

**Ecological fiscal transfers and local government spending:
The flypaper effects in the era of pandemic**

Amandeep Kaur
Ranjan Kumar Mohanty
Lekha Chakraborty
Divy Rangan

Abstract

Against the backdrop of covid pandemic, the paper explores the empirical evidence for flypaper effects in the ecological fiscal space in India. Using the panel data models, we analyse whether the impact of intergovernmental fiscal transfers or state's own revenue determines the expenditure commitments on ecology at the State level. The econometric analysis shows that the aggregate intergovernmental fiscal transfers rather than state's own income determines the ecological expenditure at subnational government levels. The evidence for efficacy of flypaper effects either stem from bureaucratic fiscal behaviour or the fiscal illusion of the economic agents about the exogeneity of ecological fiscal space. The results hold, when the models are controlled for ecological outcomes and demographic variables. However, at the disaggregated levels of intergovernmental fiscal transfers - grants and tax devolution - the evidence for flypaper effects, is mixed.

Keywords: Intergovernmental Transfers, Flypaper effect, Environmental Economics, Macroeconomic Policy, National Government Expenditures

JEL Classification: E6, H5,H7,Q5

1. Introduction

With the advent of fiscal decentralisation, many countries have focused on environmental commitments at the subnational government level. The “principle of subsidiarity” says that the responsibility for providing a particular service should be assigned to the jurisdiction “closest to people”. Such decentralised decisions in climate change commitments is getting attention worldwide ex-post to Paris accord on climate change. However, the interjurisdictional competition to attract mobile capital by trading (lowering) environmental regulations lead to “race to bottom” and “pollution havens”. Empirical evidence reveals this continuous tension between ‘principle of subsidiarity’ and the “race to the bottom”.

In the intergovernmental fiscal framework, three functions of environmental quality have been developed¹. The first considers environmental quality as a pure “international” public good for which a global solution is required, irrespective of its location. The second case considers environmental quality as a pure “local’ public good”. The ‘principle of subsidiarity’ is directly applicable to this second case. The third case, which is most common in practice, deals with the effects of interjurisdictional externalities, including water and air pollution.

The governments have tried to “internalise these externalities” through legal negotiations and fiscal instruments. It is pertinent to analyse how the tax transfers to subnational governments for the next five years have integrated environmental variables. Equally important is how efficacious of fiscal allocations at the local level in integrating the climate change commitments. Against the backdrop of covid 19 pandemic, the fifteenth Finance Commission report, which determines the tax transfers in India, was tabled in the Parliament on February 1, 2021. One of the pertinent questions is whether India’s finance commissions have used equalisation as an instrument for increasing forest cover and ecological sustainability. The 14th Finance Commission was the first-ever Commission to integrate an environmental variable in the tax-transfer formula, assigning a weight

¹ bit.ly/3plFSZC

of 7.5 per cent. However, it was articulated to mitigate “cost disabilities”. Subsequently, 15th Finance Commission also retained the criterion with an increased weightage of 10% in the unconditional fiscal transfers, using the “dense forest cover” inter-state data. As the environmental variable is incorporated in the “unconditional” fiscal transfers, the prioritisation of climate change in expenditure functions of the state government is significant to have effectiveness of such transfers on the environment. Unlike the thirteenth finance commission, the latest commissions have not designed any “conditional” fiscal transfers to climate change commitments.

Empirically, it would be interesting to examine if there is any “flypaper effect” at the local level from such environmental fiscal transfers. The narrative of flypaper effect is “money sticks where it hits”. The flypaper effect, in this context, examines if exogenous environmental fiscal transfers lead to significantly higher local government spending on climate change commitments than an equivalent amount of citizen income. Against the backdrop of pandemic, we test the relevance of flypaper effect in the Indian context. This paper analyses the flypaper effects of ecological fiscal transfers in the context of India. The rest of paper is structured as follows. Section 2 deals with the review of theoretical and policy literature. Section 3 interprets the data. Section 4 presents the econometric models and results. Section 5 concludes.

2. Review of Literature

A stronger rise in expenditure due to higher intergovernmental transfers, as compared to spending derived from rise in revenue from other sources, is the flypaper effect. Theoretically, it was believed that an increase in the public spending due to increase in transfers have the same impact as with the change in income of the median voter (Bradford and Oates,1971). However, empirically it has been proven that with the change in intergovernmental transfers, there is much more rise in spending on public goods than the rise in the income of the individuals of the state altogether. This is noted as the flypaper effect because the ‘money sticks where it hits’(Inman,2008). However, the effect still remains a paradox and has been a prominent part of debate while talking about the impact of the intergovernmental fiscal transfers (Aragon,2009). The effect also gets impacted

by other factors such as political and bureaucratic reasons. This is based on the postulation that political agents often try to maximise their own budgets which renders greater influence over the local community (Shah,2007, Dollery and Worthington, 1996, Brollo et al., 2013, Singhal, 2008). Also, it must be noted that the effect of increase in transfers behaves differently from the cut in the grants (Kjaergaard, 2015). This is also called fiscal replacement effect (Gramlich, 1987). This implies that spending is less sensitive to cuts in transfers by which the loss in transfers is compensated by increase in tax rates without willing to reduce the expenditures (Gamkhar and Oats,1996). This type of asymmetry is called *super flypaper effect*. A study by Gennari E. & Messina G. (2014) done for 8000 Italian Municipalities for the period 1999-2006 analyse a stronger flypaper effect on total municipal spending from transfers. The asymmetry coefficient for fiscal replacement is negative, revealing that municipalities increase own revenues to match up with the decline in transfers. However, this disappears when a dynamic panel data framework is used. Other socio-economic factors such as education, age also show a positive sign for public spending. Furthermore, another type of definition for the existence of flypaper effect is when the increase in transfers do not reduce the local tax rates. A study by Langer S and Korzhenevych A (2019) examine the effect of general-purpose transfers on different categories of municipal expenditures and tax rates for the German federal state of North-Rhine Westphalia. They analyse 396 municipalities for the period 2009-2015 and found that the non-matching transfers have a significant impact on total expenditures of the municipality and no effect on local tax rates. This could be because of the tight budgets of the municipalities which pressurises them to spend rather than lowering tax rates. Also, in respect to the subcategories of expenditures, public facility and social system have a positive significant effect. Another interesting study by Mehriz K and Marceau R (2014) explored how the flypaper effect is sensitive to the type of intergovernmental grants and expenditures. They found that Unconditional grants have a stronger flypaper effect as one dollar increase in unconditional grant leads to 0.82 dollar increase in municipal expenditures of 1084 Quebec municipalities for the period 2001-2007. Another new explanation to the flypaper effect is given by Sepúlveda, C. F. (2017) wherein he examines the effect based on the tax payer behavioural response to lumpsum income and tax rate. He explains that changes in shape of the budget constraint are subject to changes in the alternative sources of income. Moreover, when the change in transfers do not have any direct consequence on the tax collection costs, the government at the state level is able to reduce both the tax rates and also cut marginal cost of expenditures. However, if the same transfers are given to the tax payer, then he first uses it for its own consumption, and in that case, the government has to collect taxes that affect the tax payer

behaviour. In other words, marginal cost of public funds (MCF) can be constant or greater than 1 to produce the flypaper effect and does not have to change with transfers. To put simply, transfers' financed public expenditures are cheaper than when financed through income. Another study on recent data from 2011-2018 from 290 Swedish Municipalities by Petterson K. (2020) finds constant presence of flypaper effect as per the recent accessed date. Since the estimate of government grants by the estimate of tax revenue is greater than 1, it implies that government expenditures are stimulated by the increase in the transfers than the tax base.

