

Ecological Fiscal Transfers and State-level Budgetary Spending in India: Analysing The Flypaper Effects in India

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Amandeep Kaur, Ranjan Kumar Mohanty, Lekha Chakraborty,
Divy Rangan



National Institute of Public Finance and Policy
New Delhi

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Abstract

This paper examines the empirical evidence of flypaper effects in the ecological fiscal spending in India. Using the panel data models, we analyse whether the *intergovernmental fiscal transfers*, or the *states' own income* determine the expenditure commitments on ecology at the State level. The econometric results show that the *intergovernmental fiscal transfers* rather than the *states' own income* determines ecological expenditure at subnational levels in India. The results hold, when the models are controlled for ecological outcomes and demographic variables.

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

JEL Classification: E6, H5, H7, Q5

1. Introduction

With the progress 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 are getting attention worldwide ex-post Paris accord on climate change. However, the inter-jurisdictional competition to attract mobile capital by trading (lowering) environmental regulations lead to “race to the bottom” and “pollution havens”. Empirical evidence reveals this continuous tension between the ‘principle of subsidiarity’ and the ‘race to the bottom’.

In the intergovernmental fiscal framework, three functions of environmental quality have been developed. 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 inter-jurisdictional externalities, including water and air pollution.

The governments have tried to “internalise these externalities” through legal negotiations and fiscal instruments. In this context, it is pertinent to analyse how the transfers to subnational governments have integrated environmental variables. Equally important is to examine how efficacious fiscal allocations at the local level in integrating climate change commitments. The 15th Finance Commission report was tabled in Parliament on February 1, 2021. The 14th Finance Commission was the first-ever Commission to integrate an environmental variable in the tax-transfer formula, assigning a weight of 7.5 per cent. The 15th Finance Commission also retained the criterion with an increased weightage of 10 per cent in the unconditional fiscal transfers, using the “dense forest cover” inter-state data. As the environmental variables are an important determinant of the fiscal transfers, the prioritisation of climate change in expenditure functions of the state government is significant to have the effectiveness of such transfers on the environment. Unlike the 14th and 15th Finance Commissions, the Thirteenth Finance Commission designed “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 the 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. This paper analyses the flypaper effects of ecological fiscal transfers in the context of India. The rest of the 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 a rise in revenue from other sources, is the flypaper effect. Theoretically, it was believed that an increase in public spending due to an increase in transfers have the same impact as the change in income of the median voter (Bradford and Oates, 1971). However, empirically it has been established 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. This is noted as the flypaper effect because the 'money sticks where it hits' (Inman, 2008). However, the effect remains a paradox and has been a prominent part of the debate while talking about the impact of 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 an increase in transfers behaves differently from the cut in the grants (Kjaergaard, 2015). This is also called the 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 an 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 their 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 the 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 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 the 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 can reduce both the tax rates and also cut the marginal cost of expenditures. However, if the same transfers are given to the taxpayer, then he first uses it for his own consumption, and in that case, the government has to collect taxes that

affect the taxpayer behaviour. In other words, the 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 it 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 the 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. An extensive body of literature has empirically confirmed the existence of the flypaper effect. It is well said that the idea of the flypaper effect is no more an anomaly but a part of fiscal politics (Inman,2008). Given the limited number of empirical research particularly for India, this paper fills the gap by investigating the impact of Environmental Fiscal Transfer (EFT) on total spending on forest cover.

In India, 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 fiscal needs but also to the vertical imbalances due to asymmetries in the assignment of finances and function among different levels of government. Another important aspect attached to the transfers mechanism is its effect on public spending. Transfers in India from the Union Government to the States have seen a big shift from the first FC till date wherein there is an increase in progressivity of transfers.¹ A study by Lalvani (2000) on 14 non-special category Indian states confirmed the presence of flypaper effect i.e. increase in grants having a greater stimulating effect on the total expenditures and revenue expenditures. However, this study was based on the 11th finance commission recommendations on intergovernmental transfers. There have been significant changes in the design and allocation of transfers since post the 11th Finance Commission.

The 15th Finance Commission report tabled in Parliament in February 2021 recommended horizontal transfers to be based on the following criteria: (i) 15 per cent based on the area, ii) 45 per cent based on the income distance, iii) 15 per cent based on the 2011 census population, iv) 10 per cent for forest and ecology, v) 12.5 per cent based on demographic performance, and vi) 2.5 per cent on tax-effort². The forest and ecology-based indicator with 10 per cent weightage is both a forward-looking incentive and a reward for past performance for maintaining the forest. This recommendation is significant in the context of India's commitment to reduce its emission intensity by 33-35 per cent by 2030 compared to 2005 levels.³ Against this perspective, we analyse the effect of the transfers on the forest expenditures and check whether the flypaper effect prevails.

3. Interpreting Data

The notion of ecological fiscal transfers in India has been initiated by the 13th Finance Commission. Several states, namely, Tripura, Uttarakhand, Chhattisgarh, and

¹ "A Study on Intergovernmental transfers in India", NIPFP Report submitted to IDRC Canada 2018.

