

Fiscal Illusion and Wagner's Law: Evidence from Indian Subnational Finances

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Abstract

In recent decades, public spending both at the Union and Subnational Governments in India has been increased by manifold. Often the taxpayers systematically misperceive their tax burden as well as benefits received from the publicly provided public goods and services. This leads to fiscal illusion, i.e., they demand more public goods than they would if they had complete information resulting in a higher public spending than the desired level. The present paper analyses the subnational finances in India in search of evidence of fiscal illusion and flypaper effects as well as the validity of Wagner's law in explaining the increased public spending over the decades. Panel data from 1980-81 to 2019-20 for 20 subnational governments of India were analysed using second-generation panel unit root, and cointegration approaches accounting for the cross-sectional dependence and heterogeneity. The results of the PMG estimation provide evidence for the existence of fiscal illusion induced by intergovernmental transfers and fiscal deficit and a flypaper effect. While the validity of Wagner's law becomes weak when controlled for intergovernmental transfers and fiscal deficit, the degree of publicness of public spending is found to be low at the subnational level in the country. The increased reliance on the transfers has become a norm for many states, especially the north-eastern and hilly states having implications for the own tax collection at the subnational level, and as a result, the fiscal gap has become larger and larger.

Key words: Public Spending; Fiscal Illusion; Flypaper Effects; Wagner's Law; Second-generation Panel Unit Root and Cointegration Approach

JEL Classification: C23; H40; H72; H77

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1. Introduction

Public spending of the union government of India has increased with a CAGR of 13.01% during 1980-81 to 2019-20. At the same time, the per-capita income and population size in the country have grown by only a CAGR of 4.23% and 1.76%, respectively. The scenario was no different at the subnational level. In aggregate, the public spending at the subnational level in the country has grown by 12 times while the per-capita income by only 4 times from 1980-81 to 2019-20.¹ The size of public spending across the subnational governments has grown by multiple times during the same period. Part of the increase in the subnational public spending can be attributed to the federal provision in financing subnational spending in terms of intergovernmental transfers. In Indian fiscal decentralization, vertical fiscal imbalance and intergovernmental transfers are the key features affecting the fiscal behavior of the subnational governments. In the current fiscal decentralization structure in India, the subnational governments have a certain degree of fiscal autonomy² while having excessive spending responsibilities with limited resources creating vertical imbalance. Under the federal system in India, the power of taxes is shared between the union and subnational governments. However, due to unbalanced distribution and the existence of horizontal imbalances in terms of resource mobilization and revenue generation capacity, the intergovernmental transfers from the union to subnational governments were envisaged to address the problem of public deficit to a certain extent. The remaining resource gap is financed through borrowing (MoF, 2021). In 2019-20, the share of intergovernmental transfer (IGT) and fiscal deficit (FD) accounted for about 35% and 17% in the aggregate public spending at the subnational level in the country.

One of the commonly acknowledged explanations for such surge in public spending is the increased size of public activities with an increase in the income level, famously known as Wagner's law (Wagner, 1883).³ Several empirical studies have confirmed the validity of the law in several contexts, including single-country, cross-country, and subnational (Kolluri et al., 2000; Akitoby et al., 2006; Bruckner et al., 2012; Narayan et al., 2012; Kumar & Cao, 2020; Rani & Kumar, 2020; Nayak & Hazarika, nd). Another explanation for the increase in public spending has to do with critical features of public sector financing, especially the "fiscal illusion". It is the systematic misperception of fiscal parameters, in which benefits of government spending are overestimated, whereas contribution to its financing is underestimated. Fiscal illusion is considered positive (negative) if the quantity/benefits of public goods and services are underestimated

¹ Authors' estimation using EPWRF time series data (2022)

² The Goods and Services Tax (GST) have had varied implications for the states' fiscal autonomy depending on factors like proportion of subsumed taxes in their own revenues, growth in taxes during the pre-GST regime, and State's dependence on Union transfers. While a few especially the North-eastern and hilly states appear to be better, other states experienced shortfall in revenue partly because of the move from the origin to destination principle of taxation under GST.

³ In Narayan et al. (2012), Wagner's law is considered public expenditure behaviour, such that "as real income increases, over the long-run, the share of public expenditure relative to national income rises" (p. 1548).

(overestimated) compared to the costs of providing these goods and services (Prado & Silva, 2020).

In literature, two strategies, namely 'debt' and 'intergovernmental transfers' are often used by policymakers to explore the negative sides of fiscal illusion. Fiscal illusion due to debt occurs when the government uses debt to finance public spending, which reduces the perceived tax-price of public goods and services among the voter-taxpayers. Compared to tax, it is complicated to understand public expenditure financed through debt at the level of voter-taxpayers as debt yields only interest component in the short-run. Thus, the real cost of public goods/services provision tends to dilute over time, distorting the perception of actual public spending (Oates, 1988). In this direction, Buchanan and Wagner (1977) commented that an increase in public spending induced by a higher public deficit underestimates the real cost of public provision, and voter-taxpayers demand a higher level of public spending than the desired level. While meeting the increased demand, policymakers aim to maximize their political agenda or/and vested interest without full perception of the voter-taxpayers. Even if there are low growth and low tax revenue, the government is less likely to curtail politically agonizing spending.

Instead, governments heavily rely on borrowing for expanding public spending (Rodden, 2003; Oates, 2005; Weingast, 2009). Thus, fiscal illusion induces a higher level of public spending than the desired level if voter-taxpayers would have complete information of financing public goods and services. Analyzing the data for 26 Brazilian States, Prado and Silva (2020) found substantial evidence of fiscal illusion caused by public deficit and transfers grants from central government with possible flypaper effects. They also asserted that there was a low degree of publicness of expenditure at the subnational level, and less developed Brazilian States were experiencing higher growth in the expenses related to non-public goods. Several other studies also observed fiscal illusion induced by debt in countries such as Australia (Dollery & Worthington, 1995), the UK (Gemmell et al., 1999), and European Union (Dell'Anno & Dollery, 2014; Vitorino, 2016).