Considering that the flypaper effect has been empirically tested various times, it is evident that intergovernmental transfers have a significant effect on the level of total public spending by the state governments. Not only they help to correct the horizontal imbalances that occur due to difference in fiscal capacity and needs but also to the vertical imbalances due to asymmetries in assignment of finances and function among different levels of government. Another important aspect attached to the transfers mechanism is its effect on the public spending. Transfers in India from the union government to the states have seen a big shift from the first FC till date where in there is seen progressivity of transfers from need based on equity and efficiency parameters.² In the pretext of India, A study by Lalvani (2000) on 14 non-special category Indian states confirmed the presence of flypaper effect i.e. increase in grants have led to greater stimulating effect on the total expenditures and revenue expenditures. She explains that with the increase in grants there seemed to be an increase in both revenue and capital expenditures in the pre-reform period but with the reduction in the grants, state government were only able to maintain necessary revenue expenditure in the post reform period that questions the potential of the state government capacity to increase tax revenues. However, since this study was based on 11th finance commission recommendations on intergovernmental transfers, there has been lot of changes in the design and allocation of transfers as of now. Presently, 15th Finance commission tabled its report last year and recommended transfers to the states by the central government shall be based on 15 per cent on area; ii) 5 per cent for the income distance, 15 per cent for the population in 2011, 15 per cent for the area, 10 per cent for forest and ecology, 12.5 per cent for demographic performance, and 2.5 per cent for tax effort while 41 per cent of the total tax devolutions to flow to the state

² "A Study on Intergovernmental transfers in India", NIPFP Report submitted to IDRC Canada 2018.

governments for the year 2020-21³. However, to check for flypaper effect now becomes more relevant as other studies are dated. With the new recommendations by the 15th finance commission, the share of forest cover based transfer (7.5 per cent) that was earlier criterion of the 14th finance commission has been wiped off and in place of it, forest and ecology-based transfer share has been introduced and share is 10 per cent. Amidst the climate change commitments with the international organisations and India being very vulnerable to climate change, it is committed to reduce its emission intensity by 33-35 per cent by 2030 compared to 2005 levels.⁴ Against this perspective, we analyse the effect of ecological based transfers on the forest expenditures and check whether the flypaper effect prevails in the era of pandemic.

3. Interpreting Data

The notion of the ecological fiscal transfers in India has been initiated by the 13th Finance Commission, with the recommendation from several states including Tripura, Uttarakhand, Chhattisgarh, and Madhya Pradesh for forest cover to be incorporated as a part of the tax devolution with the weights of 5 percent, 10 percent, 10 percent, and 7.5 percent respectively. On the similar lines considering forest conservation, Arunachal Pradesh also recommended for the inclusion of environmental and forest conservation with the weight of 10 per cent, but nothing was done. Though, an additional grant of Rs. 1000 crores provided, considering the total forest acreage in the country, which was beyond the initial forest grant of Rs. 5000 crores.

With the discussion of ecological fiscal transfers (EFT) holding momentum, an incentive-based EFT was implemented during the 14th Finance Commission with support from majority of the states, considering the forest cover and its nexus to the quality of forests in the state. Extending further, the committee acknowledged the ecological benefits of forest cover and the opportunity cost attached to it, with less area available for other economic activities, and assigned a weight of 7.5 per cent to the forest cover as a part of the tax devolution. Following the tax devolution

³ <https://www.prsindia.org/theprsblog/recommendations-15th-finance-commission-2020-21>

⁴ <https://www.carbonbrief.org/the-carbon-brief-profile-india>

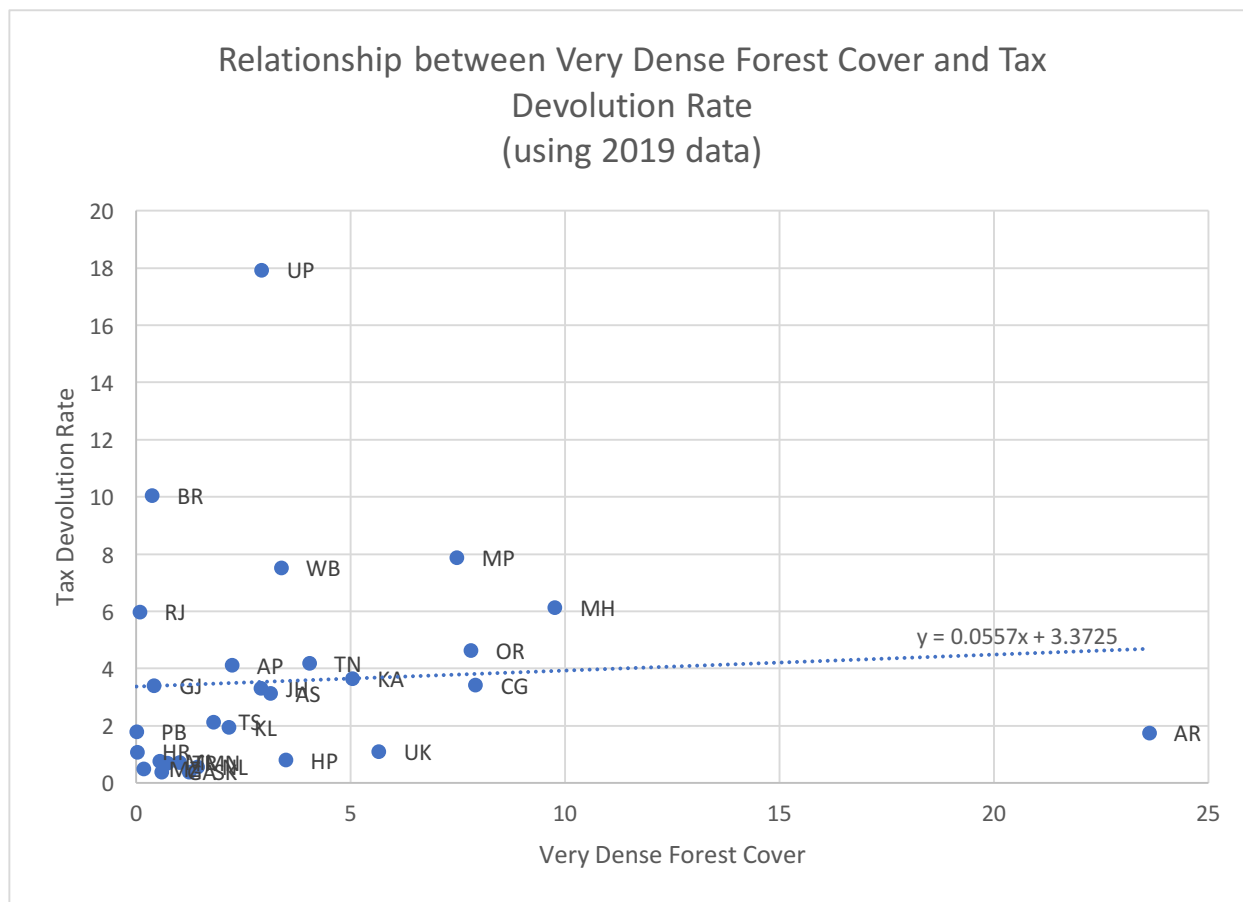
inclusion of forest cover by the 14th Finance Commission, 15th Finance Commission in their own words highlighted the need of “greater impetus and attention” to the issues of environment and climate change which was evident with the increased weightage to forest and ecology as a part of the tax devolution. There was support and even opposition in regard to the inclusion of forest cover, with some states even proposing to include tree cover outside the forest, mangrove forest, and even incremental change in forest, etc. as a means in the tax devolution formula and some outrightly suggesting the dropping of forest cover as a criterion. The final decision by the 15th Finance Commission was an inclusion of forest and ecology criterion, which is calculated with the share of the dense forest of each state in the aggregate dense forest of all the states, with an increased weightage of 10 per cent to ensure preservation and expansion of degraded and open forests for the public good and to support the fulfillment of international commitments.