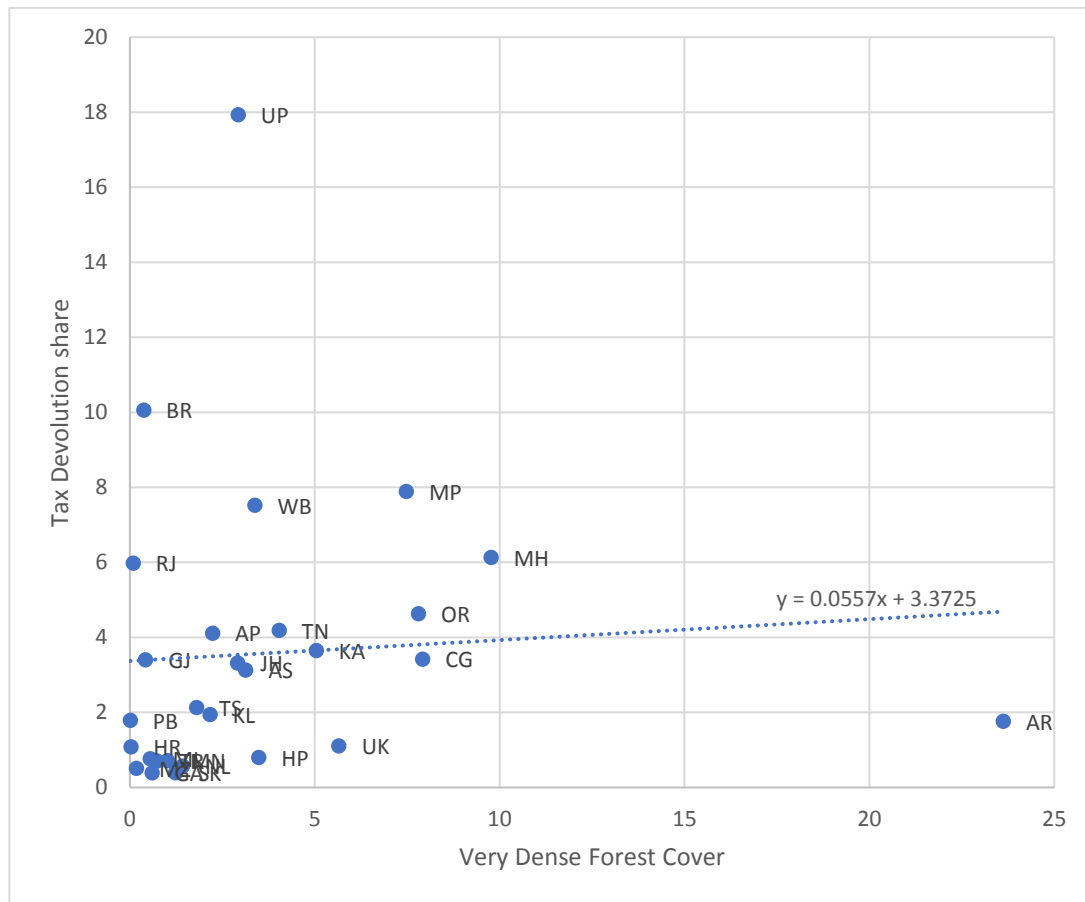
² <https://www.prsindia.org/theprsblog/recommendations-15th-finance-commission-2020-21>

³ <https://www.carbonbrief.org/the-carbon-brief-profile-india>

Madhya Pradesh in their memorandum to the Commission suggested that forest cover to be incorporated as a part of the tax devolution with the weights of 5 per cent, 10 per cent, 10 per cent, and 7.5 per cent respectively. On similar lines considering forest conservation, Arunachal Pradesh also proposed the inclusion of environmental and forest conservation with a weight of 10 per cent. The 13th Finance Commission, considering the total forest acreage in the country, provided a forest grant of Rs. 5000 crores.

The 14th and 15th Finance Commission used forest cover as an indicator of tax devolution to the States. Our analysis here is restricted to 28 states including Telangana considering the time-period 2003 to 2019. The data is divided across four segments-population data, expenditure variables, State GDP, and 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 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.

