

Examining the Relationship between Inflation and Organised Sector Employment in India: Evidence from 1974-75 to 2010-11

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ABSTRACT

Purpose: This study examines the relationship between inflation and organised-sector employment in India, with particular emphasis on the private and public sectors, over the period 1975–2011. It assesses whether inflation significantly affects organised-sector employment and examines the roles of GFCF and real GDP growth in explaining employment dynamics across the private and public sectors.

Methods: The study uses annual data on CPI-IW inflation, organised private- and public-sector employment, gross fixed capital formation (GFCF), and real GDP growth. The analysis employs unit-root tests, structural-break analysis, ARDL bounds testing, an error-correction model (ECM), diagnostic and stability tests, and Granger causality analysis to examine both short- and long-run relationships.

Findings: The results reveal substantial variation and structural breaks in inflation, employment, and economic growth. The ARDL bounds test finds no long-run relationship for private-sector employment but establishes a significant relationship for public-sector employment. The ECM shows rapid adjustment, with 82.9 per cent of short-run disequilibrium corrected annually. In the long run, GFCF is negatively associated with public-sector employment, while inflation and real GDP growth are insignificant. Granger causality runs from GFCF to public-sector employment and from public-sector employment to real GDP growth. The findings do not support a conventional Phillips Curve mechanism.

Implications: The findings suggest that employment depends more on investment, growth, and structural factors than on inflation. Policy should therefore prioritise productive investment, sector-specific employment strategies, and macroeconomic stability.

Originality: The study contributes by examining inflation–employment dynamics separately across organised private and public sectors using long-run, short-run, structural-break, and causality analyses. The findings show that employment responses to inflation differ by sector, with investment and institutional factors appearing more important than inflation.



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1. Introduction

Employment is one of the most important indicators of economic performance because it provides a direct link between economic activity, household income, living standards, and social welfare. In developing economies such as India, employment generation is also closely associated with poverty reduction, inclusive growth, and the expansion of economic opportunities. However, employment does not respond uniformly to changes in macroeconomic conditions. The private and public sectors operate under different institutional and economic environments and may therefore respond differently to inflation, investment, and

economic growth. Private-sector employment is generally influenced by business conditions, investment, productivity, technological change, and market demand, whereas public-sector employment is more closely associated with government expenditure, administrative arrangements, and institutional commitments (Government of India, 1969).

Inflation is another major macroeconomic indicator with important implications for employment and economic growth. Moderate inflation may accompany expanding economic activity, but persistent or unexpected increases in prices can reduce purchasing power, affect real wages, influence investment decisions, and create uncertainty

for households and firms. Consequently, maintaining price stability while supporting output and employment has remained an important concern of economic policy. India's economic planning has historically emphasized the objective of achieving economic growth without generating excessive inflation. The international experience of the 1970s, particularly the coexistence of high inflation and high unemployment, further intensified the debate concerning the relationship between inflation and labor-market outcomes.

The theoretical foundation for analyzing the relationship between inflation and labor-market conditions can be traced to Phillips (1958), who reported an inverse relationship between unemployment and the rate of change of money wages in the United Kingdom. The Phillips Curve subsequently became an important framework for understanding the possible short-run trade-off between inflation and unemployment. Samuelson and Solow (1960) extended the discussion by relating the Phillips Curve to price inflation and interpreted the relationship in the context of macroeconomic stabilization policy. However, the experience of stagflation during the 1970s challenged the assumption of a stable long-run trade-off between inflation and unemployment. Friedman (1968) and Phelps (1967) subsequently emphasized the role of inflation expectations, arguing that any trade-off is primarily a short-run phenomenon and that unemployment tends to return towards its equilibrium or natural rate as expectations adjust. Later developments, including rational expectations and New Keynesian approaches (Lucas, 1976; Mankiw, 2001), further incorporated expectations, nominal rigidities, and economic slack into the analysis of inflation dynamics.

Although the Phillips Curve traditionally examines the relationship between inflation and unemployment, employment can also provide a useful perspective for examining labor-market responses to macroeconomic conditions. This is particularly relevant in the Indian context, where organized-sector employment has distinctive institutional characteristics. Inflation may influence employment indirectly through real wages, production costs, aggregate demand, and investment decisions, while employment itself may respond to broader structural and institutional changes in the economy. Therefore, the relationship between inflation and employment cannot necessarily be assumed to follow the simple inverse pattern suggested by the traditional Phillips Curve.

The Indian economy experienced several significant economic and structural transformations during the study period. The period from 1974–75 to 2010–11 encompasses episodes of considerable inflationary pressure, international oil-price shocks, changes in economic policy, the 1991 economic reforms, increasing market orientation, and subsequent expansion of private-sector activity. These

developments potentially altered the behavior of inflation, investment, output, and employment dynamics, making it important to account for structural breaks, as their omission may lead to misleading inferences about stationarity and long-run relationships.

Against this background, the study examines the relationship between organized-sector employment and selected macroeconomic variables in India from 1974–75 to 2010–11, distinguishing between organized private- and public-sector employment. The explanatory variables include inflation measured by the Consumer Price Index for Industrial Workers (CPI-IW), real GDP growth, and gross fixed capital formation as a percentage of GDP (GFCF), thereby extending the conventional inflation–employment analysis to account for the roles of investment and economic activity in employment outcomes.

The empirical analysis employs descriptive statistics, correlation analysis, and variance inflation factors to examine the variables and assess multicollinearity. Conventional unit-root tests, including the Augmented Dickey–Fuller and Phillips–Perron tests, are complemented by endogenous structural-break unit-root analysis to account for changes in the time-series behavior of the variables. The structural-break analysis identifies significant changes in the variables, with break dates in 1999 for CPI-IW, 2004 for private-sector employment, 1979 for public-sector employment, 2001 for GFCF, and 1979 for real GDP growth, highlighting the importance of accounting for structural changes in the subsequent econometric analysis.

Given the mixed order of integration, the study employs the autoregressive distributed lag (ARDL) framework to examine short- and long-run relationships. Separate ARDL specifications are estimated for private- and public-sector employment to capture sector-specific differences in their macroeconomic determinants. The ARDL bounds test finds no evidence of a long-run relationship for private-sector employment ($F = 1.839557$), as the statistic falls below the lower critical bound at the 10 percent level. In contrast, the test provides strong evidence of a long-run relationship for public-sector employment ($F = 5.765831$), as the statistic exceeds the upper critical bound at the 1 percent level. The public-sector error-correction model (ECM) coefficient of -0.829203 is negative and highly significant, indicating that approximately 82.9 percent of short-run disequilibrium is corrected within a year. Further, pairwise Granger causality, diagnostic, and parameter-stability tests are employed to assess causal relationships, model adequacy, and stability. Together with unit-root, structural-break, and ARDL analyses, these methods provide a comprehensive assessment of employment dynamics.

The study addresses a gap in the literature by examining organized-sector employment, distinguishing between

private and public employment, and accounting for structural breaks in India's economic structure.

The study therefore aims to (i) examine the trends and statistical characteristics of inflation, organized private- and public-sector employment, GFCF, and real GDP growth; (ii) investigate their short- and long-run relationships; (iii) identify structural breaks; (iv) compare the determinants of private- and public-sector employment; and (v) examine Granger causality among employment, inflation, investment, and economic growth.

The study is significant from both academic and policy perspectives. It extends the inflation–employment debate by focusing on organized-sector employment and sectoral differences. From a policy perspective, the findings provide insights into the roles of inflation, investment, economic growth, and sector-specific factors in employment generation and inform policies for productive investment, growth, and macroeconomic stability.

The remainder of the paper is organized as follows. Section 2 reviews the relevant theoretical and empirical literature. Section 3 presents the data, variables, theoretical framework, and methodology. Section 4 examines inflation and employment growth in private and public sectors. Sections 5 and 6 present the regression analysis for private- and public-sector employment growth, respectively. Section 7 discusses the empirical results, while Section 8 provides a comparative analysis of private- and public-sector employment. Section 9 presents the overall results and discussion. The penultimate section discusses limitations of the study and avenues for future research, while the final section concludes the study and discusses its policy implications.

2. Review of Literature

Empirical evidence on the Phillips Curve has produced mixed and often conflicting results. While early studies, particularly in advanced economies, supported a short-run trade-off between inflation and unemployment, subsequent research has shown that this relationship is neither stable nor universal. Its validity depends on inflation expectations, labour-market conditions, monetary policy, supply shocks, and institutional factors. An early alternative view was offered by Law (1750), who argued that monetary expansion could stimulate production and employment without necessarily causing inflation when unused resources and economies of scale permit output to expand without corresponding price increases (Humphrey, 1985). Thus, higher employment or lower unemployment need not necessarily be accompanied by higher inflation.