The analysis is restricted to 28 states including Telangana considering the time period from 2003 to 2019. The data is divided across four segments - population data, expenditure variables, State GDP, and the forest cover. Population data is provided on yearly basis using the Report of the Technical Group on Population Projection by the National Commission on Population. The data from 2003 to 2010 has been extracted from the report based on the Census of India 2001 data, projecting population figures as on 1st October of each year. The data from 2011 is extracted from the report based on the Census of India 2011 data, projecting population figures as on 1st March of each year. The expenditure variables include revenue expenditure on ecology, capital expenditure and total expenditure, state own tax revenue, state own revenue receipt (tax and non-tax), share in central tax and central grants which are available on yearly basis for each state from their respective budget statements.

The State GDP (at constant prices) data is extracted out of MOSPI's (Ministry of Statistics and Programme Implementation, Government of India) database where it was available for three series – 1999 to 2010, 2004 to 2015, and 2011-20. We have spliced the data, considering the overlapping figures of years, using them to shift the base of the series to the latest data available. The data on forest cover, where we have considered four variables is available across the period of analysis on yearly basis. The variables include moderately dense forest cover, very dense forest cover,

dense forest cover (which is the summation of moderately dense and very dense cover), and open forest cover. We have used the panel data to assess the flypaper effect, incorporating environmental considerations as a part of the devolution process.

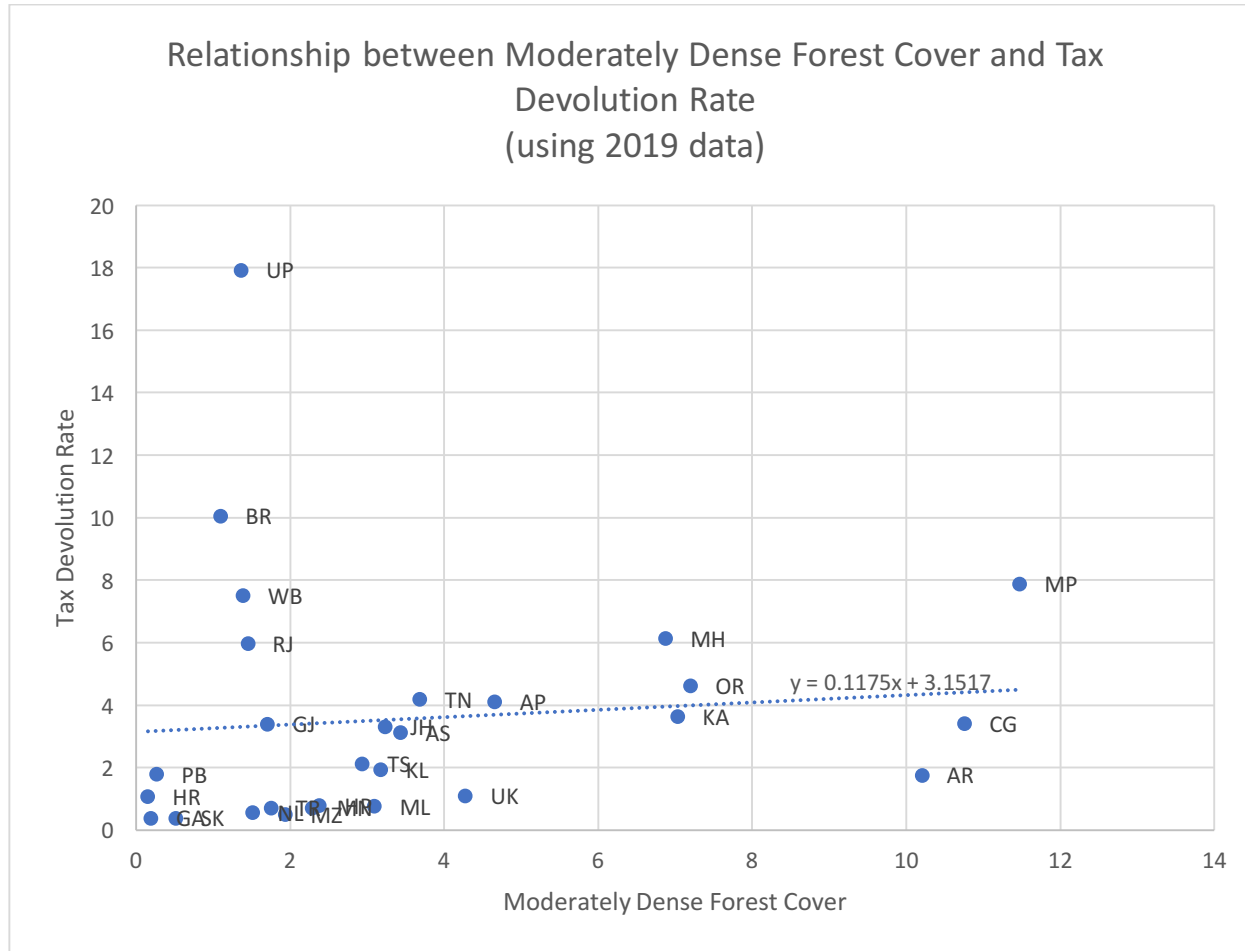
Figure 1: Link between ecological variable (very dense) and tax devolution rate



Source: (Basic data), MOSPI and Finance Accounts (various years)

Figure1 depicts a positive correlation between very dense forest cover and tax devolution rate due to weightage of 10 per cent given to forest and ecology, along with other criteria including population, area, income distance, and demographic performance. In the scatterplot, Uttar Pradesh has been seen to be the biggest outlier with more than 17 per cent of the total devolution rate while having a “very dense” forest cover of 2.93 per cent.

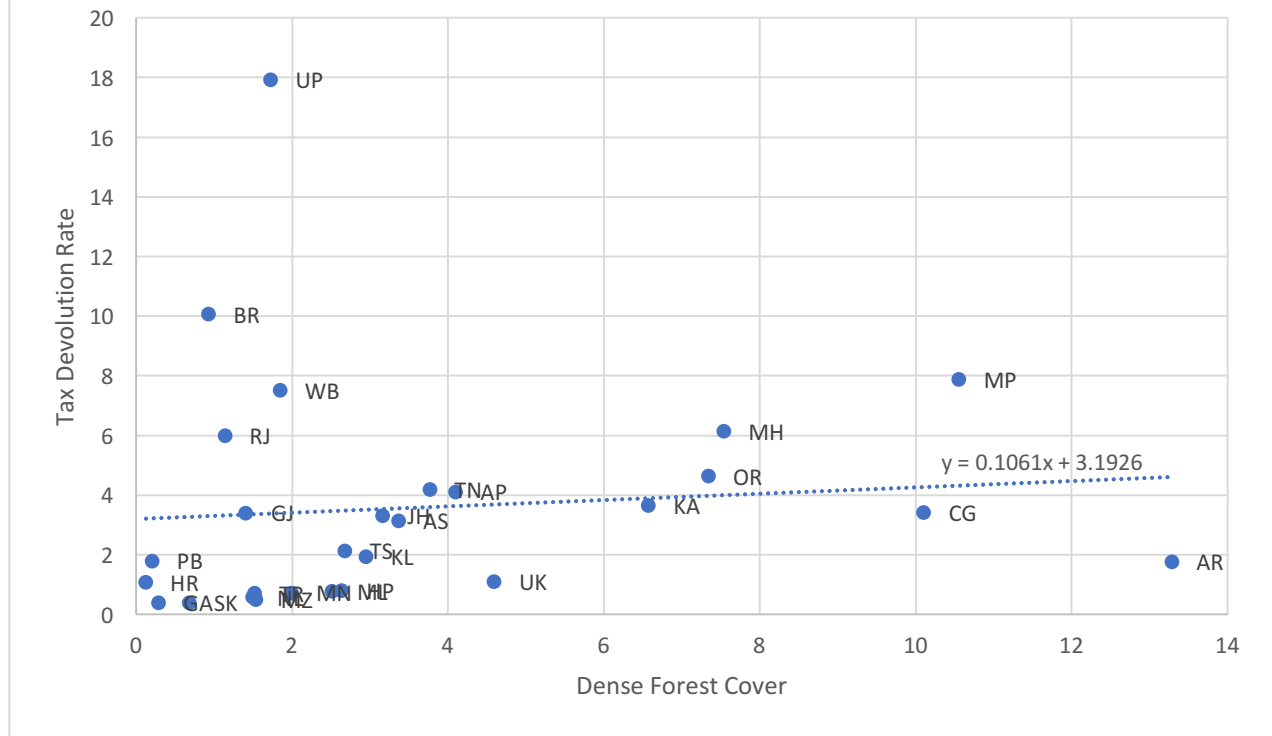
Figure 2 : Scatterplot describing relationship between ecological variable (moderate) and tax devolution rate



The plot of moderately dense forest cover as shown in Figure 2 shares a positive correlation with tax devolution share, the coefficient is stronger than the one found in the case of very dense forest cover. Uttar Pradesh in this scatterplot has also emerged to be the biggest outlier with the tax devolution share, and with the moderately dense forest cover of 1.363 per cent.

