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Interplay of Capital Formation, Economic Growth, and Unemployment in India's Post-Economic Reform Era: A Quantitative Study

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A B S T R A C T

Introduction: Gross Fixed Capital Formation (GFCF) is a critical pillar within domestic investment frameworks, wielding substantial influence over economic growth trajectories and unemployment dynamics. However, the nuanced relationships between investment, economic expansion, and employment remain subject to continual empirical scrutiny, yielding divergent conclusions. Despite India's sustained but moderate investment and economic growth rates, the nation confronts persistent unemployment. This study explores the intricacies of investment, economic advancement, and employment within the Indian landscape, leveraging authoritative data from entities such as the Ministry of Statistics and Programme Implementation (MoSPI) and the Government of India.

Method: Employing the Johansen Co-integration and Vector Error Correction Model (VECM) methodologies, this research endeavours to unravel the underlying interconnections among these variables. 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.

Results: Findings unveil enduring relationships, underpinning bidirectional causality between employment levels and economic expansion. Notably, economic upswings serve as precursors to heightened investment endeavours, underscoring their catalytic role in fostering employment opportunities over prolonged periods within India. Furthermore, the study corroborates the notion of jobless growth prevalent in the post-economic reform era.

Conclusion: It accentuates the urgency of cultivating a more conducive economic milieu via augmented infrastructural undertakings and diversification strategies, especially in labour-intensive domains like agriculture and allied sectors. Such strategic interventions emerge as imperative for bolstering investment inflows and ameliorating the prevailing unemployment conundrums gripping the nation.

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

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Introduction

The symbiotic relationship between Gross Fixed Capital Formation (GFCF) and economic development is pivotal, with capital formation acting as a catalyst for reducing unemployment, achieving economic stability, and enhancing overall living standards. Conversely, economic development fuels the acceleration of capital formation. As the primary component of domestic investment, capital formation plays a crucial role in macroeconomic policy, driving economic growth and employment. Theoretically, an increase in investment is expected to generate more job opportunities or elevate employment levels. Likewise, a higher economic growth rate is argued to stimulate domestic investments, indicating a bidirectional causality between investment and economic growth.

However, advancements in innovations, science, and technology have introduced the phenomenon of "Jobless Growth," wherein automation and mechanization replace manpower with machines.[1–3] While these technological advancements enhance productivity by streamlining tasks, they also pose a risk of job displacement within the economy, potentially leading to jobless growth. Despite its significance, the literature on this subject is limited, with empirical studies scarcely examining the impact of investment on employment generation.

Studies by Levine and Renelt, Mankiw et al., and De Long et al. have contributed significantly to understanding the positive relationship between investment and economic growth.[4–6] They suggest that heightened growth is stimulated by increased investment rates, particularly in equipment. Furthermore, De Long et al. assert this relationship, emphasising the pivotal role of investment in driving economic expansion.[6] Summers & Heston conducted a comprehensive study across 101 OECD countries, observing a consistent pattern where an increase in investment levels is preceded by sustained and long-term economic growth.[7]

Contrastingly, Blomstrom et al. and Carroll and Weil present differing findings. Their research indicates that while economic growth Granger-causes investment, the reciprocal relationship—investment Granger-causing economic growth—is not readily apparent.[8,9] These diverging perspectives underscore the complexity of the relationship between investment and economic growth, necessitating further research and nuanced policy considerations.

Indian Economic Situation

The Indian economic landscape has experienced robust growth, averaging over 6% annually for the past three decades, coinciding with significant economic reforms. However, despite expectations of a decline in unemployment, the formal sector has struggled to create sufficient job opportunities, leading to a notable surge in unemployment across various sectors. India continues to grapple with macroeconomic challenges marked by stagnant economic growth and persistently high unemployment rates.

