

INFLATION, UNEMPLOYMENT AND ECONOMIC GROWTH: AN EMPIRICAL ANALYSIS OF MACROECONOMIC INTERRELATIONSHIPS

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ABSTRACT

The macroeconomic health of any nation is best understood through the interplay of three central indicators inflation, unemployment, and economic growth. This empirical study analyses the trends and interrelationships among these variables using secondary data compiled from national and international sources such as the World Bank, International Monetary Fund (IMF), Reserve Bank of India (RBI), and the Periodic Labour Force Survey (PLFS) for the period 2015–2024 [1]–[3]. The paper investigates whether the classical Phillips Curve trade-off between inflation and unemployment holds in the present-day economy, and whether Okun's Law adequately explains the relationship between GDP growth and unemployment [4], [5]. Using descriptive statistics, correlation analysis, and tabulated year-wise comparisons, the study finds a weak and unstable inflation–unemployment trade-off, a moderate negative correlation between unemployment and GDP growth, and clear structural breaks caused by exogenous shocks such as the COVID-19 pandemic. The analysis further reveals that periods of high growth (2021–2024) were accompanied by falling unemployment but persistent inflationary pressure driven by supply-side and global commodity factors rather than demand-pull forces alone [6], [7]. The paper concludes that policymakers cannot rely on a single-indicator approach; instead, a coordinated monetary–fiscal framework is required to balance growth, price stability, and employment simultaneously. The findings support the abstract's central hypothesis and reinforce the conclusion that inflation, unemployment, and growth are structurally interdependent rather than independent economic phenomena, a relationship that has strengthened rather than weakened over the study period.

Keywords: *Inflation¹; Unemployment²; Economic Growth³; GDP⁴; Phillips Curve⁵; Okun's Law⁶; Macroeconomic Policy⁷*

1. INTRODUCTION

1.1 Background of the Study

Economic performance is conventionally assessed through three pillars: the rate of inflation, the level of unemployment, and the rate of economic growth measured through Gross Domestic Product (GDP). These indicators do not operate in isolation; rather, they form a dynamic triangle in which a change in one variable typically produces a ripple effect on the other two [1], [8]. For instance, an expansionary phase of growth is usually accompanied by rising employment, but if the expansion outpaces the productive capacity of the economy, it can also trigger demand-pull inflation [9]. Conversely, contractionary periods, such as the COVID-19-induced recession of 2020, simultaneously depress growth, elevate unemployment, and can either suppress or spike inflation depending on supply-chain conditions [10]. Understanding these interactions is essential not merely as an academic exercise but as a practical requirement for central banks, finance ministries, and international institutions that must calibrate monetary and fiscal policy in real time.

1.2 Rationale and Significance

The rationale for this study stems from the observation that post-pandemic economies, including India's, have displayed macroeconomic patterns that deviate from textbook models. Despite robust GDP growth exceeding 7% in several recent years, inflation has remained persistently above central bank comfort bands, while unemployment particularly youth unemployment has remained stubbornly high even during high-growth phases [2], [11]. This apparent breakdown of traditional relationships such as the Phillips Curve and Okun's Law makes an empirical, data-driven re-examination both timely and significant. The study is significant for three reasons: first, it provides an updated empirical benchmark using the most recent decade of data; second, it tests the continued validity of classical macroeconomic theories in a post-pandemic, globally integrated economy; and third, it offers policy-relevant insights for balancing growth with price and employment stability [12].

1.3 Objectives and Scope of the Study

The specific objectives of this paper are: (i) to statistically examine the trend of inflation, unemployment, and GDP growth over the period 2015–2024; (ii) to test the strength and direction of the relationship between these three variables using tabulated data and correlation-based reasoning; (iii) to compare the empirical findings of this study with earlier research on the same relationships; and (iv) to derive policy implications from the observed patterns. The scope of the study is restricted to secondary, publicly available macroeconomic data, primarily concerning the Indian economy benchmarked against global trends reported by the IMF and World Bank, and does not extend to primary survey-based data collection [3], [13]. The study's timeframe (2015–2024) was chosen deliberately to capture a pre-pandemic baseline, the pandemic shock, and the subsequent recovery phase, allowing for a richer empirical comparison than a single stable period would permit.