While intergovernmental transfers as a financial supplement exogenous to the subnational level reduce the degree of vertical imbalances (Wang, 2014; Morgan & Trinh, 2016), it also regulates the behaviour of the subnational governments through fiscal incentive and accountability mechanisms (Boadway & Shah, 2007; Jia et al., 2020). As the dependence on fiscal transfers becomes a norm, the scale of transfer and the fiscal gap would get larger and larger (Li & Du, 2021). However, large-scale transfer not only fades the fiscal constraints but may also result in moral hazard and distortion of behaviour of subnational governments (Li & Shen, 2010). While the effects of intergovernmental transfers on revenue as well as expenditure are incommensurate, the existence of asymmetry information between government and voter-taxpayers may lead to a "fiscal illusion". It causes the subnational governments to misconceive that the marginal cost of public goods and services financed by intergovernmental transfer is lower than that of financed by own revenue (Dahlby, 2011), resulting in a distortion in the fiscal behaviour in terms of overspending (Turnbull, 1988). In this context, Dell'Anno and Dollery (2014) argue that this misperception occurs persistently, recurrently, and consistently over time leading to an expansionist bias in governments' budgetary exercise. Similarly, Dollery and Worthington (1996) mentioned that financing public spending at the subnational level through intergovernmental transfers induces voter-taxpayers to perceive a lower tax-price of provision of public goods and services leading to overspending.

Additionally, a flypaper effect of transfers may lead the subnational government to expand public expenditure by more than proportionately than its share of own taxes

undermining the tax efforts (Chu & Chi, 2018)⁴. In other words, an increase in fiscal transfers tends to increase public spending more than an equivalent increase in income. Several empirical studies confirmed the existence of flypaper effects at public spending such as in Australian States (Dollery & Worthington, 1995), US states (Abbott & Jones, 2015), Belgian Municipalities (Heyndels, 2001), Brazilian States (Prado & Silva, 2020), and in India (Lalvani, 2002; Kaur et al., 2021). Analyzing the unconditional grants from union to subnational governments, Lalvani (2002) found that both capital and revenue spending received a greater stimulus from grants than an increase in income. Similarly, Kaur et al. (2021) demonstrated a flypaper effect of intergovernmental transfers on the ecological spending at the subnational level. These works lay the foundation for the present paper, which emphasizes in analyzing the fiscal illusion hypothesis focusing on intergovernmental transfers, fiscal deficit, and Wagner's law in the context of Indian subnational governments. Unlike Lalvani (2002) and Kaur et al. (2021), the present study employs advanced panel data techniques accounting for the aspects of cross-sectional heterogeneity and cross-sectional dependence at the subnational level. Recent panel data econometric literature demonstrated that panel-data models are likely to exhibit substantial cross-sectional dependence in the errors. Ignoring such dependence causes a significant loss of estimation efficiency resulting in biased and inconsistent estimates (Phillips & Sul, 2003; De Hoyos & Sarafidis, 2006; Sarafidis & Robertson, 2006). In addition, the present study is much broader in scope as it also considers the north-eastern and hilly states apart from the mainstream Indian states.

Given the vibrant federal structure in the country, there has been a persistent increase in the devolution of resources from the union to the subnational governments in successive Finance Commissions. More importantly, the fact that total subnational expenditures as a percent of GDP are greater than that of the union government, subnational finances have become a crucial lynchpin of India's fiscal framework (MoF, 2021). However, there has been increased fiscal pressure on the subnational governments over the last couple of years. With the slowdown in the economy and promotion of tax reduction policies, revenue has dropped significantly while expenditure has increased substantially. Thus, understanding the aspects of increased public spending focusing on fiscal illusion assumes added importance for policy prescription. With this background, the present paper aims to analyze the subnational public finances in India in search of evidence for fiscal illusion through debt strategy and transfer strategy, the existence of flypaper effects, and validity of Wagner's law.

2. Intergovernmental Transfers and Fiscal Deficit in Subnational Finances

The structural imbalance in the subnational finances twigs from a resource deficiency and cost disabilities in relation to rising spending commitments (Buchanan, 1950, 1960; Rao, 2017). Vertical fiscal imbalance between union and subnational governments arises due to certain inherent advantages that union government enjoys in raising revenue while subnational governments have greater spending responsibilities. In order to offset the fiscal imbalances and ensure horizontal equity and competitive equality at the subnational level, constitutional provisions have been made for intergovernmental transfers. The transfers can be broadly categorized as Finance Commission (FC)

⁴ Flypaper effect goes against the theoretical proposition that grants should affect public spending in a manner that is identical to that of an increase in private disposable income (Bradford & Oates, 1971)

transfers⁵ and other (non-FC) transfers.⁶ Finance Commission (FC) transfers are statutory in nature with no discretion involved, including tax devolution and general-purpose grants. Grants recommended by the FC are determined on the basis of projected gaps between nonplan current spending and post-tax devolution revenue. The Non-FC grants primarily include specific-purpose grants (schematic) directed through the Union Ministries/Departments (MoF, 2021).

Table 1 presents the five-year average of intergovernmental transfers (IGT) and fiscal deficit (FD) as a percentage of the aggregate public spending at the subnational level. The share of IGT has shown a steady increase over the years from 27.27% during 1980-85 to 30.02% during 1991-95. While the share of IGT reduced to 24.20% in between (2001-05), it went further up to 34.60% during 2016-20 with a clear gap between the general category states (GCS) and north-eastern and hilly states (NEHS). The NEHS enjoy favour in terms of IGT given that these states are small-sized, low economic base, have topographical challenges, and incur a high unit cost of providing public services (Rao, 2017). The architecture of the IGT system has been changed after the recommendation of XIV FC, where all the general-purpose transfers are now routed through FC, and all specific-purpose transfers are routed through the concerned Ministries/Departments (MoF, 2015, 2021). Accordingly, there has been a compositional shift from 2011-15 onwards with increased fiscal transfers through the FC route primarily due to discontinuation of assistances such as NCA, SCA, and SPA with the abolition of the Planning Commission.⁷ Also, there has been restructuring in the centrally sponsored and central sector schemes to reduce the support of the union government. Thus, there has been only a marginal increase in the total transfers post-2014-15 despite an substantial increase in the share of the divisible pool of taxes by 10 percentage points by the XIV FC. In other words, the sharp increase in tax devolution resulted in the share of general-purpose transfers rising significantly, but it was offset by reduced specific-purpose transfers (Chakraborty & Gupta, 2016). The increase in tax devolution was merely because of the inclusion of plan grants, which used to be routed through the Planning Commission and a larger fiscal space by giving additional untied funds to the subnational governments (Rao, 2017). Additionally, the marginal increase in IGT during 2016-20 can be traced back to the GST compensation and a hike in the centrally sponsored and central sector schemes (MoF, 2021).

