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COP28 AND ENVIRONMENTAL FEDERALISM: EMPIRICAL EVIDENCE FROM AN EMERGING ECONOMY, INDIA

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ABSTRACT

Against the backdrop of COP28, this paper investigates the impact of intergovernmental fiscal transfers (IGFT) on climate change commitments in India. Within the analytical framework of environmental federalism, we tested the evidence for the Environmental Kuznets Curve (EKC) using a panel model covering 27 Indian States from 2003 to 2020. The results suggest a positive and significant relationship between IGFT and the net forest cover (NFC) across Indian states. The analysis also suggests an inverse-U relationship between Gross State Domestic Product (GSDP) and the environmental quality, indicating a potential EKC for India. The findings substantiate the fiscal policy impacts for climate change commitments within the fiscal federal frameworks of India, and the significance of IGFT in increasing the forest cover in India. This has policy implications for the Sixteenth Finance Commission of India in integrating a climate change–related criterion in the tax-transfer formula in a sustainable manner.

KEYWORDS: Environmental Federalism, Environmental Kuznets Curve, Intergovernmental Fiscal Transfers, Government Expenditures

JEL CODES: E6, H5, H7

1. INTRODUCTION

Fiscal policy stance is a key policy instrument in ensuring sustainable development, which rests on the fact that the functioning of the market cannot, by itself, activate the signalling, response, and mobility of economic agents to achieve efficiency in both static (allocative efficiency) and dynamic (shift in the production frontier) terms. The role of fiscal policy stance in sustainable development proceeds from market failures of one kind or another. The emerging literature on environmental federalism deals with the fiscally decentralized determination of environmental quality and the dangers of a "race to the bottom." The race to the bottom happens due to inter-jurisdictional competitiveness to attract the mobile capital (mobile firms) by excessively lax environmental standards. Against the backdrop of COP28 UAE, this paper aims to examine the link between a fiscally decentralized public policy stance and environmental quality.

Existing theoretical and empirical literature on environmental federalism is heavily skewed toward the discussion on environmental regulations and ignores the fiscal policy content within to a great extent. This is a nascent attempt to empirically capture the impact of fiscal policy in a federal economy on the environmental quality using a Kuznets U specification. This paper does not refute the widely explored Kuznets U phenomenon between economic growth and environmental quality, incorporating fiscal policy variables. The crucial question, thus, is whether fiscal policy stance has an impact on environmental quality.

The paper is divided into four sections. Apart from the introduction, Section 2 deals with the theoretical framework of environmental federalism, while Section 3 discusses empirical issues related to fiscal policy stance and environmental quality. The data and methodology is discussed in Section 4. Section 5 interprets the data and Section 6 deals with the specification of the model and econometric estimation. Section 7 draws conclusions.

2. THE ANALYTICAL FRAMEWORK

In a fiscal federal setup, Oates (2001) envisions three standard-setting functions of environmental quality within the intergovernmental hierarchy. The first case considers environmental quality as a pure public good for the nation as a whole; the second prototypical case considers environmental quality as a pure local public good; and the third case deals with the effects of inter-jurisdictional externalities and Coasian-type negotiations. Oates (2001) narrated the three functions as follows:

(i) Environmental quality is a pure public good: a centrally determined, standard-setting function

This benchmark case considers that the vector of environmental quality (Q_i) is a function of the aggregate level of emissions from all sources in the nation (E).

$$Q_i = f\{E\} \quad (1)$$

Global warming and the depletion of the ozone layer falls into this category. For these matters, environmental quality is an international public good.

(ii) Environmental quality is a pure local public good: a decentralized determination of a standard-setting function

This prototypical case considers the level of environmental quality in the i^{th} jurisdiction as a function of the level of activities in that jurisdiction alone.

$$Q_i = f\{e_i\} \quad (2)$$

The "principle of subsidiarity" is directly applicable to this case—envisioning a decentralized determination of environmental quality. Each jurisdiction is expected to set its own appropriate standard for environmental quality, for instance, the protected area or net forest cover.

However, the empirical evidence suggests that in decentralized determination of environmental quality, there are dangers of a race to the bottom, which can emerge due to inter-jurisdictional competitiveness to attract mobile capital by excessively lax environmental standards. This can result in sub-optimal outputs of local public goods, including environmental quality.

