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ADB Economics Working Paper Series



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ABSTRACT

This paper examines the relationship between federal transfers and fiscal deficits in India. The system of federal transfers has been criticized on the grounds that it distorts the incentives for states to promote fiscal discipline. We analyze the relationship between transfers, state domestic product, and fiscal deficit for a panel of states during the period 1990–2010. The paper finds a positive long-run relationship and bi-directional causality between primary/gross fiscal deficits and non-plan transfers. Further, a negative long-run relationship and one-way causality between state domestic product and transfers is observed, with causality going from state product to transfers. These results are confirmed by multi-variate cointegration analysis, which finds a long-run relationship between fiscal transfers, state product per capita and the primary deficit of the states. The evidence in the paper is consistent with the system of fiscal transfers being “gap-filling.”

Keywords: federal transfers, India, public finance, panel cointegration, panel ECM.

JEL Classification: H77, R23, C33

I. INTRODUCTION

Intergovernmental fiscal transfers typically serve a number of different objectives, ranging from dealing with both vertical and horizontal fiscal imbalances to influencing regional and local economic stabilization (Boadway and Shah 2007). The role of fiscal transfers becomes even more relevant in an economy with such large regional inequalities and significant divergences in economic performance as are experienced in India. The main policy challenge for the federal transfer system in India is to evaluate the economic situation of all the regions periodically and to devise mechanisms and criteria such that fiscal transfers can contribute to reducing regional gaps.

An essential component of the design of fiscal transfers is the requirement that they do not generate incentives for the local governments to adopt a loose fiscal stance, in the belief that the central government will have to intervene *ex post* in order to fund their fiscal deficits. Such an accommodative policy would reward opportunistic behavior, and would discourage the enforcement of fiscal discipline by local governments. The resulting soft budgeted constraint could also have the consequence of contributing to the persistence of regional inequalities, to the extent that the transfers from the central government might be used to fund non-productive expenditures at the local level.

The extant literature has identified a number of causes for concern with the current Indian federal transfers system. Rao (2000, 2005) forcefully argued that it is necessary to bring both more rationality and more equity to the assignment system. A serious issue is the moral hazard associated with the fiscal transfer system from the Centre to the states, which often results in soft budget constraints and a looser fiscal discipline. George (2010) pointed out that the process of liberalization that took place in India since the early 1990s has created new challenges to the federal system, in that it required a larger role for the states compared to the central government. The Thirteenth Finance Commission (THFC), whose report covers the period 2010–2015, does recognize the need for enhanced devolution, and makes a number of recommendations based on state fiscal capacity which could lead to a greater degree of state autonomy when fully implemented (THFC 2010, Chakraborty 2010).

This paper undertakes an empirical quantitative investigation of the system of federal transfers in India. We examine the complex relationships between federal fiscal transfers from the central government, both planned and non-planned, and both state fiscal deficits and state domestic product per capita. It is thus possible to evaluate the extent to which the current system has been able to address its main objective of addressing inequalities across states, and the extent to which it has simply accommodated fiscal imbalances.

The paper makes use of a data set on Centre–state transfers and state fiscal deficits over the period 1990–2010. It evaluates empirically whether there is evidence in the data with respect to one of the main causes for concern, i.e., the “gap-filling” nature of federal transfers. The paper tests for the existence of a long-run relationship, for the direction of causality and for the nature of the relationships of transfers with state domestic product and with deficit respectively. The existence of a bi-directional causality between transfers and deficit, along with the existence of a strong co-integration relationship, would lend support a “gap-filling” role for the transfer system. Further, if there exists a co-integration relationship between transfers and net state domestic product (NSDP) per capita, with unidirectional causality from the side of NSDP to transfers, this would imply that poorer states with higher transfers do not move up in the NSDP ranking over the years. A “gap-filling” approach could thus contribute to preventing

the Indian transfer system from achieving one of its main objectives, i.e., the closing of regional gaps between poorer and richer states.

We also check for the robustness of our results by investigating the co-integration between the variables over the longer period 1981–2010. Unfortunately it is not possible to separate plan and non-plan transfers over the longer sample period, so we consider total transfers in these analyses. The main results are reinforced, and confirm the existence of a long-run relationship between state domestic product, deficits and transfers.

The next sections of the paper are organized as follows. Section II presents a brief discussion of regional inequalities and Centre–state relations in India. Section III illustrates the determinants of plan and non-plan transfers. Section IV describes the dataset and outlines the empirical framework and the estimation equations. Section V presents the results of the empirical analysis while Section VI discusses the main conclusions.

II. REGIONAL INEQUALITIES AND CENTRE–STATE RELATIONS

A. Regional Inequalities

The recent literature on regional inequalities in India has confirmed increased divergence across states in terms of their NSDP per capita. Not only have the differences in income per head not declined over time during the recent decades, but the very richest states have also experienced the highest rates of growth, which further exacerbated the initial inequalities. A number of reasons have been put forward for this widening discrepancy. Nagaraj, Varoudakis, and Vèganonès (1998) showed that infrastructures can be the single most important determinant of success or failure in economic performance across states. More recently, Bhattacharyya and Sakthivel (2004) and Purfield (2006) have attributed the increasing regional divergences to the ability of the richer states to attract more foreign investors relative to their poorer counterparts. Alessandrini, Buccellato, and Scaramozzino (2008) used spatial econometrics to emphasize the importance of geographical factors, which made it difficult for some states to increase their volume of trade in the post-reform period. Alessandrini, Fattouh, Ferrarini, and Scaramozzino (2011) examine further the role of trade reforms, and show that they were instrumental in enhancing India’s international competitiveness: however, not all states were able to benefit equally from trade liberalization.

Bandyopadhyay (2012) finds evidence of two convergence clubs, one at 50% and another at 125% of average national income. Capital expenditures, fiscal deficits, and education expenditures played a crucial role in the formation of the upper convergence club. In particular, the system of fiscal transfers from the Centre to the states might have contributed to the persistence of regional inequality, because countries with higher levels of deficit usually tended to receive a larger amount of transfers. As argued by Rao (2007), these accommodative fiscal transfers would not be conducive to sound fiscal policy by the state governments.

B. Centre–State Relations in India

The relationships between central and state governments play a critical role in the constitutional set up of the Indian Union. In the aftermath of independence, the founding fathers were weary of allocating significant responsibilities to the states because of the perceived risk of encouraging further fissiparous tensions. They opted instead for a centralized federal union in the new

constitution, with strong powers allocated to the central government (Arora 2010). It was the responsibility of the Union Parliament and government to recognize diversity, although the management of the socio-political consequences of diversity was left to state governments. The state governments were responsible for the administration of urban and rural local governments. In particular, the latter were required to oversee the functioning of local government units in rural areas, i.e., the district, block, and village *panchayat* (Bagchi 2003).