⁵ The Finance Commission transfers are made under Articles 270, 275 and 280 of the Constitution, whereas the non-FC transfers are primarily made under Article 282 of the Constitution, which states that: "The Union or a State may make any grants for any public purpose, notwithstanding the purpose is not one with respect to which Parliament or the Legislature of the State, as the case may be, make laws" (XV FC Report, pp. 89).

⁶ Prior to 2014-15, direct transfers to implementing agencies were not taken as part of State Finance Accounts and were captured only in the Union Government's accounts. However, to get clarity on the structural shifts in the transfer system, it was important to include the direct transfers to implementing agencies in the States as part of the total transfers to the States. The FC-XIV cited three key reasons for this: (a) States were required to make matching contributions; (b) the implementing agencies were manned by subnational government officials and, in some cases, headed by ministers; and (c) the implementing agencies perform quasi-government functions of delivering public services. The Union Government recognised this and has included them in the transfers to Subnational Governments from 2014-15 onwards" (XV FC Report, pp. 89).

⁷ In 2014, Government of India decided to wind down the Planning Commission. It was replaced by the newly formed NITI Aayog to better represent the present needs and aspirations of people of India.

Table 1: Trends in Intergovernmental Transfer and Fiscal Deficit (% Public Spending)

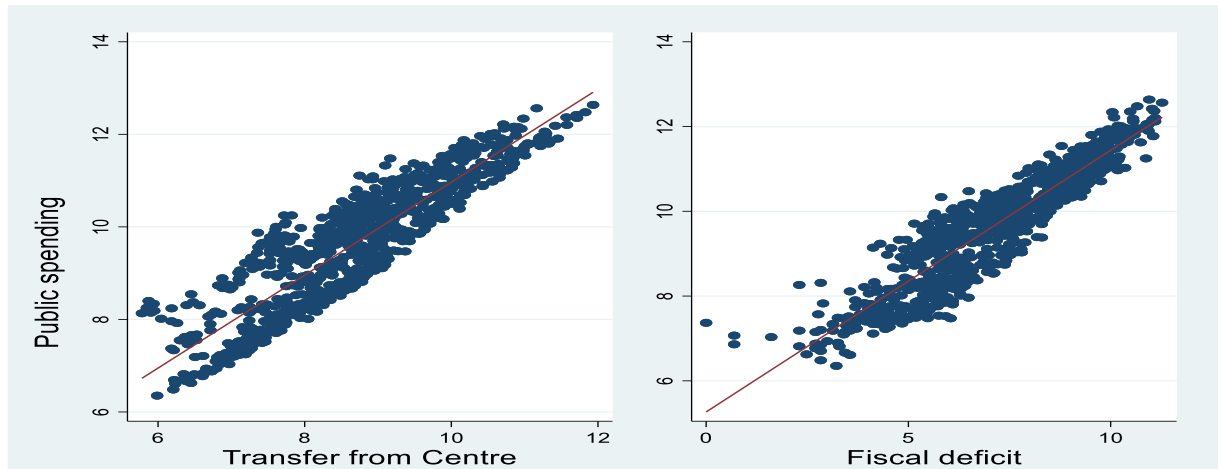
Year	Intergovernmental transfer (% of PS)			Fiscal deficit (% of PS)		
	Full sample	GCS	NEHS	Full sample	GCS	NEHS
1980-85	27.27	25.92	42.94	18.18	17.96	20.74
1986-90	28.91	26.76	53.20	18.44	18.35	19.56
1991-95	30.02	27.35	59.21	17.72	18.21	12.35
1996-00	26.31	23.30	61.72	23.33	24.13	13.82
2001-05	24.20	21.90	53.39	23.64	24.17	16.95
2006-10	31.96	29.54	62.26	14.56	15.13	7.38
2011-15	31.51	29.39	59.50	14.17	14.47	10.21
2016-20	34.60	32.84	58.31	16.68	17.00	12.35

Source: Authors' estimation, 2022

Coming to the aspect of fiscal deficits, Table 1 reveals that the deficits have been high during the 1980s and 1990s. Deficits reached a record high around 23-24% of aggregate expenditure over 1996-2005 despite a steady increase in the fiscal transfers from the union to the subnational governments. After the introduction Fiscal Responsibility and Budget Management (FRBM) Act at the subnational level from 2004 onwards, there have been efforts from the part of the subnational governments to improve their fiscal health in the post-FRBM period. The aggregate fiscal deficit had decreased from 23.64% during 2001-05 to 14.56% during 2006-10 and 14.17% during 2011-15. However, deficits registered a moderate increase (16.68%) during 2016-20, given the sluggishness in the economy and low revenue generation at the subnational level. Post-PRBM, most of the subnational governments have been successful in generating revenue surplus leading to a substantial increase in the capital outlay and a reduced fiscal deficit (Dutta, 2012). While the fiscal rules have been successful in reducing the fiscal imbalance, much of the fiscal consolidation was achieved through a reduction in discretionary development spending leaving growth implications at the subnational level (Chakraborty & Dash, 2017). According to Chakraborty and Dash (2017), the contraction in spending at the subnational governments has been partially offset by higher fiscal transfers, without which the development spending would have contracted by a larger extent in order to comply with the fiscal rule. Thus, it may be observed that a continued increase in the federal transfers might have explained a part of the fiscal consolidation path as compared to their own efforts (Simone & Topalova, 2009; Rao & Srivastava, 2014; Karnik & Lalvani, 2018).

Fig. 1 reveals a significant association of IGT and FD with public spending at the subnational level. With IGT and fiscal deficit comprising approximately 35% and 17% of aggregate public spending, respectively, it is imperative to examine the impact of IGT/FD on subnational spending and check whether there are any fiscal illusions. A test of the flypaper effect would show if IGT exerted a greater stimulatory effect on public spending of subnational government than would an equivalent increase in NSDP. In other words, this study attempts to examine if the flypaper effect could be responsible in some measure for the fiscal profligacy that has been witnessed on the part of subnational governments in India.

Fig. 1: Scatter Diagram of Intergovernmental Transfer and Fiscal Deficit in relation to Public Spending at Indian Subnational Level.