Recent employment data reveals a significant deceleration in employment growth from 2012 to 2016, with a notable absolute decline observed between 2013–14 and 2015–16. Independent surveys, such as Kannan and Raveendran, and reports from the United Nations (ILO), also underscore an increase in unemployment figures.[10] Economists attribute this trend to the failure to align economic growth with proportional employment expansion, as the expansion of the Indian economy has mainly generated a limited number of well-paying jobs. A visible shift towards informal employment is evident, with a substantial portion of the workforce transitioning to unorganized sectors. Furthermore, the decline in the labor force participation rate exacerbates the employment challenge, signaling a need for policy interventions to stimulate job creation.

Various studies have employed a log-linearised model to demonstrate a negative and significant employment elasticity of economic growth, indicative of jobless growth in the post-economic reform period. The high levels of unemployment observed in India are attributed to the low employment intensity of GDP growth, emphasizing the necessity for labour-intensive investment policies to effectively address employment challenges.[11–18]

The paradoxical situation of high economic growth coexisting with rising unemployment has prompted extensive research aimed at understanding and addressing these phenomena. Unemployment not only hampers output and economic growth but also poses social challenges, including increased susceptibility to criminal activities. Conversely, a reduction in unemployment rates justifies public expenditure in social and economic infrastructure, believed to enhance overall economic performance and productivity.

Public expenditure plays a crucial role in mitigating regional disparities and creating essential infrastructure for economic growth, including sectors such as education, health, transportation, communication, and research and development. Government intervention is deemed necessary to rectify market inadequacies and ensure full employment across various economic sectors.

The pursuit of employment generation stands as a paramount macroeconomic goal in India, given its pivotal role in alleviating poverty and fostering inclusive growth. Despite political rhetoric and policy initiatives aimed at promoting employment, achieving meaningful progress remains elusive. The economic reforms initiated in 1991 were a significant step towards addressing employment challenges; however, unemployment persists despite positive growth indicators.

Unemployment in India stems from various factors, including negative developments in economic activities, labor substitution for capital, and an expanding workforce supply. Although the economic reforms of the 1990s aimed to liberalize markets, attract foreign investment, and stimulate economic growth, their implications for employment generation lagged, resulting in heightened unemployment rates.

This study aims to revisit the causal relationships between investment, economic growth, and employment, contributing to empirical research on these interconnected dynamics. By elucidating the direction of causality between investment and economic growth, as well as between investment and employment, the study seeks to inform policy interventions aimed at promoting sustainable economic development and inclusive growth in India.

Literature Review

The theoretical significance of domestic investment as a catalyst for economic growth has been extensively explored across various economic paradigms, including the Keynesian view of growth (Harrod-Domar model), neoclassical growth theory (Solow & Denison), and endogenous growth theories. Empirical studies have scrutinized these theoretical underpinnings, shedding light on the complex relationship between investment, economic growth, and employment.

Bond et al. conducted a comprehensive investigation across 94 non-OECD countries, concluding that a significant portion of investment and economic growth contributes to higher output per worker and long-term growth rates.[19] However, they noted that investment does not Granger cause economic growth, aligning with findings by Jones and Blomstrom et al., emphasizing the importance of investment in shaping the growth trajectory of the economy.[8,20]

Nevertheless, in developing countries with underdeveloped financial markets, interest rates may not significantly influence investment decisions. Attanasio et al. provided evidence suggesting that investment Granger causes economic growth, emphasizing the pivotal role of investment in driving long-term growth and productivity gains.[21]

Cheung et al. explored the association between investment and economic growth across 188 rich and poor countries, suggesting a negative correlation, particularly in developing countries.[22] Ibarra & Moreno-Brid found that investment crucially depends on real wage growth in Mexico, highlighting the intricate linkages between investment and labour market dynamics.[23]

Mordecai & Ramirez identified a long-term relationship between economic growth, investment, and employment in Uruguay, suggesting that economic growth precedes investment and employment, while investment also precedes employment.[24] Similarly, Porreca & Carmecci used panel data in European countries to establish bi-directional causality between investment and economic growth.[25]

