), the Vector Error Correction Model (VECM), aiming to discern the direction of causality among investment, employment, and economic growth. The findings are outlined in Table 5. The table indicates the presence of unidirectional causality from Gross Domestic Product (GDP) to investment, which was significant at a 10% level of significance, during India's post-economic reform period. This finding aligns with previous studies suggesting that investment does not Granger cause economic growth.

Table 5: VEC Granger Causality Test Results.

Dependent Variable	Independent variables			
	DLINV	DLRGDP	DLEMPL	All variables
DLINV	-	9.7779 (0.0028***)	0.5322 (0.7662)	10.1084 (0.9472)
DLRGDP	5.5582 (0.0621)	-	3.9625 (0.1379)	9.1118 (0.0850*)
DLEMPL	10.2534 (0.0059***)	1.0555 (0.5859)	-	12.2411 (0.0011***)
Note: * imply a 10% significance level; *** implies a 1% significance level; **Source:** Author's computation				

Moreover, a unidirectional causality is observed from GDP to employment, contradicting the findings by Rajni (2013) for India. Additionally, a standard pairwise Granger causality test, as depicted in Table 6, confirms that GDP drives investment but not vice versa, indicating that economic growth propels investment in India. Furthermore, bi-directional causality is identified between GDP and employment, as well as between investment and employment, corroborating prior research by Rajni (2013).

Table 6: Pairwise Granger Causality Test.

Null Hypothesis	P-value
LINV does not Granger cause LRGDP	0.3513
LRGDP does not Granger cause LINV	0.0006***
LEMPL Does not Granger cause LRGDP	0.0586*
LINV does not Granger cause LEMPL	0.0157**
LRGDP does not Granger cause LEMPL	0.0003***
LEMPL does not Granger cause LINV	0.0816*
Note: *** implies rejection of the Null Hypothesis at a 1% significance level; ** implies the rejection of the Null Hypothesis at a 5% significance level; and * implies the rejection of the Null Hypothesis at a 10% significance level. **Source:** Author's Computation.	

Table 7 presents the results of the VECM estimation. The significance of the coefficient of real GDP from the VECM estimation suggests that real GDP adjusts in the short term to deviations from the long-run relationship. However, the decision criteria regarding the coefficients and t-values for the other variables indicate that they do not adjust in the short run to deviations from the long-run relationship.

Table 7: VECM Estimation Results.

Error Correction	D(LINV)	D(LRGDP)	D(LEMPL)
Cointegration Equation 1	0.0197	-0.0153	0.0154
	(0.0165)	(0.0044)	(0061)
	1.1952	-3.5118	2.5157
D {LINV (-1)}	0.7743	-0.04612	0.3254
	(0.4673)	(0.1232)	(0.1734)
	1,6567	3.7398	1.8767
D {LINV (-2)}	1.2230	-0.1669	0.3314
	(0.4960)	(0.1309)	(0.1840)
	2.2264	1.3751	1.8610
D {LRGDP (-1)}	0.3712	-0.0134	-0.0036
	(0.1154)	(0.0304)	(0.4285)
	3.2148	-0.4392	-0.0854
D {LRGDP (-2)}	-0.1373	-0.0579	0.0404
	(0.1117)	(0.0294)	(0.0414)
	-1.2300	-1.9646	0.9768
D {LEMPL (-1)}	0.1520	0.1314	0.0218
	(0.3138)	(0.0828)	(0.1164)
	0.4846	1.5868	0.1876
D {LEMPL (-2)}	-0.1574	-0.0200	0.1580
	(0.3942)	(0.0800)	(0.1128)
	-0.5127	1.2877	0.1406
Source: Author's Computation.			