Source: Authors' estimation, 2022

3. Fiscal Illusion: Theoretical Understanding

The understanding of fiscal illusion can be traced way back to Puviani (1903), who analyzed how rulers could use power to promote their political agenda. By doing so, rulers can push the voter-taxpayers' choices in a certain direction (Oates, 1988). In general, fiscal illusion refers to the systematic misperception of fiscal parameters, in which benefits of government spending are overestimated, whereas contribution to its financing is underestimated. As a result, the voter-taxpayers demand public goods and services at a higher level than they would wish, if the cost of provision of these goods and services were fully understood (Buchanan & Wagner, 1977). Illusions are generated by the policymakers in a self-interested way to maintain and increase expenditure to satisfy specific interest lobby without considering the taxpayers' perception (Edelman, 2001; Caplan, 2007). Such behaviour results in spending higher than the desired level. In other words, voter-taxpayers would have considered such level of spending as excessive spending if they have complete information on tax structure and financing public spending.

Following Borchering and Deacon (1972), Bergstrom and Goodman (1973), Gemmel et al. (1999), and Prado and Silva (2020), the present study analyzes the misperception of real contribution for public spending financing on budgetary exercise at the subnational level in India. The demand for goods and services provided at the subnational level can be expressed as a function of individual demand and the size of the population and is given as follows:

$$PS = g_i N^\eta \quad \dots (1)$$

Where PS is the public spending, g_i is the demand for goods and services, N is the population size, and η is the degree of publicness⁸ of the public spending.

⁸ If the degree of publicness equals zero ($\eta = 0$), then public spending (PS) can be considered a pure public good, indicating that overall spending per capita benefits the entire population. On the contrary, if the degree of publicness equals one ($\eta = 1$), then public spending can be seen as a pure private good.

Now consider, the demand for the public goods and services at the individual level to be

$$g_i = ay_i^\alpha p_{g_i}^\beta \quad \dots (2)$$

Where y_i refers to the income of individual voter-taxpayer 'i', p_{g_i} refers to the tax-price paid against in anticipation of receiving public good g_i , and α and β refer to income elasticity and price elasticity, respectively.

In a similar fashion, the tax-price paid for public goods and services can be defined as

$$p_{g_i} = t_i CN^\eta \quad \dots (3)$$

Where t_i reflects the proportion of total tax revenue paid by the individual, which is non-discriminatory ($t_i=T/N$), C is the cost of government in providing public goods and services, and N is the population size.

Replacing eq. (2) and eq. (3) in eq. (1),

$$PS = ay_i^\alpha C^\beta N^{(\beta+1)(\eta-1)+\eta} \quad \dots (4)$$

Replacing $y_i = \frac{Y}{N}$ and cost (C) by relative costs (R_c), eq. (4) becomes

$$\begin{aligned} PS &= aY^\alpha R_c^\beta N^{(\beta+1)(\eta-1)+(\eta-\alpha)} \\ \Rightarrow PS &= aY^\alpha R_c^\beta N^\phi \quad \dots (5) \end{aligned}$$

where

$$\phi = (\beta + 1)(\eta - 1) + (\eta - \alpha)$$

Eq. (5) presents the demand for public goods and services provided by the subnational government. In order to incorporate the fiscal illusion induced misperception of tax-price by assuming perceived tax-price (\widehat{p}_{g_i}) as a function of perception parameter (Π) and a true tax-price, i.e., $\widehat{p}_{g_i} = \Pi p_{g_i}$. The perception parameter can be defined as

$$\Pi = FD^{\pi_1} IGT^{\pi_2} \quad \dots (6)$$

Where FD refers to the fiscal deficit and IGT refers to the intergovernmental transfers received by the subnational governments, which could be used to capture the fiscal illusion related to debt and transfers. Substituting p_{g_i} for \widehat{p}_{g_i} in eq. (2), the demand for public goods and services at the subnational level becomes

$$PS = aY^\alpha FD^{\delta_1} IGT^{\delta_2} R_c^\beta N^\phi \quad \dots (7)$$

Where $\delta_1 = \beta\pi_1$, and $\delta_2 = \beta\pi_2$

Taking natural logarithm, the demand function becomes

$$\ln PS = \ln a + \alpha \ln Y + \delta_1 \ln FD + \delta_2 \ln IGT + \beta \ln R_c + \phi \ln N \quad \dots (8)$$

By assumption, a and α are positive and β is negative. The deficit-induced fiscal illusion can be observed if the coefficient of fiscal deficit appear significant and positive, and intergovernmental transfers induced fiscal illusion can be observed from a positive and statistically significant coefficient of fiscal transfers. Finally, if the coefficient of intergovernmental transfers is statistically higher than the coefficient of NSDP (Y), then there will be evidence of the existence of a flypaper effect. The degree of publicness refers to the extent to which goods and services are public in terms of non-rivalry and non-excludability can be estimated to be

$$\Rightarrow \eta = \frac{\phi - \beta + \alpha + 1}{\beta + 2} \quad \dots (9)$$

Where ϕ is the coefficient of population, β is the coefficient of relative price, and α is the coefficient of subnational income (NSDP).

4. Methodology and Data

The present paper employs the pooled mean group (PMG) put forward by Pesaran et al. (1999) for empirical investigation of the fiscal illusion and Wagner's law as specified in Eq. (8). PMG takes the cointegration form of an autoregressive distributed lag (ARDL) model adapted for a panel data environment. Long-run coefficients and group-specific error correction coefficients are estimated using a likelihood approach. PMG allows short-run coefficients (including intercepts, speed of adjustment to the long-run equilibrium values, and error variances) to be heterogeneous across the subnational units, whereas the long-run coefficients are restricted to be homogeneous across subnational units. The applicability of the PMG estimator is proven when there are often good reasons to expect homogeneity of long run-adjustment across subnational or at least a subset of them (Pesaran et al., 1999). In short-run, however, some subnational-specific characteristics ranging from economic, geographic, climatic factors to institutional and macro-economic policies may have a significant but diverse impact on the income-spending nexus. Pesaran et al. (1999) established that PMG estimators are consistent and asymptotically normal irrespective of whether the variable under consideration is I(0) or I(1) process. The cointegrating variable's response to any deviation from its long-run equilibrium implies an error-correction model as given below.

$$\Delta PS_{i,t} = \phi_i PS_{i,t-1} + \beta_i' x_{it} + \sum_{j=1}^{p-1} \varphi_{i,j}^* \Delta PS_{i,t-1} + \sum_{j=0}^{q-1} \delta_{i,j}^* \Delta x_{i,t-j} + \mu_i + \varepsilon_{it} \quad \dots (10)$$

