Fiscal Policy, Economic Growth and Income Inequality: A Case of Indian Economy

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Through this study, we try to evaluate the effects that the direct and indirect taxation and the subsidies provided by the Government have on income inequality. We use Gini coefficient as a measure of inequality and use annual data for Indian economy for years 1982-2015 and employ an ARDL-based bounds test approach for testing co-integration. We ascertain the stationarity properties for all the series, separately using the ADF test, the DF-GLS test and the KPSS test. We estimate the long-run and short-run coefficients and find that a long-run negative relationship exists between Gini coefficient and subsidy-related expenditure. The long-run coefficients of direct and indirect taxation terms are positive but are significant only at 10%. The short-run coefficients obtained from ECM show that a negative relationship exists between expenditure on subsidies and Gini coefficient. In short run, direct tax seems to have an insignificant positive coefficient while indirect tax seems to have a significant unbalancing effect. We employ the Granger causality tests to confirm direction of causality and find that there runs a unidirectional causality from direct tax, indirect tax and subsidy to Gini coefficient, while any causality from Gini to any series is largely insignificant. The results imply that the government should use the calculated hybrid of tools like direct and indirect taxation and subsidies to have an equalizing impact on the economy. Moreover, the significant causal relationship from subsidies to Gini opens up an opportunity for the government to improve the income distribution using targeted subsidies, for example the Aadhaar-linked Direct Transfer Benefits etc.

Keywords: Economic inequality, taxation, subsidies, economic growth, India

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Introduction

The developing countries have experienced sustained economic growth during the past few decades. However, even though the poverty has seen a downward trend, the absolute inequality has been a cause of concern for the governments in these countries. Inequality has been shown to have a positive relation with political instability due to the inherent discontent that inequality brings towards the administrators (Odedokun & Round, 2004). In India, inequality has been a major point of discussion since the independence in 1947 (See (Pal & Ghosh, 2007), (Subramanian, et al., 2015), (Azam, 2016)).Other modern developing economies have also been making an effort to learn from the past and take appropriate precautions to better tackle inequality (See (Sembene, 2015), (Chauhan, et al., 2015)).

Tackling inequality has been a major objective for various schemes and programmes introduced by the governments in developing nations. But even though the schemes and mechanisms have been proposed, their outcome and effect on inequality have to be ascertained to decide on their success or failure. The Indian Government has been using the tools of taxation system and expenditure under the heads of developmental expenditure, social services expenditure and expenditure on subsidies to improve the income distribution of the economy(Singh & Srinivasan, 2004). Majority of studies (e.g. (Guajardo, et al., 2014)) have studied the aggregate impacts of fiscal policy changes, but their impact on inequality and income distribution has to be evaluated in depth.

We aim to fill this gap in the context of Indian economy by analysing the impact of taxation and government's expenditure on subsidies on income inequality. We use the data from years 1982 - 2015 and test for unit roots using various tests like theADF test, the DF-GLS test and the KPSS test. We use anARDL approach and apply ARDL-bounds testing approach to ascertain the long-run co-integration between these series. We then use an ECM to analyse the short-run relationships between the variables and income inequality. After confirming the presence of co-integration, we perform the Granger Causality tests to ascertain the direction of the causal relationships between the variables and Gini coefficient (used as an indicator of income inequality). Our results show that a long-run negative relationship exists between Gini coefficient and expenditure on subsidies. The long-run coefficients of direct and indirect taxation terms are positive but are significant only at 10% level of significance. Similar to the long-run results, the short-run coefficients obtained from ECM show that a negative relationship exists between the expenditure on subsidies and the Gini coefficient. Also, while the direct tax seems to have a positive but insignificant coefficient in the short-run, indirect tax seems to have a significant unbalancing effect in short run. The Granger causality tests confirm that there runs a unidirectional causality from direct tax, indirect tax and subsidy to Gini coefficient while any causality from Gini to any of the series is largely insignificant.