3.5. Stability Tests

Table 8 displays the results of diagnostic tests conducted to assess the presence of serial correlation and heteroscedasticity. The outcomes reveal that there is no evidence of serial correlation or heteroscedasticity in the data. The null hypothesis, implying the absence of serial correlation, absence of heteroscedasticity, and adherence to a normal distribution, was accepted due to the insignificance of the probability values. These probability values exceeded the predetermined 5% significance level, as specified in Table 8. Therefore, the diagnostic tests support the validity of the model assumptions.

Table 8: Diagnostic Test Results.

Item	Applied Test	P-value	Decision
Serial Correlation	LM Test	0.4214	No serial correlation
Normality	Jacque- Bera Test	0.1976	Variables normal
Heterocedasticity	Breusch Pagan Godfrey Test	0.2699	No heterocedasticity
Source: Author's Computation.			

4. Conclusion

It is widely recognized that investment plays a fundamental role in the economic growth process, with economic growth being posited to stimulate employment generation, a critical concern for the labor-surplus Indian economy. However, the relationship between investment and economic growth remains a subject of ongoing debate, characterized by divergent findings in empirical studies, while the nexus between employment and economic growth remains inconclusive. This study delved into the dynamics of investment, economic growth, and employment in India during the post-economic reform period spanning from 1990 to 2021, employing the Vector Error Correction Model (VECM) framework. The results unveiled the existence of a long-run relationship among these variables, indicating evidence in support of bi-directional causality between employment and economic growth. Notably, economic growth was observed to precede investment, underscoring its pivotal role as a driver of investment and employment in the Indian context over the long term.

Moreover, the study confirmed the hypothesis of jobless growth during the post-economic reform period. It advocated for the pursuit of a more favorable economic

environment through enhanced infrastructural development and diversification of the economy, particularly into labor-intensive sectors such as agriculture and allied industries, to stimulate investment levels in the country. Such measures are deemed essential for addressing the challenges posed by jobless growth and fostering sustainable economic development in India.

Recommendations

The conclusions drawn from this study provide valuable insights that inform the following recommendations:

• The Government should strategically allocate budgetary resources by prioritizing capital expenditure over recurrent expenditure. This reallocation would facilitate the creation of employment opportunities, as capital spending has been identified as a significant driver of job creation.

• Policy interventions aimed at dismantling price controls and addressing structural rigidities are essential to foster a competitive environment conducive to private sector investment. By promoting competition, the private sector can be incentivized to increase investment activities, thereby contributing to economic growth and employment generation.

• Implementing sustainable subsidies targeted towards production can incentivize private sector investment, leading to a substantial reduction in unemployment. These subsidies should be designed to encourage long-term investment and innovation while minimizing adverse market distortions.

• The Government should develop tailored incentive packages to stimulate investment in sectors with low incremental capital-output ratios, such as Agriculture, Transportation, Energy Production, Telecommunication, Manufacturing, and Mining. By providing targeted incentives, the Government can attract investment to these sectors, thereby boosting employment opportunities.

• Prioritizing public investment in Agriculture and Allied Sectors is crucial, given their significant employment generation potential and role in ensuring food security. Augmenting public investment in these sectors can not only create employment opportunities but also enhance overall economic productivity and resilience.

Implementing these recommendations can contribute to fostering a conducive economic environment characterized by increased investment, sustainable growth, and reduced unemployment, ultimately leading to enhanced socioeconomic development.