Where,

$$\begin{aligned} \phi_i &= -\left(1 - \sum_{j=1}^p \varphi_{ij}\right); j=1,2, \dots, (p-1); \\ \beta_i &= \frac{\sum_{j=0}^q \delta_{ij}}{(1 - \sum_k \varphi_{ik})}; j=1,2, \dots, (q-1); \\ \varphi_{i,j}^* &= -\sum_{m=j+1}^p \varphi_{im}; j=1,2, \dots, (p-1); \text{ and} \\ \delta_i^* &= -\sum_{m=j+1}^q \delta_{i,m}; j=1,2, \dots, (q-1). \end{aligned}$$

Here, $PS_{i,t}$ represents the state-level non-financial public spending, x is the set of subnational level variables including NSDP, FD, IGT, Costs, and Relative Costs, and ϕ_i is the error-correcting speed of adjustment term. If $\phi_i = 0$, then there would not be any evidence of the existence of the long-run relationship between these two variables. ϕ_i is expected to be negative and significant, implying a return to the long-run equilibrium. The parameter β_i reflects the long-run effect of explanatory variables on the non-financial expenditure of the subnational governments. The parameter $\varphi_{i,j}^*$ captures the short-run relationship and δ_i^* are scalars. μ_i represents fixed effects, and ε_{it} is the random error term.

Following the literature, a set of variables were considered in the present study in real terms, and all are in natural logs:

- a) Public spending (PS): Proxied by the "non-financial spending" which refers to the public spending necessary to finance public goods and services excluding the financial expenses such as interest payment and debt servicing cost;

- b) NSDP (Y): The net state domestic product to reflect the local income at the subnational government to assess the validity of the Wagner's law
- c) Fiscal deficit (FD): Fiscal deficit of the subnational government as a proxy to capture the fiscal illusion induced by debt
- d) Intergovernmental transfers (IGT): It refers to the intergovernmental transfers received from the union government, which include the share in central taxes and grants as a proxy to capture the fiscal illusion induced by intergovernmental transfer
- e) Costs (C): Costs of subnational government in providing the public goods and services proxied by administrative costs to capture the price elasticity of demand
- f) Relative Cost (R_c): the relative price of providing the public goods and services proxied by administrative costs adjusted for state-level deflators to capture the relative price elasticity of demand
- g) Population (N): the size of the population at the subnational level

The data being used in this study were obtained from the EPWRF time series that provides time-series data facilitating research across various sectors of the Indian economy.⁹ Annual data for the period from 1980-81 to 2019-20 had been used for the 20 Indian subnational governments. For the last three years, i.e., 2017-18, 2018-19, and 2019-20, data published by the Reserve Bank of India was used for both the NSDP and public spending.¹⁰ Similarly, population data for 2019-20 was updated from Census Projection. The states are categorized into the General Category States (GCS) and North-Eastern and Hilly States (NEHS). This is because the two categories of states receive differential treatments for the group of states when it comes to receiving grants from the union government. While the core of core schemes are 100% financed by union government, the sharing pattern for the core schemes between subnational and union would be in the ratio of 90:10 for NEHS and 60:40 for GCS. For optional schemes, the sharing pattern would be 80:20 for NEHS and 50:50 for GCS. Moreover, the government size and NSDP of the NEHS highly depend on the transfers received from the union government.

Four states, namely Chhattisgarh, Jharkhand, Uttarakhand, and Telangana, were part of Madhya Pradesh, Bihar, Uttar Pradesh, and Andhra Pradesh, respectively, during the 80s, 90s, and 20s. So, these were combined to their original states for the purpose of consistency in analysis. In addition, four North Eastern States, namely Arunachal Pradesh, Mizoram, Nagaland, and Sikkim, were excluded from the current analysis due to discrepancies in their NSDP and public expenditure data. Goa was also excluded given its small size of economy among the GCS. A total of 7 versions of the PMG specifications were considered from a specification including only NSDP to a complete model considering fiscal illusion effects and relative cost elasticities for the full sample of 20 subnational governments. One model, each with complete specification were also estimated separately for GCS and NEHS to assess the relative position of the fiscal illusion across groups of subnational governments.

⁹ <https://epwrfits.in/index.aspx>

¹⁰ NSDP data are not available for 2020-21 for all the state. Moreover, 2020-21 was an abnormal year given the unprecedented Covid19 pandemic. Therefore, we have excluded 2020-21 from the current analysis.

4.1. Cross-sectional dependence

Prior to the estimation of Eq. (7), it is important to test whether there exists a long-run relationship between real per capita public expenditure and real per capita NSDP. In doing so, the first step is to examine the existence of cross-sectional dependence in panel data, i.e., whether cross-sectional units (subnational governments) are independent of each other or not. Such cross-sectional dependence may arise as a result of the presence of common shocks and unobserved components that ultimately become part of the error term, spatial dependence, and idiosyncratic pair-wise dependence in the disturbances with no particular pattern of common components or spatial dependence (Pesaran, 2004; Eberhardt & Teal, 2011; Baltagi, 2021). As a result, the standard panel unit root and cointegration tests (referred as the first-generation panel unit root and cointegration tests) produce biased and inconsistent estimates in the presence of cross-sectional dependence (Phillips & Sul, 2003; De Hoyos & Sarafidis, 2006). According to Phillips and Sul (2003), if there is sufficient cross-sectional dependence in the data and estimates produced, ignoring cross-sectional dependence results in a significant loss of estimation efficiency. Hence, the pooled (panel) least-squares estimator may provide little gain over the single-equation ordinary least squares. Ignoring dependence and applying tests belonging to first-generation panel unit root to a data series with cross-sectional dependence results in size distortions and low power, i.e., there would be an increased probability of rejecting the true hypothesis (O’Connell, 1998). Thus, it is imperative to check such cross-sectional dependence and account for the same while exercising a panel analysis if it exists.

To identify whether there exists any cross-sectional dependence in the data used, the present study follows the test of error cross-section dependence (CSD) proposed by Pesaran (2004). The CSD test is based on an average of pair-wise correlation coefficients of OLS residuals from the individual regression in the panel. The CSD test statistics is given as follows:

$$CSD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=1}^N \widehat{\rho}_{ij} \right) \dots (11)$$

Where $\widehat{\rho}_{ij}$ is the sample estimate of the pair-wise correlation of the residuals of state ‘i’ with state ‘j’. A higher correlation coefficient reflects a stronger cross-sectional dependence among the residuals.