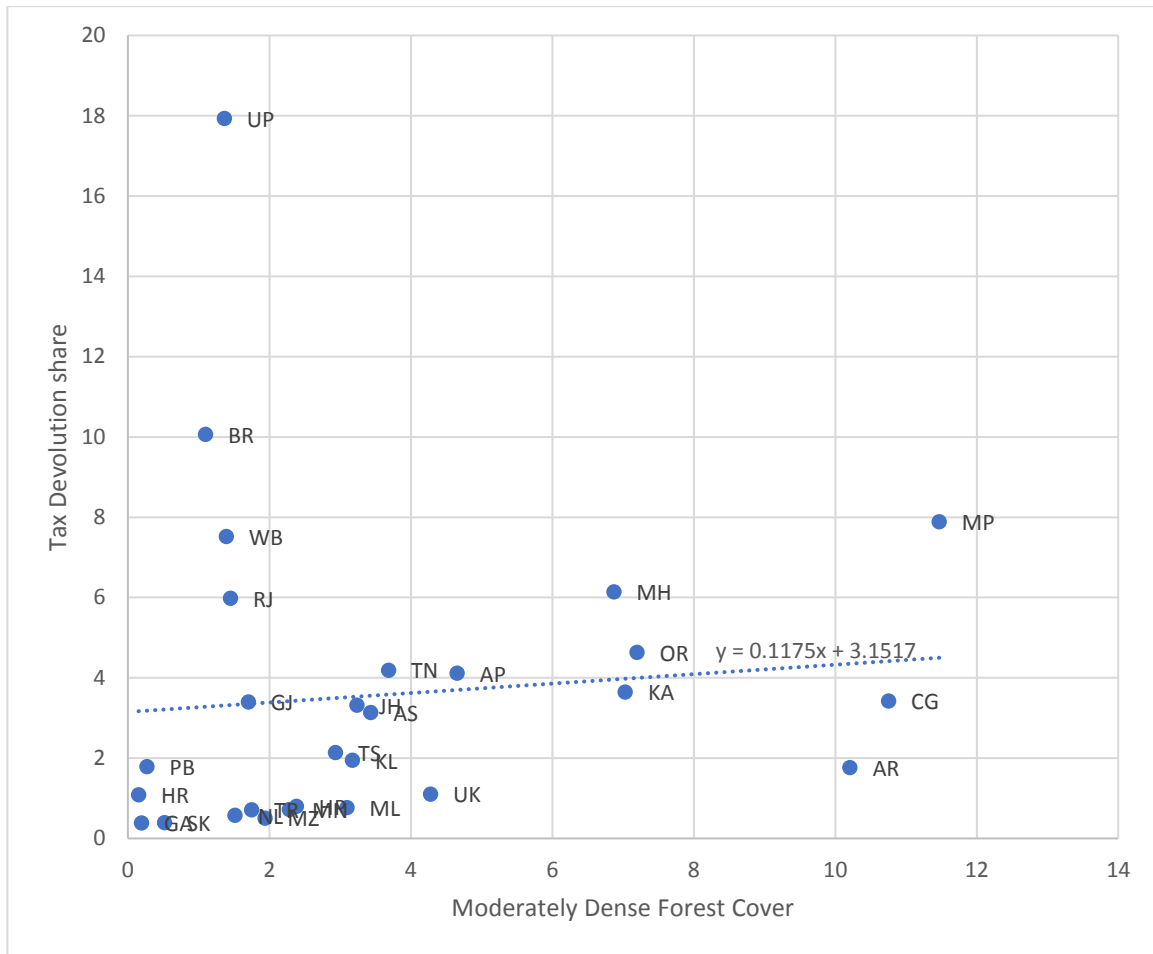
The State GDP data is extracted from MOSPI's (Ministry of Statistics and Programme Implementation, Government of India) database where it was available for three series – 1999 to 2010, 2004 to 2015, and 2011-20. We have spliced the data, considering the overlapping figures of years, using them to shift the base of the series to the latest data available. The data on forest cover 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 share


Source: (Basic data), MOSPI and Finance Accounts (2019)

Figure 1 depicts a positive correlation between very dense forest cover and tax devolution share 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 outlier with more than 17 per cent of the total devolution rate while having a “very dense” forest cover of 2.93 per cent.

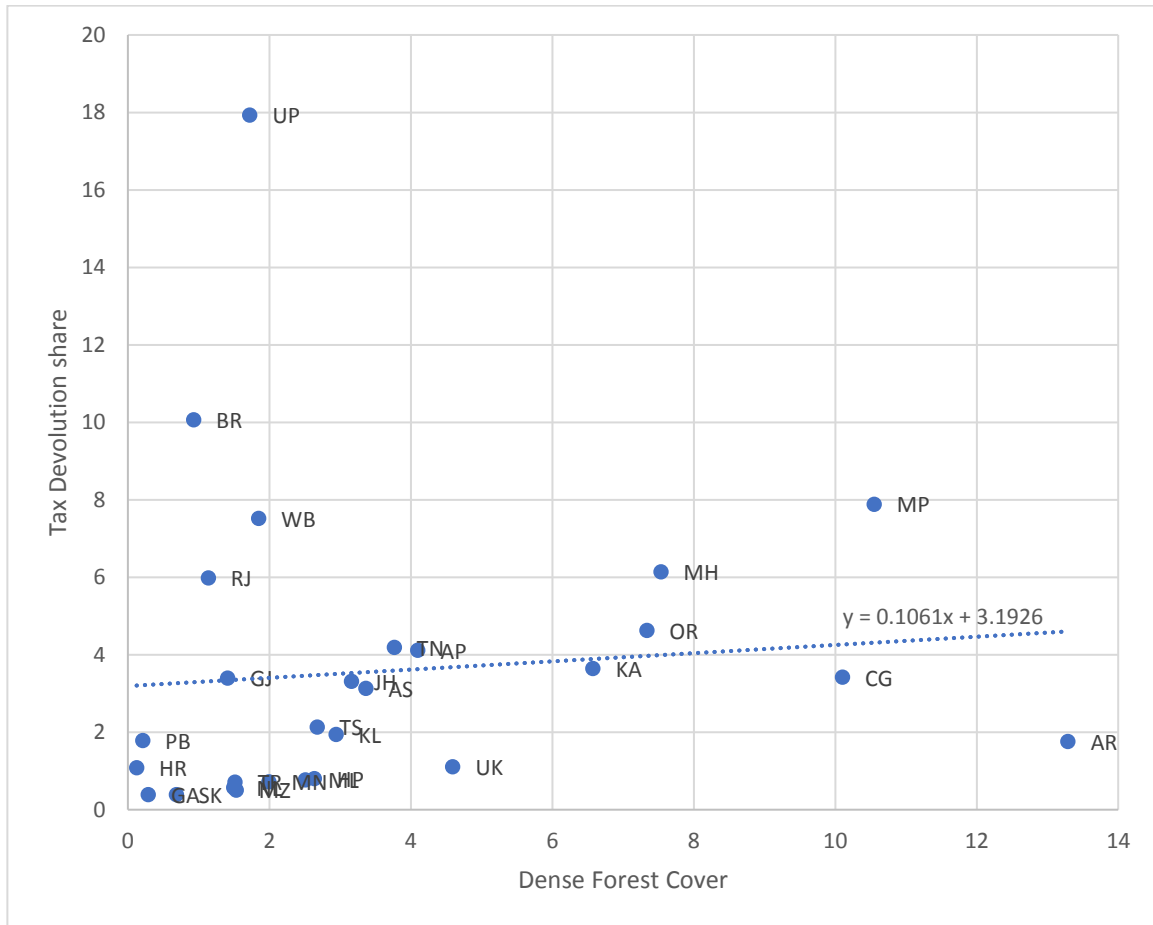
Figure 2: Scatterplot Describing Relationship between Ecological Variable (moderate) and Tax Devolution share