References

1. Coombs, R., Green, K. (1981). Microelectronics and the future of service employment. *Service Industries Journal, 1*(2), 4-21.
2. Hodge, D. (2009). Growth, employment and unemployment in South Africa. *South African journal of economics, 77*(4), 488-504.
3. Frey, C. B., Osborne, M. (2015). *Technology at work: The future of innovation and employment.* Oxford, England: Citi GPS.
4. Levine, R., Renelt, D. (1992). A sensitivity analysis of cross-country growth regressions. *The American economic review,* 942-963.
5. Mankiw, N. G., Romer, D., Weil, D. N. (1992). A contribution to the empirics of economic growth. *The quarterly journal of economics, 107*(2), 407-437.
6. De Long, J. B., Summers, L. H., Abel, A. B. (1992). Equipment investment and economic growth: how strong is the nexus?. *Brookings Papers on Economic Activity, 1992*(2), 157-211.
7. Summers, R., & Heston, A. (1991). The Penn World Table (Mark 5): an expanded set of international comparisons, 1950–1988. *The Quarterly Journal of Economics, 106*(2), 327-368.
8. Lipsey, R. E., Blomström, M., Zejan, M. (1996). Is fixed investment the key to economic growth. *The Quarterly Journal of Economics, 111*(1), 269-276.
9. Carroll, C. D., Weil, D. N. (1994, June). Saving and growth: a reinterpretation. In *Carnegie-Rochester conference series on public policy* (Vol. 40, pp. 133-192). North-Holland.
10. Kannan, K. P., Raveendran, G. (2019). From jobless to job-loss growth. *Economic and Political Weekly, 54*(44), 38-44.
11. International Labour Organisation (2001): Key Indicators of Labour Market (KILM), 2001-2, ILO-UNDP.
12. Khan, A. R. (2001). Employment policies for poverty reduction. (*No Title*).
13. Sinha, J. K. (2022). Public Expenditure for Agricultural Development the Economic Growth of Bihar (1981-2019). *Asian Journal of Economics Finance, 4*(4), 414-424.
14. Sinha, J. K., Sinha, A. K. (2022). Syndrome of Declining Economic Importance of Agriculture in Bihar (1960-2018). *Journal of Humanities, Arts and Social Science, 1.*
15. Sinha, J.K.(2022b): Impact of Unemployment and Inflation on the Economic Growth of India, Journal of Development Economics Finance, 2022, Vol.3(2).
16. Sinha, J. K. (2022). Economic impact of unemployment and inflation on output growth in Bihar during 1990–2019. *Statistical Journal of the IAOS, 38*(1), 309-318.
17. Sinha, J. K. (2022). Unemployment, public expenditure economic growth in India during post economic reform period. *Journal of Economic Research and Review, 2*(4), 476-481.
18. Sinha, J. K. (2023). Economic Growth and Public Expenditure on Human Capital Formation in India: An Econometric Investigation. *Asian Journal of Economics and Finance, 5*(2), 141-158.
19. Sinha, J. K. (2023). IMPACT OF GOVERNMENT EXPENDITURE, UNEMPLOYMENT, INFLATION, AND HOUSEHOLDS' CONSUMPTION ON ECONOMIC GROWTH IN INDIA. *Studies in Economics and International Finance, 3*(1), 63-76.
20. Sinha, J.K. (2023c): Examining the influence of Inflation, Unemployment, Poverty, and Population Growth on Economic Development in India, Studies in Economics and International Finance (2023), Vol.3(1), pp. 25-43.
21. Padder, A. H. (2018). Changing Pattern of Economic Development and Employment in India: An Interstate Analysis. *Social Science and Humanities International*, 1-29.

Volume - 1 Issue - 2

Citation: Sinha., J. K. (2024). The Tripartite Interaction of Capital Formation, Economic Growth, and Unemployment in India's Post-Liberalization Era: A Quantitative Investigation. Open Access Journal of Economic Research. 1(2), 1-9.   **Page 8 of 9**

22. Michael, E. O., Emeka, A., Emmanuel, E. N. (2016). The relationship between unemployment and economic growth in Nigeria: Granger causality approach. *Research Journal of Finance and Accounting, 7*(24), 153-162.

23. Bond, S., Lebeblicioglu, A., Schiantarelli, F. (2007). Capital accumulation and growth: A new look at the evidence. IZA Discussion, 1174.