(iii) Environmental quality as a function of inter-jurisdictional spill-over effects
This most recurring case considers environmental quality as a function of activities that flow across boundaries from other jurisdictions.

$$Q_I = f \{ e_i , e_{2,}..... e_n\} \quad (3)$$

For instance, both air and water pollution flow across jurisdictions. In this case, one solution is to invoke central intervention—though the centrally determined, uniform ambient national standards for environmental quality are not an optimal solution.

A Coasian resolution of jurisdictional spill-over affects through regional co-operations, but such co-operations are not common as the case of spill-over effects across jurisdictions causes a complex set of policy alternatives. It should also be noted that there exists a dichotomy in the nature of inter-jurisdictional externalities, whether the emission of pollution flows is uni- or bi-directional.

3. EMPIRICAL LITERATURE

There has been a continuous debate on the relationship between economic growth and environmental quality. In the initial phases of the debate, the idea was that economic growth is followed by increased economic activity and hence results in degradation of the environment (Ardndt 1998; Meadows et al. 1972). Proponents of industrial growth, however, were of the view that only by increasing economic activity can the problem of environmental degradation be managed. Hence, the synthesis argument came with the introduction of the concept of the Environmental Kuznets Curve (EKC) in the early 1990s, termed similarly to that of Kuznets

(1955) which claimed an inverse relationship between economic development and income inequality. By definition, the EKC depicts a hypothesized non-linear relationship between income (proxied for economic activity) and environmental degradation. The curve is an inverted U-shape, implying that as the economy grows, the environmental degradation increases and when the economy reaches a certain level of income per capita, the degradation starts to decline and the trend reverses (Stern 2004). When the countries begin to industrialize, pollution increases because people are more concerned with jobs and income than with clean water and air which reverses when the people are able to afford abatement and then value the environment (Dasgupta et al. 2002). The concept came through the Grossman and Krueger (1991) study on the impact of NAFTA and was subsequently introduced in the report on World Development (Shafik and Bandyopadhyay 1992).

Sooner, with the availability of data for a larger number of countries, it was empirically tested by Shafik and Bandyopadhyay (1992), Stern, Common, and Barbier (1996), and many others. Over this period, voluminous work has been published that empirically examines the EKC curve (pollution–income–growth relationship). Shafik (1994), in her paper, mentions four possible indicators of environmental quality for any given country: endowment (climate and location—specific characteristics), (per capita) income, technology (proxied by time-trend), and policy (i.e., a regulatory framework for emissions, energy taxation, investments, trade regimes). But she essentially examines the pollution–growth–income relationship through various indicators based on endowment. Stern (2004), in his review on the EKC, explains that much of the literature tried to test the theory for local and global pollutants wherein local pollutants displayed the inverted-U relationship (Shafik 1994; Lopez 1994; Stern, Common, and Barbier 1996; Seldon and Song 1994). While, for the global pollutants, environmental impact increases with income or has a high turning point with large standard errors (Cole, Rayner, and Bates 1997). Moving further, once the economy crosses the desired level of income per capita, with increased resources, the country then attempts to invest in abatement technology reconfirming the EKC curve and implying “grow first and then clean up.”

At higher levels of development come structural changes in the information-intensive industrial services, environmental awarenesses, increased environmental expenditures, etc. (Dinda 2004).

Since regulation plays an imperative role in reducing emissions, many countries have liberalized economies by lowering subsidies, reducing barriers to trade and investments, privatizing firms, and breaking off the price controls. It is therefore critical to know the relationship between environmental policy regimes and economic development. Dinda (2004) emphasizes in his paper that the availability of public goods is a state concern because people cannot afford abatement technology. This implies that environmental policy is subject to societal preferences and therefore demands environmental protection comes from the local level. It is, however, framed at the national level as it generally happens. Empirical studies, though, have mostly used absolute measures of pollutants to derive this relationship. Additionally, there is some literature that examines the relationship between environmental quality, human development, and economic health. For instance, air pollution considerably leads to health deterioration (Zhao et al. 2016), reduces human capital (Schmidt 2019), and affects quality of life (Porreca 2020). The paper by Porreca claims that a positive relationship exists between carbon emissions and the quality of life in developing countries but disappears once the country has achieved a certain level of economic development.

