

# **An Econometric Analysis of Taxation and Corruption**

## **Abstract**

This study looks into the relationship between taxes and corruption in India from 1995 to 2022 using advanced econometrics method. Corruption Perception Index (CPI) is taken as a measure of corruption, with direct tax and indirect tax as taxation measures. Findings disclose no long-run relationship between the taken variables. The regression model explains 84.29% of the variation in CPI. A unidirectional relationship is found between CPI and IT.

## **Introduction**

Two important aspects that impact a nation's economic development and success are taxes and corruption. The primary source of public funds that may be utilised to support public goods and services, income redistribution, and economic stabilisation is taxation. The misuse of public authority for one's own benefit is known as corruption, and it may harm public accountability and confidence while also undermining tax justice and efficiency. Therefore, creating and putting into practice efficient tax laws and anti-corruption initiatives depend on an awareness of the connection between taxes and corruption.

However, there is conflicting and uncertain empirical evidence regarding the relationship between taxes and corruption. Higher taxes may lead to increased chances and incentives for tax evasion and bribery, according to certain studies. According to some studies, lowering taxes could encourage corruption since it would be harder for the government to keep an eye on tax compliance, enforce it, and prevent corruption. Furthermore, it's unclear which way taxation and corruption are causally related. Does corruption impact taxation, does taxation impact corruption, or do they both have an impact at the same time?

This study intends to investigate these issues by applying some econometric methods, such as Granger causality tests and cointegration analysis, to investigate the connection between taxation and corruption. A technique called cointegration can be used to determine whether two or more variables, regardless of how non-stationary or trended they are, have a long-term equilibrium connection. Granger causality is a statistical test that determines whether one variable influences another by determining if the past values of one variable can be used to predict the future values of another. This research will investigate if taxes and corruption are cointegrated and whether there is a causal relationship between them by using these techniques on a time series data set of nations over time. Additionally, The study will also go into how the results could affect future research and policy.

## ***Literature Review***

### **Taxation, Corruption and Growth**

**Philippe Aghion, Ufuk Akcigit, Julia Cagé and William R. Kerr (2016)** – This research paper examines how tax collection and corruption affect economic growth, innovation and market entry by developing a model that focuses on improving a model that focuses on improving quality. The model is used to evaluate the welfare effects of the interaction between

taxation and corruption . this study uses data from different states and countries from US Census Bureau's Longitudinal Business Database to support the theory that taxation has a growing and curving effect on growth and innovation. Moreover , higher local corruption weakens the positive impact of taxation on growth, innovation , and market entry, operating through entrepreneurial channels. Given recent discussion about income and corporate tax rates, the research highlights the importance of considering growth and innovation when designing optimal taxes. The authors argue for a comprehensive approach that associates public finance conditions to business, growth, and overall economic development, suggesting a promising direction for future research.

**Raul A. Barreto and James Alm (2003)** - The main takeaway from the study is that when the size of the government remains constant, the existence of corruption leads to a preference for a tax structure that favors consumption taxes over income taxes. This aligns with traditional advice for developing countries with high levels of corruption, which recommends indirect taxation. The research determines the best size for a government in both corruption-free and corrupt economies by studying the relationship between tax structure and societal well-being. The findings suggest that in a corrupt environment, the ideal size of the government, which balances conflicting objectives, is around 20%. From a public representative's perspective, the ideal size of a government in a corrupt economy is about 30%, but from a private representative's viewpoint, it's only 13%. In contrast, a corruption-free economy has an optimal government size of 80%, underscoring the negative impact of corruption on societal well-being and the production of public goods. In summary, corruption significantly influences fiscal policy, indicating that a corrupt economy should have a tax structure that leans towards consumption taxes, a smaller government, and a different optimal government size compared to a corruption-free economy. The study underscores the importance of fighting corruption to maximize fiscal policies that promote economic prosperity.

**Joseph Attila (2013)** - This research paper explores the complex relationship between corruption, economic growth, and taxation. It builds on previous research by incorporating corruption into a growth model that focuses on both public spending and taxation. The study finds that corruption has two main effects: it negatively impacts taxes, leading to suboptimal tax rates and distortions that hinder growth, but it can also potentially boost growth under certain conditions. The paper uses a non-parametric analysis to show a non-linear relationship between growth and public revenue. Detailed analyses using the Generalized Method of Moments (GMM) and Three-Stage Least Squares (3SLS) reveal a significant impact of taxation on growth in the most corrupt countries. Despite theories suggesting a positive effect of corruption on economic growth, the empirical findings do not support this hypothesis. The study suggests that future research could focus on specific aspects of the tax structure, particularly value-added and international trade taxes. It's important to study the effects of recent tax reforms in developing countries on economic activities, especially the reduction of trade tariffs through the introduction of Value Added Tax (VAT), to assess their impact on development. It's important to study the effects of recent tax reforms in developing countries on economic activities, especially the reduction of trade tariffs through the introduction of Value Added Tax (VAT), to assess their impact on development.