In practice, the constitutional set up could not prevent some ambiguity in the relationships between the Centre and the state governments. Over the course of time, the consolidation of democratic processes in Indian polity has shifted the Centre–state balance towards greater decentralization, with an increased role for the states.

The original concern with the centrifugal pressures is apparent in the allocation of prerogatives for the central and the state governments respectively, as set out in the Indian constitution. The legislative powers over the various economic activities are divided into three broad areas: areas reserved for Centre (Union list), areas reserved for States (State list) and areas of joint jurisdiction (Concurrent list). Areas of national importance such as defense, foreign affairs, international trade and macroeconomic management are the responsibility of the Centre. Major economic activities (including national highways and airways) and their supervision responsibility are also assigned exclusively to the Centre. However, in practice the Centre does also contribute to some of the areas that fall within the responsibility of the states (Bagchi 2003): the State list includes law and order, public health, sanitation, schools, irrigation, agriculture, fisheries, industries land rights, local government, and other sectors with state-wide effects. Secondary and adult education, housing and land use, electricity distribution, and industrial and commercial estates are assigned to urban and local governments. The concurrent list comprises items such as education, contracts, bankruptcy and insolvency, economic and social planning, trade unions, labor welfare, electricity, newspapers, books and printing press, and stamp duties.

The complex allocation of responsibilities between the central government and the states could give rise to large vertical imbalances, if the fiscal resources available to the states prove inadequate to meet their expenditure obligations. A system of federal fiscal transfers is therefore necessary in order to address these gaps. The two main bodies that oversee fiscal transfers are the Finance Commission and the Planning Commission. The mandate of the Finance Commission is to facilitate the fiscal transfers between the Centre and the states, with a view to addressing vertical and horizontal imbalances. Its main functions are to distribute net proceeds of taxes between the Centre and the states, to determine grants-in-aid to the states, and to liaise with State Finance Commissions. The main charge of the Planning Commission is to make an assessment of all resources of the country, and to determine priorities and formulate plans for their effective and balanced utilization.

There are three main channels that regulate the flow of funds from the Central government to the states in India (Herd and Leibfritz 2008). First, the Finance Commission recommends which proportions of the Centre's taxes (notably, personal income tax and union excise duty) should be transferred to the states. Second, the Planning Commission grants central assistance to projects or schemes. Third, the Planning Commission directly administers selected schemes of government expenditure.

III. THE SYSTEM OF FISCAL TRANSFERS

The focus of the empirical analysis in this paper is on the plan and non-plan grants provided by the Planning Commission and by the Finance Commission.

Plan grants are provided by the Planning Commission. This supplies financial assistance to states in the form of grants and loans. Before 1969, central assistance was provided for by the central government on an ad-hoc basis. However, this did not help in promoting the constitutional goal of balanced growth. To promote balanced growth some states with features such as hilly terrain, international borders, significant tribal population and low level of infrastructural development were given the status of special category (SC) states. For the rest of the states, some criteria for devolution were chosen. About 30% of the funds are now reserved to the special category states, and the remaining seventy per cent are allocated to the major states.

The funds made available to the major states are assigned according to the Gadgil formula, which specifies that these funds must be allocated on the basis of a fixed number of indicators, with a given system of weights: population (60% weight), per capita income (25%), tax effort (2.5%), fiscal management (2%), fulfillment of national objectives such as population control and elimination of illiteracy (3%), and special problems (7.5%). The Gadgil formula, which when revised came to be known as the Gadgil–Mukherjee formula, helped in improving objectivity, transparency and progressiveness. The economic rationale behind using population as one of the weights was that of a negative correlation that was observed between population and state per capita income. Similarly, to reduce regional inequality and to deal with bigger states getting more funds due to their bigger plans, state per capita income was also used as a weight (Ramalingom and Kurup 1991).

Non-plan transfers are provided by the Finance Commission. These transfers are also determined according to a set of rules, whose weights however differ from those in the Gadgil formula. Specifically, criteria used for tax devolution, with their respective weights, are population (10%), income (62.5%), area (7.5%), index of infrastructure (7.5%), tax effort (5%), and fiscal discipline (7.5%) (Rao 2000, Bird and Vaillancourt 2007). Centrally sponsored schemes have also become more prominent in recent years, as well as borrowing in order to finance infrastructure at the state level.

The economic rationale for the factors used for allocation of funds by the Finance Commission is similar to that of the Gadgil–Mukherjee formula. However, the weight for the state income is higher in the devolution formula. The Finance Commission estimates the total resources of the centre and the states and then proposes a pattern for tax-sharing (Mohan 1998). This is closely linked with the state income and hence the state own tax revenue. States with higher income have a wider tax base and need lesser tax devolution from the Centre.

In principle, the three main aims of intergovernmental fiscal transfers are: (i) closing vertical fiscal gaps; (ii) equalization and horizontal equity; and (iii) correct spillovers across local jurisdictions (Rao 2005). In India, however, the post-devolution projected gaps between non-plan current expenditures and revenues have been covered by the Finance Commission through grants-in-aid. States which exhibited higher levels of deficit were able to fund their fiscal imbalance through these transfers. This resulted in a “gap-filling” role for fiscal transfers. Such an accommodative transfer policy could create perverse incentives, undermining the attempts by states to pursue fiscal discipline (Rao 1998, 2005, McCarten 2001). It could also exacerbate

regional inequalities, since states would not always receive funds on account of their needs or of the effectiveness in their use of funds, but also based on the extent to which they have engaged in fiscal profligacy (Rao 2000).

A number of these issues were addressed by the THFC, whose remit covers the period 2010–2015 and which made recommendations that would lead to enhanced fiscal responsibilities for the states and to increased incentives for them to undertake a process of fiscal consolidation, according to a specific road map (THFC 2010). In some states, the temporary deficit on account of the gap between the short-term mismatch between revenue and expenditures has been transformed into a structural deficit and fiscal reform has been called for to improve the fiscal situation. Further, the recommendation has been put forward to revise the criteria for the non-plan revenue deficit (NPRD) grants. The focus will be on assessing the components of revenues and expenditures of states, to make sure that the deficit is not due to inappropriate revenue effort or excessive expenditure. Further, states which are able to reduce their fiscal deficit and to improve their fiscal performance should be given a performance incentive grant. Finally, the Commission also recommended reducing the number of centrally sponsored schemes and restore formula-based transfers.