Similarly, only a handful of research exists on how government expenditures impact the level of environmental quality (Lopez, Galinato, and Islam 2011; Halkos and Paizanos 2013; Galinato and Islam 2017). In the paper by Halkos and Paizanos (2013), government expenditures can have both a direct and indirect impact on the level of pollutants in the economy. The paper examines 77 countries for the period 1970–2008 to analyze the relationship between government size and income on pollution, suggesting the long-term impact of government expenditures on the level of pollutants. The indirect impact of government spending through income implies that reduced government size reduces environmental quality. While, for countries with higher income levels, increases in the government size tend to reduce environmental quality because such countries are at the decreasing end of the EKC and already have an established regulatory framework in place. This means that any further increase in the government size will decrease the marginal utility and witness diminishing returns.

Another study by Galinato and Islam (2017) reveals that a higher government expenditure on public goods raises income and so there are increased consumption and higher pollution levels as

well. However, this is counteracted by strict regulatory measures and hence the pollution levels are kept in check. This is true for democratic nations where higher regulatory measures reduce the levels of pollution considerably.

Adding another perspective to government spending, non-market-based environmental policy instruments showed statistically insignificant results in the study by Badunenko, Galeotti, and Hunt (2021) while the market-based policy instruments have a greater impact. As the environmental policy indicators rise by 1 percent, emissions growth falls by 20 percent. This reaffirms the idea that government spending plays an essential role in improving the environmental quality of the country.

Referencing Dasgupta et al. (2002), a correlation between a productive public policy and economic development appears to exist, but there is considerable variation in the relationship in the way it is studied. In this paper, we shall seek to examine the impact of government spending on the environment in the context of India and to check whether fiscal spending affects the environmental quality. Primarily, we shall also examine the role of transfers in improving the forest cover (proxied for environmental quality).

4. THE DATA AND METHODOLOGY

We use panel regression (fixed or random effect) models for the empirical analysis. The variable of our interest is gross state domestic product and its square term (Table 1). The study has also included other control variables including population and fiscal transfers (Table 2).

Table 1: Description of the Variables

Variables	Description	Source
VDFC	Very dense forest cover	India State of Forest Reports
POPL	Population	Report of the Technical Group on Population Projection by the National Commission on Population)
TRNS	Total transfers (Grants+ share in Taxes)	States Budget Documents
GSDP	Gross State Domestic Product	EPWRPF

Source: Authors' compilation

Table 2: Descriptive Statistics of the Selected Variables

Stat/Variables	VDFC	POPL	TRNS	GSDP	GSDPSQ
Mean	2662.86	4.30e+07	2137247	3.46e+07	3.29e+15
Maximum	21095	2.28e+08	2.25e+07	2.82e+08	7.94e+16
Minimum	2	559000	18814.22	194552	3.79e+10
Std. Dev.	4028.027	4.62e+07	2823369	4.58e+07	8.75e+15
Observations	486	486	486	486	486

Source: Authors' Estimation.

We used the following regression model.

$$F_{it} = \beta_i + \beta_1 G_{it} + \beta_2 T_{it} + \beta_3 P_{it} + \lambda_i + \varepsilon_{it} \quad (4)$$

