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**Working Paper**

## Ecological fiscal transfers and state-level budgetary spending in India: Analyzing the flypaper effects

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## **Working Paper No. 990**

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### **Ecological Fiscal Transfers and State-level Budgetary Spending in India: Analyzing the Flypaper Effects**

by

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## **ABSTRACT**

Using panel data models, we analyze the flypaper effects—whether intergovernmental fiscal transfers or states’ own income determine expenditure commitments—on ecological fiscal spending in India. The econometric results show that the unconditional fiscal transfers, rather than the states’ own income, determine ecological expenditure in the forestry sector at subnational levels in India. The results hold when the models are controlled for ecological outcomes and demographic variables.

**KEYWORDS:** Intergovernmental Transfers; Flypaper Effect; Public Expenditures; Forestry Sector

**JEL CLASSIFICATIONS:** E6; H5; H7; Q5

## 1. INTRODUCTION

With the progress of fiscal decentralization, 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 decentralized decisions in climate change commitments are getting worldwide attention ex-post the Paris Accord on climate change. However, the interjurisdictional competition to attract mobile capital by trading (lowering) environmental regulations led 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 purely “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.

Governments have tried to internalize these externalities through legal negotiations and fiscal instruments. In this context, it is pertinent to analyze how the transfers to subnational governments have integrated environmental variables. Equally important is to examine how efficacious fiscal allocations at the local level are in integrating climate change commitments. The 15th Finance Commission<sup>1</sup> 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 percent. The 15th Finance Commission also retained the criterion with an increased weightage of 10 percent in the unconditional fiscal transfers, using the “dense forest cover”<sup>2</sup> interstate data. Unlike the 14th and 15th Finance Commissions, the 13th Finance Commission designed “conditional” fiscal transfers for climate change commitments. The conditional fiscal transfers are specific-

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<sup>1</sup> The Finance Commission is mandated to decide on the intergovernmental tax transfers in India. It is constituted by the President of India every five years. India has fifteen Finance Commissions so far.

<sup>2</sup> Defined as lands with tree canopy density of 70 percent and above.

purpose transfers and the funds are tied to a particular scheme, for instance, environmental 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 analyzes 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 the theoretical and policy literature. Section 3 interprets the data. Section 4 presents the econometric models and results. Section 5 concludes.

## **2. REVIEW OF THE 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 known as the flypaper effect. An extensive body of literature has empirically confirmed the existence of the flypaper effect. Theoretically, it was believed that an increase in public spending due to an increase in transfers has the same impact as a change in voters’ income (Bradford and Oates 1971). However, empirically it has been established that it is intergovernmental transfers, more than own income, that impacts the spending on public goods. This is termed 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 about the impact of intergovernmental fiscal transfers (Aragon 2009).

The effect is also impacted for other reason, such as political and bureaucratic factors. This is based on the postulation that political agents often try to maximize their own budgets, rendering greater influence over their 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 than a cut in intergovernmental 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 for by an

increase in tax rates without a willingness to reduce the expenditures (Gamkhar and Oates 1996). This type of asymmetry is called the “super flypaper effect.” A study by Gennari and Messina (2014) done for 8,000 Italian municipalities for the period 1999–2006 analyzes a stronger flypaper effect for total municipal spending from transfers. The asymmetry coefficient for fiscal replacement is negative, revealing that municipalities increase their own revenues to match the decline in transfers. However, this disappears when a dynamic panel data framework is used.

Other socioeconomic factors such as education and age also show a direct impact on public spending. Furthermore, another type of definition for the existence of the flypaper effect is when the increase in transfers does not reduce the local tax rates. A study by Langer and Korzhenevych (2019) examines 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 analyze 396 municipalities for the period 2009–15, finding that the nonmatching transfers have a significant impact on a municipality’s total expenditures and no effect on local tax rates. This could be because of the municipalities’ tight budgets, which pressures them to spend rather than lowering tax rates.

