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Measuring Concentration of Economic Activity Across States: Case Study of India

D. K. Srivastava[1], Muralikrishna Bharadwaj[2], Tarrung Kapur[3] and Ragini Trehan[4]

[1]Chief Policy Advisor, EY India, Member, Advisory Council to the Sixteenth Finance Commission and formerly Director, Madras School of Economics
E-mail: dkscloud@gmail.com; dk.srivastava@in.ey.com
[2]Senior Manager, Tax and Economic Policy unit, EY India
E-mail: muralikrishna.b@outlook.com; muralikrishna.b@in.ey.com
[3]Senior Manager, Tax and Economic Policy unit, EY India
E-mail: tarrung.kapur@in.ey.com
[4]Senior Manager, Tax and Economic Policy unit, EY India and part-time PhD. scholar at MSE, Chennai. E-mail: ragini.trehan@in.ey.com

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Abstract: In this paper, we have examined the pattern of concentration of economic activities amongst Indian states. For this purpose, the Herfindahl-Hirshman Index (HHI) has been used. The sample period of the study extends from 2011-12 to 2023-24. Alternative definitions of HHI based on suitable schemes of its decomposition have been utilized. Indian states are classified in terms of two categories. First, the five top states based on size of real GSDP and second in terms of four groups of states where general states (GS) are distinguished from northeastern and Himalayan (NEH) states. Each of the GS and NEH groups are divided into two sub-groups each according to the level of per capita GSDP. Thus, we have four subgroups of states namely GS1, GS2 NEH1 and NEH2. Our main findings include first, that the overall concentration of economic power has fallen over time. Further, the largest contribution to the overall HHI within each of the two categories of states comes from the top five states and the GS2 group respectively. The relative contributions of the two NEH groups is quite small and that of the GS1 group is just about one-third of the GS2 group.

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1. INTRODUCTION

India's states are characterized by several distinct features. Some states are in plain areas, others are in hilly areas. Some are coastal states, and others are forest rich states. The size of economic activities also differ across states. In fact, there is considerable concentration of economic activities amongst some states whereas in other states economic activities remain diffused. Using real GSDP as a measure of size of economic activity, in this paper we utilize the Herfindahl Hirshman Index (HHI) to measure concentration of economic activities across states in India. The overall index is then decomposed in two alternative schemes of classifying states. In the first case we divide the states into two groups consisting of the five largest states and the remaining states. In the second scheme we divide the states into four groups consisting of general states and Northeastern and Himalayan states which are further divided according to per capita GSDP. These groups have been referred to as GS1, GS2, NEH1, and NEH2 groups of states. Our main findings include first, that the overall concentration of economic power has fallen over time. Further, the largest contribution to the overall HHI within each of the two categories of states comes from the top five states and the GS2 group respectively. The relative contributions of the two NEH groups is quite small and that of the GS1 group is just about one-third of the GS2 group.

This paper is divided into seven sections. Apart from the introductory section, Section 2 provides a brief overview of the use of HHI for measuring concentration in the existing literature. Section 3 provides an overview of alternative versions of the HHI and the methodology that is used in the present paper. Section 4 looks at concentration of economic power amongst all Indian states. In Section 5, we divide the states into two groups consisting of the five largest states in terms of real GSDP and the remaining states. We examine the concentration indices of these two groups and their respective contribution to the overall HHI. In Section 6 we measure the HHI for four groups of states namely GS1, GS2, NEH1, and NEH2 and examine the contribution of the HHI of individual groups to the overall concentration index. Section 7 provides concluding observations.

2. LITERATURE SURVEY

The Herfindahl–Hirschman Index (HHI) is a widely used measure of concentration, originally developed to assess market structure and competition (Herfindahl, 1950; Hirschman, 1945) by summing the squared shares of firms, sectors, or regions. While traditionally applied in antitrust analysis, HHI is increasingly used in broader economic contexts. For example, in the existing literature, HHI has been used to evaluate concentration in national and/ subnational GDP, identifying regions or sectors that disproportionately contribute to output. Further, in the fiscal context, it has been used to measure revenue concentration and revenue dependence, helping to assess the diversification of tax bases or the concentration of intergovernmental transfers. Additionally, researchers employ HHI in input–output and network analyses, examining how concentration in production or trade links can affect volatility, resilience, and innovation. Across contexts, HHI serves as a robust and simple indicator of how economic power is distributed, informing analyses of regional inequality, fiscal capacity, and development policy.

The World Development Report (2009) employed the HHI to examine the concentration of economic activity across countries and within their subnational regions. Using regional GDP data for over 100 countries in the early 2000s, the results revealed that economic output is often highly concentrated in a few regions or metropolitan centers, particularly in developing economies such as Brazil, South Africa, and China. In contrast, advanced economies such as Germany and the US exhibited a more dispersed regional distribution of GDP. The report also highlighted a dynamic pattern in the sense that concentration tends to increase in early development stages as growth clusters in leading regions and cities, but declines as infrastructure and integration improve. The study emphasized that HHI is a useful tool for identifying geographic concentration of economic power and informing policies aimed at connectivity and regional integration.

Ezcurra and Rapún (2006) studied regional GDP concentration across Western Europe from 1980 to 2000, using data from national statistical offices. The methodology combined HHI with temporal comparisons to assess trends in regional concentration and the effect of policy integration. The study found significant variation in regional concentration with countries like Spain and Italy exhibiting high HHI values due to the dominance of a few regions, while

Germany and France being more evenly balanced. Over the study period, integration with the European Union led to some spatial diversification of economic activity.