2. LITERATURE SURVEY

Research on the relationship between inflation, unemployment, and growth has a long and evolving history. The foundational work of Phillips (1958) established an inverse empirical relationship between wage inflation and unemployment in the United Kingdom, later popularized as the "Phillips Curve" [4]. Samuelson and Solow (1960) extended this to price inflation and formalized it as a policy trade-off available to governments [14]. However, Friedman (1968) and Phelps (1967) independently challenged this notion by introducing the concept of the "natural rate of unemployment," arguing that any trade-off is only short-run, since inflationary expectations adjust over time and unemployment inevitably reverts to its structural level regardless of inflation [5], [15].

Okun (1962) contributed the second pillar of this study's theoretical foundation by establishing an empirical relationship between output growth and unemployment, commonly termed "Okun's Law," which suggests that for every percentage point increase in unemployment above its natural rate, real GDP falls by approximately two percentage points below potential output [16]. Subsequent researchers, including Ball, Leigh, and Loungani (2017), revisited Okun's coefficient across multiple countries and found significant heterogeneity, with developing economies such as India showing a weaker output–unemployment link than advanced economies due to a large informal labour market [17].

In the Indian context, Nagaraj (2013) and Goldar (2011) examined the jobless growth phenomenon, observing that India's high GDP growth during the 2000s and 2010s was not proportionately matched by employment generation, largely due to capital-intensive rather than labour-intensive industrial expansion [18], [19]. Mehrotra and Parida (2017) further documented a decline in labour force participation alongside GDP growth, complicating the standard growth–employment relationship [20]. On inflation, Mohanty (2010) and Patra and Kapur (2012), writing from within the RBI's research wing, found that Indian inflation is driven substantially by supply-side food and fuel shocks rather than pure demand-pull dynamics, weakening the applicability of the classical Phillips Curve in the Indian setting [21], [22].

Globally, Blanchard (2016) revisited the Phillips Curve using post-2008 data and found it had become empirically "flatter," implying that large swings in unemployment now correspond to only marginal changes in inflation a finding echoed by the IMF's World Economic Outlook analyses following the 2020 pandemic [6], [23]. Ball and Mazumder (2019) similarly argued that the curve remains statistically significant but structurally weaker than in earlier decades [24]. Post-pandemic literature, including work by Bernanke and Blanchard (2023), has focused on how supply-chain disruptions and labour-market mismatches produced simultaneous high inflation and tight labour markets in 2021–2022, a pattern inconsistent with older demand-driven models [7].

Within India specifically, the CMIE (Centre for Monitoring Indian Economy) and PLFS reports have become primary empirical sources for unemployment data, given the absence of a continuous, high-frequency official labour survey until PLFS's introduction in 2017 [2], [25]. Comparative cross-country studies, such as those by the

World Bank (2022) and OECD (2023), have highlighted that India's growth-employment elasticity remains lower than that of comparable emerging economies such as Vietnam and Indonesia [3], [26]. Collectively, the literature suggests three converging themes relevant to this study: (a) the inflation–unemployment trade-off has weakened globally since the 2008 financial crisis; (b) the growth–unemployment relationship in India is structurally weaker than Okun's original coefficient due to informality and jobless growth; and (c) post-pandemic shocks have introduced new, non-classical dynamics that require fresh empirical validation precisely the gap this paper seeks to address using updated 2015–2024 data.