An interesting study by Mehiriz and Marceau (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 a \$1 increase in unconditional grants leads to a \$0.82 increase in municipal expenditures in 1,084 municipalities in the Canadian province of Quebec for the period 2001–7. Another explanation to the flypaper effect is given by Sepúlveda (2017) wherein he examines the effect based on the taxpayer’s behavioral response to income and the tax rate. He explains that changes in the shape of the budget constraint are subject to changes in alternative sources of income. Moreover, when the change in transfers does not have any direct consequence on the tax collection costs, the state-level governments can reduce both the tax rates and cut the marginal cost of expenditures. However, if the same transfers are given to the taxpayer, they first use it for their own consumption and, in that case, the government has to collect taxes that affect the taxpayer behavior. In other words, the marginal cost of public funds (MCF) can be constant or greater than one to produce the flypaper effect and does not have to change with transfers. To put it simply, transfer-financed public expenditures are cheaper than when financed through income.

Another study on data from 2011–18 for 290 Swedish municipalities by Peterson (2020) finds the constant presence of flypaper effect through April of 2021. Since the estimate of government grants are larger than the estimate of tax revenue, it implies that government expenditures are stimulated more by the increase in the transfers than the tax base. It has been well stated that the idea of the flypaper effect is no longer an anomaly but a part of fiscal politics (Inman 2008). Given the limited number of empirical research studies, particularly for India, this paper fills the gap by investigating the impact of India's 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 do they help to correct the horizontal imbalances that occur due to differences 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 federal government to the states have seen a big shift from the 1st Finance Commission through today, where there is an increase in the progressivity of the transfers (NIPFP 2018). A study by Lalvani (2002) on 14 Indian states confirmed the presence of flypaper effect, i.e., an 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's recommendations regarding intergovernmental transfers; there have been significant changes in the design and allocation of transfers since the 11th Finance Commission.

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

### 3. INTERPRETING THE DATA

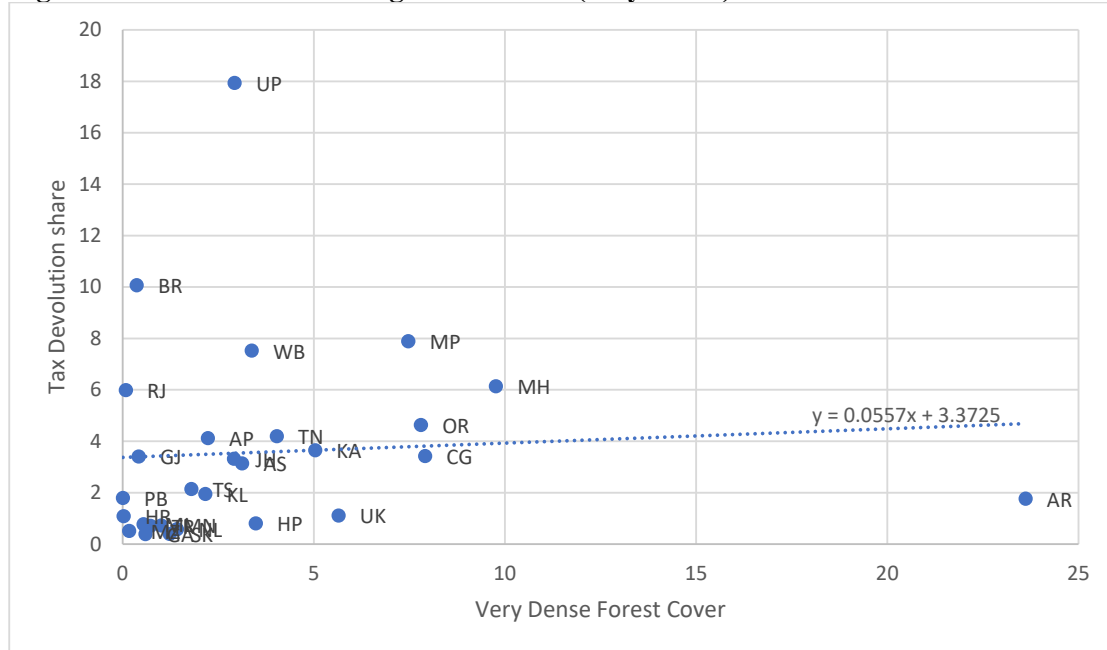
The notion of ecological fiscal transfers in India was initiated by the 13th Finance Commission. Several states—namely, Tripura, Uttarakhand, Chhattisgarh, and Madhya Pradesh—in their memorandum to the commission suggested that forest cover be incorporated as a part of the tax devolution formula, with the weights of 5 percent, 10 percent, 10 percent, and 7.5 percent, respectively. On similar lines considering forest conservation, Arunachal Pradesh also proposed the inclusion of environmental and forest conservation with a weight of 10 percent. The 13th Finance Commission, , provided a forest grant of Rs. 5,000 crores to subnational governments as specific purpose grants.