Figure 2 : Scatterplot describing relationship between ecological variable (dense) and tax devolution

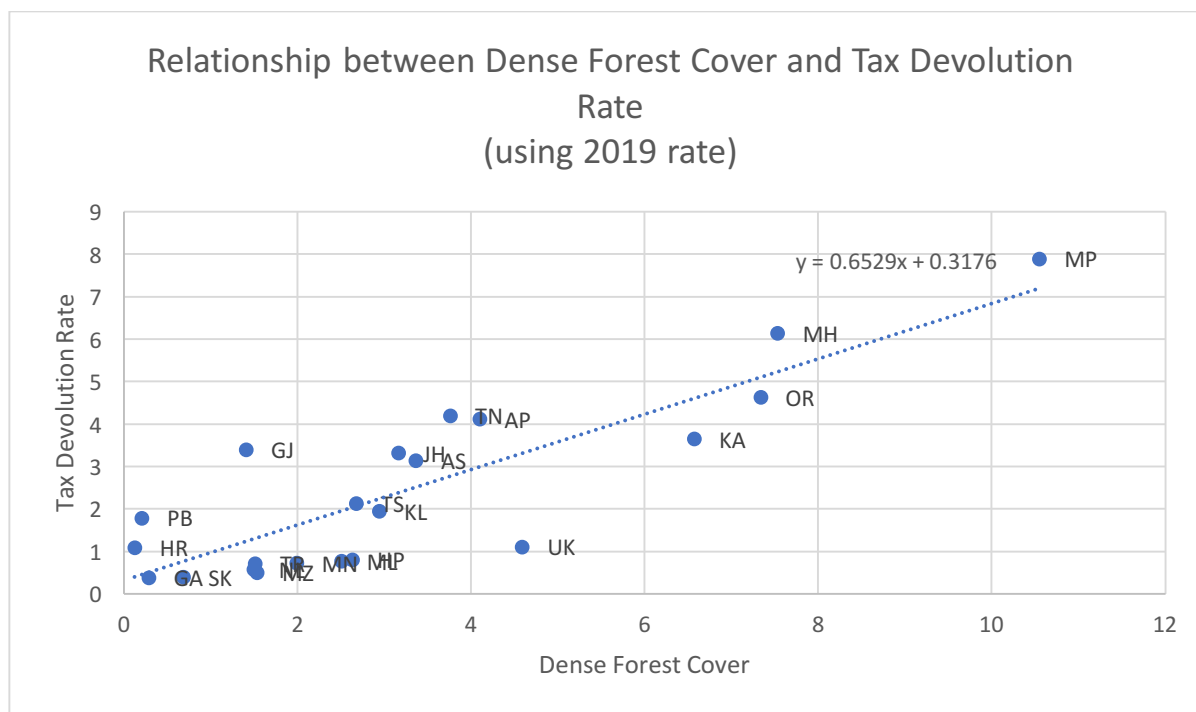
Relationship between Dense Forest Cover and Tax Devolution Rate (using 2019 rate)



Source: (Basic data), MOSPI and Finance Accounts (various years)

The dense forest cover comprises of the summation of very dense forest cover and moderately dense forest cover. The scatter plot as shown in figure 3 depicts a positive correlation. Uttar Pradesh again has emerged to be the biggest outlier with the biggest tax devolution share, with the dense forest cover of 1.723 per cent. Overall, the spread of the plot is sporadic in nature with a very weak correlation amongst them. Eliminating the major outliers from the dense forest cover data – Arunachal Pradesh, Uttar Pradesh, Bihar, West Bengal, Rajasthan and Chhattisgarh, we saw a strong correlation between the dense forest cover and tax devolution with a R-square of 0.7274.

Figure 3: Link between tax transfers and dense forest cover



Source: (Basic data), MOSPI and Finance Accounts (various years)

III. The Econometric Models and results

In order to test the flypaper effect, we use a panel data for 28 Indian States since 2003 to 2019. The dependent variables include total expenditure of the respective state government on forests as well as revenue expenditure on forests and capital expenditure on forests. The main regressors are total transfers of the state governments and SGDP. Other variables are proxy for state government own income is state's total own revenues (own tax and own non-tax revenues); demographic variables and the ecological outcome variables include moderately dense forest cover and very dense

forest cover. We analyze the sensitivity of expenditures over variations in total transfers and changes in the state government own income. Differential models are tested to confirm the presence of flypaper effect or not. These models are presented in the Tables 2-9. The description of the variables used in the testing is mentioned in the table 1 .

Table 1: Description of the variables used in the models	
Variables	Description
Tef	Total expenditure on forests
Sgdp	State Gross Domestic Product
Ttrans	Total transfers (Grants+ share in Taxes)
Mdf	Medium dense forest cover
Pop	Population
Cons	Constant
Grants	Grants from the Centre
Taxsh	Share in taxes
Ref	revenue expenditure on forests
Cef	Capital expenditure on forests
Vdf	Very dense forest cover
STORV	State total own revenues

Table 2: Flypaper Models with Aggregate and Disaggregate expenditure components									
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Dependent →	TEF	TEF	TEF	REF	REF	REF	CEF	CEF	CEF
Independent ↓									
SGDP	.332*** (0.0509)	.910*** (.0451)	.865*** (.065)	.405*** (.054)	.976*** (.047)	.847*** (.0642)	-.127 (.120)	.530*** (.0892)	.943*** (.132)
ttrans	.681*** (.0269)			.649*** (.0287)			.911* (.063)		
Grant		.362*** (.0223)			.332*** (.0233)			.555*** (.044)	
Taxshare			.326*** (.029)			.344** (.0294)			.249*** (.0605)
Mdf	.191*** (0.0630)	.141* (.0782)	.117 (.088)	.227*** (.067)	.177** (.0820)	.163* (.0866)	.0410 (.149)	-.0108 (.154)	-.0882 (.178)
pop	.410*** (0.095)	.767*** (.116)	.617** (.135)	.389*** (.102)	.740*** (.121)	.539*** (.133)	.579** (.227)	.996*** (.229)	1.120*** (.274)
cons	-7.09*** (1.434)	-14.680*** (1.691)	-10.976*** (2.077)	-7.650*** (1.529)	-15.108*** (1.772)	-10.292*** (2.042)	-8.325** (3.402)	-17.17*** (3.347)	-19.398*** (4.19)
No. of observations	452	452	452	452	452	452	452	452	452
No. of Groups	27	27	27	27	27	27	27	27	27
R ²	0.9066	0.8899	0.89	0.90	0.89	0.90	0.81	0.77	0.73
Hausman									

Note: *** is for 1% LOS, ** is 5%LOS, * is 10% LOS. Figures in the bracket denote Standard errors.