Source: (Basic data), MOSPI and Finance Accounts (2019)

The plot of moderately dense forest cover as shown in Figure 2 shows 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 outlier with the tax devolution share, and with the moderately dense forest cover of 1.363 per cent.

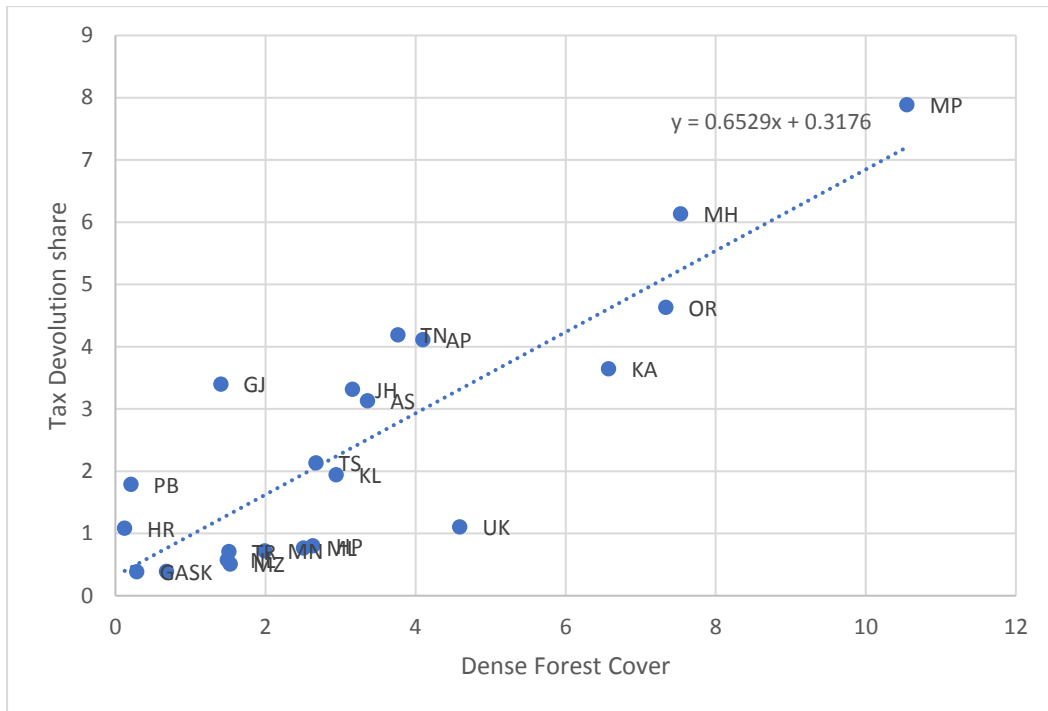
Figure 2: Scatterplot Describing Relationship between Ecological Variable (dense) and tax devolution share



Source: (Basic data), MOSPI and Finance Accounts (2019)

The dense forest cover is 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 outlier with 1.723 per cent forest cover. 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. Appendix1 shows the scatterplots after adjusting for outliers.

Figure 3: Link between Tax Transfers share and Dense Forest Cover



Source: (Basic data), MOSPI and Finance Accounts (2019)

4. The Econometric Models and Results

To test the flypaper effect, we use a panel data set of 28 Indian States. The time period is 2003 to 2019. The dependent variables are state-level total expenditure, revenue expenditure and capital expenditure on forests. The main regressors are total transfers to the state governments and the state’s own revenue. Different models are tested to confirm the presence of the flypaper effect. These models are presented in Tables 2 and 3. The description of the variables used in the testing is mentioned in Table 1.