The 14th and 15th Finance Commissions used forest cover when estimating 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 a 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, total expenditure, state’s own tax revenue, state’s own revenue receipt (tax and nontax), share in federal-level tax, and federal-level grants (which are available on a yearly basis for each state from their respective budget statements).

The state-level GDP data is extracted from the Ministry of Statistics and Programme Implementation, Government of India (MOSPI) database, where it was available for three series: 1999–2010, 2004–15, and 2011–20. We have spliced the data, considering the overlapping data, of the 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 a yearly basis. The variables include moderately dense forest cover, very dense forest cover, dense forest 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.



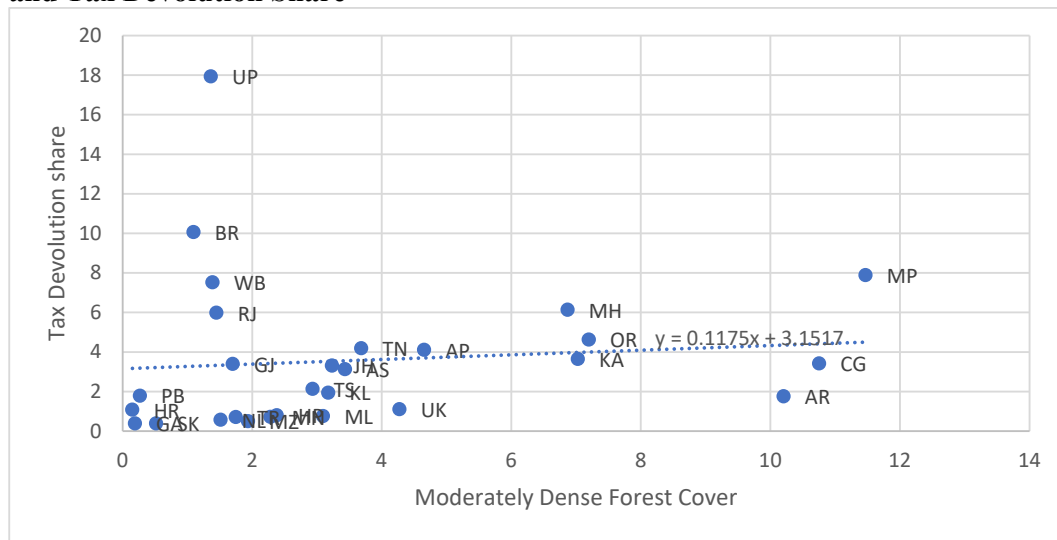
**Figure 1: Link between Ecological Variable (very dense) and Tax Devolution Share**



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 the weightage of 10 percent given to forest and ecology (along with other criteria including population, area, income distance, and demographic performance). In the scatterplot, Uttar Pradesh is shown to be the outlier with more than 17 percent of the total devolution rate while having a very dense forest cover of 2.93 percent.

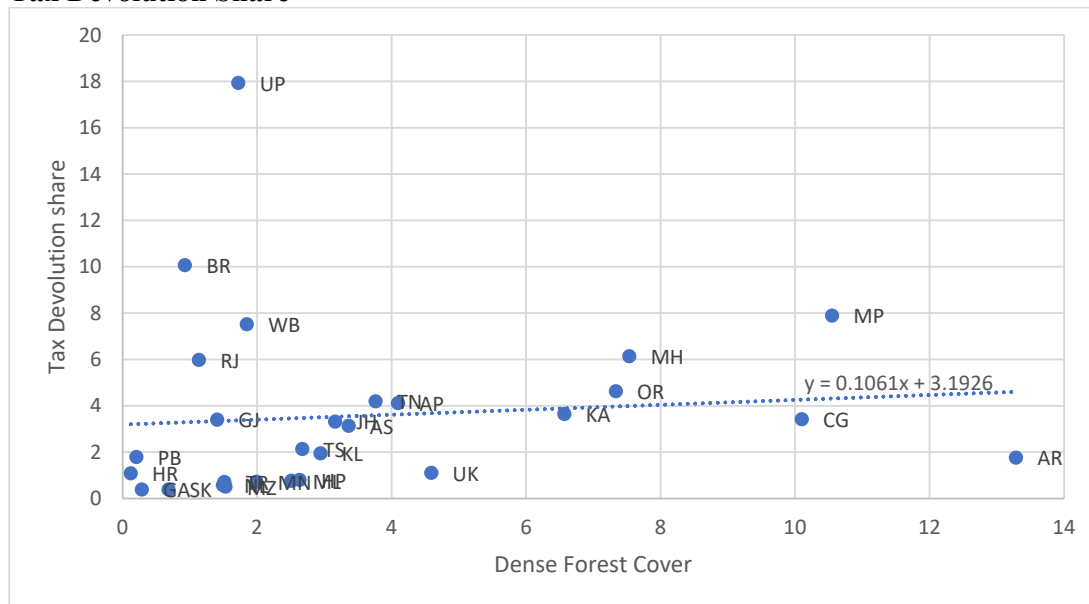
**Figure 2: Scatterplot Describing Relationship between Ecological Variable (moderate) and Tax Devolution Share**