Literature Review

Various aspects of the Indian Fiscal Policy have been studied extensively through the literature (See (Shome, 1988), (Roy, 1998), (Rao, 2000), (Bagchi, 2006) etc.). (Shome, 1988) explored the taxation-leg of the fiscal policy and presents a framework for estimating the buoyancy and elasticity of taxes and then provides some estimates of these measures from selected Asian economies.(Rao, 2000) analyse the relationship between budget deficits, money creation and inflationary pressures and present an analytical framework which suggest that for any budget deficit, there exists an optimum level of monetisation and market borrowings of the government. More recently, (Bagchi, 2006) studies the fiscal management of the Indian central government in the post-liberation period and analyses its effects on federal relations and the social sector.

Herd et. al. (Herd, et al., 2008) analysed various areas of Indian Fiscal Policy and describe how the reforms in the past two decades have helped the Indian economy to move on a high growth rate path. But they also note that there is much scope on improving the quality of public spending to target poverty reduction better.

Kumar and Soumya (Kumar & Soumya, 2010) make an attempt to understand India's fiscal situation in the aftermath of Global Financial Crisis of 2007. With the analysis of previous trends and policy measures, they prescribe a new set of policy measures to achieve long-term and inclusive economic growth. Recently, (De, 2012) presented a review of trends and trajectories seen in the Indian Fiscal policy since India's independence.

Janeba (Janeba, 2000) explored the role of government policies, especially education subsidies on income inequality and social welfare. Kuznets, (Kuznets, 1955) in his famous paper, reiterated a negative relationship between the inequality in a country's income distribution and economic growth. In our results, we obtain a similar result in the short run but a reverse result in the long run.

Feenberg et.al.(Feenberg & Poterba, 1993) analysed data for very high-income taxpayers in the American economy and found that reducing the marginal tax rates led to a larger increase in the income of high-income groups while the income of lower-income groups increased only marginally, thus leading to an increase in inequality. We obtain a similar result (though the coefficient for direct tax is insignificant) in our tests for impacts of direct and indirect tax on income inequality.

Monica Ospina (Ospina, 2010) used a panel dataset of Latin American countries and found that the social expenditure and income inequality have a two-way relationship and so once the endogeneity is controlled for, the social expenditures have no impact on the income inequality. Similarly, Niehues (Niehues, 2010) also conducted a dynamic panel-based approach for European countries, and found that the targeted unemployment benefits and public pensions are responsible for the inequality reducing impact. We build on this results, and try to estimate the effect of social expenditure in the Indian context by using the data from years 1982-2015.

Methodology

Model specification and Data

The general model estimated in this paper is as follows:

$$LGINI = \alpha_0 + \alpha_1 LCPI + \alpha_2 LPGDP + \alpha_3 DTAX + \alpha_4 IDTAX + \alpha_5\, SUBSIDY$$

Where

LGINI = Natural Log of Gini coefficient (measured as % of 100), used as proxy for Income Inequality

LCPI = Natural Log of Consumer price index, used as a proxy for Inflation

LPGDP = Natural Log of Per capita GDP, used as an indicator of size economic activity and growth momentum in the economy (Base year used is 2004-05)

DTAX = Direct tax collections of the central government (as % of GDP)

IDTAX = Indirect tax collections of the central government (as %of GDP)

SUBSIDY = Subsidies amount dispersed by central government (as % of GDP)

and α_i's are the estimation coefficients of the equation.

The paper empirically estimates the effects of both legs of fiscal policy in India i.e. the direct tax collections, the indirect tax collections and the expenditure of subsidies on income inequality in the long run and short run using the above mentioned variables and the model.

The selection of CPI (used as a proxy for inflation) as control variable in the above model is following theoretical and empirical linkages, previously established in the literature. Various empirical studies, for example those of (Bulíř, 1998), (Crowe, 2006), (Albanesi, 2007) etc. have confirmed existence of a relationship between inflation and the income inequality in the economy. Similarly, the relationship between income inequality and growth has also been studied extensively in the literature and thus warrants the inclusion of per-capita GDP as a control variable in the model (See, for example, (Hong, 2014), (Naguib, 2015) etc.).