24. Jones, C. I. (1995). Time series tests of endogenous growth models. *The Quarterly Journal of Economics, 110*(2), 495-525

25. Mordecki, G., Ramírez, L. (2014). Investment, growth and employment: VECM for Uruguay. *Serie Documentos de Trabajo/FCEA-IE; DT07/14.*

26. Antelo, E. Valverde, F. (1994): Determinants of Private Investments in Bolivia, Unidad de Analisis de Polticas Sociales Econonucas, Vol .8 pp. 1-30.

27. Attanasio, O. P., Picci, L., Scorcu, A. E. (2000). Saving, growth, and investment: a macroeconomic analysis using a panel of countries. *Review of Economics and Statistics, 82*(2), 182-211.

28. Cheung, Y. W., Dooley, M. P., Sushko, V. (2012). *Investment and growth in rich and poor countries* (No. w17788). national Bureau of economic research.

29. Ibarra, D., Moreno-Brid, J. C. (2004). Private investment, foreign direct investment and economic growth. *ECLAC, United Nations.*

30. Podrecca, E., Carmeci, G. (2001). Fixed investment and economic growth: new results on causality. *Applied Economics, 33*(2), 177-182.

31. Bekhet, H. A., bt Othman, N. S. (2011). Causality analysis among electricity consumption, consumer expenditure, gross domestic product (GDP) and foreign direct investment (FDI): Case study of Malaysia. *Journal of economics and international finance, 3*(4), 228.

32. Kanu, S. A. Ozurumba, B.A. (2014): Capital formation and economic growth in Nigeria, Global Journal of Human Social Science. Vol.4(4), pp.1-17.

33. Shuaib, I. M., Ndidi, D. E. (2015). Capital formation: impact on the economic development of Nigeria 1960-2013. *European Journal of Business, Economics and Accountancy, 3*(3), 23-40.

34. Adegboyega, S. B., Odusanya, I. (2014). Empirical analysis of trade openness, capital formation, FDI and economic growth: Nigeria experience. *The International Journal of Social Sciences and Humanities Invention, 1*(1), 36-50.

35. Mohsen, M. Meysam, M. (2013): The causality between capital formation and economic growth in MENA regions. International Letters of Social and Humanistic Science, Vol.8, pp.1-7.

36. Rajni, P. (2013). Linkages between export, import and capital formation in India. *International Research Journal of social sciences, 2*(3), 16-19.

37. Iacovoiu, V. B. (2012). Impact of Capital Investments on Unemployment in the Context of Economic Crisis. The Case of Romania. *Economic Insights-Trends Challenges, 64*(4).

38. Karim, K.A., Karim, B. A., Zaidi, M.A.S. (2012): Fixed investment, household consumption, and economic growth: A structural vector error correction model (SVECM) study of Malaysia, International Journal of Business Society, Vol.13(1), pp.63-74.

39. Ncanywa, T., Makhenyane, L. (2016). Can investment activities in the form of capital formation influence economic growth in South Africa?.

40. Kumo, W. L. (2012). Infrastructure investment and economic growth in South Africa: A granger causality analysis. *African development bank group working paper series, 160.*

41. Meyer, D. F., Sanusi, K. A. (2019). A causality analysis of the relationships between gross fixed capital formation, economic growth and employment in South Africa. *Studia Universitatis Babes-Bolyai Oeconomica, 64*(1), 33-44.

42. Levin, A., Lin, C. F., Chu, C. S. J. (2002). Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of econometrics, 108*(1), 1-24.

43. Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. Econometrica: *journal of the Econometric Society,* 1551-1580.

44. Antonio, E. Ahmed, Y. (2001): Casual relation between domestic savings and economic growth: Evidence from seven African countries. African Development Review, Vol.3(2), pp.238-249.

45. Kanu, S. I., Ozurumba, B. A. (2014). Capital formation and economic growth in Nigeria. *Global Journal of human-social science: Economics, 14*(4), 43-58.

46. Ugochukovu, U.S. Chainyere, U.P. (2013): Impact of capital formation on the growth of Nigerian economy. Research Journal of Finance and Accounting. Vol. 4(9), pp.36-42.