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 the 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, with the moderately dense forest cover of 1.363 percent.

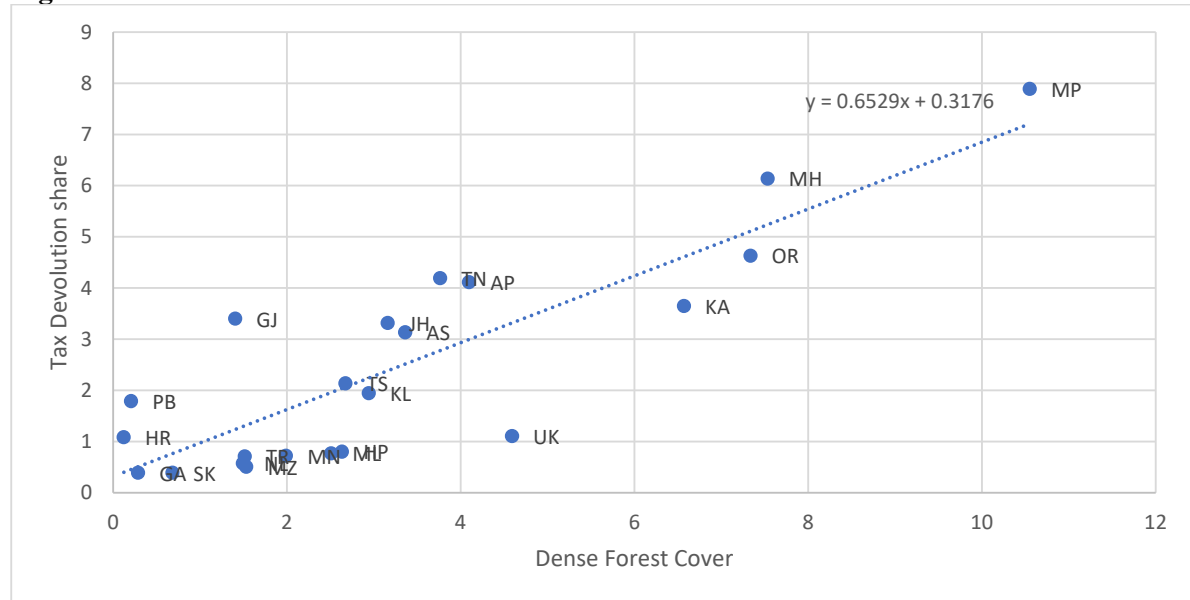
**Figure 3: Scatterplot Describing Relationship between Ecological Variable (dense) and Tax Devolution Share**



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

The scatterplot as shown in figure 4 depicts a positive correlation. Uttar Pradesh again has emerged to be the outlier with 1.723 percent 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. Appendix 1 shows the scatterplots after adjusting for outliers.

**Figure 4: 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 found in table 1.

**Table 1: Description of the Variables Used in the Models**

Variables	Description
<b>TEF</b>	Total expenditure on forests
<b>Ttrans</b>	Total transfers (grants+share in taxes)
<b>MDF</b>	Medium dense forest cover
<b>Pop</b>	Population
<b>Cons</b>	Constant
<b>REF</b>	Revenue expenditure on forests
<b>CEF</b>	Capital expenditure on forests
<b>VDF</b>	Very dense forest cover
<b>STORV</b>	State total own revenues

Taking states' total own revenues (states' own tax revenue and nontax revenue) as a proxy for the state governments' 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 States' Own Tax Revenue**