The trends in the level data series have been presented in the charts below in Figures 1-4. All the data used is available publicly from Handbook of Statistics on Indian Economy, Reserve Bank of India (RBI); Database of Indian Economy (DBIE), RBI and the Economic survey, Finance ministry, Government of India.

Figure 1

Trend of Per Capita GDP (PGDP)

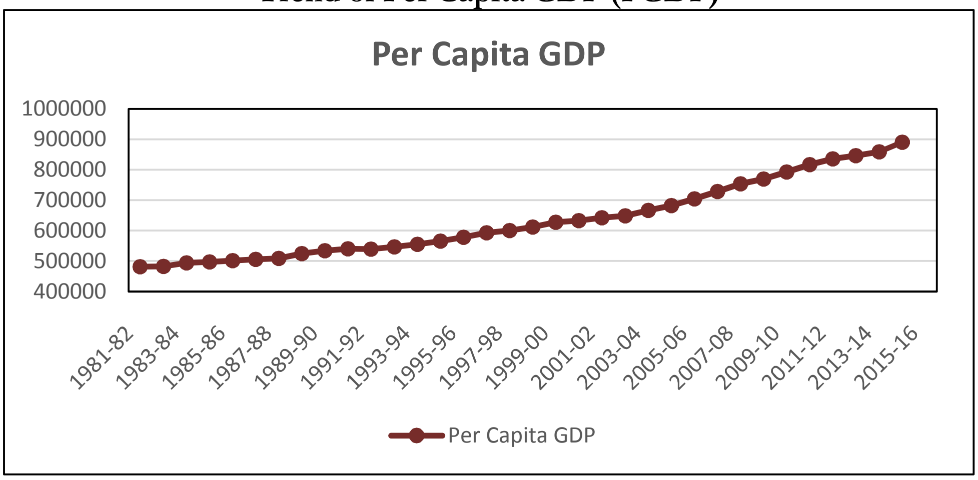


Figure 2

Trend of SUBSIDY, DTAX, IDTAX

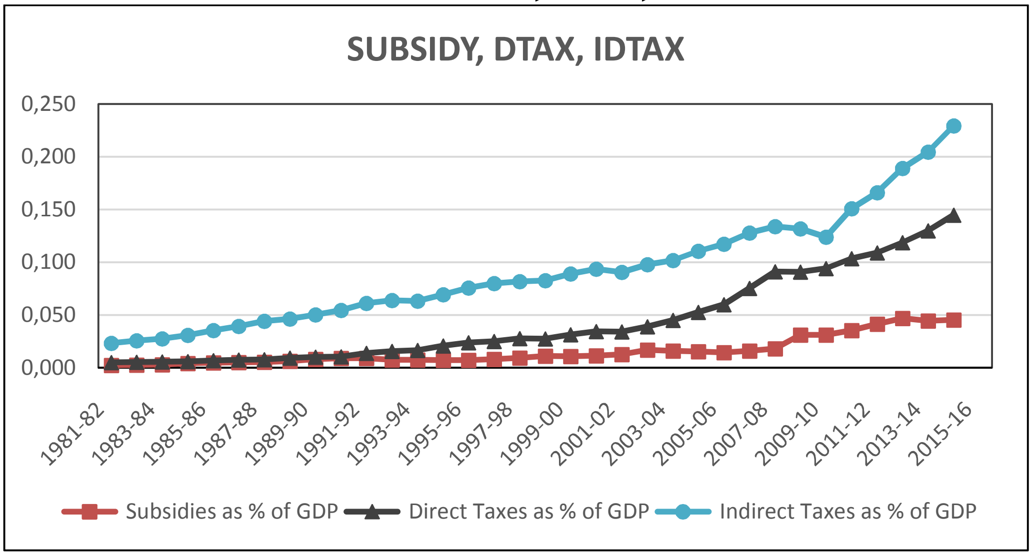


Figure 3

Trend of CPI

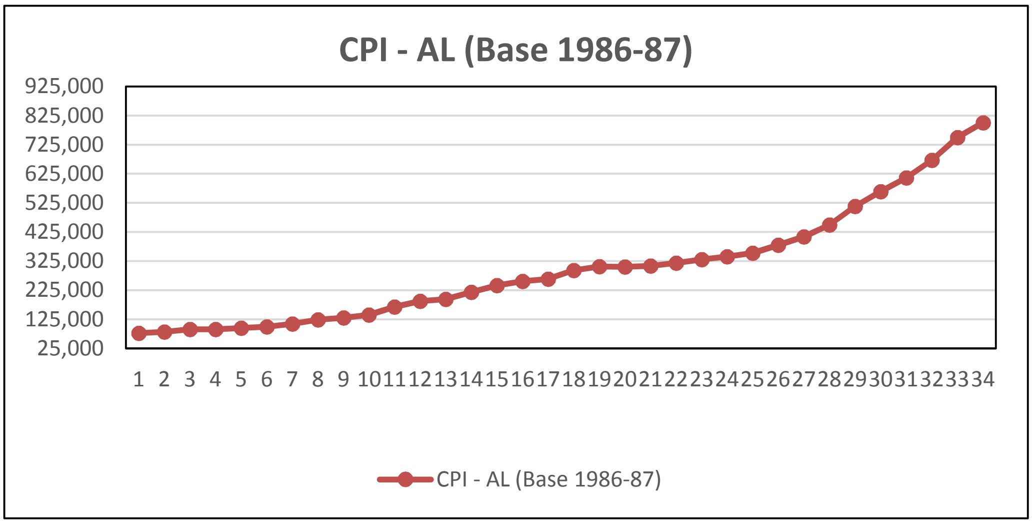
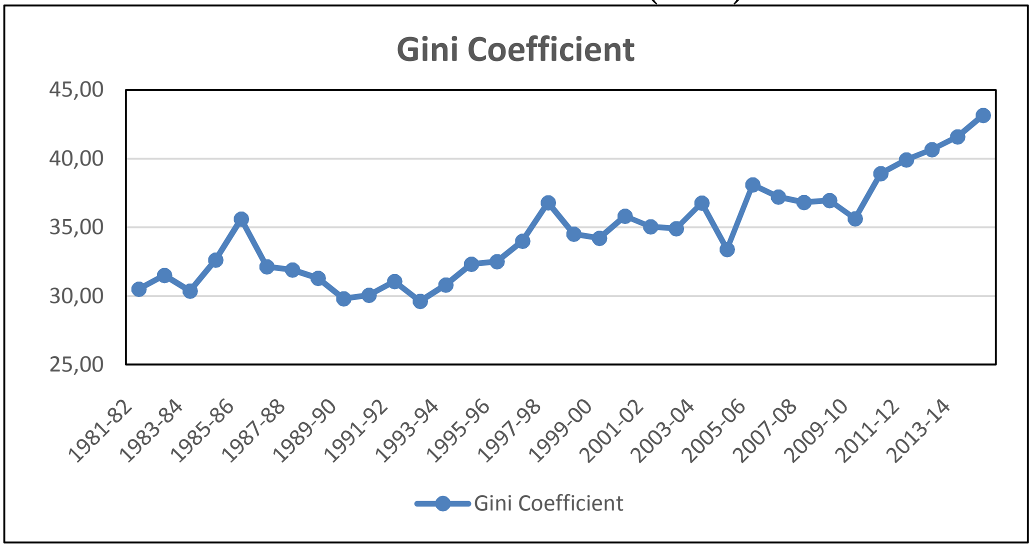


Figure 4

Trend of GINI coefficient (GINI)



Co-integration with ARDL

The empirical relationships between various variables and the Gini Coefficient modelled with Equation 1 are analysed using the Autoregressive Distributed Lag (ARDL) method proposed by Paresan et. al.(Pesaran, et al., 2001). The procedure has several advantages and is shown to be suitable in current scenario. First, the test is relatively more efficient and works better than other available methodologies in case of smaller data samples (as in case of this study). Second, the unit root tests requirements for ARDL method is slightly less stringent than other co-integration methods like Johansen and Juselius (JJ) (Johansen & Juselius, 1992) and Engle and Granger (Engle & Granger, 1987) tests. These tests would need both the series to be integrated of the same order one i.e. I (1) and would fail otherwise. ARDL technique allows for the variables to have any order less than equal one (i.e. either I (1) or I (0)). Moreover, it is not necessary that all the variables have same order of integration. Third, the ARDL bounds testing provides a simpler way for empirical analysis when compared to the multivariate model co-integration techniques in Johansen and Juselius (JJ) (Johansen & Juselius, 1992) as it allows for simple OLS regression of the co-integrating relationships once the lag order is specified.