**Raymond Fisman, Jakob Svensson (2007)** - This study reveals a strong and negative relationship between bribery rates and the short-term growth of Ugandan firms, which is even more detrimental than the impact of taxation. This evidence at the micro-level supports theories based on the effects of corruption on firms, making a significant contribution to the field. The results consistently show that corruption is a major hurdle for businesses, despite the need for more research and careful interpretation due to limitations in the data and challenges in determining cause and effect. The findings have important policy implications, emphasizing the need for donors and organizations to focus more on combating corruption in developing and transitioning countries. The study points out that corruption has a worse impact on firm growth compared to taxation, highlighting the urgency of addressing corruption as a key constraint in business endeavors.

### Corruption and Tax Evasion

**Roy Cerqueti, Raffaella Coppier (2011)** - This research paper explores the best tax rate in the context of corruption. It builds on previous research by including a public sector in the analysis and focusing on fiscal corruption, which is corruption related to government revenue and spending, rather than bureaucratic corruption. The study emphasizes the role of “shame costs,” or the societal consequences of being caught engaging in corruption, in shaping the relationship between tax rates and tax revenues. It looks at how the level of “inner honesty,” or integrity, in society affects this relationship over time. The findings suggest that the best tax rate depends on the shame costs present in the society. As the tax rate increases, both income and tax revenue growth rates decrease. However, the extent of this decrease varies between countries with low and high levels of inner honesty. In countries with a high level of honesty, a moderately high tax rate can be set before seeing significant decreases in tax revenues. On the other hand, in countries with low inner honesty, the government needs to choose a very low tax rate to avoid a significant drop in tax revenues. The study also finds that a high likelihood of audits improves the growth rate, contrasting with previous research that suggested an uncertain impact of audit measures on economic growth, mainly due to indirect effects on tax compliance and rates. Overall, the study provides valuable insights into the complex dynamics of corruption, tax rates, and growth, offering guidance for policymakers in developing effective strategies tailored to societal norms.

**André Seidel, Marcel Thum (2015)** - In the context of corruption and tax evasion, the study investigates the effect of tax policy on firms' market entry and tax revenue. Utilizing a basic model of an expense framework with no impact on market passage in a defilement liberated world, the exploration uncovers that the connection between charge strategy, debasement, and market section is nuanced. The outcomes stress the meaning of deciding if pay-offs can answer charge approaches. Stricter tax enforcement can hinder market entry when bribes are exogenous, necessitating a trade-off between market entry and tax revenue for the government. Notwithstanding, in the event that pay-offs not entirely settled, upgraded requirement can yield a double advantage — expanded market section and higher duty income. The review proposes a direct rule for this surprising result: When the marginal company evades all taxes, the efficiency of tax audits increases, resulting in the double benefit.

**James Alm, Jorge Martinez-Vazquez and Chandler McClellan (2014)** - The study investigates the impact of tax policy on firms' market entry and tax revenue in the context of corruption and tax evasion. Using a simple model of a tax system with no influence on market entry in a corruption-free world, the research reveals that the relationship between tax policy, corruption, and market entry is minimal. The results emphasize the significance of determining whether bribes can respond to tax policies. When bribes are exogenous, stricter tax enforcement can hinder market entry, leading to a trade-off for the government between market entry and tax revenue. However, if bribes are endogenously determined, enhanced enforcement can yield a dual benefit—increased market entry and higher tax revenue. The study proposes a straightforward rule for this unexpected outcome: the double benefit occurs when the marginal firm evades all taxes and the efficiency of tax audits increases.

### **Study GAP**

This work intends to close this gap by examining the dynamic and long-run link between taxes and corruption in India, a developing nation that confronts substantial issues in both areas. It does this by utilising advanced econometric approaches, such as Granger causality tests and cointegration. The Corruption Perceptions Index (CPI) is used as a stand-in for corruption in the study, which use both direct and indirect taxes as measures of taxation and spans the years 19195 to 2022.

### **Objectives of the study**

- To explore, if taxes and corruption in India have long- Run equilibrium relationship .
- To look into the direction and strength of causality between taxation and corruption in long run.

### **Data**

This study consists data of corruption perception index (CPI), Direct Tax and Indirect Tax. Data has been gathered annually between the time period 1995-2022 from source like RBI annual publications and Transparency International.