Variables	TEF	REF	CEF
<b>STOREV</b>	.448*** (.021)	.462*** (.023)	.386*** (.050)
<b>Ttrans</b>	.497*** (.018)	.488*** (.0208)	.583*** (.042)
<b>Mdf</b>	.071 (.046)	.095* (.052)	.029 (.055)
<b>Pop</b>	.130* (.071)	.105 (.080)	-.051 (.051)
<b>Cons</b>	-1.064 (1.059)	-1.091 (1.191)	.049 (.766)
<b>No. of observations</b>	459	459	459
<b>No. of groups</b>	27	27	27
<b>R<sup>2</sup></b>	0.97	0.96	0.89

Note: \*\*\* is for 1 percent level of significance (LOS), \*\* is 5 percent LOS, \* is 10 percent 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 the moderately dense forest cover variables in table 2 and with a new control variable called very dense forest cover (VDF) 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 States’ Own Tax Revenue**

	TEF	REF	CEF
<b>STOREV</b>	.401*** (.021)	.444*** (.019)	.352*** (.051)
<b>Ttrans</b>	.532*** (.018)	.519*** (.017)	.598*** (.045)
<b>VDF</b>	.012 (.008)	-.007 (.008)	.040* (.022)
<b>Pop</b>	.190*** (.068)	.016 (.020)	-.024 (.050)
<b>Cons</b>	-1.362 (1.055)	1.102*** (.300)	-.161 (.726)
<b>No. of observations</b>	443	443	443
<b>No. of groups</b>	27	27	27
<b>R<sup>2</sup></b>	0.97	0.98	0.89
<b>Hausman</b>		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 for subnational ecological spending. Controlling for demographic and geographical variables and 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 more 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 excluding of these control variables also reconfirmed the consistency of the models supporting the occurrence of flypaper effects.

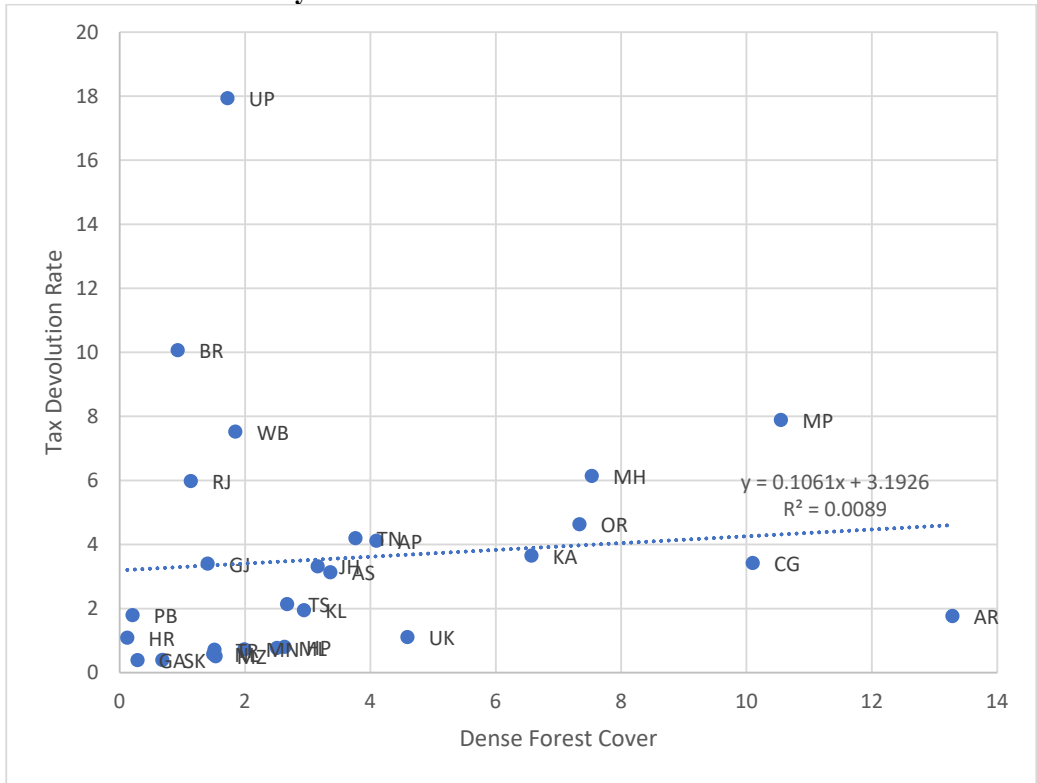
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**APPENDIX 1: DENSE COVER AND TAX DEVOLUTION—OUTLIER ELIMINATION**

