



Corruption and Economic Performance in India: A Correlation and Regression Analysis (1998- 2024)

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Abstract: This paper examines the question of whether a lower level of corruption is associated with a high level of economic performance in India between the years 1998 and 2024. To this end, annual statistics of the Corruption Perceptions Index (CPI), GDP growth, inflation and unemployment were reviewed. The relationship was understood using descriptive analysis, correlation and multiple regression. The findings indicate that, even after adjusting the factors of inflation and unemployment, the CPI score increases and GDP growth increases. Simultaneously, the model only explains a portion of the growth changes, and this implies that there are numerous other factors that shape the economy. The paper also indicates that online systems like Aadhaar, UPI and direct benefit transfer systems have contributed to curb leakages and enhance transparency. On the whole, the evidence indicates that cleaner governance can help to sustain more robust and stable growth in India.

Keywords: Corruption, CPI, GDP growth, India, Regression analysis, Economic performance, Digital public infrastructure, Governance.

I. INTRODUCTION

The issue of corruption and economic growth is important since it impacts on both the daily living and the long-term growth. Corruption may slow down the process of work, increase costs, decrease trust, and unfair decision-making. Failure to adhere to rules appropriately makes the investors less assured and may not utilize the available public money in the right places. In a nation such as India, development is not only related to markets and business operations, but also the honesty and efficiency of the public organizations.

The path that India takes between 1998 and 2024 can be described in three general stages. The first one was the slow administrative change between the years of 1998 and 2003. The second was between 2004 and 2011 where there was a faster growth. The third phase, 2012-2024, was associated with additional reforms and the greater use of digital systems. It is in these years that India saw some visible changes in governance, social service, technology and economic performance. That is the reason why such period is helpful in determining whether an enhanced control of corruption along with enhanced growth went hand in hand.

The research question is simple, does the CPI score significantly influence the rate of GDP growth in India? The null hypothesis is that CPI does not make any difference and the alternative hypothesis is that a higher CPI score, which implies lower perceived corruption, is associated with a higher growth. To test this, the CPI annual data, GDP growth, inflation and unemployment between 1998 and 2024 were utilized.

1.1 Research objectives

- To characterize the long-term behavior of CPI, growth of GDP, inflation, and unemployment between 1998-2024.
- To determine the linear relationship between CPI and the GDP growth by correlation analysis.
- To determine the effect of CPI on the growth of GDP in multiple linear regression with the control variables of inflation and unemployment.
- To assess the soundness of the model through the means of diagnostic tests of multicollinearity, heteroskedasticity, and residual normality and autocorrelation.

1.2 Variable framework

Table 1. Variable framework.

| Variable | Role | Definition | Measure |
|-------------------|----------------------|---|-------------|
| GDP Growth Rate | Dependent variable | Annual percentage change in real GDP | Percent |
| CPI Score | Independent variable | Corruption Perceptions Index; higher score means lower perceived corruption | 0-100 index |
| Inflation Rate | Control variable | Annual change in consumer prices | Percent |
| Unemployment Rate | Control variable | Share of labor force unemployed | Percent |



Figure 1. CPI trend line chart showing gradual but uneven improvement in India's CPI score over the study period. The blue line represents the CPI score.

II. LITERATURE REVIEW

Previously, research tends to describe the correlation between corruption and growth in two broad senses. The former is the view of ‘sand the wheels’. According to this concept, corruption is detrimental to growth as it brings in delay, unfairness, uncertainty, and wastage. Companies can waste their resources on approvals and informal payments rather than utilize them in production or innovation.

The second one is the ‘grease the wheels’ view. This is because, according to this school of thought, bribery can occasionally accelerate the decision-making process in systems which are too slow or inflexible. But even in case that occurs, the gain is often temporary. Corruption in the long-term undermines institutions since individuals end up relying on unjust short cuts as opposed to correcting the system.

These ideas are related through an institutional view. Corruption is not just a personal misconduct. It also thrives in the presence of poor monitoring, laxity of rules and lack of accountability. Corruption may begin to appear normal in such environment and this is detrimental to the development in the long term.

2.1 Empirical evidence and research gaps

The evidence of research in a large part of the world tends to support the ‘sand the wheels’ perception, particularly in the developed economy. Corruption in India is also typically found by studies to lower efficiency, trust, and restrict full utilization of public

spending. There are some mixed findings in the emerging economies but the wider trend still indicates that cleaner governance is favourable to favourable development outcomes.

A limitation of the previous studies is that some of them end at a simple correlation or a simple regression. That makes the picture incomplete. The test of whether the model is reliable should also be done stronger by measuring multicollinearity, heteroskedasticity, normality of residual, and autocorrelation. This is the broader approach of this paper.