If these recommendations are fully implemented, they may lead to a significant reduction in the states' reliance on transfers from the Centre and to an overall improvement in the political-economy interactions between the Centre and the states (Roy 2011).

IV. DATASET AND EMPIRICAL FRAMEWORK

A. Description of Dataset

This study uses a panel of Indian states over the period 1990–2010 to examine how transfers, both plan and non-plan, are related to net state domestic product (NSDP) per capita and to fiscal deficits. We used NSDP in preference to the gross state domestic product (GSDP) because the latter cannot be easily compiled from state account, which are not uniform in terms of state period coverage. Similarly, the breakdown of transfers to states between plan and non-plan is only available since 1990. In our estimation, we make use of panel methods which efficiently combine both the time-series and the cross-section dimensions of the observations and which can go some way towards addressing the issue of the relatively short time period. On the other hand, we also re-estimated some of the long-run equilibrium relationships using total transfers over the longer sample period 1981–2010, and the main results are unaffected.

After examining the univariate time-series properties of the series which are studied, we implement Granger-causality tests in order to examine the direction of the relationships between transfers, NSDP per capita and fiscal deficits. Ideally, states with lower NSDP should be entitled to higher transfers and vice versa. A bi-directional negative long-run causality between transfers and NSDP per capita would thus indicate that transfers from the central government to the states would tend to accrue to the poorer regions, and that these funds could contribute to the lessening of the regional inequalities across Indian states. On the other hand, a positive bi-directional long-run relationship between transfers and fiscal deficits would indicate that central government funds tend to accrue to those states which have been less rigorous in terms of enforcing fiscal discipline. This could effectively result in a soft budget constraint for the state governments. In particular, if fiscal deficits are shown to Granger-cause plan and/or non-plan transfers, there would be a reduced incentive for states to generate their own tax revenues and to improve their fiscal balance. Further, exploring both bi- and multi-variate relationships is

important in order to study the combined as well as the pair-wise relationships between the variables of interest.

B. Econometric Methodology

The univariate time-series properties of plan and non-plan transfers, NSDP per capita and fiscal deficits are first examined by means of panel stationarity tests in order to establish whether the series are $I(0)$ or $I(1)$ (Breitung 2000; Hadri 2000; Im, Pesaran, and Shin 2003; and Levin, Lin, and Chu 2002). Bi-variate and multi-variate cointegration tests between the variables are then implemented, to check for the existence of a significant mean reverting long-run relationship (Kao 1999; and Pedroni 1999, 2004). The direction of causality between plan and non-plan transfers, GSDP per capita and fiscal deficit is then examined by Granger causality tests. In particular, if state deficits are shown to Granger-cause fiscal transfers from the Centre, this could be seen as evidence that the implementation of the transfer system tends to accommodate the fiscal imbalances of the states, and that it is 'gap filling.'

The use of a panel data approach in the analysis offers a number of advantages. First, it becomes possible to explore both the time-series and the cross-section nature of the relationships between transfers, fiscal indicators, and the level of income of the individual states. Secondly, it is possible to address issues associated with the potential endogeneity of the variables. On the other hand, because of the relatively short time-series dimension of the sample (which, for most of our analysis, includes annual observations from 1990 to 2010), it is possible that some of the results might be sensitive to the lag length used in the analysis. In order to address this issue, we implement a procedure for error correction model (ECM) testing of panel data originally suggested by Westerlund (2007). The procedure includes four panel cointegration and ECM tests. The main advantages of the approach by Westerlund are that it is based on structural rather than on residual dynamics, and that it does not impose the common factor restriction that the long-run cointegrating vector for the variables in levels must be equal to the short-run dynamics on the variables in differences (see Kremers, Ericsson, and Dolado 1992). The presence of bi-variate and multi-variate cointegrating relationships is tested by verifying whether there is error correction for individual units of the panel or for the panel as a whole. The tests proposed by Westerlund control for heterogeneity across the units of the panel, both in the short run and in the long run. The tests can also allow for dependence across individual cross-sections.

The estimation equations are as follows. The basic auto-regressive model for testing unit roots can be expressed as:

$$y_{it} = \rho_i y_{i,t-1} + \delta_i x_{it} + \varepsilon_{it} \quad (1)$$

where $i = 1, 2, \dots, N$ denote the states, $t = 1, 2, \dots, T$ are the time periods, the vector x_{it} includes the exogenous variables, which could contain fixed effects or individual trends, and ε_{it} is a stationary disturbance. The autoregressive coefficients ρ_i are allowed to vary across states. The stationarity properties of equation (1) depend on the value of the autoregressive coefficients ρ_i . If $\rho_i < 1$, then y_{it} is weakly trend stationary. By contrast, if $\rho_i = 1$ then y_{it} has a unit root. The tests *LLC* by Levin, Lin, and Chu (2002), *BRT* by Breitung (2000) and the *z*-statistic by Hadri (2000) all assume that the disturbances ε_{it} are $IID(0, \sigma^2)$ and that the autoregressive coefficients are constant across the cross-section: $\rho_i = \rho$ for all i .

A bi-variate and multi-variate panel cointegration relationship between appropriate subsets of variables is then investigated. In this case, y_{it} represents transfers (non-plan and plan) and x_{it} represents NSDP per capita, primary deficit or gross fiscal deficit. The same cointegration test is repeated for each pair separately and for the three variables together. Each variable is decomposed into common factors and idiosyncratic components, and the variables are cointegrated only if their common factors cointegrate. Since the idiosyncratic components are independent by construction, it is possible to use standard panel tests such as Kao (1999) and Pedroni (1999, 2004) in order to study their properties.

The testable equations for the ECM representation developed by Westerlund (2007)¹ can be expressed as:

$$\Delta y_{it} = \delta'_i d_t + \alpha_i (y_{i,t-1} - \beta'_i x_{i,t-1}) + \sum_{j=1}^{p_i} \alpha_{ij} \Delta y_{i,t-j} + \sum_{j=-q_i}^{p_i} \gamma_{ij} \Delta x_{i,t-j} + e_{it} \quad (2)$$

The variable d_t denotes the deterministic component. Three cases can be distinguished: (i) no deterministic component, i.e. $d_t = 0$; (ii) a constant but no trend, i.e., $d_t = 1$; and (iii) a constant and a trend, i.e., d_t is a vector: $d_t = (1, t)'$. Westerlund (2007) assumes that the vector x_{it} follows a random walk, and therefore Δx_{it} and e_{it} are independent both across i and t . However, it is possible to allow for dependence across the cross-sectional units i by bootstrap methods.