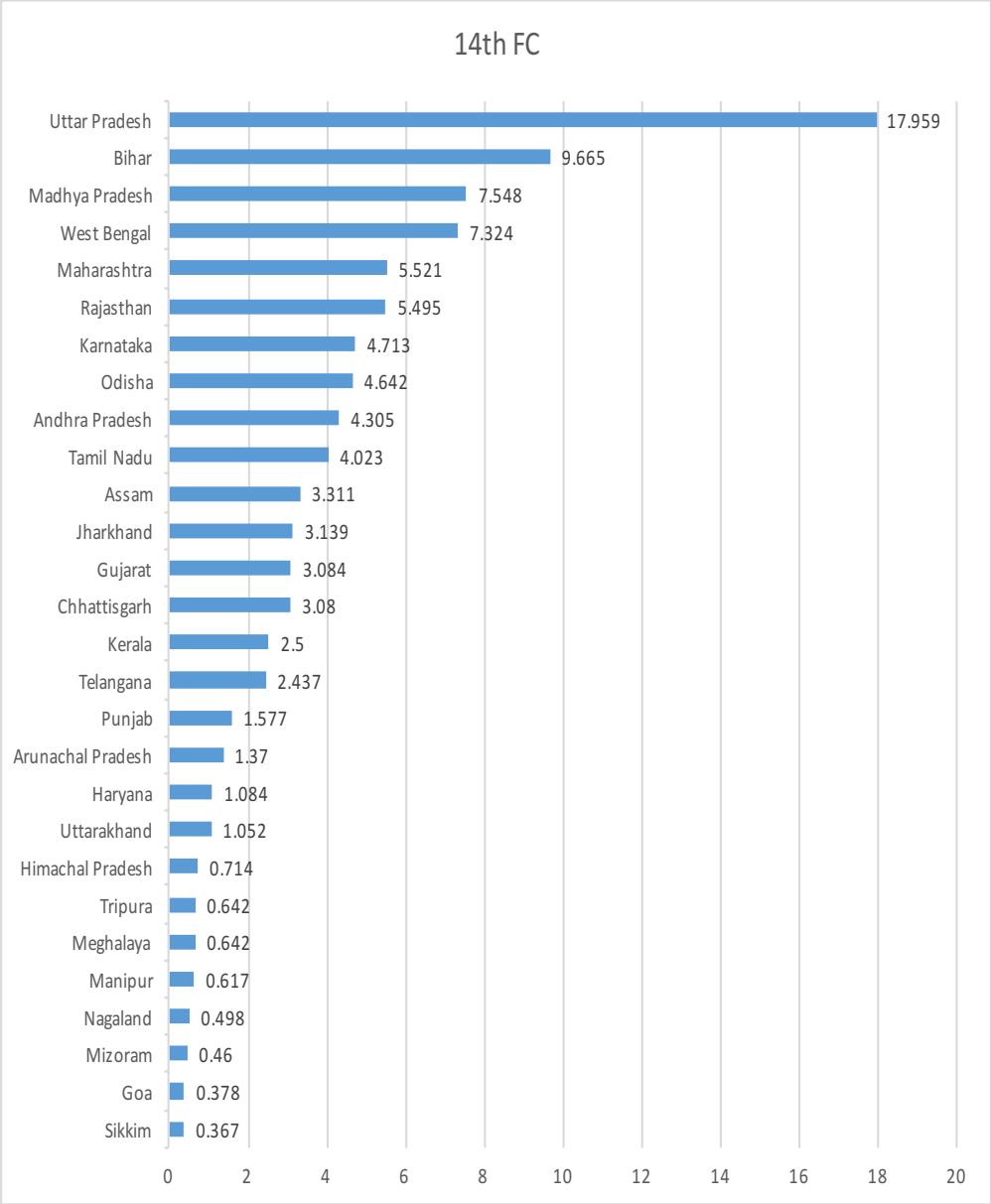
where, *i* represents states and *t* refers to the time period. F_{it} represents very dense forest cover (VDFC), G_{it} relates to Gross State Domestic Product and T_{it} refers to fiscal transfers and P_{it} refers to population. β_i represents intercept or constant. λ_i shows the effects of excluded variables in the model which are invariant overtime. ε_{it} is an error term, often called the idiosyncratic error or time-varying error because it represents unobserved factors that change over time and affect F_{it}.

5. INTERPRETING DATA

Figures 1–3 present the ecological fiscal transfers' share in the Fourteenth Finance Commission (14FC) and the Fifteenth Finance Commission (15FC) to the states in India. The share of devolution is highest for the state of Uttar Pradesh, while the lowest share of devolution is taken by Sikkim in Figure 1 as per the 14FC recommendations. Since the ecology-based criterion was retained by the 15FC as well, the share of devolution to the states is presented in Figure 2 as an interim devolution. Figure 3 represents the final devolution made to the states as per the 14FC recommendations revealed in the 15FC report presented in 2021. These estimates are the final devolution of the states where the lowest share went to Goa and the second lowest to Sikkim.