### **Methodology**

Regression analysis is one the the most often used statistical techniques. This techniques helps us to estimate the relationship among dependent and independent (explanatory) variable. A regression model shows whether change in Explanatory variable cause any change in dependent variable. It does this by fitting a best – fit line and observing how data is dispersed around the line.

## Regression equation

$$CPI_t = \beta_1 + \beta_2 DI_t + \beta_3 IT_t + \varepsilon_t$$

Where, CPI = Corruption perception index

$\beta_1$  = intercept

DT = Direct Tax

IT = Indirect Tax

$\varepsilon_t$  = Error term

Here, the above equation, corruption perception index (CPI) is the dependent variable with Direct tax (DT) and Indirect Tax (IT). A direct tax is one that is paid by an individual or group to the organisation that levied it. Examples of taxes that are paid by an individual taxpayer directly to the government include income tax, real estate tax, personal property tax, and asset taxes. A tax that is collected by one party in the supply chain and transferred to the customer as part of the cost of buying an item or service is known as an indirect tax. Value-added taxes, sales taxes, and import charges are a few examples. The government frequently uses indirect taxes to raise money, and depending on the consumer's income, these taxes can be either progressive or regressive.

This study applies Cointegration approach, A set of time series variables with a linear combination that is integrated of a lower order but integration of the same order is said to have Cointegration, a statistical property. This implies a long term equilibrium between these variables, which keeps them in balance so that they do not deviate from each other. Cointegration is frequently used to estimate the long- and short-term dynamics of a relationship between non-stationary variables and to test for correlation between them.

Rule pertaining to integrated series linear combinations

a)  $x_t \sim I(0) \Rightarrow a + b x_t \sim I(0)$

$$x_t \sim I(1) \Rightarrow a + b x_t \sim I(1)$$

b)  $x_t \sim I(0)$  and  $y_t \sim I(0) \Rightarrow a x_t + b y_t \sim I(0)$

c)  $x_t \sim I(0)$  and  $y_t \sim I(1) \Rightarrow a x_t + b y_t \sim I(1)$  i.e.  $I(1)$  is a dominant property.

d) Generally if  $x_t \sim I(1)$  and  $y_t \sim I(1)$  then  $a x_t + b y_t \sim I(1)$ .

The Cointegration follow following steps. To test the order of integration of the time series variables by applying unit root test, such as PP test. The null hypothesis of these test is that the variables has unit root. step 2 if the variables are integrated of same order, then test for cointegration using Engle-Granger. If the variable found to be co-integrated we can find the short run dynamics of the relation using ECM. Then we move forward to test Granger Causality using the F-test. The Null is lagged value of one variable do not explain the variation in the

other variable. IF value if F-statistic is greater than the critical value , then the null is rejected and Granger causality is confirmed.

## Emperical Results And Discussion

**Table 1.** summary statistic

|                   | DI      | IT     | CPT   |
|-------------------|---------|--------|-------|
| MIN               | 22287   | 22176  | 2.63  |
| 1 <sup>st</sup> Q | 58622   | 60408  | 2.8   |
| Median            | 256388  | 94415  | 3.35  |
| Mean              | 320661  | 133586 | 3.345 |
| 3 <sup>rd</sup> Q | 505720  | 205864 | 3.85  |
| Max               | 1066827 | 380508 | 4.1   |

### Unit Root Test

The unit root test is used to find if there are any mixed in the order of integration of the under lying variable. The presence of unit root shows the non – stationary series , while absence indicates stationary series.

The value reported in Table 1 indicates that the varies i.e DT , ID and CPI all are stationary at first difference, showing they are integrated process of order 1. Here every variables showing stationary at difference 1 have paved they way to make use of Cointegration.

**Table 2.** Unit Root Test

| Variables | T-statistics |                            | Order of integration |
|-----------|--------------|----------------------------|----------------------|
|           | Level        | 1 <sup>st</sup> Difference |                      |
| CPI       | -13.362      | -27.648                    | I (1)                |
| DT        | -2.0782      | -19.181                    | I (1)                |
| IR        | -12.217      | -20.651                    | I (1)                |

### **Linear Regression Analysis**

we used formula  $CPT \sim DT + IT$  , here table 3 showing summary statistic of the residuals, which actually the difference between the observed and predicted values of the dependent variable. Basically residual measures how well the model fits the data. Lower the residuals SD, zero mean, and a symmetric distribution is good for model. Here median is 0.0384, which is close to zero, and SDerror of 0.216, which is also very small. The minimum and maximum value 0.3137, showing no extreme outliers. Also for coefficient , intercept coefficient is  $2.775e^{+00}$  ie  $\beta_1 = 2.775^{00}$  ,  $\beta_2 = 1.310e-06$  ,  $\beta_3 = 1.143e-06$ . P value of for this is less than 0.5,

showing they are insignificant at the 5% level .comes to residual SE,smaller the SE better fit of the model . multiple R-squared is 0.8429,which means that 84.29% of the variation in CPT is explained by the model. Adj R- squared is 0.8303 and p value is  $8.989e^{-11}$  which is less than 0.05 indicating model is significant.