The applicability of the Phillips Curve to India has attracted considerable attention because of the country's

distinct inflation dynamics and labour-market structure. Inflation is shaped by both demand- and supply-side factors, including food and commodity prices, weather conditions, energy prices, exchange rates, and domestic demand, while employment depends on investment, growth, technology, labour-market institutions, government policies, and structural transformation. Consequently, empirical evidence on the inflation–employment relationship in India remains inconclusive.

Dholakia (1987, 1990) found limited evidence of a stable Phillips Curve in India, highlighting structural rigidities and supply-side factors. Paul (2009) showed that the relationship could emerge when macroeconomic and supply-side factors were incorporated. Patra and Ray (2010) identified inflation expectations, demand conditions, and supply disturbances as key determinants of inflation within a New Keynesian framework. Similarly, Singh et al. (2011) found support for the Phillips Curve after accounting for supply shocks and estimating the output gap using a nonlinear Kalman-filter approach. Kapur (2013) further demonstrated the usefulness of augmented Phillips Curve specifications for explaining and forecasting inflation in India. Recent research has continued to question whether inflation in emerging economies can be explained solely by demand-side conditions or a conventional Phillips curve. Behera et al. (2018) revisited the Phillips Curve for India during the transition to flexible inflation targeting, highlighting the importance of CPI-based inflation dynamics and changes in the monetary-policy framework.

Evidence from the Reserve Bank of India indicates that supply disruptions, including adverse weather and the COVID-19 shock, increased the contribution of supply-side factors to inflation, underscoring the need to distinguish between demand- and supply-driven inflation. Recent evidence has increasingly emphasised supply-side sources of inflation, particularly food, fuel, energy, and commodity prices. This is especially relevant for India, where such factors can affect consumer inflation independently of domestic demand.

Recent international research further highlights the role of goods-price and supply shocks in inflation. Dao et al. (2024) find that post-pandemic headline inflation was strongly influenced by energy prices, food prices, and supply-chain disruptions, with transmission to underlying inflation shaped by labour-market tightness and broader macroeconomic conditions. Similarly, recent IMF research (Gudmundsson et al., 2024) shows that relative goods-price changes and sector-specific supply constraints contributed significantly to the post-pandemic inflation surge, suggesting that sectoral supply conditions can influence the inflation–activity relationship.

Recent India-specific evidence further highlights the role of supply-side and goods-price factors. Using quarterly

data for 2012–13 to 2024–25, Sanyal (2025) finds that adverse supply shocks, including poor harvests, extreme weather, and supply-chain disruptions, significantly affect food inflation, with effects persisting for several quarters. This indicates that recent inflation dynamics in India have been influenced substantially by supply conditions rather than demand pressures alone.

Recent literature suggests that the inflation–employment relationship should be viewed within a broader macroeconomic framework. Inflation can affect employment through real wages, production costs, aggregate demand, investment, uncertainty, and monetary policy, while employment and output conditions can influence inflation through demand and labour-market pressures. Consequently, a simple one-directional relationship may not adequately capture the dynamics of a developing economy such as India.

A key limitation of the existing literature is its focus on unemployment, output gaps, wages, or aggregate inflation, with relatively little attention to organised-sector employment, particularly private and public-sector employment separately. Few studies also examine inflation alongside investment and economic growth while accounting for structural changes over a long historical period.

The present study addresses this gap by examining the relationship between CPI-IW inflation, organised private- and public-sector employment, GFCF as a percentage of GDP, and real GDP growth in India during 1974–75 to 2010–11. It incorporates endogenous structural breaks and employs the ARDL framework to distinguish short- and long-run relationships. Separate employment equations further assess whether the determinants of employment differ across the two sectors.

Thus, the literature provides a strong foundation for examining inflation and labour-market outcomes, while highlighting the roles of supply shocks, goods prices, investment, output, institutions, and structural changes.

The present study extends this literature by shifting from the conventional inflation–unemployment framework to organised-sector employment, distinguishing between private and public employment and incorporating structural breaks and the ARDL framework in its empirical analysis.

3. Data Source and Research Methodology

3.1. Data Source

The study examines the relationship between organised-sector employment and selected macroeconomic variables in India over 1974–75 to 2010–11, using annual data on organised private- and public-sector employment, inflation, Gross Fixed Capital Formation (GFCF) as a percentage of GDP, and real GDP growth.

Inflation and employment data are obtained from the Reserve Bank of India's *Handbook of Statistics on the Indian Economy*. Inflation is measured by the Consumer Price Index for Industrial Workers (CPI-IW), covering the 1960, 1982 and 2001 base series, while employment is measured as organised-sector employment in the private and public sectors at the end of March. Since the employment data cover only the organised sector, the findings should not be interpreted as representing the entire Indian labour market.

GFCF is included as an indicator of investment and capital formation, while real GDP growth captures overall economic activity. Their inclusion enables the study to examine employment dynamics beyond the simple inflation–employment relationship. The descriptive statistics and correlation analysis use 37 annual observations, whereas the ARDL estimations use 36 effective observations due to lag adjustments in the ARDL model.

3.2. Variables and Measurement

Table 1: Variable Definitions and Role in the Model

Variable	Role in Model	Measurement/Description	Expected Analytical Role
Private-Sector Employment (EMP_PRIVATE)	Dependent variable	Organised private-sector employment growth/series	Captures private-sector employment performance
Public-Sector Employment (EMP_PUBLIC)	Dependent variable	Organised public-sector employment growth/series	Captures public-sector employment performance
CPI-IW	Explanatory variable	Inflation measured through Consumer Price Index for Industrial Workers	Captures price and inflation conditions
GFCF (% of GDP)	Explanatory variable	Gross Fixed Capital Formation as a percentage of GDP	Represents investment and capital formation
Real GDP Growth	Explanatory variable	Annual real GDP growth rate	Represents overall economic activity and output conditions

Source: Author's compilation based on the data used in the empirical analysis.

Since the study does not directly use unemployment as the labour-market indicator, organised-sector employment growth is used to examine the employment dimension of the relationship. If a Phillips Curve-type mechanism operates, higher inflation associated with stronger economic activity may coincide with increased employment, implying a positive relationship between inflation and employment growth. However, employment is influenced by factors beyond inflation, including investment, economic growth, technological change, institutions and sector-specific policies. Accordingly, the study extends the basic inflation–employment framework by incorporating GFCF and real GDP growth and estimating separate equations for organised private- and public-sector employment. The empirical specification can therefore be represented generally as:

$$EMP_t = f(CPI_t, GFCF_t, GDPG_t)$$

where represents either private-sector or public-sector employment, denotes CPI-IW inflation, represents gross fixed capital formation as a percentage of GDP, and denotes real GDP growth.

3.3. Research Hypotheses

The study examines whether inflation, investment and economic activity have statistically significant relationships with organised-sector employment.

- **Hypothesis 1: Private-Sector Employment**

H₁: There is no statistically significant relationship between private-sector employment and the selected macroeconomic variables.

H₁: There is a statistically significant relationship between private-sector employment and the selected macroeconomic variables.

- **Hypothesis 2: Public-Sector Employment**

H₀: There is no statistically significant relationship between public-sector employment and the selected macroeconomic variables.

H₁: There is a statistically significant relationship between public-sector employment and the selected macroeconomic variables.

The analysis does not assume an a priori direction for the effect of inflation on employment; the direction and statistical significance of the estimated coefficients are determined empirically.

3.4. Econometric Methodology

The empirical analysis is conducted in sequential stages.

- **H₁: Step 1: Descriptive Statistics**

Descriptive statistics, including mean, median, minimum, maximum, standard deviation, skewness, kurtosis and

Jarque–Bera statistic, are used to examine the basic characteristics and distribution of the variables.

- **Step 2: Correlation Analysis**

Pairwise Pearson correlation coefficients are estimated to assess the direction and strength of linear associations among the variables. Correlation analysis serves as a preliminary diagnostic and does not imply causality or a long-run relationship.

- **Step 3: Multicollinearity Test**

Variance Inflation Factors (VIFs) are used to assess multicollinearity among the explanatory variables. High VIF values indicate substantial correlation among the variables, which may reduce the precision of individual coefficient estimates.

- **Step 4: Unit-Root Test**

The stationarity of the time-series variables is examined using the Augmented Dickey and Fuller (1979) and Phillips and Perron (1988) tests. For both tests, the null hypothesis is that the series contains a unit root; rejection of the null indicates stationarity.

The ARDL framework is appropriate when variables are a mixture of I(0) and I(1) processes, provided that none is integrated of order I(2).

- **Step 5: Structural-Break Unit-Root Test**

Given the long study period and significant economic and institutional changes, conventional unit-root tests are complemented by an endogenous structural-break unit-root test (Vogelsang, 1993). The test identifies potential break dates endogenously using an innovational-outlier specification with intercept and trend. The break date is selected based on the minimum Dickey–Fuller t-statistic reported in the EViews output.