Table 1: Description of the variables used in the models

Variables	Description
TEF	Total expenditure on forests
Ttrans	Total transfers (Grants+ share in Taxes)
MDF	Medium dense forest cover
Pop	Population
Cons	Constant
REF	revenue expenditure on forests
CEF	Capital expenditure on forests
VDF	Very dense forest cover
STORV	State total own revenues

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 the existence of flypaper effect. Other control variables in the models explained do not have a significant impact.

Table 2: Flypaper effects: MDF Models with aggregate and disaggregated ecological spending and state's own tax revenue

Variables			
Dependent→	TEF	REF	CEF
Independent↓			
STOREV	.448*** (.021)	.462*** (.023)	.386*** (.050)
Ttrans	.497*** (.018)	.488*** (.0208)	.583*** (.042)
Mdf	.071 (.046)	.095* (.052)	.029 (.055)
Pop	.130* (.071)	.105 (.080)	-.051 (.051)
Cons	-1.064 (1.059)	-1.091 (1.191)	.049 (.766)
No. of observations	459	459	459
No. of Groups	27	27	27
R²	0.97	0.96	0.89

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

4.1: Very dense cover models

We ran the regressions with moderately dense forest cover variables in Table 2 and with a with a new control variable called VDF (Very Dense Forest Cover) in Table 3. The models represent a strong flypaper effect as the coefficient of total transfers is more than the coefficient of the state's own revenue. The effect is also prevalent for revenue expenditure and capital expenditure. The demographic variable is also positive and significant.

Table 3: Flypaper effects: VDF Models with aggregate and disaggregated ecological spending and state's own tax revenue

Dependent →	TEF	REF	CEF
Independent ↓			
STOREV	.401*** (.021)	.444*** (.019)	.352*** (.051)
Ttrans	.532*** (.018)	.519*** (.017)	.598*** (.045)
VDF	.012 (.008)	-.007 (.008)	.040* (.022)
Pop	.190*** (.068)	.016 (.020)	-.024 (.050)
Cons	-1.362 (1.055)	1.102*** (.300)	-.161 (.726)
No. of observations	443	443	443
No. of Groups	27	27	27
R ²	0.97	0.98	0.89
Hausman		RE value=0.144	RE value=0.50

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

5. Conclusion

Our econometric models show a significant flypaper effect on subnational ecological spending. Controlling for demographic and geographical variables, disentangling the total tax transfers over different categories of expenditures – current and capital - also confirmed the flypaper effects. We find evidence of stimulus to the revenue expenditure on forests with the increase in tax transfers than from the increase in the states' income. Ecological outcome variables, both moderately dense forest cover and very dense forest cover are positively correlated with subnational ecological spending. It is interesting to note that the inclusion and drop of these control variables also reconfirmed the consistency of the models supporting the occurrence of flypaper effects.