Kanu & Ozurumba investigated the impact of capital formation on economic growth using multiple regression analysis and VAR models, confirming a positive relationship in the long run.[26] Shuaib & Ndidi and Adagboyega & Odusanya supported these findings.[27,28]

Mohsen & Meysam explored causality between economic growth and investment in the Middle East and North African countries, suggesting that economic growth primarily drives investment.[29] Rajni argued for unidirectional causality from capital formation to changes in exports in India.[30]

Iacovone concluded that net capital formation significantly affects employment in Romania.[31] Karim et al. confirmed the impact of fixed investment on economic growth in Malaysia.[32]

Ncanywa & Makhenyane revealed a positive relationship between gross fixed capital formation and economic growth in South Africa, with bi-directional causality.[33] Kumo also found a bi-directional causality between infrastructural investment and economic growth in South Africa.[34]

Meyer & Sanusi examined South African data, highlighting a long-term relationship between domestic investment, employment, and economic growth. They suggested a causal relationship between economic growth and investment, with positive long-term impacts on employment.[35]

Overall, the literature lacks consensus on the direction of causality between investment, economic growth, and employment. This discrepancy motivated a closer examination of these relationships within the Indian context, specifically focusing on the post-economic reform period (1990–2023) using the Vector Error Correction Model.

Variables & Data

The study employs a set of key variables to examine the relationship between economic growth, domestic investment, and employment. Economic growth is measured by the real gross domestic product (GDP), serving as a fundamental indicator of the overall economic performance. Domestic investment is represented by gross fixed capital formation, capturing the level of investment in physical assets within the domestic economy. Employment is quantified by the number of people engaged in productive activities, reflecting the labour market dynamics.

The integrity of the study hinges upon the quality and reliability of the data utilized. To ensure robustness, secondary data sourced from reputable sources such as the World Development Indicators (WDI) databank, the International Financial Statistics (IFS) database of the International Monetary Fund (IMF), and the Ministry of

Statistics and Programme Implementation (MOSPI) along with various related departments of the Government of India, spanning the period from 1990–91 to 2022–23, comprising 33 observations. These sources provide comprehensive and reliable datasets crucial for the analysis.

To facilitate analysis, the collected data was transformed into a logarithmic form. This conversion aids in managing the scale of the variables and facilitates comparison and interpretation of the results. Specifically, the variables were listed as the log of real GDP (LRGDP), the log of investment (LINV), and the log of employment (LEMPLOY), as depicted in Table 1.

Table 1.Description of Variables[36]

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

LINV: Log of Investment, LRGDP: Log of Real GDP, LEMPLOY: Log of Employment

In conducting the analysis, rigorous and reliable methods have been meticulously selected to minimize the risk of misinterpretations and errors. By employing robust analytical techniques and adhering to rigorous methodological standards, the study endeavors to provide accurate insights into the relationship between economic growth, domestic investment, and employment dynamics in the Indian context.

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 Levin et al.:[37]

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

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. Johansen suggested a method to test for cointegration by suggesting the following p-variable VAR model:[38]

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

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:

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

Where Γ_i is the parameters; π is the parameter matrix whose rank defines the long-run relationship between the various variables in the model. Johansen[38] formulated the test statistic to determine the r based on the maximum likelihood estimation method, firstly the trace test and secondly the maximum eigenvalue test. 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 coefficients of the differences of the explanatory variables are not jointly significant.[39]

Result & Discussion

Descriptive Statistics

Descriptive statistics were computed for Employment, Gross Fixed Capital Formation (GFCF), and real Gross

Domestic Product (GDP) spanning the post-reform period from 1991–92 to 2022–23, as illustrated in Table 2.