The reported endogenous structural break dates indicate breaks in CPI-IW, private-sector employment, public-sector employment, GFCF, and real GDP growth in 1999, 2004, 1979, 2001, and 1979, respectively. These breaks indicate changes in the underlying behaviour of the variables and are important because ignoring them may lead to misleading conclusions about stationarity and long-run relationships.

3.5. ARDL Model

Following the unit-root and structural-break analysis, separate ARDL models are estimated for private- and public-sector employment to account for their potentially different responses to macroeconomic conditions.

Model 1: Private-sector Employment

$$PE_t = f(INF_t, GDP_t, GFCF_t)$$

where,

- PE = Private-sector Employment Growth
- INF = CPI (IW) Inflation
- GDP = Real GDP Growth
- GFCF = Gross Fixed Capital Formation

Model 2: Public-sector Employment

$$PUE_t = f(INF_t, GDP_t, GFCF_t)$$

where,

- PUE = Public-sector Employment Growth
- INF = CPI (IW) Inflation
- GDP = Real GDP Growth
- GFCF = Gross Fixed Capital Formation

The general ARDL specification can be written as,

$$Y_t = \alpha_0 + \sum_{i=1}^p \alpha_i y_{t-i} + \sum_{j=0}^{q_1} \beta_j CPI_{t-j} + \sum_{k=0}^{q_2} \gamma_k GDPG_{t-k} + \sum_{l=0}^{q_3} \delta_l GFCF_{t-l} + \varepsilon_t$$

where,

- Y_t = employment in either the private or public sector;
- CPI_t = CPI-IW inflation;
- $GDPG_t$ = real GDP growth;
- $GFCF_t$ = GFCF as a percentage of GDP;
- p, q_1, q_2, q_3 = lag lengths;
- α_0 = intercept;
- ε_t = error term.

A concise version:

Based on the EViews results, the selected specifications are:

- Private-sector employment: ARDL (1,0,0,0)
- Public-sector employment: ARDL (1,0,1,0)

The model-selection procedure evaluated alternative lag combinations and selected the preferred specification using the Akaike Information Criterion (AIC). The EViews output reports 54 candidate models.

3.6. ARDL Bounds Test

After estimating the ARDL models, the Bounds Testing approach of Pesaran et al. (2001) is used to test for a long-run relationship among employment, inflation, investment, and economic growth. The null hypothesis is no long-run relationship, against the alternative of a long-run relationship.

The calculated F-statistic is compared with the lower and upper critical bounds. A value below the lower bound implies non-rejection of the null hypothesis, while a value above the upper bound implies its rejection. A value between the bounds is inconclusive. This approach is appropriate as the study variables are a mixture of I(0) and I(1).

3.7. Error-Correction Model (ECM)

Where a long-run relationship is established, the ECM is used to distinguish short-run dynamics from long-run adjustment. The ECM is expressed as:

$$\Delta Y_t = \alpha_0 + \sum \beta_i \Delta X_{t-i} + \lambda ECT_{t-1} + \varepsilon_t$$

A negative and statistically significant error-correction coefficient indicates adjustment towards long-run equilibrium. In the public-sector employment model, the coefficient of -0.829203 implies that approximately 82.9% of the previous period's disequilibrium is corrected within one year, indicating a rapid adjustment towards equilibrium.

3.8. Diagnostic and Stability Tests

Several diagnostic tests are employed to assess model adequacy and stability: Breusch–Godfrey L M for serial correlation in the residuals, Breusch and Pagan (1979) for heteroskedasticity, Jarque–Bera for residual normality, Ramsey (1969) RESET for functional-form misspecification, and CUSUM and CUSUMSQ for parameter stability, respectively. Together, these tests provide evidence on the reliability and stability of the estimated ARDL models.

3.9. Granger Causality

Pairwise Granger causality tests are conducted with two lags to examine the direction of temporal predictive relationships among the variables. The test assesses whether past values of one variable improve the prediction of another beyond its own past values, rather than establishing structural causality. The results indicate whether relationships among employment, investment, inflation, and economic growth are unidirectional, bidirectional, or insignificant (Granger, 1969).

4. Inflation and Employment Growth in the Private and Public Sectors

During 1975–2011, India experienced moderate inflation, with average CPI inflation of 7.97 per cent. Average employment growth was higher in the organised private sector (1.46 per cent) than in the organised public sector (0.89 per cent), indicating relatively stronger private-sector employment growth. The subdued growth of public-sector employment may reflect government recruitment policies and administrative decisions rather than market forces. The historical movements of the three variables are shown in Figure 1.

The median inflation rate was 7.8 per cent, indicating that half of the observations were below and half above this value. The small difference between the mean (7.97 per cent) and median suggests an approximately symmetric inflation distribution with limited skewness. In contrast, the mean values exceeded the medians for both employment series, indicating positive skewness, possibly due to a few years of exceptionally high employment growth.

With a standard deviation of 5.02 per cent, inflation fluctuated considerably around its mean of 7.97 per cent

during the study period. Public-sector employment growth had a slightly lower standard deviation (2.11) than private-sector employment growth but also a much lower mean, indicating limited variation around a lower growth rate. These fluctuations reflected changing economic conditions, business cycles, and government policies.

The inflation rate ranged from 3.8 per cent to 26.8 per cent, indicating substantial fluctuations over the study period. While the minimum was well below the mean of 7.97 per cent, the maximum was substantially higher, reflecting varying macroeconomic conditions and periods of both low and exceptionally high inflation. The wide range of private-sector employment growth indicated substantial fluctuations, with periods of both contraction and strong expansion. Although public-sector employment growth also declined in some years, its maximum growth rate was lower than that of the private sector.

With a CV of 63.04 per cent, inflation recorded the lowest relative variation among the three variables – inflation, private sector employment growth, and public sector employment growth. Private-sector employment growth

showed more than twice the relative variability of inflation, while public-sector employment growth had the highest CV (235.94 per cent). This high CV reflected its relatively low mean rather than necessarily greater absolute fluctuations. This shows that employment growth, particularly in the public sector, was more volatile than inflation.

The Pearson correlation coefficients between CPI (IW) inflation and private- and public-sector employment growth were 0.0812 and 0.0561, respectively, indicating very weak positive relationships. However, the corresponding t-values (0.4818 and 0.3327) were below the critical value of 2.0301, while the p-values (0.6328 and 0.7413) exceeded the 5 per cent significance level. Thus, the null hypothesis could not be rejected, indicating no statistically significant relationship between inflation and either private- or public-sector employment growth during 1975–2011. The findings provide little empirical support for the Phillips curve hypothesis and suggest that employment growth was influenced more by structural, institutional, technological, demographic, and policy-related factors than by inflation.

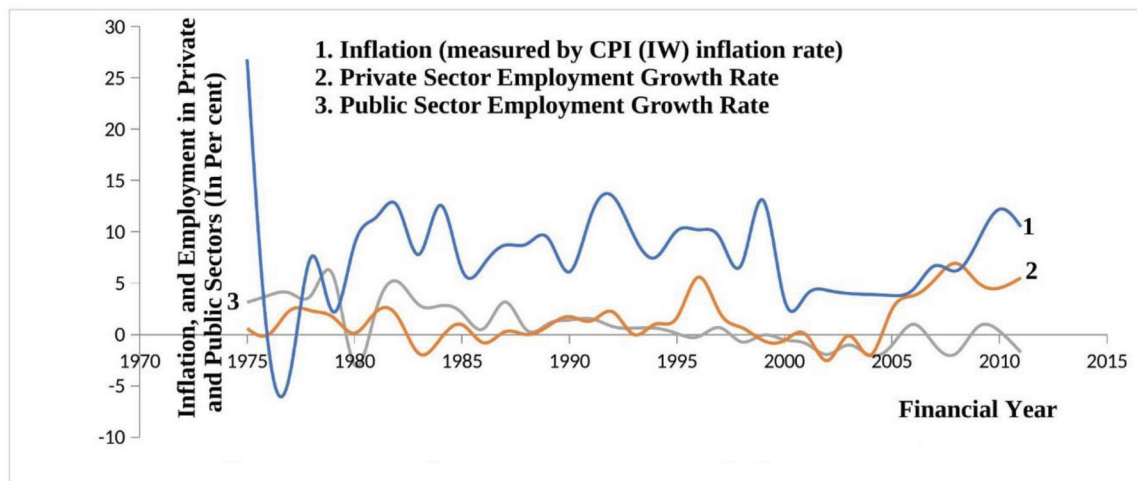


Figure 1: Relationship between Inflation and Employment in India

5. Regression Analysis: Private Sector Employment Growth (1975-2011)

The estimated regression equation for the impact of inflation on private sector employment growth rate was,

$$Y_{PVT} = 1.1734 + 0.0364(X) \\ (0.7100)(0.0757)$$

where indicates private sector employment growth rate, and values in parentheses are the standard errors of the estimated coefficient, with the first value in parenthesis representing the standard error of the intercept and the second representing the standard error of the slope coefficient. The inflation

coefficient was 0.0364, implying that a one-percentage-point increase in inflation was associated with only a 0.036 percentage-point increase in private-sector employment growth, indicating a negligible effect.