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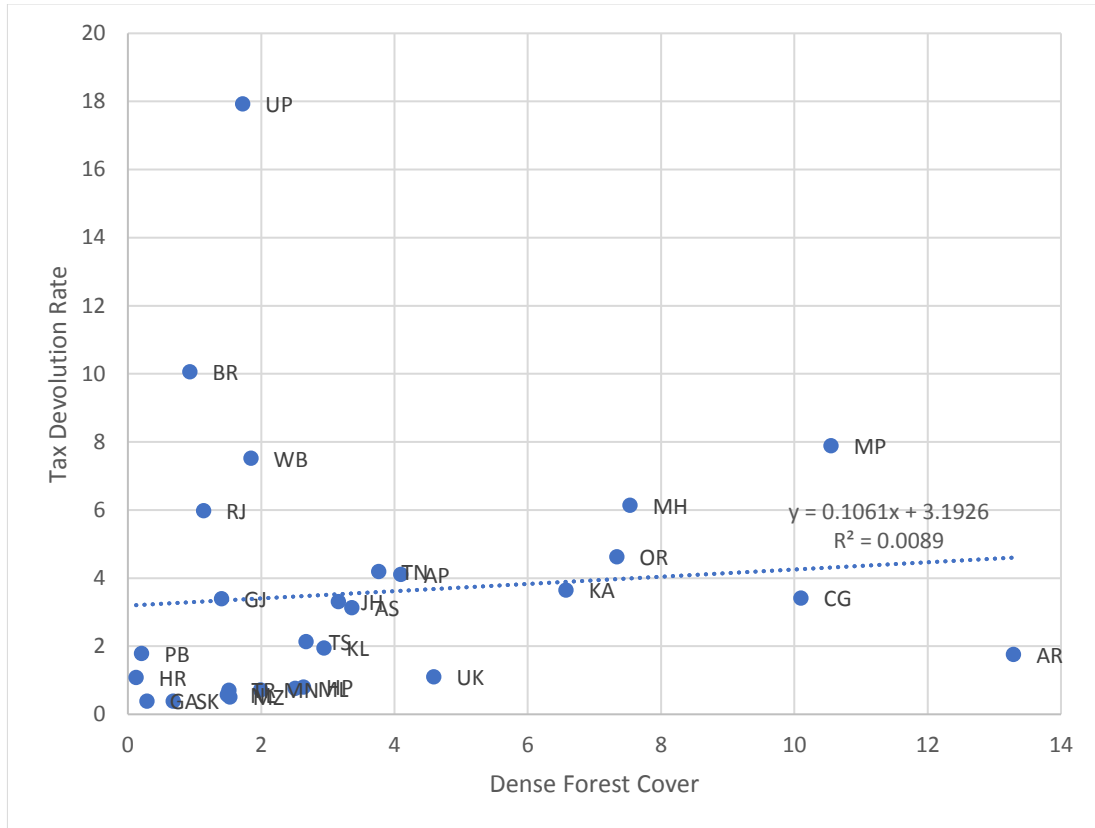
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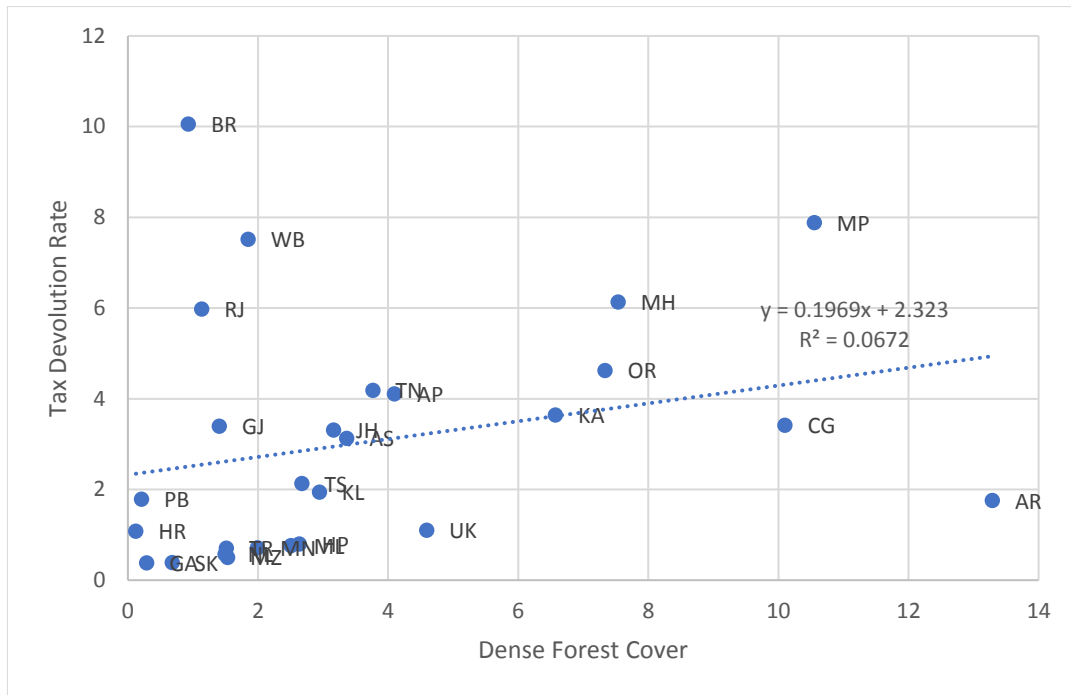
Appendix 1 :Dense Cover and Tax Devolution – Outlier elimination

Table A1: Without any outlier elimination –overall link



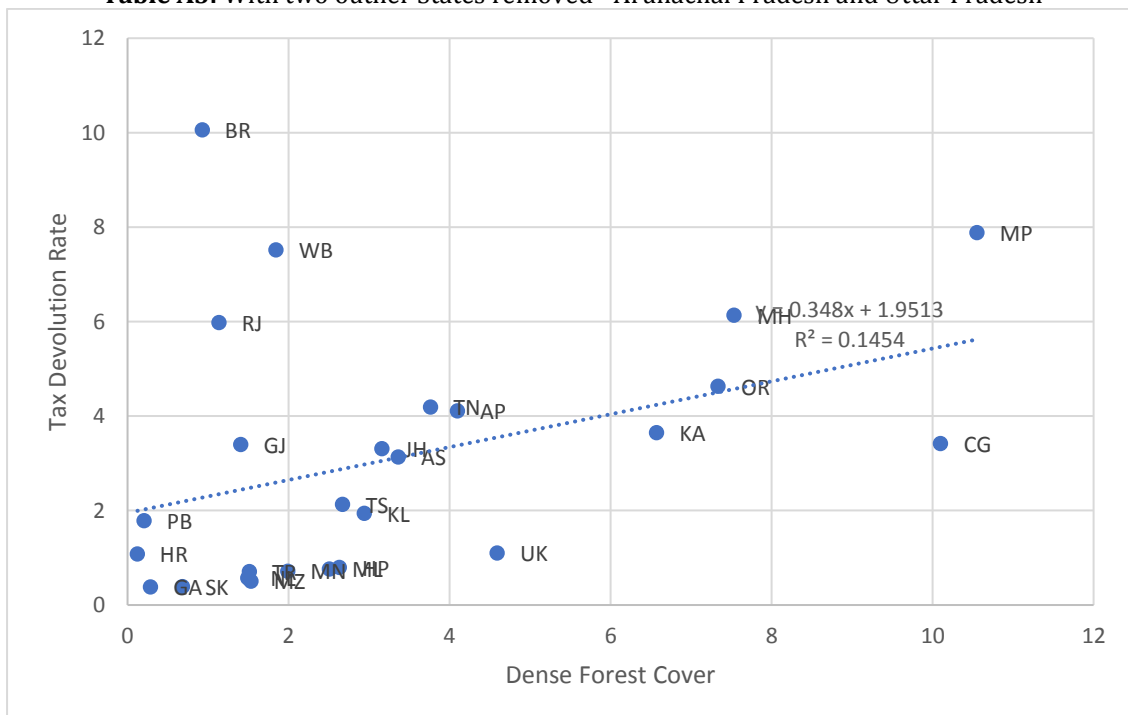
Source: (Basic data), MOSPI and Finance Accounts