The added advantage in ARDL technique is that it would allow for incorporating the short-run dynamics into the Error correction model (ECM) (See Equation 2 below) without losing any long-run information.

ARDL bounds-test approach

A basic ARDL test involves three steps:

1. OLS regression of the unrestricted ECM model(Equation 2)
2. Estimation on a long co-integrating relationship established by the bounds test using (Equation 3)
3. Estimation using the restricted ECM model described in (Equation 4) used to investigate the short-run dynamic parameters

The equations mentioned above are as follows:

$$\Delta LGINI = \delta_0 + \delta_1 T + \delta_2 LCPI_{t-1} + \delta_3 PGDP_{t-1} + \delta_4 DTAX_{t-1} + \delta_5 IDTAX_{t-1} + \delta_6 SUBSIDY_{t-1} + \sum_{i=1}^{q} \alpha_i LCPI_{t-i} + \sum_{i=1}^{q} \beta_i LPGDP_{t-i} + \sum_{i=1}^{q} \gamma_i DTAX_{t-i} + \sum_{i=1}^{q} \theta_i IDTAX_{t-i} + \sum_{i=i}^{q} \vartheta_i SUBSIDY_{t-i} + \varepsilon_t \quad (2)$$

$$\Delta LGINI = \delta_0 + \sum_{i=0}^{q} \delta_1 LCPI_{t-i} + \sum_{i=0}^{q} \delta_2 LPGDP_{t-i} + \sum_{i=0}^{q} \delta_3 DTAX_{t-i} + \sum_{i=0}^{q} \delta_4 IDTAX_{t-i} + \sum_{i=0}^{q} \delta_5 SUBSIDY_{t-i} + \varepsilon_t \quad (3)$$

$$\Delta LGINI = \mu + \sum_{i=1}^{q} \delta_i \Delta LGINI_{t-i} + \sum_{i=1}^{q1} \alpha_i \Delta LCPI_{t-i} + \sum_{i=1}^{q2} \beta_i \Delta LPGDP_{t-i} + \sum_{i=1}^{q3} \gamma_i \Delta DTAX_{t-i} + \sum_{i=1}^{q4} \theta_i \Delta IDTAX_{t-i} + \sum_{i=i}^{q5} \vartheta_i \Delta SUBSIDY_{t-i} + \emptyset ECM_{t-1} + \varepsilon_t \quad (4)$$

Equation 2 specifies the unrestricted/unconstrained error correction model (UECM) of the ARDL approach and is used to determine existence of the long-run and short-run relationships between the dependent and independent variables. Here T is the time trend and other series are the same as have been defined in previous sub-section. The δ_i's represent the long-run coefficients while the coefficients α_i's, β_i's, γ_i's, θ_i's and ϑ_i's are represent the short-run coefficients.

The null and alternate hypotheses for equation 2 (i.e. Step 1) are defined as:

H0:$\delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$

H1:$\delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq 0$

where rejection of *H0* would imply a co-integrating relationship among the series.

The presence of long-run relationship among variables is tested for using a Wald's test (F-statistic) for the joint significance of the coefficients of the lagged values of the variables. Alternate methods, with regards to the Wald's test, are the Lagrange Multiplier (LM) test and the likelihood-ratio test, all of which behave in an asymptotically similar fashion (See (Engle, 1984)). The computed F statistics from the Wald's test are compared with tabulated critical values in Paresan et. al.'s original work (Pesaran, et al., 2001). Recently, the Narayan (Narayan, 2004) tabulated updated critical values used for comparison with test F statistics in bounds-testing approach.