4.2. Second-generation panel unit root test

To ascertain the panel integrational properties of data series to be used in the estimation model, the cross-sectionally augmented IPS (CIPS) test, as suggested by Pesaran (2007) is employed for testing unit root in the presence of cross-sectional dependence. The CIPS test takes into account the cross-sectional dependence based on the existence of one single common factor that exists across the states affecting the public spending and NSDP. The common factor is proxied by the cross-sectional mean values of Y_{it} and its lagged values as well as the first difference of the variable. It is based on the unit root hypothesis on the t-ratio of the OLS estimate of b_i in the cross-sectionally augmented Dicky-Fuller (CADF) regression:

$$\Delta y_{it} = a_i + b_i y_{i,t-1} + c_i y_{t-1} + d_i \Delta y_t + e_{it} \dots (12)$$

Where y_{t-1} is the cross-sectional means of lagged values, Δy_t is the cross-sectional mean of the first difference of y_{it} . After running the CADF regression for each unit ‘i’ in the

panel, Pesaron's method averages the t-statistics on the lagged value ($CADF_i$) to obtain the CIPS statistics as given below:

$$CIPS(N, T) = \frac{1}{N} \sum_{i=1}^N CADF_i(N, T) \quad \dots (13)$$

The joint asymptotic limit of the CIPS statistic is nonstandard, and the critical values are given for different levels of N and T.

4.3. Testing for cointegration

If the variables under consideration ascertain a panel unit root, the next challenge is to examine whether these variables are panel co-integrated. Given that the variables under consideration are stationary either at level $I(0)$ or at first difference $I(1)$, one may proceed to exercise panel cointegration to test whether there is any cointegrating relationship between public spending and the variable under consideration such NSDP at the subnational level. The present study employs panel cointegration test as proposed by Pedroni (2004) that accounts for the unobserved factors. The seven test statistics allow heterogeneity in the panel, both in the short-run dynamics as well as in the long-run slope and intercept coefficients. The test provides seven test-statistics namely "panel v-statistic", "panel Phillips-Perron type rho statistic", "group Phillips-Perron type rho statistic", "panel Phillips-Perron type t-statistic", "group Phillips-Perron type t-statistic", "panel ADF type t-statistic", and "group ADF type t-statistic" ensuring the robustness of the evidence on panel cointegration. Pedroni (2004) test statistics could be classified into two categories: within dimension (panel tests) and between dimension (group tests). The "within dimension" tests take into account the common time factors and allow heterogeneity across cross-sections. The "between dimensions" tests allow for heterogeneity of parameters across cross-sections. Moreover, the test can include common time dummies applied by using time demeaning of data for each cross-section and variables to address simple cross-sectional dependency as given below:

$$\bar{y}_t = \frac{1}{N} \sum_i^N y_{i,t} \quad \dots (14)$$

The Pedroni test statistics are residual-based tests with residuals collected from following regressions:

$$y_{i,t} = \alpha_i + \beta_{1i}x_{1it} + \beta_{2i}x_{2it} + \dots + \beta_{mit}x_{mit} + e_{it} \quad \dots (15)$$

$$\Delta y_{it} = \sum_{m=1}^M \beta_{mi} \Delta x_{mi} + \eta_{it} \quad \dots (16)$$

$$\hat{e}_{it} = \hat{\gamma}_i \hat{e}_{it-1} + \hat{\mu}_{it} \quad \dots (17)$$

$$\hat{e}_{it} = \hat{\gamma}_i \hat{e}_{it-1} + \sum_{k=1}^K \hat{\gamma}_{ik} \Delta \hat{e}_{it-k} + \hat{\mu}_{it}^* \quad \dots (18)$$

Where i represents the states in the panel, t is the time period, m is vector of regressors, and k represents the lags in the ADF Regression.

5. Results and Discussions

Table 2 presents the results of CSD test for the full sample, the sub-sample includes general category states (GCS), and another sub-sample that includes north-east and hilly states (NEHS). The estimation reveals that there exists a high degree of cross-sectional dependence in the panels considered in the present study. Therefore, employing the first-generation unit root and cointegration tests ignoring the cross-sectional dependence would result biased and inconsistent estimates.

Table 2: Pesaran (2004) Test to Detect the Presence of Cross-sectional Dependence

Model	Full Sample (20)	GCS (14)	NEHS (6)
1	13.695***	5.619***	2.459**
2	26.064***	15.922***	1.054
3	16.132***	13.344***	0.364
4	8.537***	7.807***	5.798***
5	8.070***	6.522***	4.194***
6	8.669***	6.454***	3.757***
7	7.738***	5.764***	4.321***

Notes: Null hypothesis: Pesaran's test statistics is of cross-sectional independence. *, **, and *** denote significance level at 10%, 5% and 1%, respectively.

Source: Authors' estimation, 2022

Table 3: Second Generation Unit Root Test (Pesaran, 2007)

Variables (in log)	CIPS					
	Full Sample (20)		GCS (14)		NEHS (6)	
	C	C&T	C	C&T	C	C&T
Public spending	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
NSDP	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
Population	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
Fiscal deficit	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
Intergovernmental transfers	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Administrative cost	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
Relative cost	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)

Notes: (1) I(0) indicates stationary at level, and I(1) indicates stationary at first difference at significance level of 5% error; (2) C refers constant and C&T refer constant and trend.

Source: Authors' computation

Given the presence of cross-sectional dependence in data across the States and balanced panel, the presence of unit root for the log of variables (public spending, NSDP, population, fiscal deficit, transfer revenue, administrative cost, and relative cost) considered is evaluated accounting for such dependence using second-generation unit root tests. This test is carried out for all three panels at the level and for the first difference in both the versions with constant and constant including trend. Results of the second-generation test reveal that two variables namely population and transfer revenue are stationary at first difference i.e., integrated of I(1) while the others are integrated of I(0).

The test reject the presence of unit-root process for the population across all three panels and for the transfer revenue in case of NEHS with constant including trend (Table 3).

To test if there is a linear combination of public spending and the regressors across three panels, panel cointegration tests for both versions of constant and constant, including trend. Table 4 reports panel cointegration test statistics of both within and between dimensions. Among these two dimensions, out of seven test statistics, in most cases, the null hypothesis of no cointegration is rejected. So, the evidence suggests a long-run equilibrium relationship between public spending and listed regressors.