Table A2: Removal of Uttar Pradesh, the outlier State



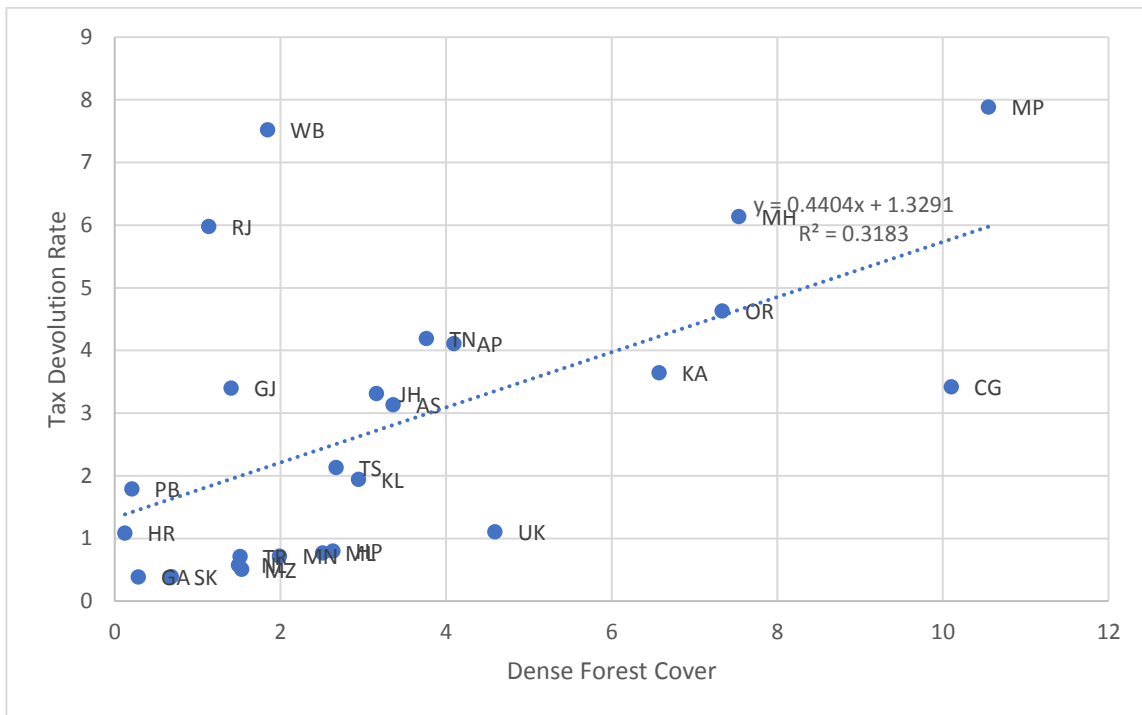
Source: (Basic data), MOSPI and Finance Accounts