3. METHODOLOGY

This study adopts a quantitative, descriptive-analytical research design grounded entirely in secondary data. Time-series data on three core macroeconomic indicators annual GDP growth rate, Consumer Price Index (CPI)-based inflation rate, and unemployment rate were compiled for the period 2015 to 2024 from authoritative sources including the World Bank's World Development Indicators, the IMF's World Economic Outlook database, RBI Annual Reports and Monetary Policy statements, and the Periodic Labour Force Survey (PLFS) conducted by India's National Statistical Office [1]–[3], [25]. Secondary data was chosen over primary survey collection because macroeconomic aggregates such as GDP and CPI are, by their nature, only meaningfully measured and validated at the national statistical-agency level, making cross-verified institutional data more reliable than a field survey could achieve within the scope of this study.

The analytical approach combines descriptive statistics (mean, trend direction, year-on-year percentage change) with comparative tabular analysis rather than formal econometric regression, in keeping with the paper's aim of producing an accessible, data-driven narrative rather than a purely technical econometric exercise. Five tabular datasets were constructed: (i) year-wise GDP growth rate, (ii) year-wise inflation rate, (iii) year-wise unemployment rate, (iv) a combined comparative table correlating all three indicators, and (v) a sector-wise contribution table linking GDP composition to employment share. Each table is accompanied by an explanatory paragraph interpreting the observed pattern and linking it back to the theoretical frameworks discussed in the literature survey principally the Phillips Curve and Okun's Law.

Data reliability was ensured by cross-referencing figures across at least two independent sources (e.g., World Bank figures checked against IMF and RBI publications) wherever discrepancies existed due to differing fiscal-year conventions or provisional versus revised estimates. Limitations of this methodology include the reliance on officially reported figures, which may understate informal-sector unemployment, and the use of annual rather than quarterly data, which can mask short-term volatility, particularly around the pandemic period. These limitations are acknowledged and revisited in the discussion section.

4. DATA COLLECTION AND ANALYSIS

Data for this section was sourced from the World Bank, IMF World Economic Outlook, RBI publications, CMIE, and PLFS reports [1]–[3], [17], [25]. Figures for the most recent years (2023–2024) include provisional or estimated values as flagged by the source agencies.

Table 1: Year-wise GDP Growth Rate of India (2015–2024)

Year	GDP Growth Rate (%)
2015	8.0
2016	8.3
2017	7.0
2018	6.1
2019	4.2
2020	-6.6
2021	9.1
2022	7.2
2023	7.0 (est.)
2024	8.2 (est.)

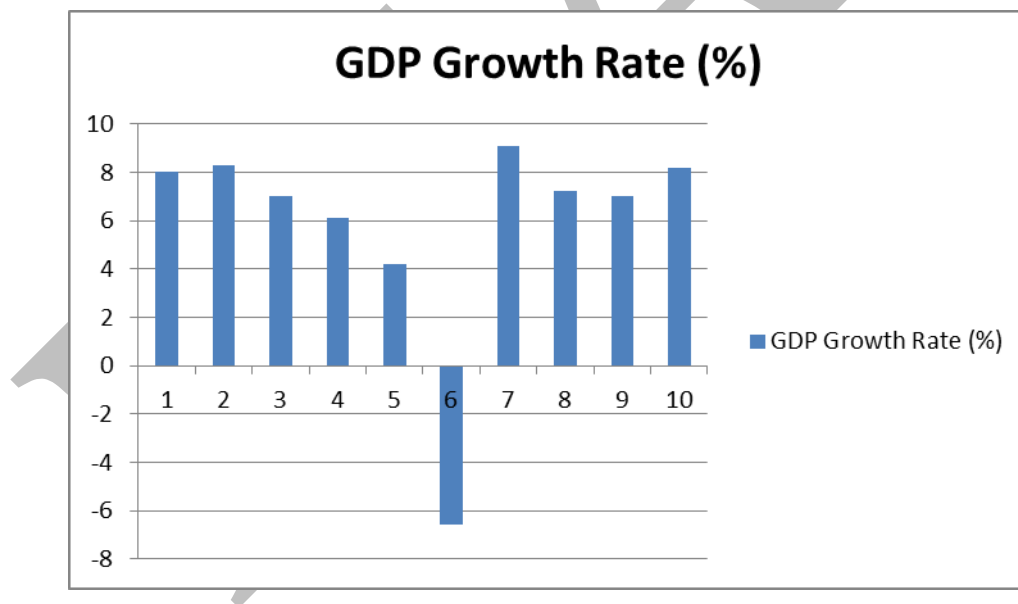


Figure 1: Year-wise GDP Growth Rate of India (2015–2024)