Inflation explained only 0.65 per cent of the variation in private-sector employment growth ($R^2 = 0.0065$), while the negative adjusted R^2 (-0.0218 , Table 2) indicated that the model performed worse than a constant-only model based on the mean employment growth of 1.46 per cent. The standard error of the regression (2.2803) further indicated considerable prediction error. The model was not statistically significant ($F = 0.2303$, $p = 0.6342 > 0.05$), and the inflation coefficient was insignificant ($t = 0.4800$,

$p = 0.6342$). Its 95 per cent confidence interval (-0.1173 to 0.1900 , Table 3) included zero, while the t -statistic was below the critical value of ± 2.03 . Overall, the results indicate

that inflation had negligible explanatory power and no statistically significant effect on private-sector employment growth during 1975–2011.

Table 2: Regression Model Summary and ANOVA: Private Sector Employment Growth (1975-2011)

Regression Statistics		ANOVA			
Static	Value	Source of Variation	Degrees of Freedom	F-Statistics	Significance of F
Observations	37	Regression	1	0.2303	0.6342
Multiple R	0.0809	Residual	35	-	-
R ²	0.0065	Total	36	-	-
Adjusted R ²	-0.0218	-	-	-	-
Standard Error	2.2803	-	-	-	-

Source: Authors' Calculation using Handbook of Statistics on the Indian Economy, the Reserve Bank of India (RBI) 2012-13.

Table 3: Estimated Regression Coefficient: Private Sector Employment Growth (1975-2011)

Parameter	Coefficients	Standard Error	t-statistic	p-value	Confidence Interval 95%	
					Lower	Upper
Intercept	1.1734	0.7100	1.6529	0.1073	-0.2678	2.6145
CPI (IW) in %	0.0363	0.0757	0.4800	0.6342	-0.1173	0.1900

Figure 2 presents the residual plot for the regression of inflation (CPI-IW) and private-sector employment growth. The residuals are randomly scattered around the zero line without systematic patterns, curvature, or a funnel-shaped distribution. This suggests that the assumptions of linearity

and homoscedasticity are reasonably satisfied, with no clear visual evidence of model misspecification. Overall, the residual plot indicates that the basic OLS assumptions are reasonably met.

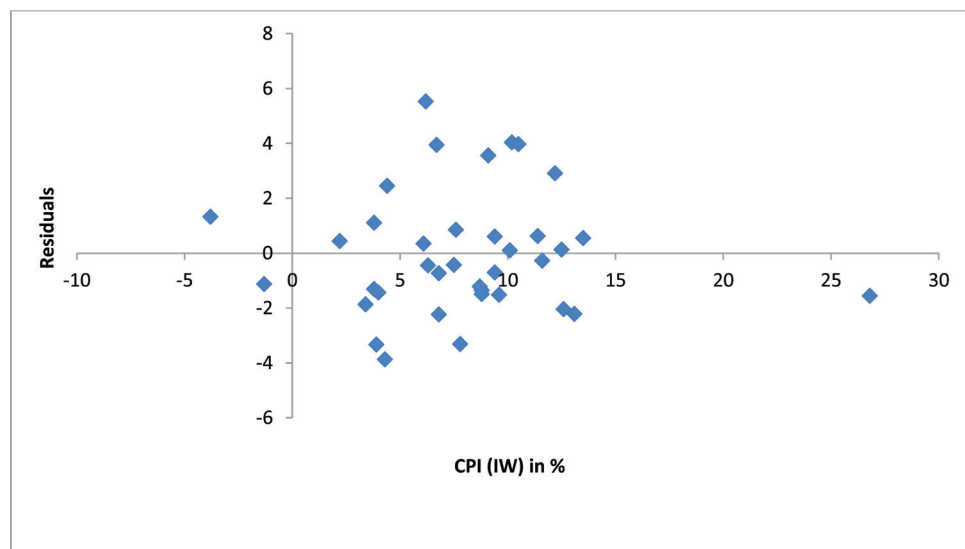


Figure 2: Residual Plot of the Regression Model for the Private Sector Employment Growth against Inflation (CPI-IW), 1975-2011

Source: Authors' Calculation using Handbook of Statistics on the Indian Economy, the Reserve Bank of India (RBI) 2012-13.

A few observations lie relatively far from the main cluster, including one at an inflation rate of approximately 27 per cent with a relatively large negative residual, indicating a potential outlier. However, no systematic pattern or funnel-shaped distribution is evident, and the residuals range approximately from -4 to +6, suggesting no strong visual evidence of heteroscedasticity. Overall, the basic OLS assumptions appear reasonably satisfied. Nevertheless, the model has weak explanatory power, as indicated by the low R^2 , and the inflation coefficient is statistically insignificant ($p = 0.6342$), providing insufficient evidence of a significant relationship between inflation and private-sector employment growth during 1975–2011.

6. Regression Analysis: Public Sector Employment Growth (1975–2011)

The esregression equation for the impact of inflation on public sector employment growth rate was,

$$Y_{PUB} = 0.7052 + 0.0235(X) \\ (0.6641)(0.0708)$$

Table 3 presents the regression model summary and ANOVA results for the relationship between inflation and public sector employment growth in India during the period 1975–2011. The regression analysis was based on 37 annual observations.

The value of the Multiple R was 0.0561, indicating an extremely weak positive linear relationship between inflation and public sector employment growth. The coefficient of determination of R^2 was 0.0032, implying that inflation explained only 0.32 per cent of the variation in public sector employment growth during the study period. Consequently, approximately 99.68 per cent of the variation in public sector employment growth was explained by other factors not included in the regression model and by random disturbances. This finding suggested that inflation possessed very little explanatory power in predicting changes in public sector employment growth.

The Adjusted R^2 was -0.0253 (Table 4). A negative adjusted R^2 indicated that, after accounting for the sample size and the number of explanatory variables, the regression model performed worse than a model containing only the intercept. This implied that including inflation as an explanatory variable did not improve the model's ability to explain variations in public sector employment growth.

Table 4: Regression Model Summary and ANOVA: Public Sector Employment Growth (1975–2011)

Regression Statistics		ANOVA			
Static	Value	Source of Variation	Degrees of Freedom	F-Statistics	Significance of F
Observations	37	Regression	1	0.1107	0.7413
Multiple R	0.0561	Residual	35	-	-
R^2	0.0032	Total	36	-	-
Adjusted R^2	-0.0253	-	-	-	-
Standard Error	2.1331	-	-	-	-

Source: Authors' Calculation using Handbook of Statistics on the Indian Economy, the Reserve Bank of India (RBI) 2012–13.

The standard error of the regression was 2.1331 (Table 4), indicating an average deviation of approximately 2.13 percentage points between predicted and observed public-sector employment growth and, hence, limited predictive accuracy. The ANOVA results showed an F-statistic of

0.1107 with a p-value of 0.7413, exceeding the 5 per cent significance level. Thus, the overall regression model was statistically insignificant, indicating that inflation had negligible explanatory power for public-sector employment growth during 1975–2011.

Table 5: Estimated Regression Coefficient: Public Sector Employment Growth (1975–2011)

Parameter	Coefficients	Standard Error	t-statistic	p-value	Confidence Interval 95%	
					Lower	Upper
Intercept	0.7052	0.6641	1.0620	0.2955	-0.6430	2.0534
CPI (IW) in %	0.0235	0.0708	0.3327	0.7413	-0.1201	0.1672

Source: Authors' Calculation using Handbook of Statistics on the Indian Economy, the Reserve Bank of India (RBI) 2012–13.

Table 5 presents the estimated regression coefficients for examining the relationship between inflation, measured by the Consumer Price Index for Industrial Workers (CPI-IW), and public-sector employment growth in India during 1975–2011. The intercept was estimated at 0.7052, implying predicted employment growth of approximately 0.71 per cent when inflation was zero. However, it was statistically insignificant ($t = 1.0620$, $p = 0.2955 > 0.05$), indicating that the intercept was not significantly different from zero. Its statistical significance, however, has limited substantive relevance unless the intercept has a specific theoretical interpretation.