The Error Correction Model (2) can be rewritten in an unrestricted form as:

$$\Delta y_{it} = \delta'_i d_t + \alpha_i y_{i,t-1} + \lambda'_i x_{i,t-1} + \sum_{j=1}^{p_i} \alpha_{ij} \Delta y_{i,t-j} + \sum_{j=-q_i}^{p_i} \gamma_{ij} \Delta x_{i,t-j} + e_{it} \quad (3)$$

where the relationship between the parameters in equations (3) and (2) is given by $\lambda'_i i = -\alpha_i \beta'_i$. The autoregressive parameter α_i on the lagged dependent variable in (3), $y_{i,t-1}$, captures the speed at which the variable returns to the equilibrium given by the relationship $y_{i,t-1} - \beta'_i x_{i,t-1}$ from equation (2). In the formulations (2) and (3), cointegration and error correction are closely related: if $\alpha_i < 0$ then there is error correction and y_{it} and x_{it} are cointegrated, whereas if $\alpha_i = 0$ then there is no error correction and y_{it} and x_{it} are not cointegrated.

The null hypothesis of the test can be expressed in terms of no cointegration: $H_0: \alpha_i = 0$ for all i . The alternative hypothesis is in general different according as to whether one requires that all α_i 's are equal across the cross-sectional units, or whether one allows for the α_i 's to differ across the panel members. Westerlund (2007) proposes two tests for the dis-homogenous case, where the alternative hypothesis is $H_1^g: \alpha_i < 0$ for at least one i . These tests are called *group-mean tests*, and are denoted by G_τ and G_α respectively.² Similarly two tests are proposed for the homogeneous case, where the speed of adjustment α_i is equal for all i and where the alternative hypothesis is $H_1^p: \alpha_i = \alpha < 0$ for all i . These tests are called *panel tests*, and are denoted by P_τ and P_α respectively.³

¹ See also Persyn and Westerlund (2008) for details of how the estimation procedure can be implemented.

² The test statistic G_α is normalised by the number of time series observation T .

³ Again, the test statistic P_α is normalised by the number of time series observation T .

The group-mean tests and the panel tests are based on the assumption of cross-sectional independence. Westerlund (2007) therefore suggests recomputing the test statistics using a bootstrap method, which is valid under very general forms of dependence between the cross-sectional units. The empirical analysis in the next section reports Westerlund's tests both without and with bootstrapping.

V. EMPIRICAL RESULTS

A. Plan and Non-plan Transfers, NSDP per Capita and Fiscal Deficits

Table 1 shows the correlation coefficients between plan and non-plan transfers, NSDP per capita, and both primary and gross fiscal deficits over the sample period 1990–2010 for the whole panel of state observations. The correlation between plan and non-plan transfers is positive and large, which indicates that, on average, states that received higher plan transfers also received higher non-plan transfers and vice versa. NSDP per capita is negatively related to plan transfers, but positively related to non-plan transfers. High-income states therefore tend to receive lower plan transfers, consistent with a policy aimed at reducing regional inequalities, but higher non-plan transfers. Both types of transfers are positively correlated with primary and gross fiscal deficits, which would appear to suggest that transfers might be used in order to fund the deficit of states.

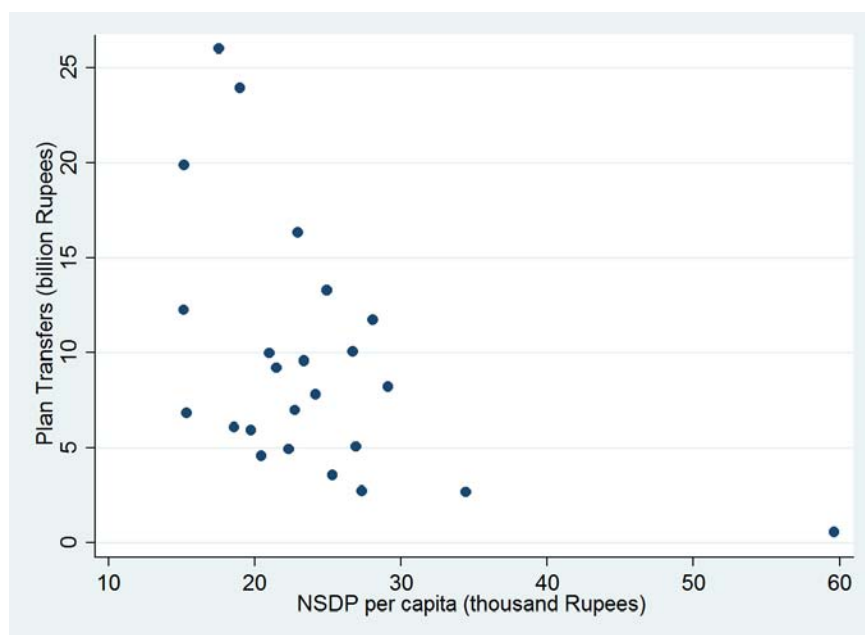
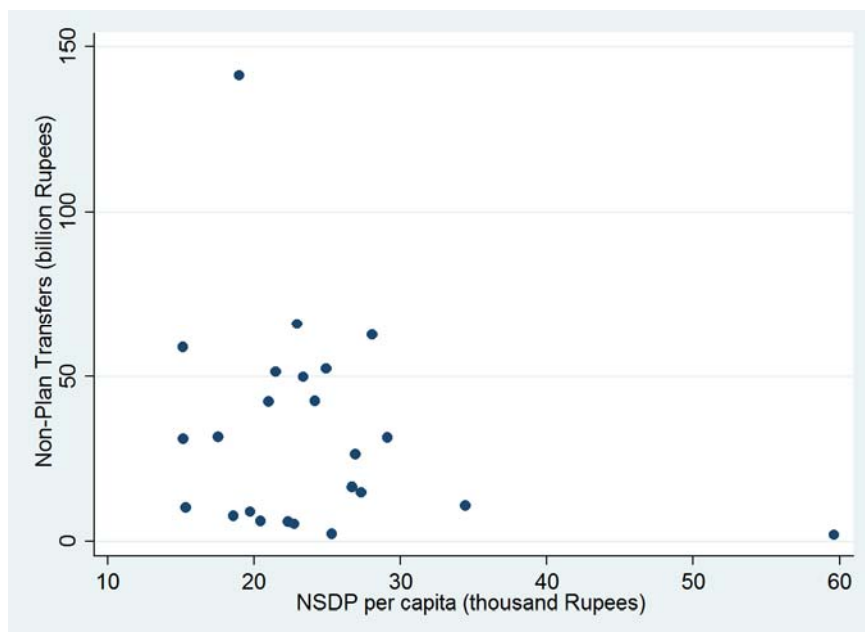
Table 1: NSDP per Capita, Fiscal Deficit and Transfers: Correlation Coefficients

Variable	Plan transfers	Non-plan transfers
Plan transfers	1.000000	0.628864
Non-plan transfers	0.628864	1.000000
NSDP per capita	−0.057229	0.082896
Primary deficit	0.132387	0.333191
Gross fiscal deficit	0.360689	0.678706

Source: Authors' estimates.