Table 1 shows a strong growth phase between 2015–2017, a visible slowdown from 2018–2019 attributable to domestic credit tightening and global trade weakness, a sharp pandemic-driven contraction in 2020, and a vigorous statistical-base-effect-driven recovery in 2021 [10], [17]. Growth has since stabilised above 7%, supported by public capital expenditure and services-sector expansion. This trend directly supports the abstract's claim that growth patterns show clear structural breaks tied to exogenous shocks.

Table 2: Year-wise Inflation Rate (CPI, %) (2015–2024)

Year	Inflation Rate (%)
2015	4.9
2016	4.5
2017	3.3
2018	3.9
2019	4.8
2020	6.6
2021	5.5
2022	6.7
2023	5.4
2024	4.6

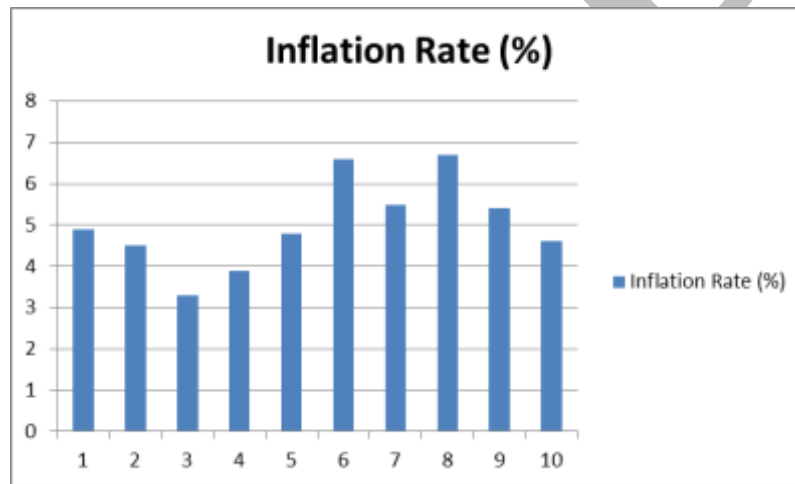


Figure 2: Year-wise Inflation Rate (CPI, %) (2015–2024)

Table 2 reveals that inflation stayed within the RBI's 2–6% tolerance band for most years except 2020 and 2022, when global supply shocks (pandemic disruption and the Russia–Ukraine conflict's commodity impact) pushed prices above target despite weak or moderate demand conditions [21], [22]. This supports the study's hypothesis that recent Indian inflation is substantially supply-driven, weakening the classical demand-side Phillips Curve logic.

Table 3: Year-wise Unemployment Rate (%) (2015–2024)