Table 4: Pedroni Cointegration Tests

Test Statistics	Full Sample (20)		GCS (14)		NEHS (6)	
	C	C&T	C	C&T	C	C&T
<i>Within-dimension</i>						
Panel ν	0.5974	-1.097	0.1664	-1.341	0.3086	-0.593
Panel ρ	-3.881***	-2.859***	-3.013***	-1.93**	-3.345***	-2.795***
Panel PP	-11.18***	-11.72***	-8.683***	-8.679***	-9.119***	-10.29***
Panel ADF	-9.466***	-10.05***	-6.648***	-7.613***	-6.929***	-8.027***
<i>Between-dimension</i>						
Group ρ	-2.926***	-1.612*	-2.146**	-0.9598	-3.036***	-2.186**
Group PP	-12.42***	-12.9***	-9.537***	-9.241***	-11.81***	-12.09***
Group ADF	-10.16***	-10.14***	-6.848***	-7.846***	-8.018***	-8.203***

Notes: (1) Pedroni cointegration tests null hypothesis: no-cointegration; (2) ***, **, and * means rejection of the null respectively, at 1%, 5% and 10% level of significance; (3) see Pedroni (1999) for a detailed explanation on specifications and critical values of test statistics; (4) variables are in logs: public spending (PS), income as NSDP (Y), population (N), fiscal deficit (FD), intergovernmental transfer (IGT), costs related to providing public goods and services (C), and relative costs (Rc) in terms of relative prices. (5) C refers constant and C&T refer constant and trend.

Source: Authors' computation

Table 5 reports the PMG long-run coefficients for 9 models. The specification in the first model to check the validity of Wagner's law at the Indian sub-national, in which public spending (PS) depends only on NSDP (Y). The income elasticity is found to be greater than unity (1.087), implying the validity of Wagner's law in the context of Indian subnational. In other words, a percentage point growth in income leads to a more than proportionate growth in subnational governments' public spending. This can be seen as the first evidence in favour of Wagner's law. When controlled for population (N) in Model 2, the income elasticity is found to be close to unity, implying a long-run relationship between NSDP and public spending ceteris paribus.

In Model 3, fiscal deficit (FD) is added to test if indebtedness proxied by fiscal deficit (FD) leads to fiscal illusion in the Indian subnational. The income elasticity is positive (0.697) and significant at 1% level. The long-run elasticity related to the fiscal deficit is positive (0.119) and significant, indicates when state spending is funded through fiscal borrowing, the taxpayers underestimate the cost of providing public goods and demand more public spending.

Table 5: PMG: Long-Run Coefficients (Dependent Variable: Public Spending)

Variables (in logs)	Model 1 Coeff.	Model 2 Coeff.	Model 3 Coeff.	Model 4 Coeff.	Model 5 Coeff.	Model 6 Coeff.	Model 7 Coeff.	Model 8 Coeff.	Model 9 Coeff.
NSDP (Y)	1.087***	0.910***	0.697***	0.517***	0.374***	0.260***	0.381***	0.561***	0.265***
Population (N)		0.570***	1.269***	0.358***	0.366***	0.240***	0.350***	-0.336**	0.315**
Fiscal deficit (FD)			0.119***		0.150***	0.123***	0.157***	0.162***	0.375***
Intergovernmental transfers (IGT)				0.412***	0.512***	0.429***	0.507***	0.359***	0.636***
Costs (C)						0.248***			
Relative costs (Rc)							0.002	0.025	-0.003
ECM (-1)	-0.286***	-0.362***	-0.299***	-0.477***	-0.403***	-0.429***	-0.391***	-0.369***	-0.688***
Publicness degree (η)	1.044	1.240	1.483	0.937	0.870	0.750	0.866	0.617	0.789
Wald Test ($\alpha=\delta_2$)				2.13	3.89**	6.93***	3.02*	3.29*	22.27***

Note: (1) Model 1 to 7 for full sample States, Model 8 for General category States (GCS) and Model 9 for Northeast and Hilly States (NEHS); (2) ***, **, and * means rejection of the null respectively, at 1%, 5% and 10% level of significance; (3) optimal lag structures of all estimates used in were selected via Akaike Information Criterion (AIC).

Source: Authors' estimation

Model 4 switches another variable related to intergovernmental transfer (IGT) as a combination of share in Central tax and grants from Union to subnational governments. The elasticity (0.411) is positive and significant, indicating a 1% growth in transfers revenue leads to a 0.41% increase in public spending (PS), implying the presence of fiscal illusion induced by the IGT. As for the long-run coefficient of NSDP (Y) is positive (0.517) and significant but lower compared to earlier models. The estimated elasticities from Model 5 reveal that inter-governmental transfer induced fiscal illusion with flypaper effect in Indian subnational context.

Model 6 considers administrative costs (C) of subnational governments required for providing public goods and services. All the coefficients are significant, and the IGT elasticity is statistically higher than that of income fiscal illusion with flypaper effects while weak validity of Wagner's law. The estimated parameter for the administrative cost (C) is statistically significant but with the opposite expected sign. A possible explanation for this opposite sign, as discussed in Prado and da Silva (2020), could be because the estimation is capturing effects of public sector wage increases on spending rather than impact on demand. It implies that there is a need to include the administrative cost in relative terms, as the relative prices matter the most in an agent's consumption behaviour.

Model 7 is considered to be the final model that includes relative costs (Rc) along with the other variables considered in the present study. All coefficients are statistically significant except the relative cost (Rc). The results reveal higher fiscal illusion effects induced by debt as well as IGT and a weak validity of Wagner's law. One percent increase in fiscal deficit (FD) and one percent increase in intergovernmental transfer (IGT) lead to an increase in public expenditure of 0.157% and 0.507%, respectively. The income elasticity reveals that public spending at the subnational level increases less than proportional in relation to income. The income elasticity is statistically lower than the IGT elasticity, indicating flypaper effects at Indian subnational governments. Further, fiscal illusion and flypaper are examined separately for the panels of GCS and NEHS in Model 8 and 9, respectively. All coefficients are significant except the relative cost, and indicate fiscal illusion induced by both IGT and FD while a weak validity of Wagner's law. Thus, the impact of fiscal illusion is likely to be more obvious the more subnational governments rely on IGT and FD. However, IGT elasticity is lower than the income elasticity in Model 8, asserting no evidence of Flypaper effects in the panel of general category states. In contrast, Model 9 provides evidence of flypaper effects induced by IGT in the case of North-eastern and Hilly states.