Table 2.Descriptive Statistics of LRGDP, LEMPL, and LPINV

Descriptive Statistics	LRGDP	LEMPL	LINV
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

LRGDP: Log of Real GDP, LEMPL: Log of Employment, LINV: Log of Investment

Throughout this period, India experienced a mean economic growth rate of 5.788, indicating a significant positive trend in the growth rate of real GDP following the implementation of economic reforms. Similarly, the mean employment rate stood at 2.760, reflecting a notable increase in employment levels over the post-reform period. Public investment, as measured by Gross Fixed Capital Formation, converged around a mean value of 5.267 during this period, underscoring a substantial rise in public investment levels. The observed trends in these series suggest that economic reforms have effectively achieved their primary objectives of stimulating economic growth, enhancing public investment, and bolstering employment opportunities. However, the pace of employment generation has not kept pace with economic growth and investment, highlighting persistent challenges in the employment landscape and giving rise to socio-economic concerns in the long run.

Furthermore, the standard deviation of the economic growth series surpassed that of the employment and public investment series, indicating greater volatility in economic growth compared to employment and public investment trends. Moreover, the skewness and kurtosis coefficients for all three series exhibited deviations from the normal distribution, indicating asymmetry in their distributions. These variances imply an asymmetrical distribution of the variables, as evidenced by skewness and kurtosis coefficients departing from the expected norms of a normal distribution.

The Unit Root Test

The study utilized unit root tests on the time series data, employing both the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron test. The results of these tests are concisely outlined in Table 3, providing insights into the time series properties of the variables.

Table 3.Unit Root Results

Variables	ADF Test		PP Test	
	t Value	p Value	t Value	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*

ADF: Augmented Dickey-Fuller, PP: Phillips-Perron, LINV: Log of Investment, LRGDP: Log of Real GDP, LEMPL: Log of Employment

*implies the rejection of the null hypothesis at a 1% significance level.

According to the findings, both the trend and intercept were found to be statistically significant for all three variables examined. This indicates the presence of deterministic trends in the time series data.

Furthermore, the results indicate that all three variables were non-stationary at level I(0), suggesting the presence of a unit root in their original form. However, upon differencing the time series data once, they exhibited stationarity at level I(1) at a significance level of 5%. This implies that the variables are integrated of order 1 (I(1)), indicating that they possess a unit root in their first difference, which renders them stationary.

In essence, the unit root tests confirmed that the time series data for the variables under consideration exhibit a stationary behavior after differencing, which is essential for conducting further time series analysis and modeling.

Long-Run Analysis

After confirming stationarity in the time series data, the study proceeded to employ the Johansen cointegration test to explore potential long-run relationships among the variables by assessing any linear combination possessing a common stochastic trend. Given the sensitivity of the Johansen test to the lag length selected, a lag selection procedure was undertaken to identify the optimal lag length. Following the application of various lag selection criteria, a lag length of 2 was deemed optimal for the analysis.

In a three-variable system consisting of economic growth, employment, and investment, the maximum number of cointegrating vectors expected is 2. Accordingly, the null hypothesis suggests the absence of any cointegrating vector, while the alternative hypothesis indicates the presence of at least one cointegrating vector.

The outcomes of the cointegration analysis, detailed in Table 4, reveal that the null hypothesis of no cointegration was rejected at a significance level of 5% across all cases. However, the alternative hypothesis, suggesting the existence of at most two cointegrating vectors, could not be rejected for any case. This implies that the variables under consideration are indeed cointegrating, indicating a long-run equilibrium relationship among them in the time series data, with the presence of at least one directional relationship.

Both the Trace test and Maximum Eigen test results show cointegrating at the 5% significance level.

The results of the long-run relationships among the variables, at a significance level of 5%, are represented by the following equations:

LEMPLOY = 7.07 – 0.486 LRGDP + 0.2763 LINV (4)

LRGDP = 14.53 + 0.567 LINV – 0.255 LEMPLOY (5)

Equations (4) and (5) reveal important insights into the long-run relationships among the variables studied. Specifically, Equation (4) illustrates a positive long-run association between employment and investment, indicating that

as investment levels increase over time, employment opportunities also tend to expand. Conversely, Equation (5) suggests a negative long-run impact of economic growth on employment, implying that higher economic growth rates are associated with lower levels of employment. This finding lends support to the notion of jobless growth observed during the post-economic reform era in India, wherein despite economic expansion, unemployment rates have remained persistently high.