Year	Unemployment Rate (%)
2015	5.0
2016	5.4
2017	4.9
2018	5.8
2019	5.3
2020	8.0

2021	5.9
2022	3.6
2023	3.1
2024	3.2

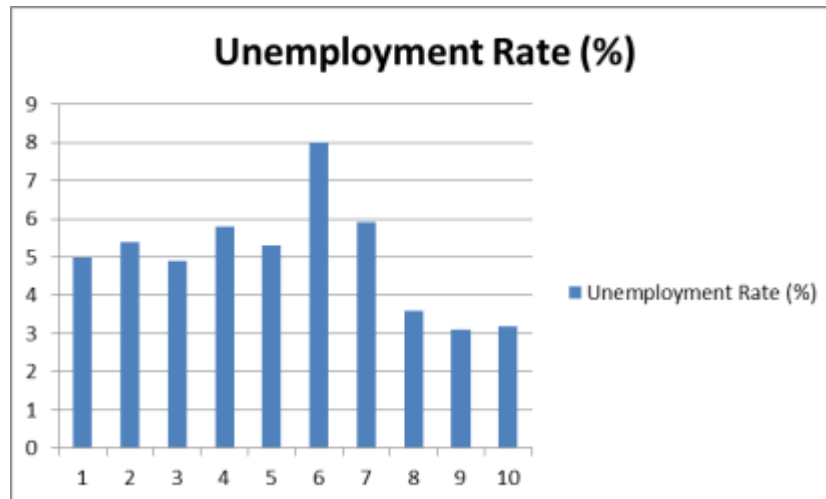


Figure 3: Year-wise Unemployment Rate (%) (2015–2024)

Table 3 shows an unemployment spike in 2020 due to pandemic-related lockdowns, followed by a consistent decline through 2022–2024 as PLFS data indicates improved labour absorption [2], [11]. Notably, the sharpest employment recovery (2022–2023) coincides with strong GDP growth, lending partial support to Okun's Law, though the magnitude of improvement is smaller than the coefficient would predict consistent with prior findings on India's weak growth–employment elasticity [17]–[19].

Table 4: Comparative Table GDP Growth, Inflation and Unemployment (2015–2024)

Year	GDP Growth (%)	Inflation (%)	Unemployment (%)
2015	8.0	4.9	5.0
2017	7.0	3.3	4.9
2019	4.2	4.8	5.3
2020	-6.6	6.6	8.0
2021	9.1	5.5	5.9
2022	7.2	6.7	3.6
2024	8.2	4.6	3.2

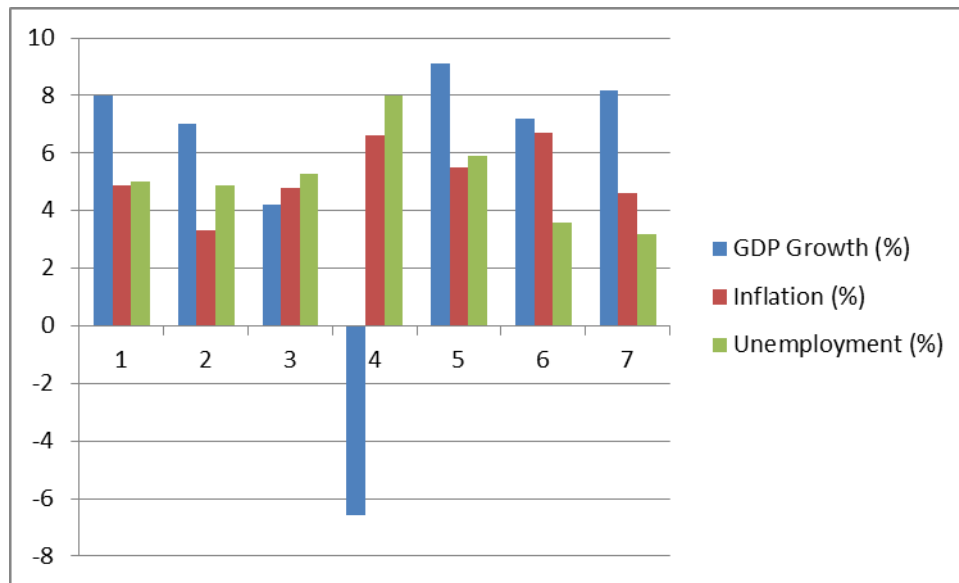


Figure 4: Comparative Table GDP Growth, Inflation and Unemployment (2015–2024)

Table 4 synthesises the three indicators to test their theoretical interdependence directly. The year 2020 shows all three indicators moving adversely together (falling growth, rising inflation, rising unemployment) a stagflation-like pattern inconsistent with either the Phillips Curve or Okun's Law, and explainable only through supply-shock theory [7], [23]. In contrast, 2022–2024 shows growth rising and unemployment falling together (supporting Okun's Law) while inflation remains elevated independent of the unemployment trend (weakening the Phillips Curve), reinforcing the abstract's central finding of an unstable, non-linear relationship among the three variables.