Figures 1 (a) and (b) display the average plan and non-plan transfers respectively against NSDP per capital for the states considered in the analysis, during the period 1990–2010. There is a clear negative relationship for plan transfers, whereas the picture for non-plan transfers is not so clear cut. Figures 2 (a) and (b) plot both types of transfers against the primary deficits. Here we can see a clear positive relationship both for plan and for non-plan transfers, which is *prima facie* evidence in favor of a gap filling role of fiscal deficits.

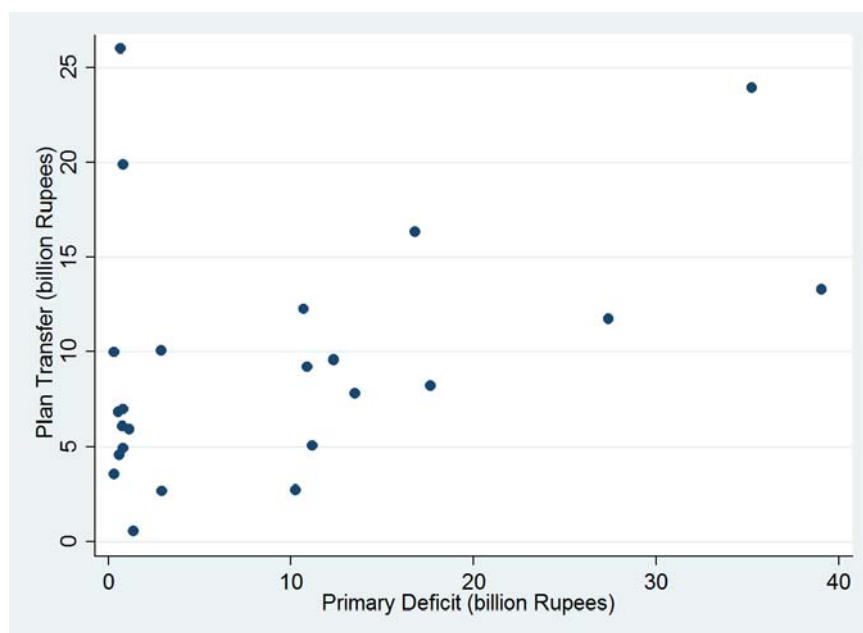
In order to shed further light on the relationship of transfers with the primary deficit, the adjusted partial residual plots are shown in Figures 3 (a) and (b). These figures display each observation's residual, plus its component predicted from NSDP per capita, against the values of primary deficit. They thus show the relationship between transfers and fiscal deficits controlling for NSDP per capita. The positive associations from Figure 2 are reinforced, which again is suggestive of a potential accommodating role for fiscal transfers.

Figure 1: Plan and Non-plan Transfers and NSDP per capita (1990–2010)**(a) Plan transfers and NSDP per capita.****(b) Non-plan transfers and NSDP per capita.**

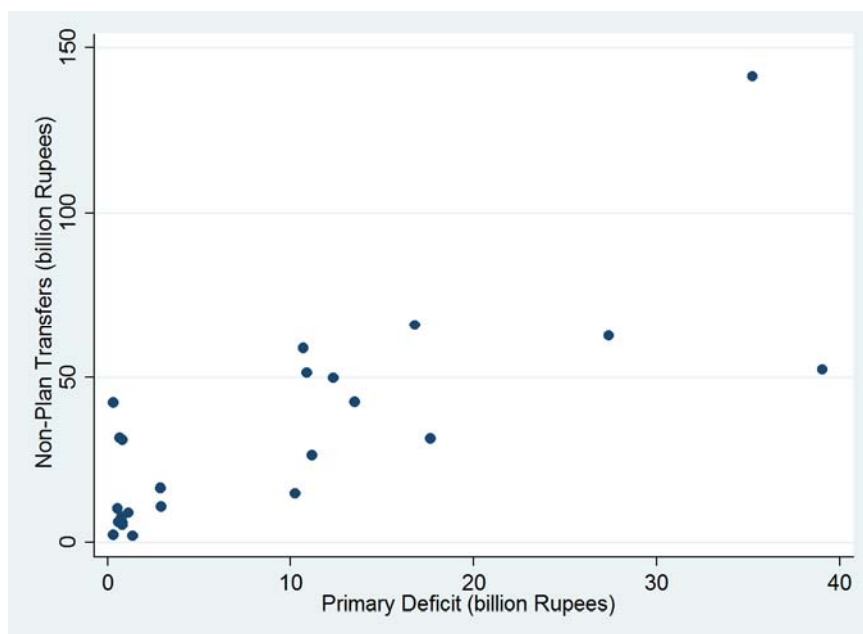
Source: Authors' estimates.

Figure 2: Plan and Non-plan Transfers and Primary Deficits (1990–2010)