Equation 3 specifies the relationship established for a bound-testing approach for long-run and short-run dynamics. The model includes lagged values of the dependent variables and the ARDL technique has an added advantage that different independent variables (regressors) can be assigned different lag-lengths as they enter the model.

Equation 4 specifies the restricted version of error correction model used to analyse the relationships and co-integration dynamics in short run where α_i's, β_i's, γ_i's, θ_i's and ϑ_i's are short-run dynamic coefficients to equilibrium and $\emptyset$ is the speed adjustment coefficient and ECM_{t-i} is the lagged error-correction term obtained from the long-run equilibrium relationship.

Granger's Causality (non-causality) Test

After the null hypothesis of "No presence of co-integration" is rejected using ARDL-based co-integration (See Section 4 for detailed results), we proceed to actual causality testing for analysing the long-run and short-run causal relationships of various series with the Gini coefficient. We use the approach suggested by Toda and Yamamato (Toda & Yamamoto, 1995) for testing the Granger non-causality. The advantage of the approach is that it behaves well (at least asymptotically) regardless of the order of integration being I(0), I(1) or I(2), being either non-co-integrated or being co-integrated.

Results and Analysis

Unit root tests

Paresan et. al. (Pesaran, et al., 2001) stated that the ARDL-based bounds testing approach should be applied only when the all the series being tested are either I(0) or I(1) (i.e. no series is integrated of order more than or equal to 2). For ascertaining the integration properties of the series used in the model described in previous section, we make use of three different unit root tests namely: ADF test, DF-GLS test and KPSS test. The results of all these three tests for level and first difference values of the series have been compiled and presented in Table I below.

Unit root tests: ADF, DF-GLS, and KPSS

Table 1

Series	ADF	DFGLS	KPSS
DTAX	0.860[x]	-2.400[x]	0.206**
IDTAX	2.133[x]	-0.465[x]	0.173**
GINI	-2.765[x]	-2.931*	0.126***
SUBSIDY	-0.739[x]	-0.896[x]	0.178**
CPI	-1.279[x]	-2.678[x]	0.167**
LPGDP	-1.147[x]	-0.632[x]	0.200**
Δ*DTAX*	-4.094**	-4.231*	0.101[x]
Δ*IDTAX*	-4.044**	-4.199*	0.181***
Δ*GINI*	-8.093*	-8.242*	0.056[x]
Δ*SUBSIDY*	-5.337*	-5.488*	0.080[x]
Δ*CPI*	-3.803**	-2.121[x]	0.141***
Δ *LPGDP*	-5.148*	-5.049*	0.099[x]

Notes: [x] – Fail to reject H0, * - H0 rejected at 1%, ** - H0 rejected at 5%, *** - H0 rejected at 10% significance levels

The ADF and DF-GLS tests define Null Hypothesis (H_0) as "Unit root present" and Alternate Hypothesis (H_1) as "Unit root absent". KPSS test works in a reverse way and defines H_0 as "Series is stationary" and H_1 as "Series is non-stationary". The results in Table I (Note: ΔX denotes the first-difference for series X) show that at level values, data series of DTAX, IDTAX, GINI, SUBSIDY and CPI all fail to reject the H_0 of ADF and DF-GLS that "Unit root is present"(all fail to reject even at 10%) and reject the H_0 of KPSS that "Series is stationary" (GINI at 5% and others at 1%). When the first-differenced values for the series are used, the H_0 of ADF and DF-GLS is rejected by the series of DTAX, IDTAX, CPI (at

5%); GINI, SUBSIDY, PGDP (at 1%) confirming that all of them are not I(0). Similarly, when first-differenced values for the series are used, all the series fail to reject H_0 of KPSS (except IDTAX which rejects it only at 10% and can be neglected). This confirms that all the series are either I(0) or I(1), i.e. are not integrated of the order more than or equal to 2. This allows us for proceeding to the ARDL-bounds test approach.