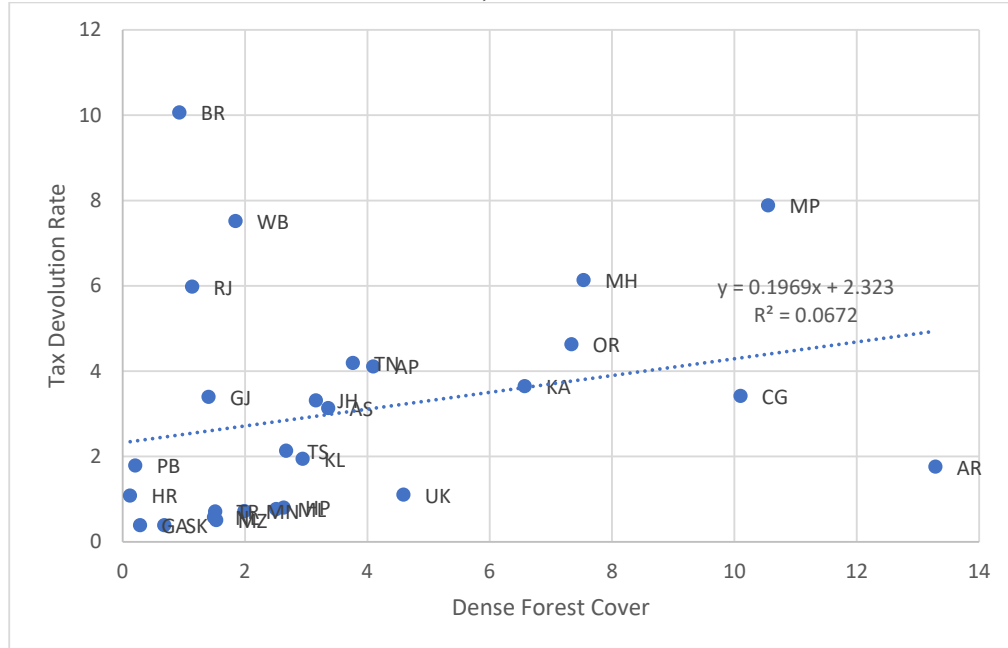
**Table A1: Without Any Outlier Elimination—Overall Link**