**Table 3 . Regression Summary**

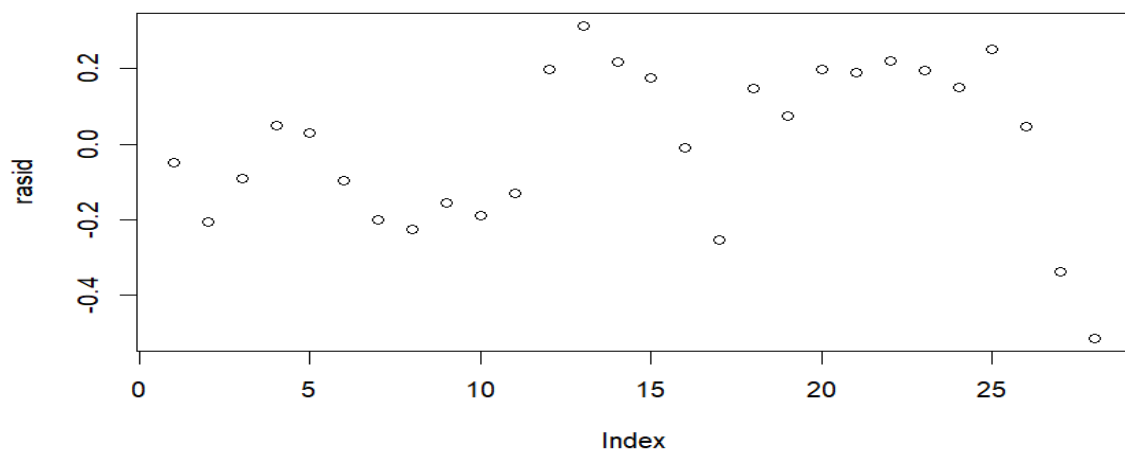
| Coefficient | Estimate  | Std.error | T value | P value    |
|-------------|-----------|-----------|---------|------------|
| Intercept   | 2.77e+00  | 6.762e+02 | 41.036  | <2e-16***  |
| DT          | 1.301e-06 | 3.357e-07 | 3.876   | 0.00068*** |
| IT          | 1.143e-06 | 9.292e-07 | 1.230   | 0.23016    |

From table 4 we can analyse p value is not significant at 95% confidence interval , we fail to reject Nll. Suggesting Residual is non- stationary . hence there is no long Run Relationship (no-cointegration)

**Table 4. Unit Root For Residual**

| Data  | T- statistic | TNP | P – value | H <sub>1</sub> |
|-------|--------------|-----|-----------|----------------|
| resid | -8.8131      | 2   | 0.05576   | Stationary     |

Fig.1 also showing residual are not stationary.



## Causality Test

**Table 5.** In case 1 , where  $H_0$  CBT does not granger cause DT i.e there is no relation between Corruption and Direct Tax. Similarly Direct tax and Indirect tax does not have any relation. But in case of CBT and IT have uni-directional relation .

**Table 6.** Granger Causality Test

| Null Hypothesis               | P – value | Causal Relation          |
|-------------------------------|-----------|--------------------------|
| CBT does not Granger cause DT | 0.7485    | No Relation              |
| DT does not Granger cause CBT | 0.2014    | No Relation              |
| IT does not Granger cause CBT | 0.0458    | Uni Directional Relation |
| CBT does not Granger cause It | 0.3403    | No Relation              |

## Conclusion

This study basically aims to explore the dynamic and long- relationship between taxes and corruption in india, a developing nation with having in both the areas. The research employed advance econometrics method, including Granger causality test and cointegration ,using data from 1995 to 2022. The corruption perception Index (CPI) has used as a proxy for corruption, with direct and indirect tax taken as measure of taxation. The unit test revealed all the variables are stationary at first difference , showing  $I(1)$ . However, the unit root test for residual suggested there is no long – run relationship (no-cointegration) between the variables , implying that thay may be related but they don't move together in long run.

The regression analysis suggested a good fit of the model i.e 84.29 % of the variation in CPI is explained by the model. The granger causality test indicated a uni directional relation between corruption and Indirect tax however there is no relation between corruption and Direct Tax.

These finding are helpful to understood the complex relationship between corruption and taxation. However there many more things which will done , future research could also explore the other factores which are influencing their relationship.



## Referances

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