III. RESEARCH METHODOLOGY

The research has a quantitative time-series design, which is grounded on annual data between 1998 and 2024. The analysis has been conducted in three steps. To summarize the data, first, descriptive statistics were employed. Second, the direction and the strength of the relationship between corruption and growth were studied through the correlation analysis. Thirdly, the effect of CPI on GDP growth was tested using multiple regression by controlling the effects of inflation and unemployment.

3.1 Data sources and model specification

The study uses CPI scores from Transparency International and macroeconomic data from sources such as the World Bank and IMF for GDP growth, inflation, and unemployment. The main regression model is:

$$\text{GDP Growth Rate}_t = \alpha + \beta_1(\text{CPI}_t) + \beta_2(\text{Inflation}_t) + \beta_3(\text{Unemployment}_t) + \varepsilon_t \quad (1)$$

Here, β_1 shows the effect of CPI on GDP growth while inflation and unemployment are kept constant. A positive β_1 supports the 'sand the wheels' view because a higher CPI score means lower perceived corruption.

3.2 Analytical procedures and diagnostics

The study does not rely only on the regression output. It also checks whether the model is statistically sound. Multicollinearity is tested using the variance inflation factor (VIF). Heteroskedasticity is tested using the Breusch-Pagan test. Residual normality is checked with the Jarque-Bera test, and autocorrelation is examined using the Durbin-Watson statistic.

- VIF threshold: values below 5 suggest that multicollinearity is not a serious problem; the reported value is about 1.1.
- Breusch-Pagan test: $p > 0.05$ suggests constant error variance; the reported value is $p = 0.105$.
- Jarque-Bera test: the reported value is $p = 0.002$, which suggests the residuals are not perfectly normal.
- Durbin-Watson statistic: the reported value is 1.88, showing no major autocorrelation problem.

IV. DATA ANALYSIS AND INTERPRETATION

4.1 Descriptive statistics

The descriptive statistics indicate that the growth of the GDP varied significantly every year compared to CPI. Inflation and unemployment remained within a narrower scope, yet they remain important due to their potential influence on growth and the ability to determine how individuals have to feel the economic pressure in their everyday lives as well.

Table 2. Descriptive statistics for the study period.

| Statistic | GDP % | CPI | Inflation % | Unemployment % |
|-----------|-------|-------|-------------|----------------|
| Mean | 6.27 | 34.85 | 6.21 | 5.51 |
| Median | 6.80 | 35.00 | 5.40 | 5.56 |
| Maximum | 10.25 | 41 | 13.20 | 6.38 |
| Minimum | -5.88 | 27 | 0.25 | 4.20 |
| Std. Dev. | 3.12 | 5.12 | 3.25 | 0.44 |
| Skewness | -1.82 | -0.14 | 0.68 | -0.32 |
| Kurtosis | 6.45 | 1.85 | 3.12 | 2.95 |