The point to be noted here is that the consistency of finance commissions in integrating climate change variables in tax devolution has led to an increase in forest cover in India. The bi-variate scatter plots revealed that the link between ecological fiscal-transfer share and the VDFC is positive.[1]

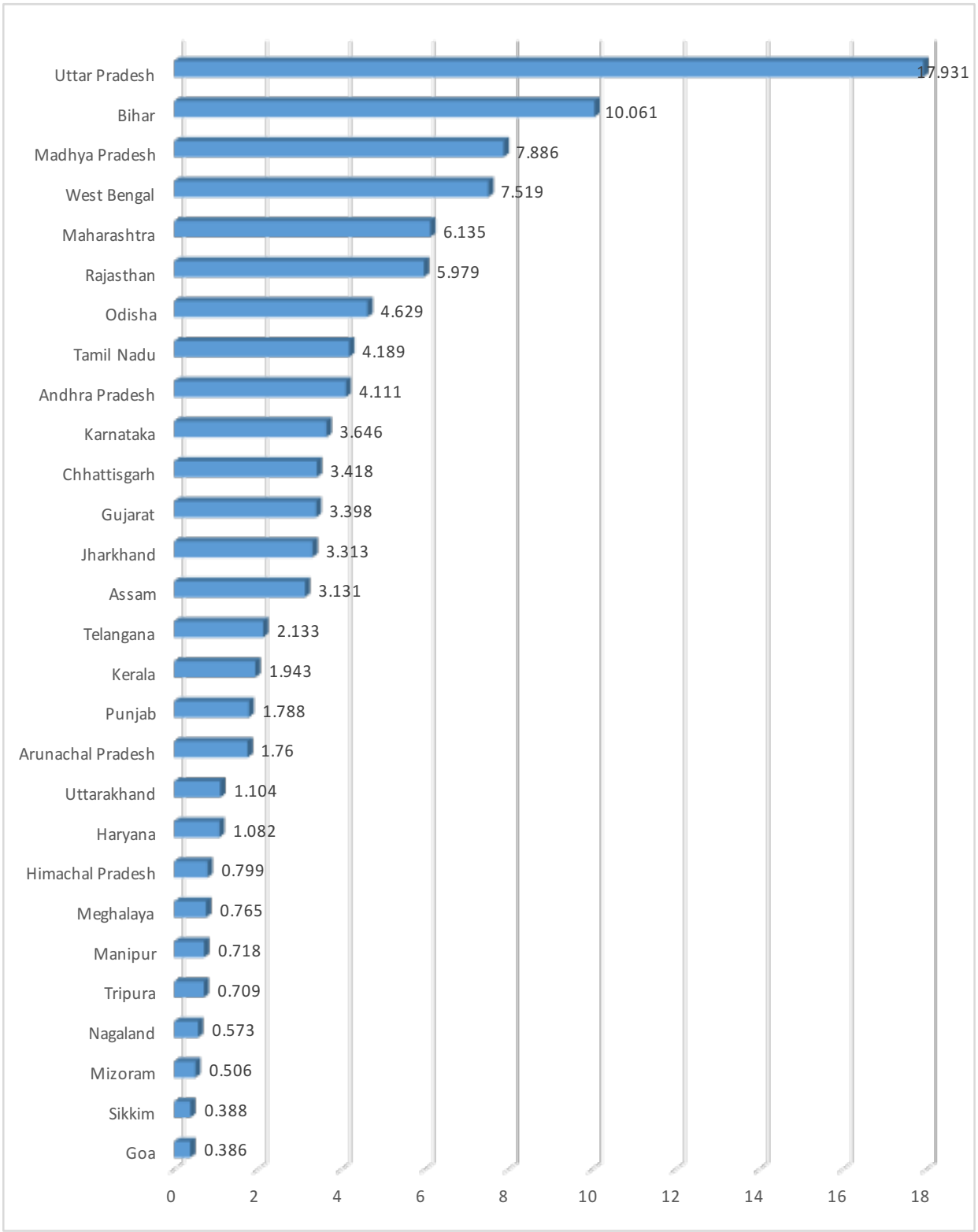
Figure 1: Ecological Fiscal Transfer Share in 14th Finance Commission (in percent)



Source: Finance Commission report, 14th (2014).