The estimated inflation coefficient was 0.0235, indicating that a one-percentage-point increase in inflation was associated with a 0.0235 percentage-point increase in public-sector employment growth, holding other factors constant. Although the coefficient was positive, its magnitude was very small. The standard error (0.0708), approximately three times the coefficient, indicated substantial uncertainty and limited precision in the estimate.

The inflation coefficient had a very small t -statistic (0.3327), indicating that the estimate was close to zero relative to its sampling variability. The corresponding p -value (0.7413) exceeded the 5 per cent significance level, so the null hypothesis that the coefficient equals zero could not be rejected. Thus, the estimated relationship between inflation and public-sector employment growth was not statistically significant.

The 90 per cent confidence interval for the inflation coefficient ranged from -0.1201 to 0.1672 and included zero, indicating that the coefficient could be negative, zero, or positive. Thus, the data do not provide sufficient evidence to determine the direction or significance of the relationship. Overall, the coefficient, t -statistic, p -value, and confidence interval consistently indicate that inflation was not statistically significantly associated with public-sector employment growth in India during 1975–2011. Although the estimated relationship was positive, its magnitude was small and the evidence was insufficient to establish a meaningful relationship.

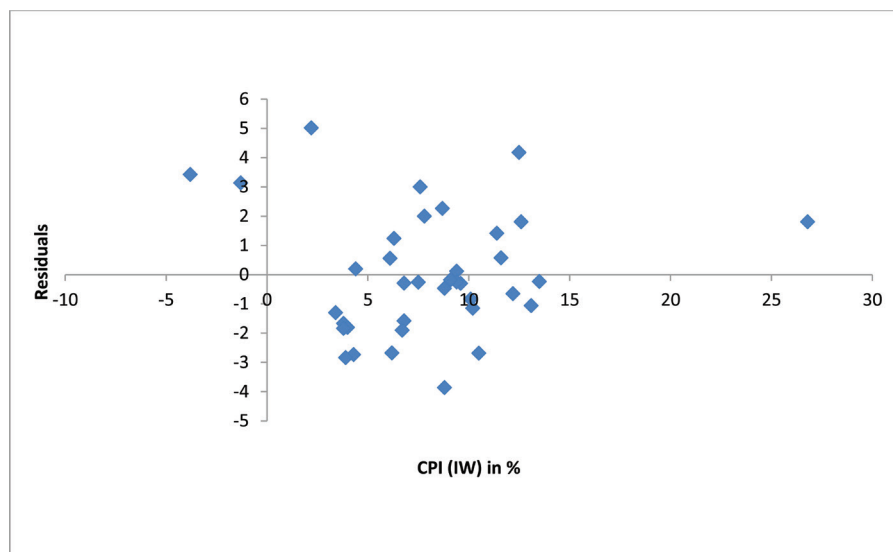


Figure 3: Residual Plot of the Regression Model for the Public Sector Employment Growth against Inflation (CPI-IW), 1975-2011

Source: Authors' Calculation using Handbook of Statistics on the Indian Economy, the Reserve Bank of India (RBI) 2012-13.

Figure 3 presents the residual plot for the regression of inflation (CPI-IW) and public-sector employment growth during 1975–2011. The residuals are randomly distributed around the zero line without any systematic, curved, or cyclical pattern, suggesting that the assumption of linearity is reasonably satisfied and that a linear regression model is appropriate for examining the relationship.

Further, the residuals showed a fairly uniform spread across inflation values of approximately 4% to 14%, with most lying between -3 and $+3$ percentage points. No clear funnel-shaped pattern was observed, suggesting no strong

evidence of heteroscedasticity. Thus, the assumption of constant variance (homoscedasticity) was reasonably satisfied.

Although a few observations showed relatively large residuals (approximately $+5.0$, $+4.2$, and -4.0), these were isolated and did not form a systematic pattern. One observation at a relatively high inflation rate of 27–28% had a residual of about $+2$ percentage points, which was not unusually large. Overall, these observations did not indicate a clear violation of the homoscedasticity assumption.

The residual plot showed no severe outliers or clear evidence of influential observations. However, definitive

assessment of influence would require additional diagnostics, such as Cook's distance and leverage statistics.

7. Empirical Results

7.1. Descriptive Statistics

Table 6: Descriptive Statistics, 1975–2011

Statistic	CPI-IW	Private Employment	Public Employment	GFCF (% GDP)	Real GDP Growth
Mean	7.967568	1.462703	0.893514	25.15135	5.670270
Median	7.800000	1.020000	0.620000	24.60000	5.900000
Maximum	26.80000	6.930000	5.770000	35.80000	9.600000
Minimum	-3.800000	-2.540000	-2.950000	16.60000	-5.200000
Std. Deviation	5.022784	2.255774	2.107135	5.213051	2.762634
Skewness	0.952656	0.615314	0.421594	0.452183	-1.676251
Kurtosis	7.115656	2.870128	2.553628	2.265223	7.595023
Jarque–Bera	31.71028	2.360776	1.403249	2.093235	49.87832
Probability	0.000000	0.307160	0.495779	0.351123	0.000000
Observations	37	37	37	37	37

The descriptive results (Table 6) show that average CPI-IW inflation is 7.97, while average real GDP growth is 5.67 percent. Private-sector employment has a mean of 1.46 and public-sector employment a mean of 0.89 in the units of the supplied series. GFCF averages 25.15 percent of GDP.

Inflation and real GDP growth display relatively high kurtosis and statistically significant Jarque–Bera probabilities, indicating departures from normality. In contrast, the Jarque–Bera probabilities for private employment, public employment and GFCF are above 0.10.

7.2. Correlation Analysis

Table 7: Pairwise Correlation Matrix

Variable	CPI-IW	Private Emp.	Public Emp.	GFCF	Real GDP Growth
CPI-IW	1.000000	0.080861	0.056004	-0.121415	0.265593
Private Employment	0.080861	1.000000	-0.074273	0.487730	0.068741
Public Employment	0.056004	-0.074273	1.000000	-0.669843	-0.398646
GFCF	-0.121415	0.487730	-0.669843	1.000000	0.237734
Real GDP Growth	0.265593	0.068741	-0.398646	0.237734	1.000000

The correlation matrix (Table 7) indicates relatively weak linear associations between CPI-IW inflation and the two employment measures. The correlation between CPI-IW and private-sector employment is 0.0809, while that between CPI-IW and public-sector employment is 0.0560. GFCF exhibits a moderate positive correlation with private-sector employment (0.4877) but a relatively strong negative correlation with

public-sector employment (−0.6698). Real GDP growth has a weak positive correlation with private-sector employment (0.0687) and a moderate negative correlation with public-sector employment (−0.3986). These bivariate correlations provide preliminary evidence only and do not establish causal relationships. Therefore, further multivariate time-series analysis using the ARDL framework is required.

7.3. Multicollinearity

Table 8: Centered Variance Inflation Factors

Variable	Centered VIF – Model 1	Centered VIF – Model 2
CPI-IW	1.119370	1.119370
Real GDP Growth	1.168934	1.168934
GFCF (% GDP)	1.102734	1.102734

The centered VIF (Table 8) values for CPI-IW, real GDP growth, and GFCF are 1.119, 1.169, and 1.103, respectively, all well below the conventional threshold of 5.

This indicates no evidence of problematic multicollinearity, and all explanatory variables can therefore be retained for ARDL estimation.

7.4. Conventional Unit-Root Tests

Table 9: Summary of ADF and Phillips–Perron Unit-Root Results

Variable	ADF at Level	ADF 1st Diff.	ADF Order	PP at Level	PP 1st Diff.	PP Order
CPI-IW	-7.044335 (0.0000)	—	I(0)	-6.483864 (0.0000)	—	I(0)
Private Employment	-2.325532 (0.1698)	-7.486720 (0.0000)	I(1)	-2.640038 (0.2661)	-8.076702 (0.0000)	I(1)
Public Employment	-6.424274 (0.0000)	—	I(0)	-6.548541 (0.0000)	—	I(0)
GFCF (% GDP)	-2.671749 (0.2535)	-7.393796 (0.0000)	I(1)	-2.745075 (0.2258)	-7.427387 (0.0000)	I(1)
Real GDP Growth	-7.702940 (0.0000)	—	I(0)	-13.994940 (0.0000)	—	I(0)

Note: For ADF and PP, the null hypothesis is that the series contains a unit root. The reported specifications follow the EViews output.

The conventional (Table 9) unit-root evidence shows a mixture of I(0) and I(1) variables. CPI-IW, public-sector employment and real GDP growth are stationary in levels in the reported ADF and PP specifications, while private-sector employment and GFCF become stationary after first differencing. This mixed integration structure is consistent with the use of an ARDL framework, provided that no variable is I(2).