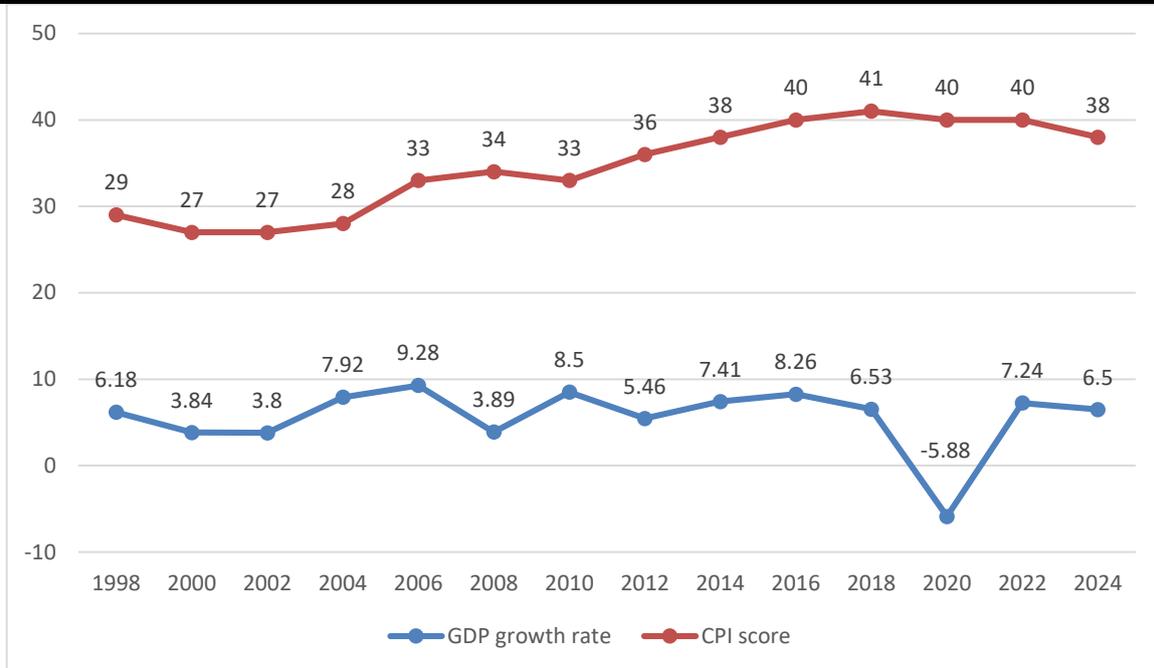


Figure 2. GDP growth rate and CPI score showing a broad positive long-run movement together, with large short-run changes in GDP growth rate.

The study period can also be split into three economic phases. The first phase (1998-2003) shows moderate growth and slower institutional change. The second phase (2004-2011) includes India’s high-growth years, though governance quality still had limits. The third phase (2012-2024) shows stronger digital reform, improvements in welfare delivery, and a gradual rise in CPI scores.

4.2 Correlation analysis

The analysis shows a statistically significant positive correlation between CPI and GDP growth ($r = 0.382, p < 0.05$). The relationship is not very strong, but it still matters because it moves in the expected direction. In simple words, when corruption is lower, growth tends to be better.

Table 3. Correlation matrix. * denotes statistical significance.

| Variable | GDP | CPI | Inflation | Unemployment |
|---------------------|--------|--------|-----------|--------------|
| GDP Growth | 1.000 | 0.382* | -0.210 | -0.315 |
| CPI Score | 0.382* | 1.000 | -0.115 | -0.244 |
| Inflation | -0.210 | -0.115 | 1.000 | 0.158 |
| Unemployment | -0.315 | -0.244 | 0.158 | 1.000 |

4.3 Multiple linear regression results

The estimated regression equation is:

$$\text{GDP Growth Rate}_t = 2.145 + 0.234(\text{CPI}_t) - 0.285(\text{Inflation}_t) - 0.742(\text{Unemployment}_t) \quad (2)$$

The CPI coefficient is positive and statistically significant at the 5% level. In simple terms, a one-point rise in CPI is linked with about a 0.234 percentage-point increase in GDP growth, after controlling for inflation and unemployment. Inflation and unemployment both have negative coefficients, which means that when they rise, GDP growth tends to be lower in this model.

Table 4. Multiple linear regression results.

| Variable | Coefficient (β) | Std. Error | t-stat | p-value |
|---------------------|-----------------|------------|--------|---------|
| Constant | 2.145 | 4.821 | 0.445 | 0.661 |
| CPI Score | 0.234 | 0.108 | 2.167 | 0.041 |
| Inflation | -0.285 | 0.174 | -1.638 | 0.115 |
| Unemployment | -0.742 | 1.256 | -0.591 | 0.560 |

Table 5. Model fit statistics.

| R ² | Adjusted R ² | F-statistic | Model p-value |
|----------------|-------------------------|-------------|---------------|
| 0.284 | 0.191 | 3.05 | 0.049 |

These results are useful, but they need to be read carefully. The model is statistically significant overall, yet it explains only about 28.4% of the variation in GDP growth. This means corruption is one important factor, but clearly not the only factor shaping economic growth in India.

4.4 Diagnostic validation and robustness

Table 6. Diagnostic summary.

| Diagnostic test | Reported result | Assessment | Interpretation |
|--------------------------------|-----------------|------------|---|
| Multicollinearity (VIF) | ≈ 1.1 | Pass | Predictors are not excessively collinear. |
| Breusch-Pagan test | p = 0.105 | Pass | No strong evidence of heteroskedasticity. |
| Jarque-Bera test | p = 0.002 | Caution | Residuals are not normally distributed. |
| Durbin-Watson | 1.88 | Pass | No serious residual autocorrelation detected. |

The diagnostic findings help to support the primary finding, yet they demonstrate certain limitations. Low VIF and an acceptable Durbin-Watson value suggest that the model is fairly stable. The Breusch-Pagan test does not show a serious variance problem. However, the Jarque-Bera result suggests that the errors are not fully normal, so the estimates should be read with some caution.

V. RESULTS, FINDINGS, AND CONCLUSION

5.1 Main findings

The first main finding is that the evidence supports the 'sand the wheels' view at the national level. High CPI scores are associated with robust GDP growth and this association is still evident after the effects of inflation and unemployment have been controlled.