Source: (Basic data), MOSPI and Finance Accounts

We examine the effect of total transfers on aggregate ecological expenditure in Model 1 and find the coefficient of total transfers to be more significant than coefficient of state income proxied by SGDP (Table 2). This confirms the existence of flypaper effect. The other demographic controls and ecological outcome variables like Moderately dense forest cover are added to the main regressors which also are found significant. Disaggregating the ecological expenditure into revenue expenditure (Model 4 to 6) and capital expenditure (Model 7 to 9), we find the presence of flypaper effect for the revenue expenditures when regressed with the total transfers. This could be because of the committed revenue expenditures that the state government is bounded with and hence, it could be that more transfers are used to finance the revenue expenditures given the intertemporal

budget constraints of the state governments. The other control variables also found to be significant. Segregating the total transfers into grants (model 5) and share in taxes (model 6), we find no evidence of flypaper effect whereas in Model 7 to 9, we see that coefficient of total transfers is found at 10 per cent level of significance while coefficient of SGDP has no significance (Model 7). In model 8 we see that though the coefficient of total transfers is slightly significant than SGDP, we cannot totally ascertain the presence of flypaper effect while coefficient of share in taxes show no presence of fixed effects (Model 9). Dropping the demographic variables and calculating the main regressors, we find strong evidence of flypaper effect as the coefficient of total transfers is higher than that of the state income proxied with coefficient of SGDP (Model 10). While flypaper effect also exists with the revenue expenditures on forest when regressed with the total transfers (model 13). Also, the other control variables show a positive impact. The differential effects of grants and share in taxes with the ecological expenditures confirms no clear flypaper effects (Table 3).

Table 3: Flypaper Models with aggregate and disaggregate components of ecological spending, uncontrolled for demographic effects on Total, Revenue and									
Variables	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18
Dependent →	TEF	TEF	TEF	REF	REF	REF	CEF	CEF	CEF
Independent ↓									
SGDP	.340*** (.0519)	.994*** (.0454)	.875*** (.0668)	.412*** (.055)	1.057*** (.047)	.856*** (.065)	-0.116 (.121)	.639*** (.087)	.961*** (.134)
Ttrans	.713*** (.026)			.679*** (.0280)			.955 (.061)		
Grant		.386*** (.0230)			.355*** (.024)			.586*** (.044)	
Taxshare			.368*** (.0291)			.381*** (.028)			.325*** (.058)
Mdf	.283*** (.0604)	.315*** (.0773)	.251*** (.0850)	.315*** (.0641)	.345*** (.080)	.280*** (.083)	.171 (.141)	.215 (0.148)	.154 (.171)
Pop									
Cons	-1.614** (.657)	-4.738*** (.810)	-2.543*** (.956)	-2.440*** (.698)	-5.507*** (.843)	-2.916*** (.935)	-0.572 (1.539)	-4.261*** (1.560)	-4.093** (1.923)
No. of observations	452	452	452	452	452	452	452	452	452
No. of Groups	27	27	27	27	27	27	27	27	27

R ²	0.86	0.91	0.92	0.86	0.90	0.92	0.69	0.83	0.81
Hausman							Negative		
Note: *** is for 1% LOS, ** is 5%LOS, * is 10% LOS. Figures in the bracket denote Standard errors.									

Source: (Basic data), MOSPI and Finance Accounts

Taking state total own revenues (state own tax revenue and non-tax revenue) as a proxy for the state government's income and total transfers to the state government as the main regressors, we find existence of flypaper effect in model 19 (Table 4). However, the coefficient for the total transfers is not very significant vis-à-vis the coefficient of state's own revenue. It is evident from Table 3 about the existence of flypaper effect in revenue expenditures in Model 22. The point to be noted here is that segregating transfers into grants and share in taxes, there seems to be no evidence of flypaper effects. Another concern here is the random effect model coefficients taken up for the capital expenditures on forests and total transfers in Model 25 which however may not be efficient and may need further action. Other control variables in the models explained do not have significant impact but are positive.

Table 4: Flypaper effects: Models with aggregate and disaggregated ecological spending and state's own tax revenue									
Variables	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24	Model 25	Model 26	Model 27
Dependent →	TEF	TEF	TEF	REF	REF	REF	CEF	CEF	CEF
Independent ↓									
SGDP									
STOREV	.448*** (.021)	.689*** (.023)	.673*** (.024)	.462*** (.023)	.717*** (.025)	.650*** (.024)	.386*** (.050)	.545*** (.053)	.822*** (.061)
ttrans	.497*** (.018)			.488*** (.0208)			.583*** (.042)		
Grant		.264*** (.018)			.241*** (.020)			.402*** (.043)	
Taxshare			.253*** (.018)			.278*** (.018)			.115** (.0459)
Mdf	.071 (.046)	-.099* (.061)	-.0543 (.0625)	.095* (.052)	-.0824 (.066)	-.005 (.063)	.029 (.055)	-.136 (.142)	-.273* (.156)
pop	.130* (.071)	.353*** (.096)	.119 (.099)	.105 (.080)	.328*** (.105)	.059 (.100)	-.051 (.051)	.544** (.223)	.502** (.248)
cons	-1.064 (1.059)	-3.13** (1.430)	.737 (1.466)	-1.091 (1.191)	-3.114** (1.560)	1.11 (1.480)	.049 (.766)	-7.781** (3.312)	-5.893* (3.668)
No. of observations	459	459	459	459	459	459	459	459	459
No. of Groups	27	27	27	27	27	27	27	27	27
R ²	0.97	0.94	0.94	0.96	0.95	0.95	0.89	0.81	0.75
Hausman							RE (value >0.05)= 0.55		

Note: *** is for 1% LOS, ** is 5%LOS, * is 10% LOS. Figures in the bracket denote Standard errors.

Source: (Basic data), MOSPI and Finance Accounts

As compared to Model 19 in Table 4, dropping the demographic variable in Model 28, makes the coefficient of total transfers more significant than the coefficient of state's own revenue confirming the flypaper effect. The same result holds true when taken with the REF as the dependent variable (Model 31). Control variable moderately dense forest does not showcase high level of significance with the dependent variables. While regressing the segments of total transfers with the dependent variable, there is no presence of flypaper effects.

Variables	Model 28	Model 29	Model 30	Model 31	Model 32	Model 33	Model 34	Model 35	Model 36
Dependent →	TEF	TEF	TEF	REF	REF	REF	CEF	CEF	CEF
Independent ↓									
SGDP									
STOREV	.456*** (.020)	.721*** (.021)	.679*** (.023)	.469*** (.023)	.747*** (.023)	.654*** (.024)	.357*** (.040)	.595*** (.049)	.848*** (.060)
ttrans	.502*** (.018)			.492*** (.020)			.599*** (.038)		
Grant		.267*** (.018)			.244*** (.020)			.407*** (.043)	
Taxshare			.258*** (.017)			.281*** (.018)			.135*** (.045)
Mdf	.097** (.043)	-.033 (.059)	-.030 (.059)	.116** (.049)	-.021 (.064)	.006 (.059)	.012 (.052)	-.035 (.136)	-.171 (.148)
pop									
cons	.706* (.416)	1.698*** (.566)	2.361*** (.559)	.331 (.468)	1.367** (.615)	1.92*** (.564)	-.485 (.536)	-.343 (1.300)	.956 (1.403)
No. of observations	459	459	459	459	459	459	459	459	459
No. of Groups	27	27	27	27	27	27	27	27	27
R ²	0.97	0.96	0.95	0.96	0.96	0.95	0.89	0.87	0.76
Hausman							RE value=0.58		

Note: *** is for 1% LOS, ** is 5%LOS, * is 10% LOS. Figures in the bracket denote Standard errors.

Source: (Basic data), MOSPI and Finance Accounts (various years)

Tables 6 to 9 run the same regressions but now with a new control variable called VDF (Very Dense Forest Cover). Model 37 in Table 5 represents a strong flypaper effect as the coefficient of total transfers is more than the coefficient of SGDP. Interesting to note is that this coefficient is more significant than one tested along with the control variable, MDF. The effect is also prevalent for Revenue expenditures presented in Model 40 and CEF presented in Model 43. In Model 44, grants from the have stronger flypaper effect on the capital expenditures on forest as compared to coefficient of SGDP. The demographic variable is also positive and significant.