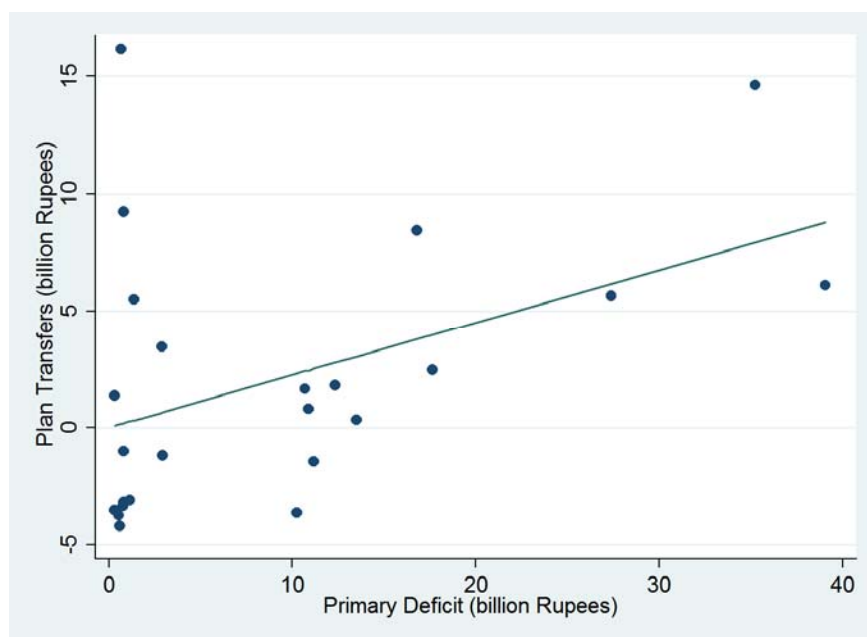
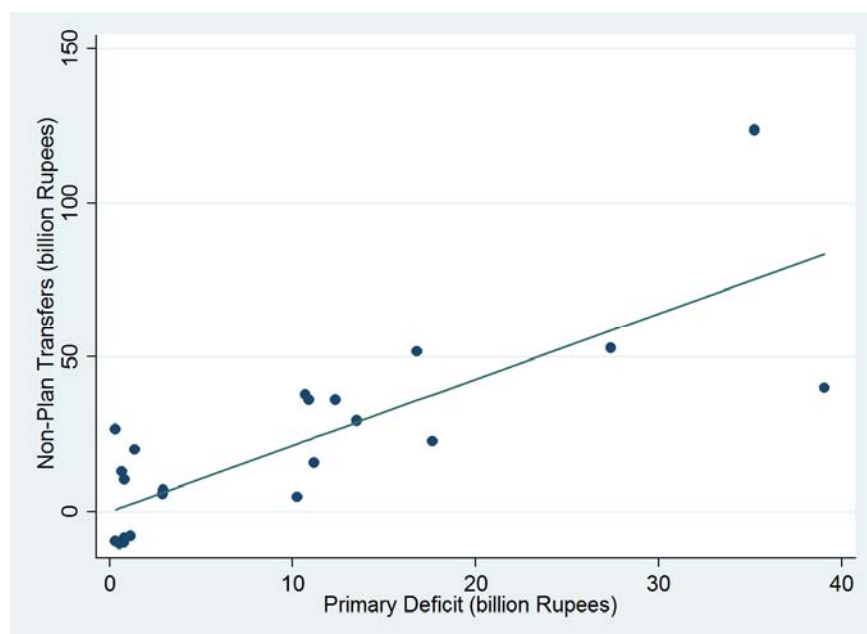
(a) Plan transfers and primary deficits



(b) Non-plan transfers and primary deficits.



Source: Authors' estimates.

Figure 3: Adjusted Partial Residual Plots**(a) Plan transfers and primary deficits.****(b) Non-plan transfers and primary deficits.**

Notes: The figures graph each observation's residual plus its component predicted from NSDP per capita against the values of primary deficit.

Source: Authors' estimates.

B. Panel Stationarity

Before proceeding to the analysis of the cointegration of the variables, it is necessary to establish their stationarity properties. This is done in Table 2. All the panel unit root tests examined in Table 2, with the exception of the Hadri z-statistic, test for the existence of a unit root in a series. Hence, if the t -stat falls within the rejection region and the p -value is low, the null hypothesis can be rejected and the series are non-stationary in levels.

Table 2: Panel Unit Root Tests

	Levin, Lin and Chu	Breitung t-stat	Im, Pesaran and Shin W-stat	ADF – Fisher Chi-square	PP-Fisher Chi-square	Hadri z-stat
NSDP per capita	0.0000	0.0000	0.0001	0.0003	0.0000	0.0000
Plan transfers	0.7512	0.0000	0.0001	0.0000	0.0000	0.0000
Non-plan transfers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Primary deficit	0.0000	0.0000	0.0000	0.0000	0.0000	0.6863
Gross fiscal deficit	0.0000	0.0000	0.0000	0.0000	0.0000	0.8424

Notes:

The tests are computed on the panel data set.

All series are examined in first differences.

All values reported in the table are p -values.

The panel unit root tests reported in the table test for the existence of a unit root in the series, except the Hadri z-statistics. Hence, if the t -statistic falls within the rejection region and the p -value is low, the null hypothesis can be rejected and the series is non-stationary in levels.

Source: Authors' estimates.

For NSDP per capita and for non-plan transfers, all the tests except the Hadri z-statistic support the hypothesis that the series are non-stationary in levels and stationary in the first differences. For plan transfers, the Hadri z-statistic and the Levin, Lin and Chu (*LLC*) tests do not support the hypothesis that the series is non-stationary in levels and stationary in the first differences. However, all other four tests do support this hypothesis. This series is labeled to be weakly stationary in first differences. For primary deficit and for gross fiscal deficit, all the six tests lend support to the hypothesis that the series are non-stationary in levels and stationary in first differences.

C. Multivariate Panel Cointegration

The panel cointegration tests can be performed on a dataset in which the variables in discussion are non-stationary in levels and stationary in first differences. This was confirmed with the help of the panel stationarity tests reported in Table 2. In the multi-variate panel cointegration tests NSDP per capita, primary deficit, and gross fiscal deficit respectively are first tested for a long-run relationship with non-plan and plan transfers. The results are summarized in the first three rows of Table 3. All three tests, except one Pedroni test (group rho-statistic), reject the null hypothesis of no cointegration. Hence, all sets of variables are cointegrated in the multi-variate framework. From the Kao (1999) tests we can also obtain the cointegration coefficients (for first differences) which confirm the positive relationship between transfers and the primary deficit and gross fiscal deficit respectively.

Table 3: Summary Multi-variate Panel Cointegration

	Pedroni (group rho-statistic)	Pedroni (group PP-statistic)	Pedroni (group ADF statistic)	Fischer ($r < 0$)	Fischer ($r < 1$)	Fischer ($r < 2$)	Kao (1999)	Cointegr. coeff. (Kao)
NSDP per capita and non-plan, plan transfers	0.9366	0.0618	0.0075	0.0000	0.0015	0.0004	0.0155	-0.0738
Primary deficit and non-plan, plan transfers	0.4319	0.0000	0.0002	0.0000	0.0803	0.1341	0.0000	0.1304
Gross fiscal deficit and non-plan, plan transfers	0.9097	0.0067	0.0000	0.0000	0.0008	0.0076	0.0000	0.2070
NSDP per capita, primary deficit, total transfers (plan, non plan)	0.9758	0.2457	0.0143	0.0000	0.0004	0.0006	0.0000	-0.0481
NSDP per capita, gross fiscal deficit, total transfers (plan, non-plan)	0.9641	0.0471	0.0021	0.0000	0.0012	0.0799	0.0008	-0.0504
NSDP per capita, primary deficit, gross fiscal deficit and total transfers (plan, non-plan) ⁴	0.9997	0.6329	0.0691	0.0000	0.0000	0.0533	0.0006	-0.0494

Source: Authors' estimates.