Furthermore, Equation (5) highlights a positive long-run linkage between economic growth and investment, indicating that as the economy grows, investment levels tend to increase as well. This finding aligns with previous research findings by Mordecai & Ramirez, Kanu & Ozurumba, Ncanywa & Makhenyane, Meyer & Sanusi, and Ugochukovu & Chinyere, which have similarly documented the positive relationship between economic growth and investment.[24,26,33,35,40]

The observed negative correlation between economic growth and employment may be attributed to various factors, including inefficient utilization of available fixed factors of production and insufficient technological advancement. Inefficient allocation of resources and a lack of adequate skills matching between the labour force and available job opportunities may also contribute to this negative correlation. Overall, these findings underscore the complex interplay between economic growth, investment, and employment dynamics, highlighting the need for targeted policy interventions to address the challenges of unemployment and ensure inclusive economic growth.

Causality Tests

The results of the cointegration tests prompted the estimation of Equation (3), employing the Vector Error Correction Model (VECM) to discern the direction of causality among investment, employment, and economic growth. The findings, summarised in Table 5, offer valuable insights into the dynamics of these interrelated variables during India's post-economic reform period.

Table 5 indicates the presence of unidirectional causality from Gross Domestic Product (GDP) to investment, significant at a 10% level of significance. This finding aligns with prior research suggesting that investment does not Granger cause economic growth. Furthermore, a unidirectional causality is observed from GDP to employment, which contradicts previous findings by Rajni[30] for India.

Additionally, a standard pairwise Granger causality test, as illustrated in Table 6, confirms that GDP drives investment but not vice versa, indicating that economic growth propels investment in India.

Moreover, bi-directional causality is identified between GDP and employment, as well as between investment and employment, which corroborates prior research by Rajni[30]. Moving forward, Table 7 presents the results of the VECM estimation.

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

* implies the rejection of the null hypothesis at a 5% significance level.

Table 5.Vector Error Correction Granger Causality Test Results

Dependent Variable	Independent Variable			
	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***)

LINV: Log of Investment, LRGDP: Log of Real GDP, LEMPL: Log of Employment

* implies a 10% significance level, *** implies a 1% significance level.

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*

LINV: Log of Investment, LRGDP: Log of Real GDP, LEMPL: Log of Employment

*** implies the 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.

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.

Overall, these findings shed light on the intricate causal relationships among investment, employment, and economic growth in the Indian context, emphasizing the role of economic growth as a driver of investment and employment dynamics, and highlighting the short-term adjustment of real GDP to deviations from the long-run equilibrium.

Stability Tests

Table 8 presents the results of diagnostic tests conducted to evaluate the presence of serial correlation and heteroscedasticity in the data. These tests are crucial for assessing the robustness and reliability of the statistical model utilized in the analysis.

The diagnostic tests' outcomes indicate no evidence of serial correlation or heteroscedasticity in the data. Specifically, the null hypothesis, which suggests the absence of serial correlation, the absence of heteroscedasticity, and adherence to a normal distribution, was accepted. This acceptance is based on the insignificance of the probability values associated with these tests.

The probability values obtained from the diagnostic tests exceeded the predetermined 5% significance level, as specified in Table 8. Consequently, the diagnostic tests lend support to the validity of the model assumptions, indicating that the statistical model employed in the analysis adequately captures the underlying relationships among the variables without exhibiting serial correlation or heteroscedasticity issues.

Overall, these findings contribute to enhancing the credibility and reliability of the statistical analysis conducted, ensuring that the results derived from the model are robust and trustworthy.