Source: (Basic data) MOSPI and Finance Accounts

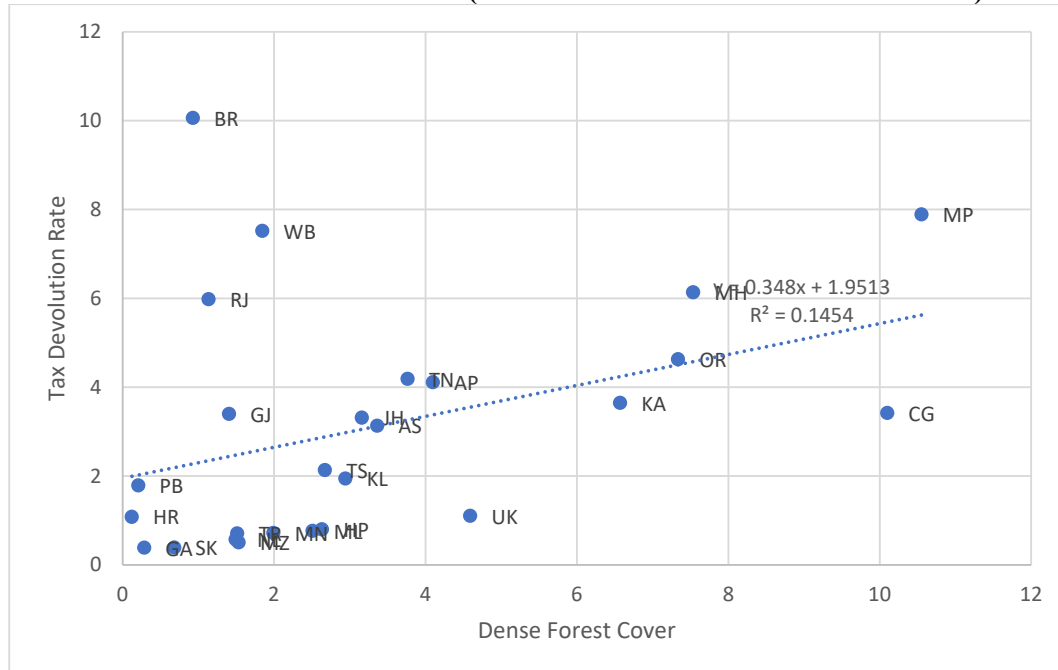


**Table A2: Removal of Uttar Pradesh, the Outlier State**



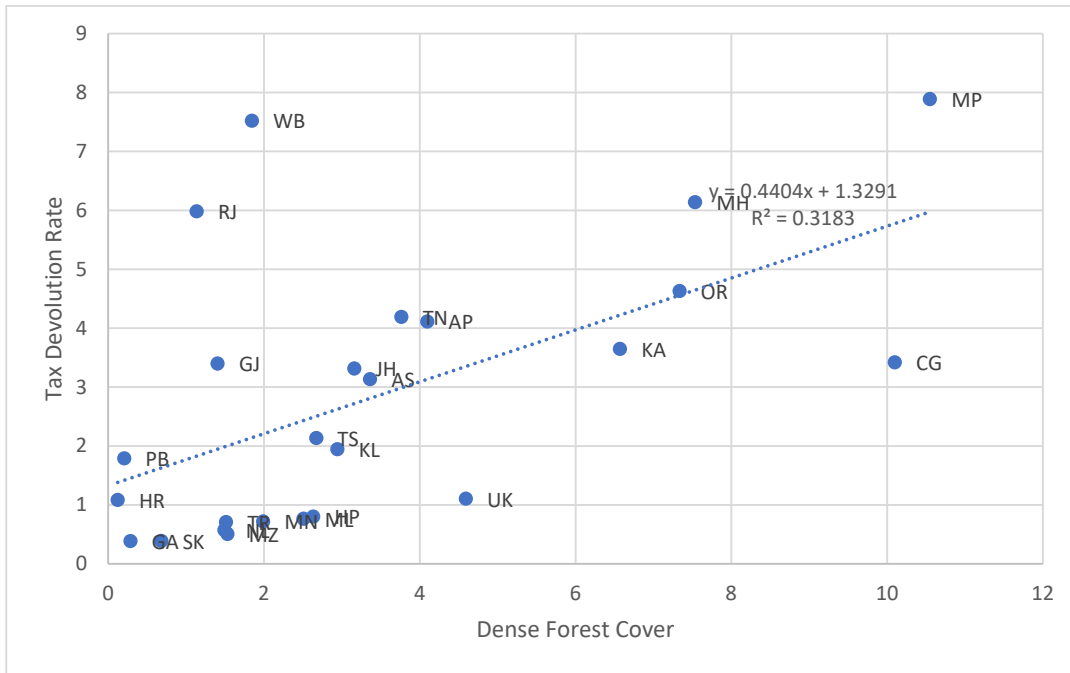
Source: (Basic data) MOSPI and Finance Accounts