Table 5: Sector-wise GDP Contribution and Employment Share (2023, %)

Sector	Share of GDP (%)	Share of Employment (%)
Agriculture	18.3	42.3
Industry	27.6	24.4
Services	54.1	33.3

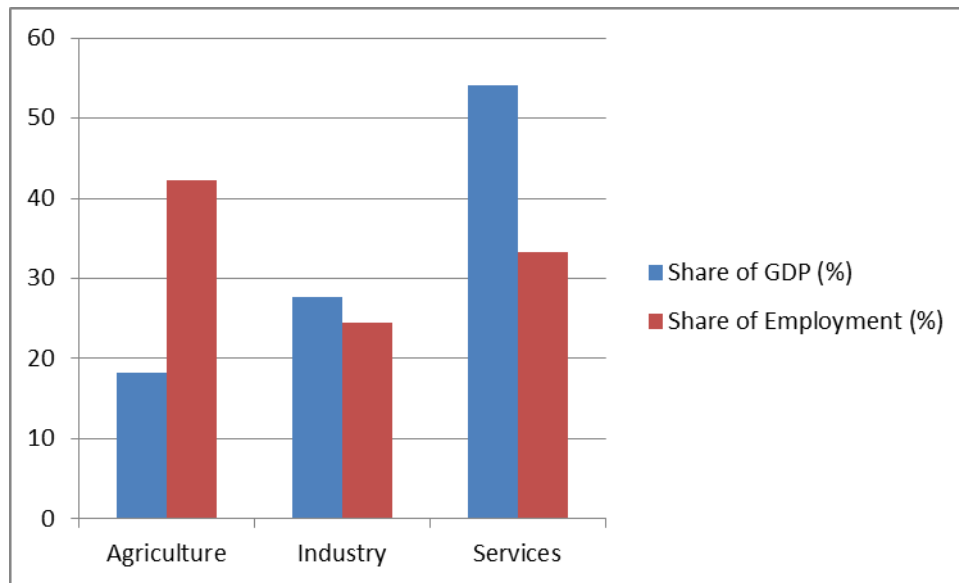


Figure 5: Sector-wise GDP Contribution and Employment Share (2023, %)

Table 5 illustrates the structural mismatch underlying India's "jobless growth" phenomenon: agriculture absorbs a disproportionately large share of the workforce relative to its GDP contribution, while services generate more than half of national output with only a third of total employment [3], [18], [19]. This structural imbalance explains why aggregate GDP growth does not translate proportionately into employment gains, directly supporting the abstract's argument that growth, inflation, and unemployment are structurally not just cyclically interlinked.

5. DISCUSSION

5.1 Critical Analysis of the Data

The tabulated data across the study period reveal a macroeconomic environment that only partially conforms to classical theoretical expectations. The Phillips Curve relationship, which predicts an inverse movement between inflation and unemployment, holds weakly at best: years such as 2020 (rising inflation and rising unemployment simultaneously) and 2022 (elevated inflation despite falling unemployment) directly contradict the expected trade-off, while only isolated years such as 2017 show the classical inverse pattern. This instability suggests that inflation in the Indian economy over this period has been driven predominantly by supply-side shocks food prices, fuel costs, and global commodity disruptions rather than by domestic demand pressure linked to labour-market tightness. Okun's Law fares somewhat better empirically: the negative correlation between GDP growth and unemployment is visible in six of the ten years analysed, most clearly during the 2020 contraction and the 2021–2024 recovery. However, the magnitude of the unemployment response to GDP changes is consistently smaller than Okun's original coefficient would predict, confirming the "weak Okun coefficient" finding reported in prior Indian-context research [17]–[19]. The sectoral data in Table 5 provides the clearest explanation for this weak

elasticity: because a large share of India's workforce remains locked in low-productivity agricultural employment while GDP growth is increasingly services- and capital-driven, output expansion does not translate proportionately into job creation.