Co-integration among fiscal policy legs and Gini Coefficient

The empirical results from the unit root tests (See previous sub-section) confirm that none of the series involved in co-integration is I(2) or higher. Now, we estimate the ARDL-bounds test approach to co-integration. As per the procedure mentioned in Section 3.3, we estimate Equation 2 using OLS and test for joint significance of parameters of the lagged variables in the equation. Here (as mentioned in Section 3.3), we only test for joint significance of δ's only and not other parameters. The assumptions of ARDL-bounds testing approach can be verified using the diagnostics test results listed in Table II. Table IV reports the results of calculated F statistics and diagnostics test.

Diagnostic tests for ARDL bounds test

Table 2

Diagnostic test	Statistic (p-value)
Normality J-B value	5.3211 (0.210)
Serial correlation LM test	1.3100 (0.252)
Heteroscedasticity (ARCH)	4.2682 (0.118)
Ramsey reset test	0.7559 (0.385)

The results from ARDL-bounds test show that the calculated F-statistics for joint significance of parameters of lagged variables is 14.84 (0.005). Thus, the calculated F-statistics turns out to be higher than the critical upper bounds value mentioned in (Pesaran, et al., 2001) and (Narayan, 2005). This suggests that a co-integrating relationship exists between Gini coefficient and the dependent variables involved. The results of diagnostics tests confirm the soundness of the model and confirm the satisfiability of the underlying assumptions required for employing the tests.

The long-run coefficients estimated from the ARDL test are reported in Table III. From the results, it is clear that DTAX has a positive and significant coefficient (at 10% level), which is expected as though the direct taxation is claimed to be progressive but the effects on after-tax income are more pronounced for the middle-income groups. The results also show a long-run negative relationship exists between Gini coefficient and expenditure on subsidies. This shows that the increase in expenditure would indeed contribute to more equalising effect on the income distribution in the long run. The long-run coefficient of indirect taxation term is positive but is not significant.

Estimated Long Run Coefficients, dependent variable is LGINI

Table 3

Regressor	Coefficient	t-statistic (p-value)
LPGDP	0.0950	0.5236 (0.606)
DTAX	2.1147	1.7136 (0.100)
IDTAX	0.3014	0.4836 (0.634)
SUBSIDY	-5.3088	-1.7234 (0.098)
LCPI	-0.0088	-0.5175 (0.610)

The short-run coefficients from the restricted error correction model (ECM) are presented in Table IV. Similar to the long-run results, the short-run coefficients obtained from ECM show that a negative relationship exists between expenditure on subsidies and Gini coefficient. Also, while direct tax seems to have a positive but insignificant coefficient in the short-run, indirect tax seems to have a significant unbalancing effect in short run. Per capita GDP has a positive but insignificant coefficient which can be related to the unequal positive overflows that the growth in economic activity has.

ECM representation of ARDL,dependent variable is LGINI

Table 4

Regressor	Coefficient	t-statistic
LPGDP	0.6954	-1.3132 (0.201)
DTAX	-1.9199	-1.0558 (0.301)
IDTAX	1.9002	1.9934 (0.057)
SUBSIDY	-3.5596	-1.8985 (0.069)
LCPI	-0.0059	-0.4883 (0.629)
ECM (-1*)*	-0.6705	-3.3989 (0.002)

Granger Causality (non-causality) tests

Once the co-integration is confirmed, we employ the Granger causality tests (with the approach suggested by Toda and Yamamato (Toda & Yamamoto, 1995)) to confirm the direction of causality and our results show that there runs a unidirectional causality from direct tax, indirect tax and subsidy to Gini coefficient while any causality from Gini to any series is largely insignificant. The F-statistic values and the corresponding p-values are shown in the Table V.

Pairwise Granger Causality Tests

Table 5

Null Hypothesis	F-Statistic	p-value
DTAX does not Granger Cause LGINI	3.26179	0.0538
IDTAX does not Granger Cause LGINI	3.53634	0.0432
SUBSIDY does not Granger Cause LGINI	2.89429	0.0568
LCPI does not Granger Cause LGINI	0.19242	0.8261
LPGDP does not Granger Cause LGINI	3.68619	0.0384

The stability of the results was evaluated by applying the cumulative sum of recursive residuals (CUSUM) and its square (CUSUMSQ) tests proposed by (Brown, et al., 1975). The results shown in Figure 2 suggest parameter consistency.