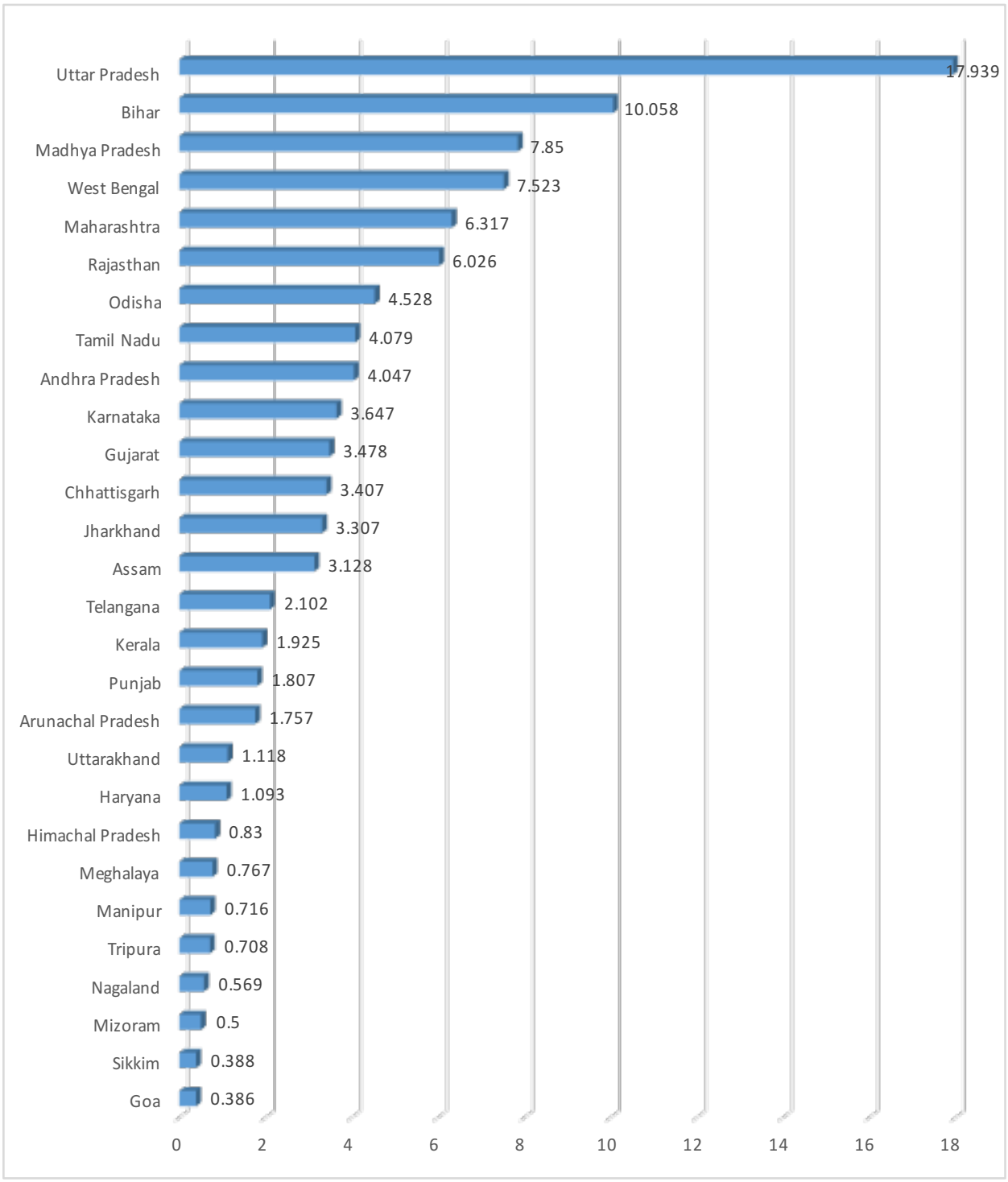
[1] The details of the scatterplot can be made available upon request.

Figure 2: Ecological Fiscal Transfer Share in 15th Finance Commission Interim Devolution (in percent)



Source: Finance Commission Report, 15th (Interim) (2020).

Figure 3: Ecological Fiscal Transfer Share in 14th Finance Commission (in percent)



Source: Finance Commission report, 15th (Final) (2021).