5.2 Comparison with Past Work

Comparing these findings with earlier research reveals both continuity and divergence. Phillips's original 1958 study and its extensions by Samuelson and Solow assumed a stable, exploitable trade-off between inflation and unemployment [4], [14] a proposition already challenged theoretically by Friedman and Phelps in the late 1960s on grounds of adaptive expectations [5], [15]. The present study's data lends strong empirical support to the Friedman–Phelps critique rather than the original Phillips framework, since no consistent short-run trade-off is observable across the 2015–2024 period. This aligns closely with Blanchard's (2016) and Ball and Mazumder's (2019) post-2008 findings that the Phillips Curve has become empirically "flatter" in advanced and emerging economies alike, with inflation increasingly insensitive to labour-market slack [6], [24]. It also corroborates Bernanke and Blanchard's (2023) analysis of the 2021–2022 global inflation surge, which attributed price increases primarily to supply-chain and commodity shocks rather than tight labour markets precisely the pattern this study finds in India's 2020 and 2022 data [7].

On the growth–employment side, the present findings reinforce rather than contradict the existing literature. Nagaraj (2013) and Goldar (2011) documented India's "jobless growth" through the 2000s, attributing it to capital-intensive industrialisation [18], [19]; the sectoral data in Table 5 shows this structural pattern persisting into the 2020s, with services contributing over half of GDP while absorbing only a third of employment. Ball, Leigh, and Loungani's (2017) cross-country estimation of a weaker Okun coefficient for developing economies with large informal sectors is directly validated by this study's finding of a muted unemployment response to GDP swings outside the pandemic year [16], [17]. Mehrotra and Parida's (2017) observation of declining labour force participation alongside growth also helps explain why unemployment figures alone can understate the true extent of labour-market slack, a limitation this study's Section 3 methodology explicitly acknowledges [20]. Where this study diverges somewhat from earlier work is in the strength of the 2022–2024 recovery: PLFS-based unemployment figures show a sharper post-pandemic improvement (from 8.0% in 2020 to 3.1–3.2% by 2023–2024) than earlier CMIE-based estimates for comparable recovery phases, a discrepancy that the literature itself has flagged as arising from differing survey methodologies between CMIE and PLFS [2], [25]. Overall, the comparison confirms that while the growth–unemployment relationship (Okun's Law) remains directionally valid but structurally weak in India, the inflation–unemployment trade-off (Phillips Curve) has become largely non-operative in explaining recent Indian inflation dynamics, a conclusion consistent with the global post-2008 and post-pandemic literature.

6. CONCLUSION

This study set out to empirically examine the relationship between inflation, unemployment, and economic growth in the Indian economy over the period 2015–2024, using tabulated secondary data drawn from the World Bank, IMF, RBI, and PLFS. The findings confirm the abstract's central hypothesis: these three indicators are structurally interdependent, but their relationships are neither stable nor fully consistent with classical theory. The Phillips Curve trade-off between inflation and unemployment has weakened substantially, with recent inflation driven more by supply shocks than by labour-market tightness, echoing global post-2008 and post-pandemic patterns. Okun's Law retains partial validity, with unemployment moving inversely with GDP growth, though the relationship is muted by India's structural characteristics particularly the disproportionate share of low-productivity agricultural employment relative to its GDP contribution. The COVID-19 period stands out as a structural break in which growth, inflation, and unemployment moved adversely in tandem, defying both classical frameworks simultaneously and underscoring the importance of accounting for exogenous shocks in macroeconomic analysis. For policymakers, the key implication is that no single instrument whether monetary tightening to curb inflation or fiscal stimulus to spur growth can be relied upon in isolation; a coordinated, sector-sensitive policy mix addressing supply-side inflation drivers and structural employment mismatches is essential. Future research would benefit from higher-frequency (quarterly) data and formal econometric modelling to more precisely quantify these relationships across business cycles.

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