**Table A3: With Two Outlier States (Arunachal Pradesh and Uttar Pradesh) Removed**



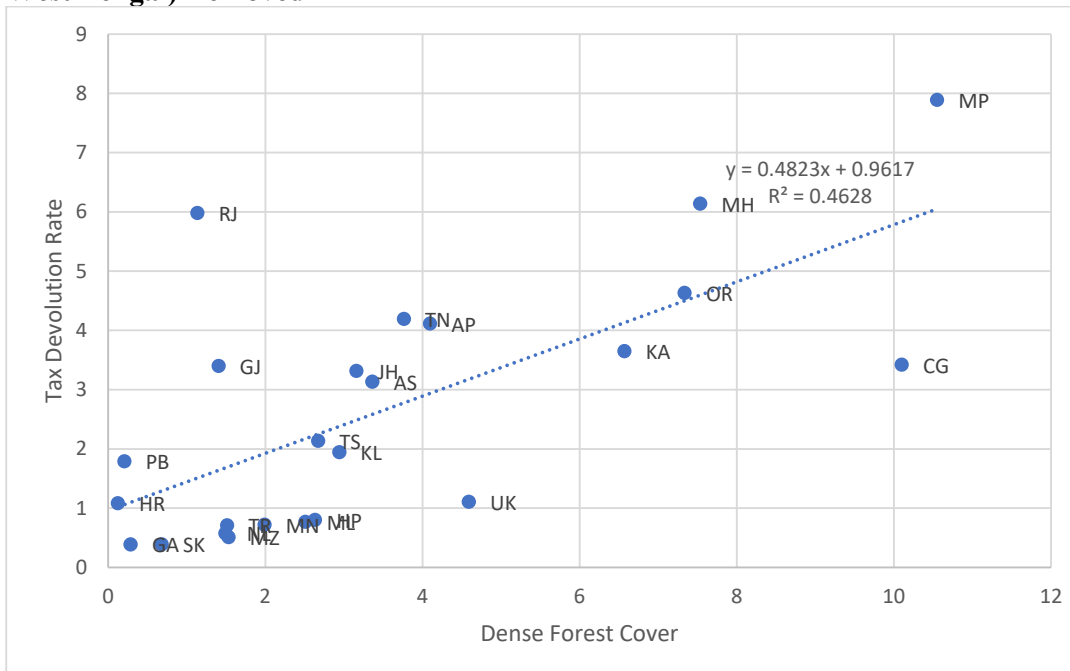
Source: (Basic data) MOSPI and Finance Accounts

**Table A4: With Three Outlier States (Arunachal Pradesh, Uttar Pradesh, and Bihar) Removed**



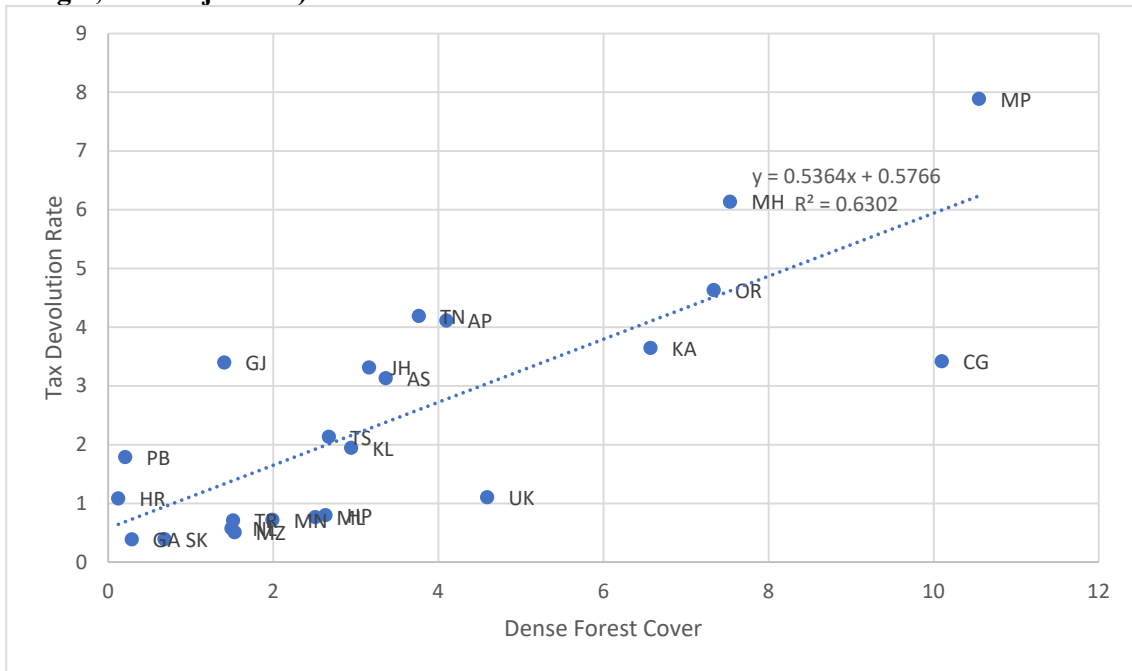
Source: (Basic data) MOSPI and Finance Accounts

**Table A5: With Four Outlier States (Arunachal Pradesh, Uttar Pradesh, Bihar, and West Bengal) Removed**



Source: (Basic data) MOSPI and Finance Accounts

**Table A6: With Five Outlier States (Arunachal Pradesh, Uttar Pradesh, Bihar, West Bengal, and Rajasthan) Removed**



**Source:** (Basic data) MOSPI and Finance Accounts