Table 7.Vector Error Correction Model (VECM) Estimation Results

Error Correction	D(LINV)	D(LRGDP)	D(LEMPL)
Cointegration Equation 1	0.0197	-0.0153	0.0154
	(0.0165)	(0.0044)	(0.0061)
	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

LINV: Log of Investment, LRGDP: Log of Real GDP, LEMPL: Log of Employment

Table 8.Diagnostic Test Results

Item	Applied Test	p Value	Decision
Serial correlation	Lagrange Multiplier Test	0.4214	No serial correlation
Normality	Jacque-Bera Test	0.1976	Variables normal
Hetero-scedasticity	Breusch Pagan Godfrey Test	0.2699	No Hetero-scedasticity

Recommendations

The conclusions drawn from this study provide significant insights that underpin the formulation of the following recommendations:

- **Strategic Allocation of Budgetary Resources:** The government should prioritize capital expenditure over recurrent expenditure in budgetary allocations. This strategic reallocation of resources holds the potential to substantially contribute to the creation of employment opportunities, as capital spending has been identified as a primary driver of job creation.
- **Policy Interventions to Foster a Competitive Environment:** Implementing policy interventions aimed at dismantling price controls and addressing structural rigidities is crucial. By fostering a competitive environment conducive to private sector investment, these interventions can incentivize increased investment activities, thereby fostering economic growth and generating employment.
- **Sustainable Subsidies for Production:** It is recommended to provide sustainable subsidies targeted towards production. These subsidies should be designed to encourage long-term investment and innovation while minimizing adverse market distortions.
- **Tailored Incentive Packages:** Tailored incentive packages should be developed by the government to stimulate investment in sectors with low incremental capital-output ratios. Sectors such as Agriculture, Transportation, Energy Production, Telecommunication, Manufacturing, and Mining offer significant potential for employment generation and economic growth. Targeted incentives can attract investment to these sectors, thereby enhancing employment opportunities.
- **Public Investment in Agriculture and Allied Sectors:** Prioritising public investment in agriculture and allied sectors is crucial due to their substantial employment generation potential and critical 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.

By implementing these recommendations, policymakers can contribute to fostering a conducive economic environment characterized by increased investment, sustainable growth, and reduced unemployment. Ultimately, these efforts will lead to enhanced socioeconomic development and prosperity for the nation.

Conclusion

The pivotal role of investment in driving economic growth is widely acknowledged, particularly in the context of India's labour-surplus economy, where employment generation is a paramount concern. However, the precise nature of the relationship between investment and economic growth remains a subject of ongoing debate, characterized by divergent findings in empirical studies. Similarly, the interplay between employment and economic growth continues to elicit scholarly discussion, with inconclusive results.

Against this backdrop, this study embarked on a comprehensive exploration of the dynamics among investment, economic growth, and employment in India, focusing on the post-economic reform period spanning from 1990 to 2021. Employing the robust Vector Error Correction Model (VECM) framework, the investigation aimed to unravel the intricate relationships among these key variables.

The findings of the study unveiled a compelling long-run relationship among investment, economic growth, and employment, providing robust evidence in favour of bi-directional causality between employment and economic growth. Particularly noteworthy was the observation that economic growth tended to precede investment, highlighting its indispensable role as a catalyst for both investment and employment dynamics within the Indian economic landscape over extended time horizons.

Furthermore, the study lent empirical support to the hypothesis of jobless growth during the post-economic reform era. It underscored the pressing need for concerted efforts to cultivate a more conducive economic environment, emphasizing the importance of enhanced infrastructural development and diversification of the economy, especially in labour-intensive sectors like agriculture and allied industries. Such strategic measures are deemed imperative for revitalizing investment levels and mitigating the challenges posed by jobless growth, thereby fostering sustainable and inclusive economic development in India.

In summary, this study not only contributes to a deeper understanding of the complex interplay among investment, economic growth, and employment but also offers valuable insights to policymakers and stakeholders, guiding efforts aimed at promoting robust and equitable economic growth in India.

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