7.5. Structural-Break Unit-Root Analysis

Because conventional unit-root tests can be affected by structural changes, the supplied EViews output also reports an endogenous structural-break test. The specification is trend and intercept with an intercept-only break, classified as an innovational outlier. The break date is selected by minimizing the Dickey–Fuller t-statistic. The reported p-values are based on Vogelsang (1993) asymptotic one-sided p-values.

Table 10: Structural-Break Unit-Root Results

Variable	Break Year	Break Type	Break-ADF Statistic	p-value	Decision
CPI-IW	1999	Innovational outlier	-8.901439	<0.01	Reject unit root
Private Employment	2004	Innovational outlier	-4.828538	0.0548	Reject at 10%
Public Employment	1979	Innovational outlier	-7.278594	<0.01	Reject unit root

GFCF (% GDP)	2001	Innovational outlier	-4.051619	0.3397	Do not reject
Real GDP Growth	1979	Innovational outlier	-9.279485	<0.01	Reject unit root

Table 10 presents structural-break results, revealing that the statistical behaviour of the variables is not homogeneous over time. The strongest break-adjusted evidence of stationarity is observed for real GDP growth (-9.279485), CPI-IW (-8.901439) and public-sector employment (-7.278594). Private-sector employment is marginally significant at the 10 percent level ($p=0.0548$). GFCF has an identified break in 2001, but its break-adjusted unit-root null is not rejected ($p=0.3397$). Thus, the existence of a selected break date should not itself be interpreted as proof of a statistically significant break in stationarity.

The identified dates also have substantive analytical value. The private-employment break occurs in 2004, while public employment and real GDP growth show a break in 1979. Inflation has a break in 1999 and GFCF in 2001. These dates suggest that the employment relationships may have been subject to changing economic or institutional regimes, strengthening the case for checking structural stability alongside the ARDL estimates.

7.6. ARDL Estimates: Private-Sector Employment

Table 11: Selected ARDL Model for Private-Sector Employment

Variable	Coefficient	Std. Error	t-Statistic	p-value
Private Employment (-1)	0.581218	0.144792	4.014163	0.0004
CPI-IW	-0.008389	0.078436	-0.106958	0.9155
Real GDP Growth	0.030415	0.101950	0.298335	0.7674
GFCF (% GDP)	0.111205	0.084910	1.309682	0.1999
C	-2.228032	1.736505	-1.283055	0.2090
R-squared	0.484010			
Adjusted R-squared	0.417430			
F-statistic (p-value)	7.269663 (0.000299)			
Durbin-Watson	2.117948			

The selected private-sector model is ARDL(1,0,0,0). The lagged dependent variable is positive and highly significant, indicating persistence in private-sector employment. Inflation, real GDP growth and GFCF are individually insignificant in the reported conditional

dynamic equation. The model has an R-squared of 0.484010 and an adjusted R-squared of 0.417430 (Table 11). The overall F-statistic is statistically significant ($p=0.000299$), indicating joint explanatory power within the estimated equation.

7.7. Private-Sector Bounds Test and Long-Run Relationship

Table 12: ARDL Bounds Test – Private-Sector Employment

Statistic	Value	10% I(0)	10% I(1)	5% I(0)	5% I(1)	1% I(0)	1% I(1)
F-statistic	1.839557	2.37	3.20	2.79	3.67	3.65	4.66
k	3						

The private-sector F-statistic of 1.839557 is below the lower critical bound of 2.37 even at the 10 per cent level (Table 12); therefore, the null hypothesis of no levels relationship cannot be rejected. The evidence does not support a stable long-run cointegrating relationship between private-sector employment and CPI-IW, real GDP growth, and GFCF in the reported sample and

specification. Although the EViews output provides a levels equation and an ECM coefficient, these results do not establish cointegration. Accordingly, the reported long-run coefficients should not be interpreted as confirmed equilibrium effects, and the significant negative ECM coefficient should not be treated as standalone evidence of cointegration.

7.8. ARDL Estimates: Public-Sector Employment

Table 13: Selected ARDL Model for Public-Sector Employment

Variable	Coefficient	Std. Error	t-Statistic	p-value
Public Employment (-1)	0.170797	0.168526	1.013477	0.3189
CPI-IW	0.008540	0.065425	0.130530	0.8970
Real GDP Growth	-0.158278	0.102134	-1.549705	0.1317
Real GDP Growth (-1)	0.214779	0.102747	2.090361	0.0452
GFCF (% GDP)	-0.231755	0.066280	-3.496580	0.0015
C	6.148167	1.945624	3.159998	0.0036
R-squared	0.563156			
Adjusted R-squared	0.490349			
F-statistic (p-value)	7.734877 (0.000090)			
Durbin-Watson	1.939761			

The selected public-sector model is ARDL (1,0,1,0). The first lag of real GDP growth is positive and statistically significant at the 5 percent level, while the contemporaneous real GDP growth coefficient is negative but statistically insignificant. GFCF has a negative and statistically significant coefficient

(-0.231755, $p=0.0015$) in the conditional dynamic equation. Inflation is statistically insignificant. The model explains approximately 56.3 percent of the variation in public-sector employment, with an adjusted R-squared of 0.490349 (Table 13).

7.9. Public-Sector Bounds Test and Long-Run Relationship

Table 14: ARDL Bounds Test – Public-Sector Employment

Statistic	Value	10% I(0)	10% I(1)	5% I(0)	5% I(1)	1% I(0)	1% I(1)
F-statistic	5.765831	2.37	3.20	2.79	3.67	3.65	4.66
k	3						

The public-sector F-statistic is 5.765831 (Table 14). It exceeds the upper critical bound at the 1 percent level (4.66), as well as the 5 percent and 10 percent upper bounds. The null hypothesis of no levels relationship is therefore rejected,

providing strong evidence of a long-run relationship between public-sector employment and the explanatory variables in the reported specification.

Table 15: Public-Sector Long-Run Coefficients

Variable	Long-run Coefficient	Std. Error	t-Statistic	p-value
CPI-IW	0.010299	0.079002	0.130364	0.8971
Real GDP Growth	0.068139	0.199729	0.341157	0.7354

GFCF (% GDP)	-0.279491	0.068210	-4.097527	0.0003
C	7.414551	1.656920	4.474900	0.0001

The long-run equation shows that GFCF is negatively and significantly associated with public-sector employment (coefficient -0.279491; $p=0.0003$). Inflation and real GDP growth are not statistically significant in the long run (Table 15). The negative GFCF coefficient should be interpreted

cautiously because it is a conditional long-run association within the public-employment equation and may reflect the historical composition of investment and employment rather than a structural causal effect.

7.10. Error-Correction Model

Table 16: Public-Sector Error-Correction Model

Variable	Coefficient	Std. Error	t-Statistic	p-value
D (Real GDP Growth)	-0.158278	0.059508	-2.659777	0.0124
CointEq (-1)	-0.829203	0.145066	-5.716034	0.0000
R-squared	0.595442			
Adjusted R-squared	0.583543			
Durbin-Watson	1.939761			

The error-correction coefficient is -0.829203 (Table 16) and significant at the 1 per cent level, indicating that approximately 82.9 per cent of the previous period's disequilibrium is corrected within one year. The short-run change in real GDP growth is negative and significant (-0.158278, $p = 0.0124$). The ECM has an R-squared of 0.595442 and an adjusted

R-squared of 0.583543 (Table 16). The results indicate a clear difference between private- and public-sector employment dynamics during 1975–2011: the private-sector model shows no evidence of a long-run relationship, whereas the public-sector model indicates a statistically significant long-run relationship at the 5 per cent level.

7.11. Diagnostic Tests

Table 17: Diagnostic Test Results

Diagnostic	Statistic	p-value	Decision at 5%	Interpretation
Breusch–Godfrey LM	F = 0.310367	0.7357	Do not reject H0	No evidence of serial correlation
Breusch–Godfrey LM	Obs*R ² = 0.780776	0.6768	Do not reject H0	Consistent with no serial correlation
Breusch–Pagan–Godfrey	F = 2.546838	0.0491	Reject H0	Evidence of heteroskedasticity
Breusch–Pagan–Godfrey	Obs*R ² = 10.72750	0.0571	Do not reject at 5%	Borderline/mixed evidence
Jarque–Bera	JB = 0.725589	0.695730	Do not reject H0	Residuals approximately normal
Ramsey RESET	F = 8.397815	0.0014	Reject H0	Evidence of functional-form/omitted-nonlinearity concern
Ramsey RESET	LR = 16.91662	0.0002	Reject H0	Confirms specification concern

The Breusch–Godfrey test provides (Table 17) no evidence of serial correlation up to two lags ($p=0.7357$). The Jarque–Bera statistic for residuals is also insignificant ($p=0.695730$), suggesting that the residual distribution is broadly compatible with normality. The Breusch–Pagan–Godfrey F-test, however, is significant at the 5 percent level ($p=0.0491$), indicating heteroskedasticity;

its Obs*R-squared version is marginal at $p=0.0571$. The Ramsey RESET test is strongly significant (F $p=0.0014$; LR $p=0.0002$), indicating that the reported specification may omit nonlinear terms or other relevant functional-form components. These findings mean that the public-sector results are informative but should be interpreted with diagnostic caution.