Table 6: Inferences from the PMG Results of Best Fit Models

Evidence of	Criteria based on estimated coefficients	Models from Table 5	Remarks
Wagner's law	Income elasticity < 1	7,8,9	Weak validity
<i>Fiscal illusion</i>			
Debt illusion	Positive and significant	7, 8, 9	Valid
Transfer illusion	Positive and significant	7, 8, 9	Valid
	$\delta_2 > \alpha$, and significant Wald stat.	7, 9	Holds in case of full sample and NEHS
Flypaper effects	$\delta_2 < \alpha$, and significant Wald stat.	8	Does not hold in case of GCS
Degree of publicness	Closer to 1	7, 8, 9	Evidence of low publicness
Error correction	Negative, less than one, and significant	7, 8, 9	Short-run shock adjusted to long-run equilibrium at the speed of 39%, 37%, and 69% correction in the first year respectively for full sample, GCS and NEHS.

Note: Inferred from Table 5

Source: Authors' compilation

Finally, the estimated models point out the following findings (Table 6): (a) Strong validity of Wagner’s law in the Indian subnational context. However, the long-run relationship between NSDP and public spending at subnational governments becomes weak when controlled for the intergovernmental transfer revenues and fiscal deficit account across all three studied panels (full sample, GCS and NEHS); (b) presence of strong fiscal illusion effects in case of all panels induced by intergovernmental transfer and fiscal deficit; (c) Flypaper effect of intergovernmental transfers holds in case of full sample and NEHS; (d) low degree of publicness (η is closer to one) indicating a low participation of public goods and services in subnational governments; (e) long-run equilibrium occur at the speed of correction 39% for full sample where the speed of adjustment in NEHS (69%) is much higher as compared to GCS (37%).

Table 7 reports the results of standard Granger causality regressions developed by Dumitrescu and Hurlin (2012) that reveal which variables Granger-cause public spending (PS). In this case, when considered the unidirectional causes from variables to public spending, the results indicate all the variables except fiscal deficit (FD) reject the null hypothesis of non-causality, confirming the existence of fiscal illusion over the public spending of Indian sub-national States.

Table 7: Causality Tests to Public Spending

Variables (in natural logs)	Full Sample (20)		GCS (14)		NEHS (6)	
	\bar{Z}	\tilde{Z}	\bar{Z}	\tilde{Z}	\bar{Z}	\tilde{Z}
NSDP (Y)	↔	↔	↔	↔	↔	↔
Population (N)	↔	↔	↔	↔	→	→
Fiscal deficit (FD)	←	←	←	←	←	←
Intergovernmental transfers (IGT)	↔	↔	↔	↔	↔	↔
Cost (C)	↔	↔	↔	↔	↔	↔
Relative cost (Rc)	→	→	→	→	→	→

Note: (1) H0: variable does not Granger-cause public expenditure; (2). Z-bar (\bar{Z}) and Z-bar tilde (\tilde{Z}) statistics are the standardized version of Wald-statistic (\bar{W}). (3) Causality test results are significant at 5% level of significance; (4). → indicates unidirectional cause from variable to public expenditure, ← indicates unidirectional cause from public expenditure to variable. and ↔ indicates bi-directional causality between variable and public expenditure.

Source: Authors' computation.

For robustness of the results, an alternative specification of Model 7 was estimated. Table 8 reports PMG results for the full sample, GCS and NEHS panels by modifying two things in regressor: (1) variable population (N) is replaced with population density (Dn); and (2) by adding a new variable as interest payment and debt servicing cost (Idc). The statistically significant estimated coefficients are in-line with the long-run PMG results, as shown in Table 6. Thus, based on the estimation of different variable specifications, the results obtained point to a robust indication of weak validity of Wagner’s law, having fiscal illusion and flypaper effects influencing the growth of public spending in the Indian subnational governments. This finding also associates the low publicness in the participation of public goods and services in a scenario of low welfare return of public expenditure.

Table 8: Robustness Check: PMG Coefficients

Variables	Full sample	GCS	NEHS
NSDP (Y)	0.392***	0.549***	0.267***
Population density (Dn)	0.399***	-0.292*	0.232
Fiscal deficit (FD)	0.180***	0.176***	0.336***
Intergovernmental transfers (IGT)	0.522***	0.377***	0.639***
Relative costs (Rc)	-0.007	0.030	-0.011
Interest payment and debt servicing cost (Idc)	-0.005	-0.045**	0.050*
ECM (-1)	-0.381***	-0.385***	-0.670***
Publicness degree (η)	0.895	0.634	0.748
Wald Test ($\alpha=\delta_2$)	3.14*	2.82*	20.08***

Note: (1) ***, **, and * means rejection of the null respectively, at 1%, 5% and 10% level of significance; (2) optimal lag structures of all estimates used in were selected via Akaike Information Criterion (AIC).

Source: Authors' estimation

6. Conclusions

In recent decades, the public spending at union and subnational governments in India have increased manifold. Literature provides two prominent explanations for such expansion of public spending: Wagner's law and fiscal illusion. While Wagner's law appears from the long-run relationship between public spending and income, fiscal illusion occurs when voter-taxpayers underestimate the real cost of public provision demanding higher public spending. Additionally, a flypaper effect may appear when the subnational government spending responds more to a change in intergovernmental transfers than domestic product at the subnational level. The present paper examines whether there are any evidence on these explanations in the Indian subnational context using data from 20 subnational governments for the period 1980-81 to 2019-20. Given the presence of cross-sectional dependence and heterogeneity, the present paper employs second-generation panel unit root and cointegration tests. The results of the PMG estimation provide evidence for the existence of fiscal illusion induced by intergovernmental transfers and fiscal deficit and a flypaper effect. While the validity of Wagner's law becomes weak when controlled for intergovernmental transfers and fiscal deficit, the degree of publicness of public spending is found to be low at the subnational level in the country.

These findings have important policy perspectives given the increased share of intergovernmental transfers in subnational budgetary exercise in India. As these transfers lead to fiscal illusion, the voter-taxpayers tend to underestimate the true cost of public provisioning of goods and services. Similarly, the voter-taxpayers also fail to internalize the future costs of borrowing (for financing fiscal deficit). Altogether, these illusions lead to subnational spending higher than the desired level. The NEHS, which depends mostly on intergovernmental transfers, are stuck in a public spending growth mechanism, which is difficult to escape. The increased reliance on the transfers has become a norm for many subnational governments having implications for the tax collection at the subnational level, and as a result, the fiscal gap has become larger and larger. More importantly, the low degree of publicness indicates growth in subnational spending occurs primarily in the non-public goods and services spending benefiting mostly the interest groups. There is a need to rationalize public spending to make a difference in providing public goods and services.

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