These results confirm that NSDP per capita shares a long-run relationship with both types of transfers. On the other hand, the long-run relationship between the fiscal deficits and the non-plan and plan transfers lends support to the hypothesis that the system of federal transfers is strongly influenced by the level of deficits in the state. The nature of relationship between the two confirms the fact that states with higher deficits are usually provided with higher transfers in the long run.

The bottom three rows of Table 3 look at the joint cointegrating relationship between NSDP per capita, fiscal deficits and transfers. Again with the exception of some Pedroni tests (group rho- and PP-statistics), all the other tests reject the null hypothesis of no cointegration. There is therefore evidence of a long-run relationship between NSDP per capita, fiscal deficits and federal transfers for the Indian states.

D. Direction of Causality

The results in Table 3 have established the existence of a long-run relationship between state income, fiscal deficits and transfers. Table 4 examines the direction of causality between these variables. NSDP per capita, primary deficit and gross fiscal deficit all Granger-cause both plan and non-plan transfers. It is important however to note that neither category of fiscal transfers Granger-causes NSDP per capita. Thus, although poorer states have, on average, received larger fiscal transfers from the central government than richer states, there appears to be no evidence from the analysis that these transfers have led to higher state incomes.

⁴ Fischer ($r < 3$) is only applicable to this set of variables. The corresponding p -value is 0.0736.

Table 4: Bi-variate Granger Causality Tests

Explanatory variable	Dependent variable				
	Non-plan transfers	Plan transfers	NSDP per capita	Primary deficit	Gross fiscal deficit
Non-plan transfers	----	----	1.88497 (0.1531)	----	5.39855 (0.0003)
Plan transfers	----	----	0.3732 (0.96337)	2.63024 (0.02371)	3.25196 (0.0122)
NSDP per capita	3.22828 (0.04065)	4.23860 (0.0150)	----	----	----
Primary deficit	----	4.03218 (0.0014)	----	----	----
Gross fiscal deficit	5.53886 (0.0002)	5.77177 (0.0002)	----	----	----

Notes:

The values reported in the table are *F*-statistics.The figures in brackets are *p*-values.

Source: Authors' estimates.

By contrast, fiscal transfers are seen to Granger-cause fiscal deficits. These results could be read as evidence that fiscal transfers have encouraged state governments to implement less rigorous fiscal policy, in the expectation that the transfer system would accommodate their fiscal imbalances.

E. ECM-based Cointegration Tests

Table 5 reports the results of bi-variate ECM-based cointegration tests (Westerlund, 2007). The variables considered are NSDP per capita, primary deficit and gross fiscal deficit. Their long-run relationship with plan and non-plan transfers is tested. The table reports the *p*-values of one-sided cointegration tests based both on the normal distribution (G_τ , G_α , P_τ , and P_α) and on the bootstrapped distribution ($G_\tau(B)$, $G_\alpha(B)$, $P_\tau(B)$, and $P_\alpha(B)$). The bootstrap tests are to be preferred, because they allow for cross-sectional dependence across the regions.

Table 5: ECM-based Bi-variate Cointegration Tests

	G_τ	G_α	P_τ	P_α	$G_\tau(B)$	$G_\alpha(B)$	$P_\tau(B)$	$P_\alpha(B)$
NSDP per capita and non-plan transfers	0.006	0.756	0.000	0.001	0.090	0.040	0.000	0.010
Primary deficit and non-plan transfers	0.010	0.000	0.000	0.000	0.010	0.000	0.000	0.000
Gross fiscal deficit and non-plan transfers	1.000	1.0000	1.000	0.069	0.000	0.000	0.000	0.000
NSDP per capita and plan transfers	0.0000	0.455	0.000	0.004	0.040	0.000	0.000	0.000
Primary deficit and plan transfers	0.019	0.000	0.000	0.000	1.000	1.000	0.990	0.890
Gross fiscal deficit and plan transfers	0.239	0.0063	0.000	0.003	1.000	1.000	1.000	1.000

Notes:

The figures reported in the table are *p*-values.For G_τ , G_α , P_τ , and P_α the *p*-values are for a one-sided test based on the standard normal distribution.For $G_\tau(B)$, $G_\alpha(B)$, $P_\tau(B)$, and $P_\alpha(B)$ the *p*-values are for a one-sided test based on a bootstrapped distribution.

Source: Authors' estimates.

NSDP per capita is cointegrated with both types of transfers. This is evidence of a long-run relationship between fiscal transfers, both plan and non-plan, and state income per capita. This finding is consistent with the results of the previous analysis and confirms that poorer states do tend to receive higher transfers, although from Table 4 there is no evidence that fiscal transfers help predict future state income.

Table 5 however fails to support a long-run bi-variate relationship between fiscal deficits (both primary and gross) and plan transfers, although it does find evidence of cointegration between deficits and non-plan transfers. These results would appear to suggest that plan transfers from Central government are not related to state fiscal deficits in the long run, so that there is no systematic accommodation to state fiscal policy through such transfers. By contrast, non-plan transfers appear to be in an equilibrium relationship with fiscal deficits in the long run, thus confirming the accommodative role of these transfers with respect to the state fiscal policy.

Table 6 presents ECM-based tests on multi-variate long-run relationships among different sub-sets of variables. When NSDP per capita is considered jointly with both types of transfers, there is no evidence of cointegration from the bootstrap tests [$G_\tau(B)$, $G_\alpha(B)$, $P_\tau(B)$, and $P_\alpha(B)$]. When fiscal deficits are also considered, however, the tests support the existence of a long-run cointegrating relationship. In particular, NSDP per capita, primary deficit and total transfers appear to be co-integrated in the long run. Replacing primary deficit with gross fiscal deficit usually leads to a no cointegration result.