Figure 5

Plot of Cumulative Sum of Recursive residuals

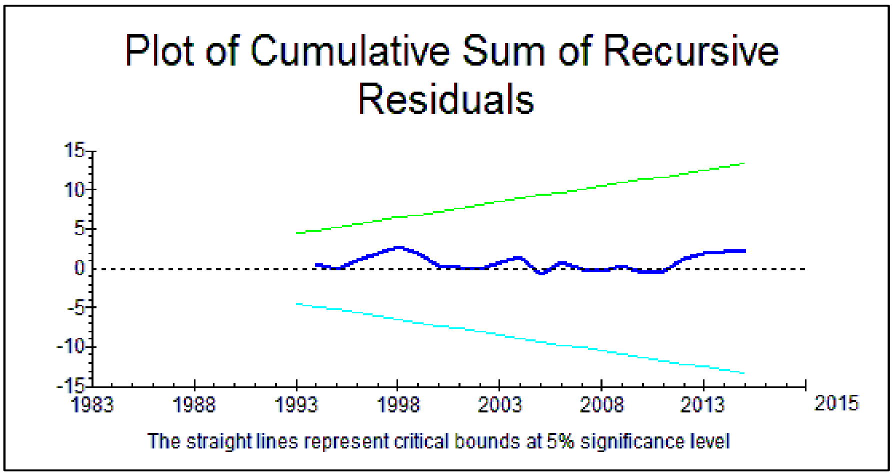
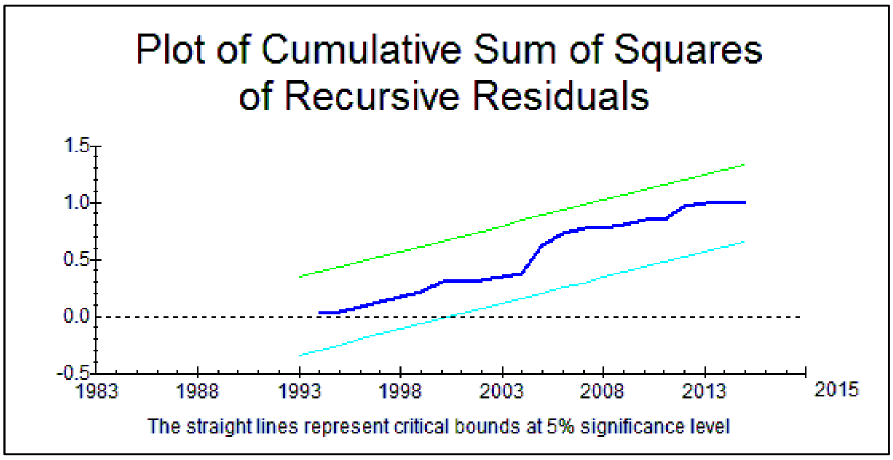


Figure 6

Plot of Cumulative Sum of Squares of Recursive residuals



Conclusions and Policy Prescriptions

The main objective of the paper was to study and quantify the impacts of the various heads of fiscal policy namely direct and indirect taxation and expenditure on subsidies. From the results, it is clear that only concentrating on taking growth levels to double digits is not going to be much beneficial for overall income distribution in the economy both in long as well as short run.

Our results confirmexistence of a short-run and long-run relationship between the expenditure on subsidies and Gini coefficient. This implies that the government should use the calculated hybrid of tools like direct and indirect taxation and subsidies to have an equalizing impact on the economy. With an aim of keeping the fiscal deficit in control, it is clear that the government's hands are tied with respect to increasing the subsidies in a long run. But the significant causal (and negative) relationship from subsidies to Gini opens up an opportunity for the government to improve the income distribution using targeted subsidies, for example the Aadhaar-linked Direct Transfer Benefits etc.

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