7.12. Parameter Stability: CUSUM and CUSUM of Squares

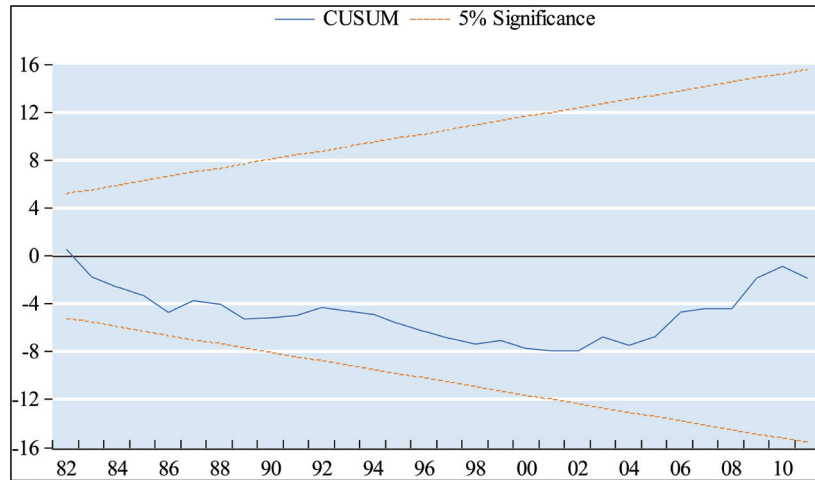


Figure 4: CUSUM Test

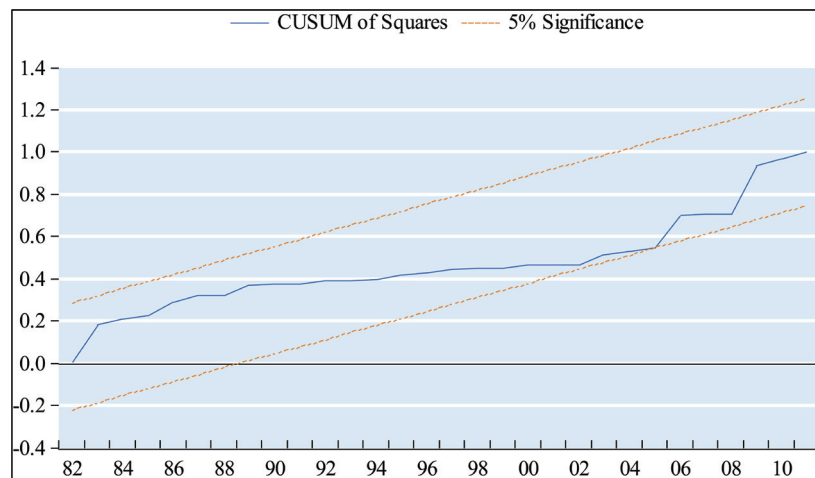


Figure 5: CUSUM of Squares Test

The supplied CUSUM plot (Figure 4) remains within the reported 5 percent significance boundaries over the sample, which supports parameter stability for the cumulative residual test. The CUSUM of Squares plot (Figure 5), however, approaches and appears to cross the upper significance boundary during the later part of the sample,

suggesting possible instability in the variance or higher-moment behavior. Thus, the stability evidence is mixed: the CUSUM test is broadly supportive, whereas the CUSUM of Squares warrants caution regarding changes in variance or regime behaviour.

7.13. Pairwise Granger Causality

Table 18: Pairwise Granger Causality Tests (2 Lags)

Null Hypothesis	F-statistic	p-value	Decision at 5%
CPI-IW does not Granger-cause Public Employment	0.15326	0.8586	Do not reject
Public Employment does not Granger-cause CPI-IW	0.30390	0.7402	Do not reject
Real GDP Growth does not Granger-cause Public Employment	1.82253	0.1791	Do not reject
Public Employment does not Granger-cause Real GDP Growth	3.67576	0.0373	Reject

GFCF does not Granger-cause Public Employment	3.95667	0.0298	Reject
Public Employment does not Granger-cause GFCF	0.54663	0.5846	Do not reject
Real GDP Growth does not Granger-cause CPI-IW	3.27199	0.0518	Do not reject at 5%
CPI-IW does not Granger-cause Real GDP Growth	1.53009	0.2329	Do not reject
GFCF does not Granger-cause CPI-IW	0.06973	0.9328	Do not reject
CPI-IW does not Granger-cause GFCF	1.56397	0.2259	Do not reject
GFCF does not Granger-cause Real GDP Growth	2.66891	0.0857	Do not reject at 5%
Real GDP Growth does not Granger-cause GFCF	0.98859	0.3839	Do not reject

The Granger results indicate two statistically significant directional relationships at the 5 per cent level involving public-sector employment: GFCF Granger-causes public-sector employment ($p = 0.0298$), and public-sector employment Granger-causes real GDP growth ($p = 0.0373$), with neither reverse direction being significant. No bidirectional causality is found between CPI-IW and public employment. GDP-growth-to-inflation is marginally significant at the 10 per cent level ($p = 0.0518$), while GFCF-to-real-GDP-growth provides weaker evidence at 10 per cent ($p = 0.0857$). These Granger results indicate predictive causality and should not be interpreted as evidence of structural or policy causation.

Table 19: Comparative Summary of Main ARDL Findings

Feature	Private Sector	Public Sector
Selected ARDL	ARDL(1,0,0,0)	ARDL(1,0,1,0)
R-squared	0.484010	0.563156
Adjusted R-squared	0.417430	0.490349
Bounds F-statistic	1.839557	5.765831
Long-run relationship	Not supported	Supported at 1%
Significant long-run variable	None interpreted as cointegrating	GFCF (-0.279491 ; $p=0.0003$)
ECM coefficient	-0.418782 (not used as standalone cointegration proof)	-0.829203 ($p<0.001$)
Adjustment speed	Not interpreted due to failed bounds test	82.9% per year
Key Granger finding	Not reported separately in supplied pairwise test	GFCF $\rightarrow$ Public Employment; Public Employment $\rightarrow$ GDP Growth

The private-sector results suggest greater sensitivity to short-run and idiosyncratic forces not captured by the three macroeconomic regressors. By contrast, the public-sector equation exhibits a statistically stable long-run relationship and rapid error correction. The public-sector finding that GFCF is negatively related to employment in the long run may appear counterintuitive, but it is consistent with the possibility that investment composition and capital intensity can raise productive capacity without proportionately increasing public employment. Because the supplied model does not contain a broader set of fiscal, demographic,

8. Comparative Discussion: Private versus Public Sector Employment

The central empirical result is that private- and public-sector employment exhibit different long-run behaviour. The private sector bounds test fails to establish a levels relationship, whereas the public-sector bounds test strongly supports cointegration. This difference implies that the same macroeconomic variables cannot be assumed to generate identical long-run employment responses across sectors.

technological or institutional controls, the coefficient should not be interpreted as a general proposition that investment destroys public employment.

9. Results and Discussion

The empirical analysis examines whether the relationship between inflation and organised-sector employment in India is consistent with the conventional Phillips Curve proposition and whether it differs between the private and public sectors. Covering 1975–2011, the study employs descriptive statistics,

correlation analysis, unit-root and structural-break tests, ARDL estimation, bounds testing, error-correction modelling, diagnostic and stability tests, and Granger causality. This framework helps distinguish the simple inflation–employment association from the broader roles of investment and economic growth in determining employment outcomes.

The Phillips Curve traditionally describes an inverse short-run relationship between inflation and unemployment. When employment is considered instead, this implies a positive relationship between inflation and employment, as stronger aggregate demand may raise prices while encouraging production and labour demand. However, this relationship is generally considered short-run, as inflation expectations, productivity, technology, institutions, and structural changes may weaken it over time. Thus, the present study does not treat organised-sector employment growth as a direct substitute for unemployment but examines whether the employment response implied by the Phillips Curve is evident in India's organised sector.

The preliminary evidence provides little support for a systematic inflation–employment relationship. The correlation between CPI-IW inflation and private- and public-sector employment growth was approximately 0.081 and 0.056, respectively, with both coefficients close to zero and statistically insignificant. Thus, changes in inflation were not systematically associated with changes in organised-sector employment growth. The earlier regression results similarly showed positive but very small inflation coefficients and low explanatory power, indicating that inflation alone explained only a negligible share of the variation in employment growth.