Variables	Model 37	Model 38	Model 39	Model 40	Model 41	Model 42	Model 43	Model 44	Model 45
Dependent →	TEF	TEF	TEF	REF	REF	REF	CEF	CEF	CEF
Independent ↓									
SGDP	.192*** (.049)	.828*** (.045)	.764*** (.066)	.263*** (.053)	.893*** (.048)	.750*** (.065)	-.282** (.121)	.438*** (.0901)	.799*** (.132)
STOREV									
Ttrans	.731*** (.026)			.701*** (.029)			.945*** (.066)		
Grant		.370*** (.0232)			.342*** (.024)			.547*** (.045)	
Taxshare			.323*** (.030)			.343*** (.029)			.237*** (.060)
MDF									
VDF	.040*** (.011)	.049*** (.0153)	.082*** (.017)	.032** (.012)	.043*** (.016)	.071*** (.016)	.102*** (.028)	.106*** (.030)	.162*** (.034)
Pop	.525*** (.086)	.907*** (.111)	.802*** (.129)	.509*** (.094)	.887*** (.117)	.729*** (.128)	.733*** (.214)	1.163*** (.219)	1.338*** (.259)
Cons	-6.683*** (1.374)	-15.255*** (1.703)	-12.359*** (2.079)	-6.946*** (1.490)	-15.442*** (1.794)	-11.334*** (2.056)	-9.893*** (3.392)	-19.580*** (3.359)	-23.037*** (4.160)
No. of observations	436	436	436	436	436	436	436	436	436
No. of Groups	27	27	27	27	27	27	27	27	27

R ²	0.91	0.88	0.88	0.92	0.89	0.89	0.78	0.77	0.74
Hausman									
Note: *** is for 1% LOS, ** is 5%LOS, * is 10% LOS. Figures in the bracket denote Standard errors.									

Source: (Basic data), MOSPI and Finance Accounts (various years)

Table 7 presents the regression model with VDF and dropping the population variable. We see that flypaper effect still holds as the coefficient of tax transfers is significant and more than the coefficient of SGDP. Wherein the control variables have no significant impact on the expenditures. For the segments of expenditures, we do not see reliable results as Hausman test value has been negative for Model 49 and 54.

Variables	Model 46	Model 47	Model 48	Model 49	Model 50	Model 51	Model 52	Model 53	Model 54
Dependent →	TEF	TEF	TEF	REF	REF	REF	CEF	CEF	CEF
Independent ↓									
SGDP	.396*** (.021)	.926*** (.047)	.777*** (.069)		.989*** (.049)	.762*** (.067)	.195*** (.053)	.563*** (.089)	
STOREV									
ttrans	.681*** (.015)						.788*** (.037)		
Grant		.406*** (.024)			.377*** (.025)			.594*** (.046)	
Taxshare			.382*** (.029)			.397*** (.029)			
MDF									
VDF	.000 (.009)	.020 (.016)	.059*** (.017)		.014 (.016)	.050*** (.017)	.046** (.023)	.068** (.030)	
Pop									
Cons	.653*** (.143)	-1.559*** (.300)	.233 (.444)		-2.046*** (.313)	.110 (.436)	-.721** (.346)	-2.017*** (.567)	
No. of observations	436	436	436	436	436	436	436	436	436
No. of Groups	27	27	27	27	27	27	27	27	27
R ²	0.96	0.95	0.94		0.95	0.95	0.85	0.85	
Hausman	RE (value=0.44)			Negative value of chisquare			RE value>0.05 =0.73		Negative value of chisquare

Note: *** is for 1% LOS, ** is 5%LOS, * is 10% LOS. Figures in the bracket denote Standard errors.

Source: (Basic data), MOSPI and Finance Accounts (various years)

Model 55 presents significant coefficient of total intergovernmental fiscal transfers as compared to state's own tax revenue coefficient indicating flypaper effect; although it is not that strong (Table 8). However, in Models 58 and 61, we see the presence of flypaper effect but these are coefficient of random effect models which, we are not taking into consideration subject to inefficiency. The coefficients of ecological outcomes and demography are positive but not significant. Also, for the disaggregated intergovernmental fiscal transfers - grants and share in taxes - no flypaper effect is seen.

Table 8: Flypaper Models with Intergovernmental Fiscal Transfers and State's Own Revenue ; Controlled for Ecological Outcomes and Demography outcome variables									
Variables	Model 55	Model 56	Model 57	Model 58	Model 59	Model 60	Model 61	Model 62	Model 63
Dependent →	TEF	TEF	TEF	REF	REF	REF	CEF	CEF	CEF
Independent ↓									
SGDP									
STOREV	.401*** (.021)	.669*** (.024)	.655*** (.026)	.444*** (.019)	.700*** (.027)	.636*** (.026)	.352*** (.051)	.500*** (.057)	.766*** (.064)
ttrans	.532*** (.018)			.519*** (.017)			.598*** (.045)		
Grant		.276*** (.019)			.254*** (.021)			.408*** (.045)	
Taxshare			.253*** (.018)			.277*** (.018)			.119** (.045)
MDF									
VDF	.012 (.008)	.021* (.012)	.031** (.012)	-.007 (.008)	.016 (.013)	.023* (.012)	.040* (.022)	.071** (.029)	.096*** (.031)
pop	.190*** (.068)	.350*** (.096)	.157 (.098)	.016 (.020)	.320*** (.105)	.104 (.099)	-.024 (.050)	.644*** (.222)	.576** (.244)
cons	-1.362 (1.055)	-3.996*** (1.489)	-.336 (1.534)	1.102*** (.300)	-3.747** (1.623)	.376 (1.550)	-.161 (.726)	-10.576*** (3.426)	-9.459** (3.796)
No. of observations	443	443	443	443	443	443	443	443	443
No. of Groups	27	27	27	27	27	27	27	27	27
R ²	0.97	0.95	0.95	0.98	0.95	0.95	0.89	0.82	0.80
Hausman				RE value=0.144			RE value=0.50		
Note: *** is for 1% LOS, ** is 5%LOS, * is 10% LOS. Figures in the bracket denote Standard errors.									

Source: (Basic data), MOSPI and Finance Accounts (various years)

Hausman tests recommended random effect models to be chosen and hence the model 64,67 and 70 portray flypaper effect (Table 9). But since most of the models have been fixed effects, we may not take these into consideration. For coefficient of grants and share in taxes are weaker than the coefficient of state's own revenue, there is no existence of flypaper effect. Even the control variable for ecological outcome, very dense forest, is not significant.

Table 9: Flypaper Models with Demographic and Ecological Outcome Variables									
Variables	Model 64	Model 65	Model 66	Model 67	Model 68	Model 69	Model 70	Model 71	Model 72
Dependent →	TEF	TEF	TEF	REF	REF	REF	CEF	CEF	CEF
Independent ↓									
SGDP									
STOREV	.434*** (.015)	.708*** (.022)	.667*** (.025)	.452*** (.016)	.735*** (.024)	.643*** (.025)	.338*** (.042)	.571*** (.052)	.810*** (.062)
ttrans	.526*** (.014)			.514*** (.016)			.605*** (.042)		
Grant		.277*** (.019)			.255*** (.021)			.410*** (.045)	
Taxshare			.257*** (.018)			.281*** (.018)			.136*** (.045)
MDF									
VDF	-.002 (.007)	.008 (.012)	.026** (.012)	-.008 (.008)	.004 (.013)	.019* (.012)	.041** (.021)	.047* (.028)	.075** (.030)
pop									
cons	1.541*** (.086)	1.397 (.127)	2.102*** (.143)	1.324*** (.096)	1.177*** (.138)	1.987*** (.144)	-.489* (.262)	-.669** (.292)	-.534 (.355)
No. of observations	443	443	443	443	443	443	443	443	443

No. of Groups	27	27	27	27	27	27	27	27	27
R ²	0.98	0.96	0.95	0.98	0.96	0.95	0.89	0.88	0.82
Hausman	RE value=0.22			RE value=0.28			RE value=0.52		
Note: *** is for 1% LOS, ** is 5%LOS, * is 10% LOS. Figures in the bracket denote Standard errors.									