Table 6: ECM-based Multi-variate Cointegration Tests

	G_τ	G_α	P_τ	P_α	$G_\tau(B)$	$G_\alpha(B)$	$P_\tau(B)$	$P_\alpha(B)$
NSDP per capita and non-plan, plan transfers	0.926	1.000	0.447	1.000	0.500	0.370	0.230	0.100
Primary deficit and non-plan, plan transfers	0.002	1.000	0.019	0.998	0.040	0.010	0.020	0.010
Gross fiscal deficit and non-plan, plan transfers	0.105	1.0000	0.139	1.000	0.090	0.010	0.080	0.020
NSDP per capita, primary deficit, total transfers (plan, non-plan)	0.998	1.000	1.000	1.000	0.430	0.030	0.0006	0.030
NSDP per capita, gross fiscal deficit, total transfers (plan, non-plan)	0.955	1.000	1.000	1.000	0.380	0.180	0.690	0.070
NSDP per capita, primary deficit, gross fiscal deficit and total transfers (plan, non-plan)	1.000	1.000	1.000	1.000	0.750	0.560	0.910	0.310
NSDP per capita, primary deficit, debt and non-plan transfers	0.768	1.000	0.004	0.819	0.470	0.030	0.060	0.010
NSDP per capita, primary deficit, debt and plan transfers	0.000	0.999	0.000	0.764	0.030	0.010	0.000	0.000

Notes:

Sample period is 1990–2010.

The figures reported in the table are p -values.

For G_τ , G_α , P_τ , and P_α the p -values are for a one-sided test based on the standard normal distribution.

For $G_\tau(B)$, $G_\alpha(B)$, $P_\tau(B)$, and $P_\alpha(B)$ the p -values are for a one-sided test based on a bootstrapped distribution.

Source: Authors' estimates.

The last two rows of Table 6 introduce state debt as an additional variable in the equilibrium relationship between NSDP per capita, primary deficits, and transfers. From the bootstrap tests there is some evidence of cointegration, especially for plan transfers. The stock of state debt could therefore also play a role in the long-run equilibrium relationship between transfers, state income and fiscal variables.

Table 7 extends the ECM-based tests to the sample period 1981–2010. The breakdown between plan and non-plan transfers is not available over this longer period, and therefore the estimates are based on total transfers. If one compares and contrasts the results with the corresponding ones from Table 6, the main findings are all confirmed. The bootstrap tests show that NSDP per capita, primary deficit and total transfers are co-integrated in the long run. The precision of the estimates tends to be greater over this longer sample: the significance level of tests improves, especially for gross fiscal deficits which now become statistically significant.

Table 7: ECM-based Multi-variate Cointegration Tests: 1981–2010

	G_τ	G_α	P_τ	P_α	$G_\tau(B)$	$G_\alpha(B)$	$P_\tau(B)$	$P_\alpha(B)$
NSDP per capita, primary deficit and total transfers	0.273	0.841	0.055	0.347	0.140	0.030	0.020	0.020
NSDP per capita, gross fiscal deficit and total transfers	0.330	0.753	0.124	0.292	0.160	0.010	0.100	0.030
NSDP per capita, primary deficit, gross fiscal deficit and total transfers	0.091	1.000	0.281	0.996	0.020	0.020	0.070	0.100

Notes

Sample period is 1981–2010.

The figures reported in the table are p -values.

For G_τ , G_α , P_τ , and P_α the p -values are for a one-sided test based on the standard normal distribution.

For $G_\tau(B)$, $G_\alpha(B)$, $P_\tau(B)$, and $P_\alpha(B)$ the p -values are for a one-sided test based on a bootstrapped distribution.

Source: Authors' estimates.

Over the longer time period 1981–2010, Zivot-Andrews (1992) tests also show evidence that a number of states experienced a structural break in the series for primary deficits over the period from 2003 to 2005. Similarly, total transfers tended to experience structural break over the years 2004–2005. These breaks could be associated with the enactment of the Fiscal Responsibility and Budget Management Act 2003, which set targets to reduce the fiscal deficit and ensure long-run fiscal stability for India.

There is therefore evidence of a long-run equilibrium relationship between fiscal transfers, NSDP per capita and the primary deficit of the states. Thus, after controlling for the level of income, fiscal transfers from the Centre tend to be related to the fiscal stance of the states. This evidence strongly supports the view that transfers have played an ex post accommodative role with respect to the fiscal imbalances of the state governments. It will be important to verify if the recommendations for fiscal restructuring between the Centre and the states put forward by the Thirteen Finance Commission (THFC 2010) will indeed bring about both an increase in the degree of devolution and enhanced fiscal responsibility for the states.

VI. CONCLUSIONS

Bridging the gap between the economically and socially divergent regions in a developing country like India is a challenging task. A common way of dealing with this task is to provide additional financial support to the less well-off states in order to help them develop and compete with their richer counterparts. However, attention needs to be paid to the overall determinants of such transfers in a federal set up. There could be a temptation to direct transfers to those states with the largest fiscal imbalances, and therefore with the largest need to meet short-term funding requirements, rather to the countries with the greatest long-term needs. This would undermine the credibility of the central government when it tries to enforce a binding budget constraint on the state governments, and it could lead to a reduced effort by states to raise their own revenue and to a more accommodating fiscal policy.

This paper analyses the long-run relationships between federal transfers, NSDP per capita and state fiscal deficit. The evidence is supportive of the view that the Indian federal transfers system is indeed “gap-filling” in nature, with a positive bi-directional long-run relationship between fiscal transfers and deficit. In addition there is also evidence of a unidirectional causality relationship between NSDP per capita and transfers, with the direction of causality going from NSDP per capita to transfers. These results are confirmed by multi-variate cointegration analyses, which find evidence of a long-run equilibrium relationship of fiscal transfers with both NSDP per capita and the primary deficit of the states.

Whilst the system of federal transfers in India has been successful in directing resources towards the poorer states, it may have been less effective in enforcing the incentives for local states to strengthen their fiscal discipline. The transfers from the central government have been systematically used in order to accommodate the fiscal imbalances of the states.

At the same time, there is doubt on the effectiveness of transfers regarding their role in closing the gap between richer and poorer states. At a time when the process of liberalization that took place in India since the early 1990s has called for a larger role for the states relative to the central government, it is important that policy should be directed at enhancing the revenue raising capabilities of the states and at improving their fiscal discipline and accountability.

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Federal Transfers and Fiscal Discipline in India: An Empirical Evaluation

The paper shows that the Indian federal transfers system tends to accommodate state fiscal deficits. While this system has been successful in directing resources towards the poorer states, it may have been less effective in enforcing the incentives for states to strengthen their fiscal discipline.

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