The descriptive results also reveal differences between the two sectors. Average CPI inflation was about 7.97 per cent, compared with average employment growth of 1.46 per cent in the private sector and 0.89 per cent in the public sector. These differences suggest distinct employment dynamics: private-sector employment is more closely influenced by investment, production, productivity, technology, and market conditions, whereas public-sector employment depends more on government recruitment, fiscal conditions, and administrative decisions.

The time-series analysis highlights the importance of structural changes over the long study period. The unit-root results show a mixture of $I(0)$ and $I(1)$ variables, supporting the use of the ARDL approach (Table 19). The structural-break analysis identifies endogenous breaks in 1979 for public employment and real GDP growth, 1999 for CPI-IW, 2001 for GFCF, and 2004 for private employment. These breaks suggest that the underlying economic relationships were not constant throughout the sample and may reflect changes in economic conditions, policy regimes, and structural transformation.

The ARDL results further reveal sectoral differences. For private-sector employment, the selected model is $ARDL(1,0,0,0)$. The positive and significant lagged employment coefficient indicates persistence in employment growth. However, the CPI-IW coefficient (-0.008389) is statistically insignificant ($p = 0.9155$), indicating no significant short-run effect of inflation on private-sector employment. Real GDP growth and GFCF are also statistically insignificant in the conditional dynamic equation.

The bounds test for the private-sector model produces an F-statistic of 1.839557, which is below the lower critical bound (Table 19). Thus, the null hypothesis of no levels relationship cannot be rejected, indicating no statistically supported long-run relationship among private-sector employment, inflation, real GDP growth, and GFCF. This finding is consistent with the preliminary correlation and regression results and reinforces the weak explanatory role of inflation in private-sector employment movements.

The public-sector model presents a different outcome, with the selected specification being $ARDL(1,0,1,0)$. The overall model is statistically significant ($F = 7.734877$; $p = 0.000090$). However, CPI-IW is statistically insignificant in the short run (coefficient = 0.008540 ; $p = 0.8970$), as is current-period real GDP growth, although its lagged value is positive and significant at the 5 per cent level. GFCF has a negative and statistically significant short-run coefficient (-0.231755 ; $p = 0.0015$).

In the long run, CPI-IW (coefficient = 0.010299 ; $p = 0.8971$) and real GDP growth remain statistically insignificant, whereas GFCF is negative and significant at the 1 per cent level (coefficient = -0.279491 ; $p = 0.0003$). This negative association does not imply that investment inherently reduces employment; rather, it may reflect capital intensity, technological substitution, changes in investment composition, and the changing role of the public sector. Thus, the employment-generating quality and composition of investment may matter more than its aggregate magnitude.

The public-sector bounds test provides strong evidence of a long-run relationship, with an F-statistic of 5.765831 (Table 19) exceeding the upper critical bound at the 1 per cent level. Thus, the null hypothesis of no long-run relationship is rejected, confirming a stable long-run association between public-sector employment and the selected macroeconomic variables, although inflation itself remains statistically insignificant.

The error-correction model further confirms adjustment towards long-run equilibrium. The error-correction coefficient is -0.829203 and significant at the 1 per cent level, indicating convergence and suggesting that approximately 82.9 per cent of the previous period's disequilibrium is corrected within one year.

The Granger causality results indicate unidirectional causality from GFCF to public-sector employment ($p = 0.0298$) and from public-sector employment to real GDP growth ($p = 0.0373$). GFCF also Granger-causes real GDP growth at the 10 per cent significance level. However, no significant causality is found between CPI-IW inflation and public-sector employment in either direction. Overall, investment and employment dynamics appear more closely associated with the growth process than inflation. These results should be interpreted as predictive precedence rather than evidence of structural causality.

The combined findings provide limited empirical support for the conventional Phillips Curve interpretation in India's organised sector. Correlation and regression results show only a very weak positive association between inflation and employment growth, while the ARDL results indicate that CPI-IW is statistically insignificant in both the private- and public-sector models. Thus, there is insufficient evidence that higher inflation systematically increases organised-sector employment during 1975–2011.

This weak relationship may reflect differences in the determinants of employment across sectors. Public-sector employment was influenced largely by government recruitment, fiscal conditions, administrative requirements, and public policy, whereas private-sector employment depended more on investment, industrial expansion, productivity, technology, business expectations, and labour-market conditions. The economic reforms initiated in 1991 and subsequent structural changes may have further altered these relationships.

The findings are also consistent with the modern Phillips Curve view that the inflation–unemployment trade-off is primarily short-run and may weaken as expectations adjust. Given the substantial institutional and structural changes over the 37-year sample period, any short-run inflation–employment relationship may not remain stable over the long run.

10. Conclusions and Policy Implications

The study concludes that the conventional Phillips Curve relationship is not empirically supported by organised-sector employment data in India over 1975–2011. Although correlation and regression analyses indicate a very weak positive association between inflation and employment growth, the relationship is statistically insignificant. The ARDL results reinforce this finding, as CPI-IW is insignificant in both private- and public-sector employment equations, indicating that higher inflation does not systematically increase organised-sector employment.

The findings nevertheless reveal important sectoral differences. For private-sector employment, the bounds-test

F-statistic of 1.839557 is below the lower critical bound, indicating no established long-run relationship. In contrast, the public-sector F-statistic of 5.765831 exceeds the upper critical bound at the 1 per cent level, confirming a long-run relationship. The error-correction coefficient of -0.829203 indicates that approximately 82.9 per cent of disequilibrium is corrected within one year. GFCF has a negative and significant long-run effect on public-sector employment, suggesting that investment does not necessarily generate proportional employment, possibly because of increasing capital intensity, technological change and the declining role of the public sector in labour absorption. The Granger-causality results further indicate that GFCF precedes public-sector employment, while public-sector employment precedes real GDP growth.

The evidence does not establish a statistically significant direct inflation–employment relationship in India's organised sector. Instead, employment outcomes appear to depend more on investment, economic growth, structural transformation and institutional factors. Sustainable employment generation therefore requires a balanced policy framework combining price stability with productive investment, skill development, technological progress and employment-oriented structural reforms.

11. Limitations and Future Scope

The findings of the study support a sector-specific rather than one-size-fits-all employment strategy. Investment policy should focus not only on the volume of capital formation but also on its employment intensity, sectoral composition and labour demand. Since aggregate GDP growth is not significant in the public-sector long-run equation, employment policy should emphasise the composition of growth and its employment-generating capacity. For private-sector employment, greater attention should be given to credit access, productivity, entrepreneurship, technology adoption and labour-market conditions. Investment appraisal should also consider employment effects alongside output and infrastructure objectives. The identified structural breaks further suggest that employment policies should account for changes across different economic regimes and major economic shocks. Thus, the estimates should not be interpreted as establishing a simple structural causal effect of inflation on employment. Inflation is not a significant determinant of organised-sector employment, while investment and employment dynamics appear more important. The absence of a long-run relationship in the private-sector model, contrasted with cointegration and substantial error correction in the public-sector model, highlights distinct sectoral employment-generation mechanisms and the need for sector-specific policy. However, since the study examines

organised-sector employment rather than unemployment, it does not constitute a direct test of the original Phillips Curve. Future research could extend the sample beyond 2011, incorporate broader labour-market indicators, examine sector- and regime-specific effects, explicitly model structural breaks, include additional theoretically relevant variables, and employ robust estimation techniques. Clear documentation of data sources, units, transformations, and revision vintages, particularly for historical employment series, would further strengthen future analyses.

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Authorship Contribution

Rajesh Pal conceptualized the study, prepared the initial draft, conducted the data analysis, handled the editing and formatting, and addressed the reviewers' comments.

Reena Nigam developed and applied research and econometric methodology and addressed the reviewers' comments related to the methodological and econometric aspects of the study.

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Ethical Approval

This study is based exclusively on secondary, publicly available data from the Reserve Bank of India's *Handbook of Statistics on the Indian Economy 2012-13*. No experiments on humans or animals were conducted. Ethical approval was therefore not required.

Conflict of Interest

The authors affirm that there is no conflict of interest in relation to this research or its publication.

Declaration

The authors confirm that the manuscript is original, has not been published previously, and is not under consideration

for publication elsewhere. The authors have reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Data Availability Statement

The data used for analysis in this study were collected from the Reserve Bank of India's *Handbook of Statistics on the Indian Economy 2012-13*. The data supporting the findings of this study are available from the authors upon reasonable request.

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AI Disclosure Statement

Artificial intelligence tools were used to assist the language editing, grammar refinement, and academic tone improvement during the preparation of the manuscript. All research ideas, methodologies, data analysis, interpretations, limitations and future research, conclusion and policy implications are solely the work of the authors.

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