Source: (Basic data), MOSPI and Finance Accounts (various years)

4. Conclusion

An extensive body of literature has empirically confirmed the existence of flypaper effect. It is well said that the idea of flypaper effect is no more an anomaly but a part of fiscal politics (Inman,2008). Given the dearth of empirical research particularly for India, this paper fills the gap by investigating the impact of EFT on total spending on forest cover. Results portray a sizeable flypaper effect suggestive of reliability of state governments on central transfers to induce spending. Controlling of demographic and geographical variables, disentangling the total transfers over different types of expenditures also show promising results. We also find evidence of stimulus to the revenue expenditure on forests with the increase in transfers than from the increase in the states' income. This could be because of the committed revenue expenditures that the state government is bounded with and hence, it could be that more transfers are used to finance the revenue expenditures given the tight budgets of the state governments. Demographic variable, population is positively correlated with public spending in most cases. It could be relevant as there is an additional cost for the state governments to provide services for the specific age groups. Geographic variables, moderately dense forest cover and very dense forest cover are positively correlated with the spending. It is interesting to note that inclusion and drop of these control variables also make the results interesting.

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Appendix 1 : Dense Forest Cover and Tax Devolution – Outlier elimination

Table A1: Without any elimination -overall

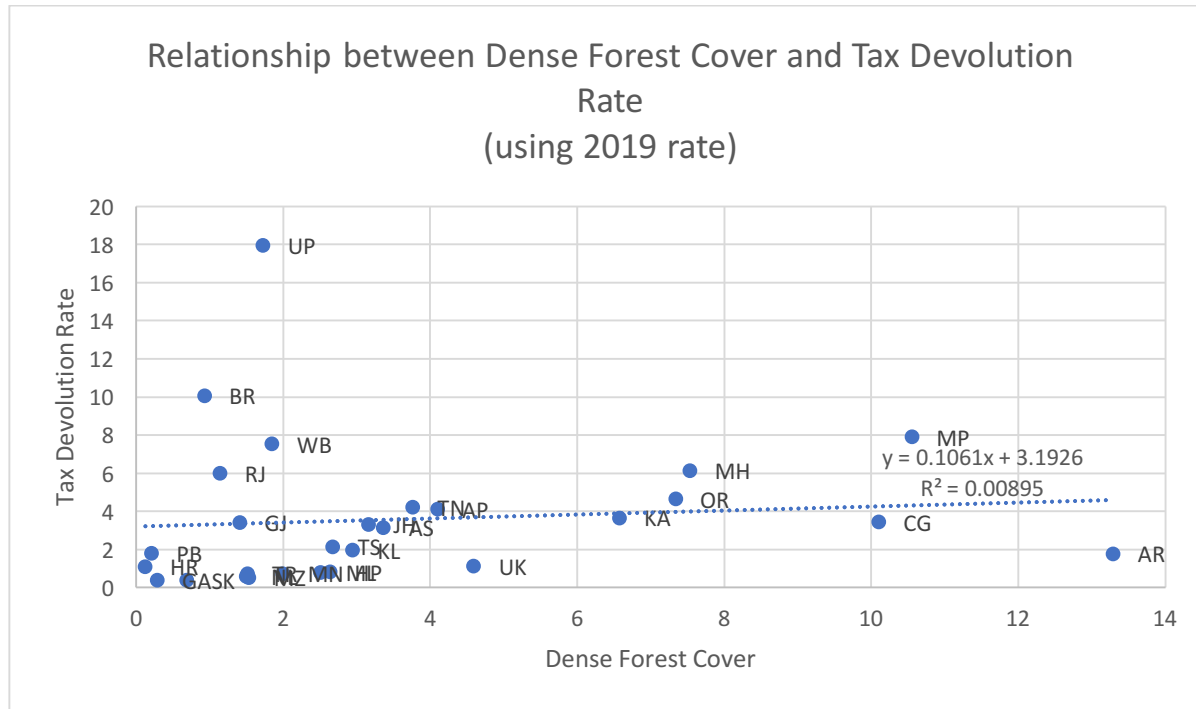


Table A2: Removal of Uttar Pradesh , the outlier State

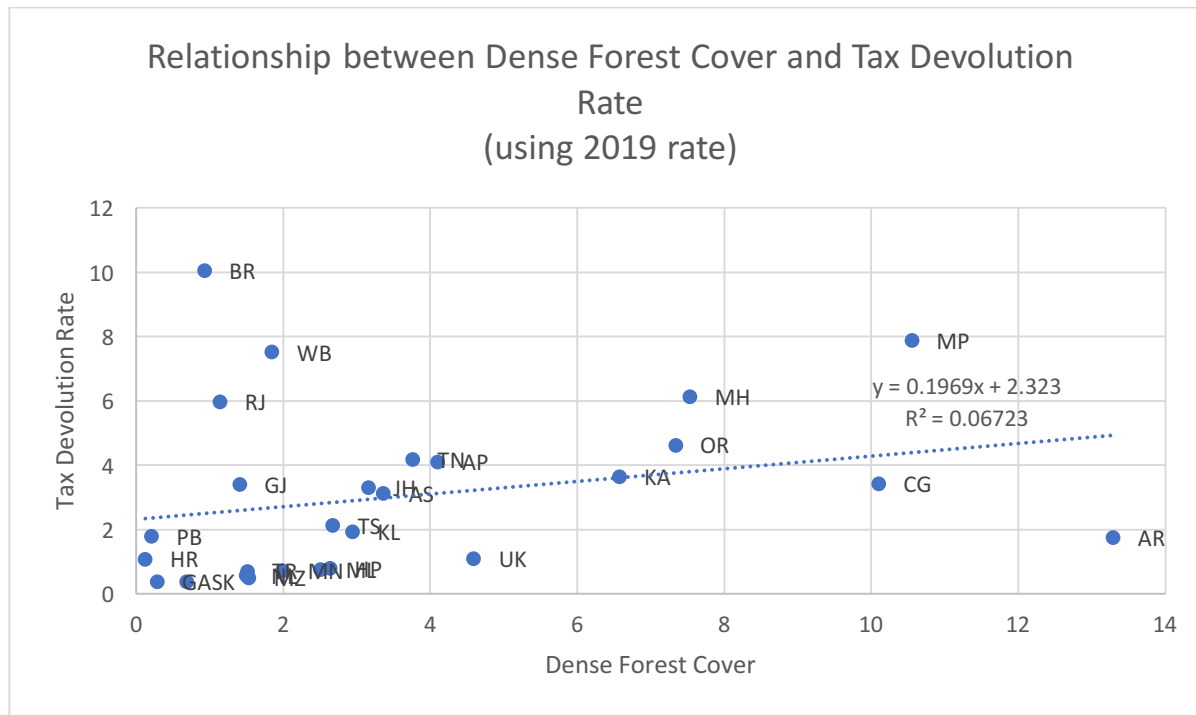


Table A3: With two outlier States removed - Arunachal Pradesh and Uttar Pradesh

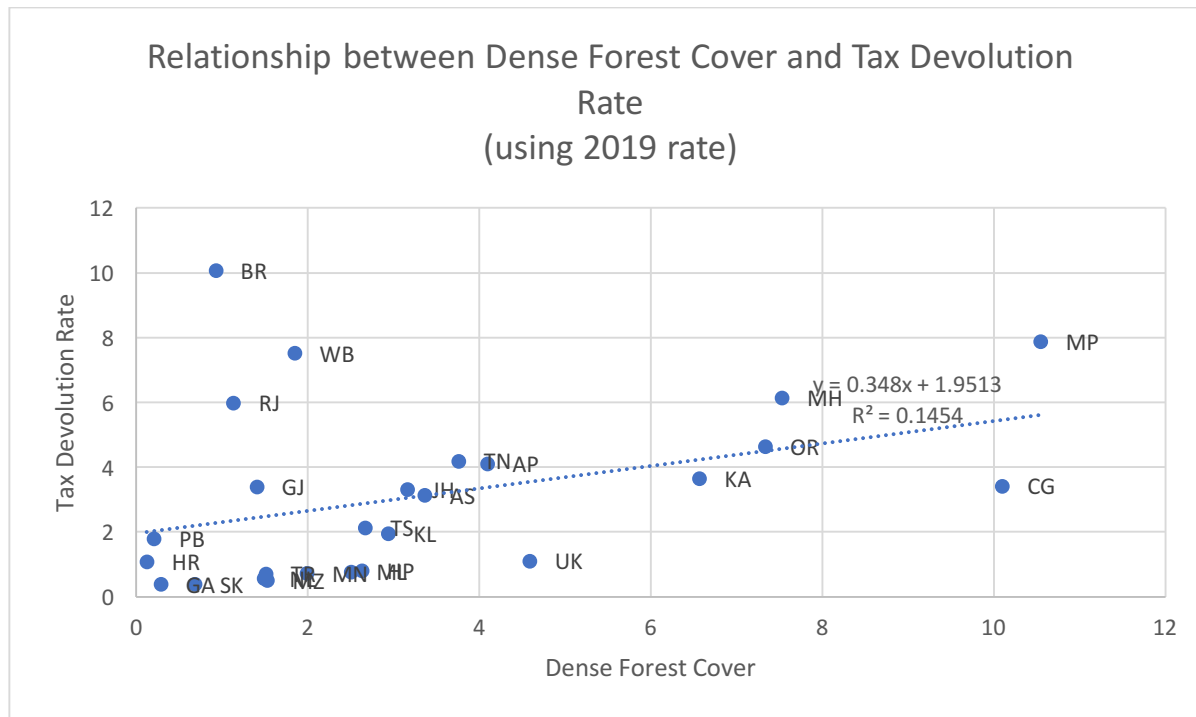


Table A4 : With three outlier States removed - Arunachal Pradesh, Uttar Pradesh, and Bihar

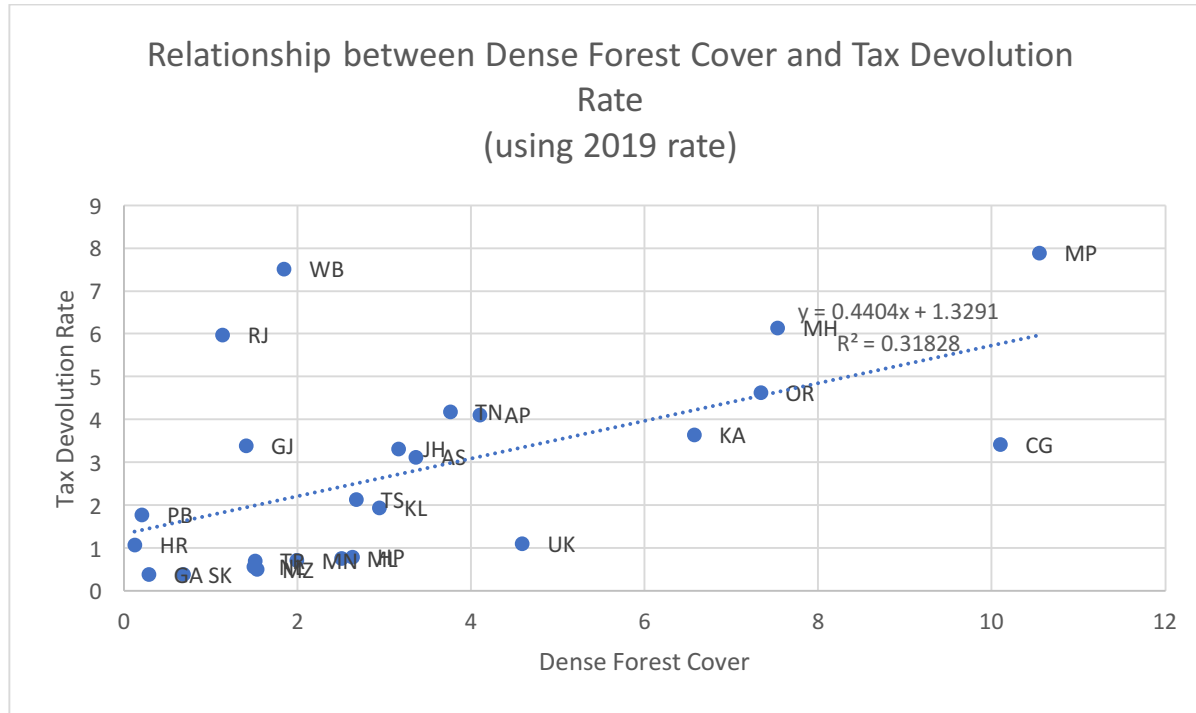


Table A5: With four outlier State removed : Arunachal Pradesh, Uttar Pradesh, Bihar, and West Bengal

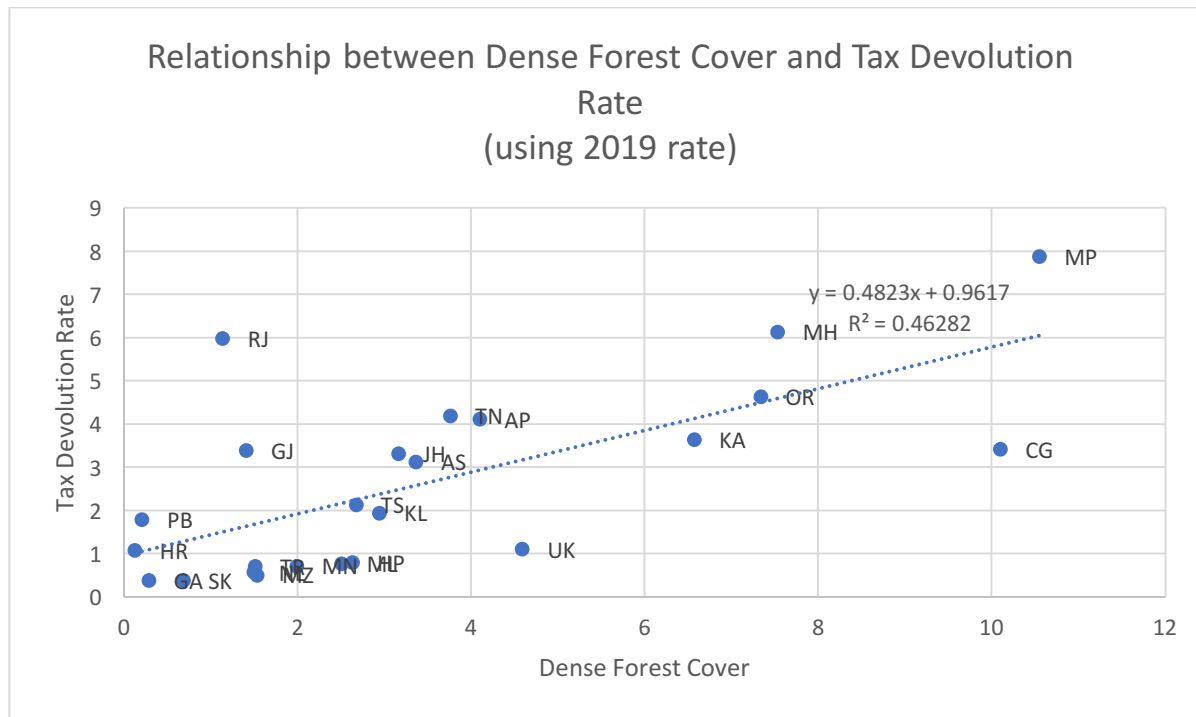


Table A6: With five outlier States removed : Arunachal Pradesh, Uttar Pradesh, Bihar, West Bengal, and Rajasthan