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



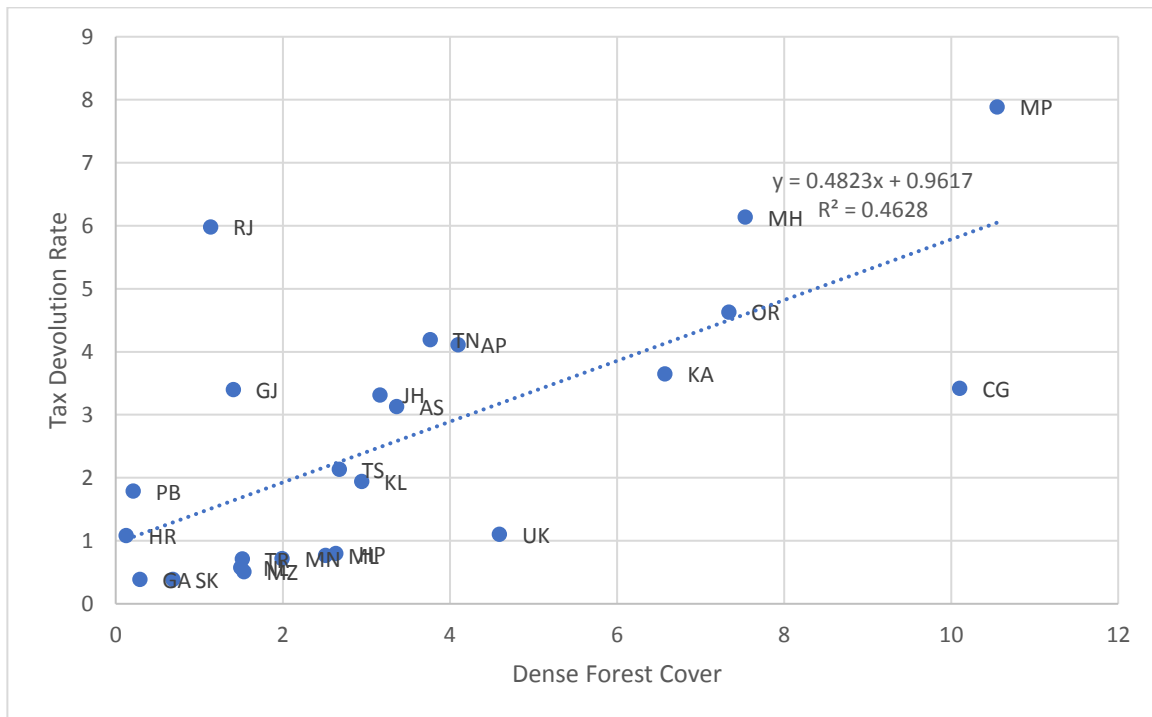
Source: (Basic data), MOSPI and Finance Accounts

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



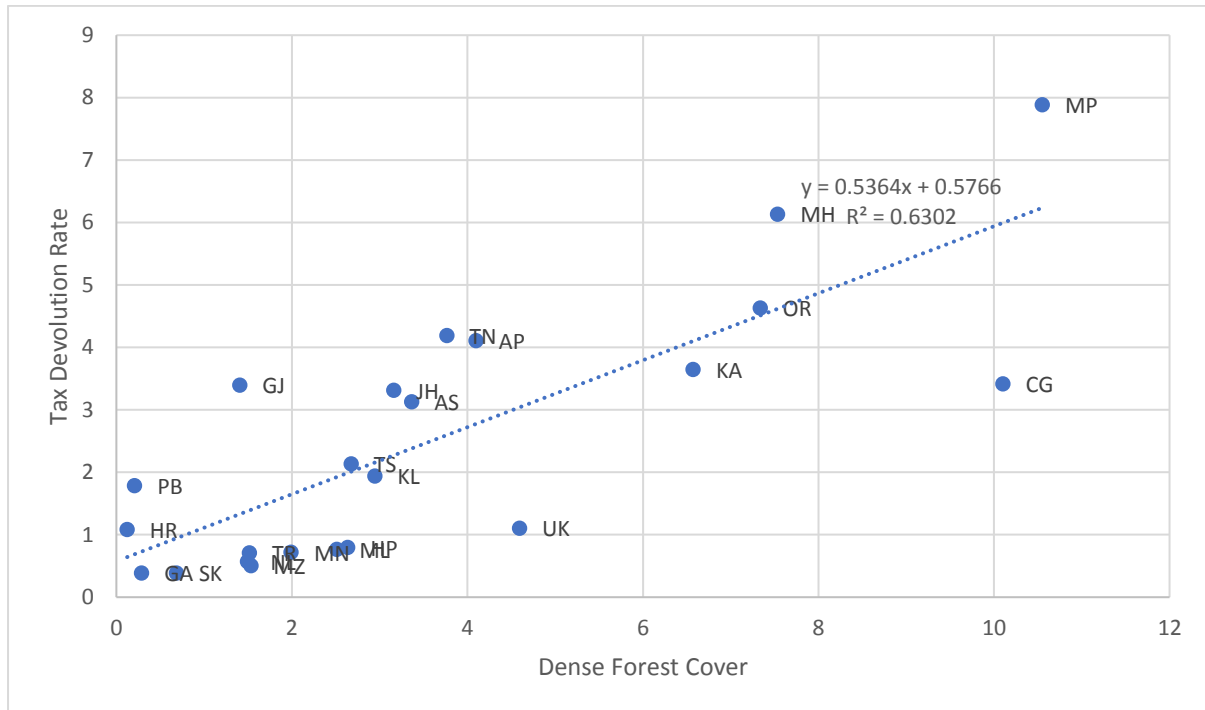
Source: (Basic data), MOSPI and Finance Accounts

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



Source: (Basic data), MOSPI and Finance Accounts

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



Source: (Basic data), MOSPI and Finance Accounts

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Amandeep Kaur, is Economist, NIPFP
Email: amandeep.kaur@nipfp.org.in

Ranjan Kumar Mohanty, is former Economist, NIPFP
Email: ranjanmohanty85@gmail.com

Lekha Chakraborty, is Professor, NIPFP
Email: lekha.chakraborty@nipfp.org.in

Divy Rangan, is Research Fellow, NIPFP
Email: divy.rangan@nipfp.org.in

National Institute of Public Finance and Policy,
18/2, Satsang Vihar Marg,
Special Institutional Area (Near JNU),
New Delhi 110067
Tel. No. 26569303, 26569780, 26569784
Fax: 91-11-26852548
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