The rationale of the 15FC (both in the interim and final reports) to retain the forest and ecology criterion with weight 10 percent larger was based on their "impact on the revenue disabilities and expenditure needs of States, and also on the huge ecological benefits to the nation and for meeting our international commitments." However, the climate change–related variables are not only the forest-sectoral variables. The future finance commissions may consider other crucial ecological variables based on a composite ecological-fiscal transfer index.

Three questions are crucial here. What is the effect of ecological fiscal transfers on state-level ecological spending? Are there any flypaper effects (i.e., evidence of the impact of intergovernmental transfers) on local spending or own income? Busch, Kapur, and Mukherjee (2020) found that the introduction of EFTs has not yet led states to increase their forestry budgets. Kaur et al. (2021), however, found evidence for the impact of intergovernmental fiscal transfers on ecological budgets more than own income. The existence of flypaper effects in the context of ecological fiscal space is thus reiterated. Having established the evidence for effectiveness of ecological-fiscal transfers on state-level ecological spending decisions, it is inevitable that we examine the degree to which the fiscal transfer is translated into better forest-cover outcome.

6. ECONOMETRIC MODELS AND RESULTS

In order to test the relationship between intergovernmental fiscal transfers (IGFT) and the net forest cover, we used the panel dataset for 27 states in India for the period 2003–20. The states not in the analysis include Telangana and the combined state of Jammu and Kashmir. The reason for dropping Telangana is that the state, formerly part of Andhra Pradesh, became independent in 2014. With the resolution passed to repeal section 370 of the Indian Constitution in August 2019, came the reconstitution of Jammu Kashmir and Ladakh as two separate union territories. This implies reorganization in the resource devolution framework. Therefore, to maintain consistency with the data, these two states were dropped.

In the analysis, the net forest cover is the dependent variable. The independent variables include

the GSDP, GSDPsquared, population, and intergovernmental fiscal total transfers (IGFT). The econometric results are presented in Table 3 below. In the models, we try to examine the relationship between forest cover and total IGFT, controlling for GSDP and population. Primarily, the purpose is to examine whether there is a positive relationship between the forest cover and total fiscal transfers to the state by the union government. Furthermore, we need to determine the existence of an EKC for India. The results revealed that there is a significant positive relationship between IGFT and net forest cover. Taking population as an independent variable, we see there is an inverse and significant relationship between population and net forest cover.

Table 3: Econometric Results

	Model (1)	**Model (2)**
Variables	NFC	NFC
GSDP	.0000164*** (4.52e-06)	.0000164*** (4.52e-06)
GSDP_SQ	-5.64e-14*** (1.57e-14)	-5.71e-14*** (1.57e-14)
Total Transfers	.000115*** (.0000391)	.0000862*** (.0000354)
POP	-.0000154* (8.83e-06)	
Cons	2694.587*** (805.5464)	2097.434*** (772.7207)
No. of Obs.	486	486
No. of Groups	27	27

Source*:* Authors' estimations.

Notes: ***, ** and * denote the significance level at 1 percent, 5 percent and 10 percent respectively. Figures in the bracket denote standard errors

7. CONCLUSIONS

The study explores the fiscal policy imperatives for integrating ecological criteria into the intergovernmental fiscal transfers in India. Measurement issues as well as methodological challenges—related to constructing a composite ecological IGFT index—arise when we try to translate three setting functions of climate change commitments (i.e., international public goods with the plausibility of inter-jurisdictional spill overs and localized public good characteristics) into components of a tax transfer formula." Given that the global public good characteristics are

outside the purview of intergovernmental fiscal transfers, a simple indicator capturing the local ecological public good can be a criterion of tax transfers. From that perspective, the 14FC of India has designed the world's first-ever ecological fiscal transfer and the 15FC has retained the ecological criterion. To keep the ecological criteria simple and practical, the finance commissions have used a single-indicator approach and used only net forest cover as the criterion for tax transfers, along with the other non-ecological variables, including population, area, and income distance. The empirical evidence suggests that the consistency of ecological criteria in intergovernmental fiscal transfers in India has helped to increase the net forest cover. The econometric results revealed a positive and significant relationship between IGFT and net forest cover. This has policy implications for the 16FC of India.

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