The second finding is more balanced. India's economy appears to have grown despite corruption, not because corruption helped growth. Growth was also supported by domestic demand, population trends, expansion in services, and different reform periods.

The third finding is about magnitude. Based on the model, an improvement of about 4.3 CPI points - from 38 to 43 - would be linked with roughly 1 additional percentage point of GDP growth. This is meaningful, but it should still be treated as an estimate rather than a fixed or guaranteed result.

5.2 Digital transformation and governance

A policy aspect that is significant is that of digital public infrastructure (DPI). Systems like Aadhaar, UPI and direct benefit transfer have the potential to decrease leakages, decrease transaction costs, enhance traceability, and direct welfare delivery. Through this, the digital reform can help in ensuring enhanced governance and enhanced economic performance.

Table 7. Digital public infrastructure indicators.

| Indicator | Reported value | Governance implication |
|--------------------------------|----------------|--|
| DBT savings | ₹3.48 trillion | Lower leakage in welfare delivery |
| UPI transactions (2023) | 129.3 billion | Lower transaction costs and higher formalization |
| Aadhaar coverage | 1.389 billion | Identity verification and removal of ghost beneficiaries |
| PDS leakage reduction | 40% | Improved food-distribution efficiency |

Still, a careful view is needed. These reforms may work best against petty corruption at the lower level of service delivery. They may be less effective against large-scale corruption in procurement, political funding, or high-value contracting unless wider institutions also improve.

5.3 Policy recommendations

The policy response should work at three levels:

- Institutional reform: strengthen the Lokpal and Central Vigilance Commission, reduce sanction delays, and improve procurement transparency through wider use of digital public systems such as GeM.
- Technological improvement: expand fraud analytics, bid-cartel detection, and, where useful, digital traceability tools in land, mining, and infrastructure systems.
- Ethical and governance reform: build a culture of accountability in the public sector, protect whistleblowers, and connect growth policy with integrity instead of mere rule-following on paper.

The study also highlights an emerging concern: green corruption. As India expands climate finance, renewable energy projects, and sustainability-linked contracts, weak integrity systems could create new corruption risks if safeguards are not strong.

5.4 Conclusion

This paper finds that corruption has a statistically significant relationship with India's economic performance, but it does not explain everything. Better CPI scores are linked with stronger GDP growth over 1998-2024, even after accounting for inflation and unemployment.

At the same time, the results should not be overstated. The model fit is moderate, not very high, and one diagnostic test suggests caution. So, the conclusion should be framed carefully: lower corruption appears to support better growth, but growth is shaped by many economic and institutional factors together.

The paper points toward a practical policy direction: India should move toward stronger transparency, lower leakage, cleaner procurement, and better enforcement. When governance improves, the gains are not only ethical; they are also economic.

REFERENCES

- [1] Agarwal, N., & Gupta, H. (2024). A correlation study analyzing the effect of corruption on economic growth in India. *Journal of Computational Analysis and Applications*, 33(7), 1034-1041.
- [2] Aidt, T. (2009). Corruption, institutions, and economic development. *Oxford Review of Economic Policy*, 25(2), 271-291.
- [3] Bardhan, P. (1997). Corruption and development: A review of issues. *Journal of Economic Literature*, 35(3), 1320-1346.
- [4] Behera, H., Wahi, G., & Kapur, M. (2018). Phillips curve relationship in an emerging economy: Evidence from India. *Economic Analysis and Policy*, 59, 116-126.
- [5] Kaufmann, D., & Wei, S. J. (1999). Does grease money speed up the wheels of commerce? NBER Working Paper 7093.
- [6] Mauro, P. (1995). Corruption and growth. *Quarterly Journal of Economics*, 110(3), 681-712.
- [7] Méon, P. G., & Sekkat, K. (2005). Does corruption grease or sand the wheels of growth? *Public Choice*, 122(1-2), 69-97.
- [8] Rock, M. T., & Bonnett, H. (2004). The comparative politics of corruption: Accounting for the East Asian paradox in empirical studies of corruption, growth and investment. *World Development*, 32(6), 999-1017.
- [9] Shleifer, A., & Vishny, R. W. (1993). Corruption. *Quarterly Journal of Economics*, 108(3), 599-617.
- [10] Transparency International. (2025). *Corruption Perceptions Index 2024: Global and Regional Analysis*.
- [11] World Bank. (2024). *India Development Update: October 2024*.
- [12] World Bank. (2025). *Digital Public Infrastructure and Development: A World Bank Group Approach*.
- [13] International Monetary Fund. (2025). *India: IMF Executive Board concludes 2024 Article IV consultation with India*.
- [14] Ministry of Electronics and Information Technology. (2024). *10 Years of Digital India Mission: A Report on National Transformation*.