Lessmann (2012) examined regional inequality and the impact of fiscal decentralization using cross-country data from 1980 to 2005, covering more than 50 countries. The study calculated HHI for each country using regional GDP shares. Regression analysis was employed to assess the relationship between fiscal decentralization indicators and HHI, controlling for GDP per capita, population, and country size. Results indicated that countries with higher levels of fiscal decentralization including Australia, Canada and Germany generally had lower HHI values, reflecting a more even distribution of economic power across regions, while economies that were more centralized such as China, India and Russia had higher concentration. The study demonstrated the utility of HHI in linking institutional structure to spatial economic outcomes.

Azzoni (2001) analyzed regional GDP and income inequality in Brazil from 1970 to 1995, using state-level GDP data. Results showed a high degree of concentration, with São Paulo and a few southern states dominating national output, resulting in persistently high HHI values. The methodology also included comparisons of HHI trends over time to assess convergence or divergence among regions. The findings highlighted structural imbalances in Brazil's federal system, where economic power remained heavily skewed toward a small number of states, emphasizing the relevance of concentration measures for policy and federal fiscal planning.

Miranda-Pinto (2021) examined how sectoral concentration and production network structures shape cross-country differences in GDP volatility, offering insights that go beyond conventional HHI measures of output concentration. Using OECD input–output matrices for 61 countries, the study constructed network indicators such as density, skewness, and service share and related them to GDP growth volatility around the 2008-10 global economic and financial crisis. The results show that economies with more diversified and denser production networks exhibit lower volatility, with the effect being the strongest in service-oriented economies. A calibrated multi-sector Constant Elasticity of Substitution model further demonstrates that the stabilizing effect of diversification depends on substitution elasticities between labor and intermediates, which are typically higher in services. The findings

suggest that while higher HHIs of GDP concentration are associated with greater volatility, the impact depends crucially on where concentrated sectors are located within the input–output network.

The HHI has also emerged as a tool in assessing economic diversification, particularly in resource-dependent economies. In the study by Belbali et al. (2024), the HHI is employed to quantify the concentration of Algeria's economic activities across sectors from 2019 to 2023, revealing moderate diversification with index values ranging between 0.2 and 0.4. The literature review within the paper highlights the HHI's widespread application in similar contexts, including studies by Ghedier and Kiheli (2022) which underscore the persistent dominance of the oil and gas sector despite policy efforts aimed at diversification. The HHI's sensitivity to sectoral imbalances makes it a reliable indicator for evaluating structural economic shifts, as demonstrated by its use in both sectoral and export diversification analyses. Moreover, the paper discusses interpretive thresholds of HHI values, aligning them with degrees of economic concentration, and reinforces the index's utility in cross-country comparisons and longitudinal assessments of diversification strategies.

Empirical studies of India's regional growth trajectories, using the HHI, indicate that the distribution of national output has become increasingly concentrated in a few large, industrially advanced states. For example, Ahluwalia (2000), using data from 1990–91 to 1997–98, depending on the availability of data series for GDP, sectoral growth, and investment, showed that states such as Maharashtra, Tamil Nadu, and Karnataka consistently increased their shares of national GDP during the post-reform period, benefiting from rapid industrialization, higher investment inflows, and the rise of modern service sectors such as information technology. Similarly, Panagariya and More (2014), using data for the period 1993-94 to 2011-12, documented that the relative contribution of smaller or agriculture-dependent states such as Bihar, Jharkhand, and many northeastern states either stagnated or declined over time, reflecting weaker structural transformation and lower capacity to attract capital. This divergence has resulted in rising interstate concentration, highlighting that India's growth is being disproportionately driven by a handful of high-performing states.

A study by Gaur (2010), employed HHI alongside other inequality indices such as the Gini coefficient, Theil index, Relative Mean Deviation

(RMD), and Atkinson's index to examine disparities amongst Indian states in both total and per capita State Domestic Product (SDP) over the period 1980–2002. The author justifies the use of HHI by emphasizing its sensitivity to the distribution of economic activity across federating units and its ability to reflect concentration trends over time. As developed in Srivastava and Aggarwal (1979), the study utilizes three variants of the HHI (denoted as H_1, H_2, and H_3). The empirical findings reveal a rising trend in HHI values, particularly after the economic reforms of 1991, indicating increasing concentration of economic activity in a few developed states such as Gujarat, Maharashtra, and Haryana. This trend is consistent with the broader narrative of post-reform divergence, where richer states have grown faster than poorer ones, exacerbating regional inequalities.

Kathuria (2009), and later Kathuria, Rajesh Raj, and Sen (2010, 2013), employed the HHI to capture the degree of industrial concentration within Indian states. The HHI was calculated using the share of different manufacturing sub-sectors in a state's total manufacturing output. Their empirical results, based on data for 15 major states between 1994 and 2005, showed that states with more diversified industrial structures recorded higher manufacturing productivity growth, while states with highly concentrated industry bases were more vulnerable to sector-specific shocks and demonstrated weaker productivity performance. The analysis underscored the importance of diversification for sustaining productivity gains and highlighted how measures of concentration such as the HHI can be used to explain regional differences in economic outcomes within a federal system.

HHI has also been used for the purpose of fiscal analysis primarily to examine the concentration or diversification of fiscal variables, such as tax revenue composition, expenditure allocation, fiscal decentralization, and intergovernmental transfers. In the context of fiscal aggregates, Srivastava and Aggarwal (1979) had utilized the HHI for studying tax revenue centralization in India. They had defined and estimated alternative versions of the HHI. Srivastava and Trehan (2018) had defined an index of seasonal unevenness and used this index for a study of seasonal patterns of fiscal aggregates in India.

3. SOME FEATURES OF THE HHI INDEX

We consider a universe of 'n' participating states.

Thus, for i=1 to n, the HHI index is defined as

$$H_1 = \sum_{i=1}^{n} \left(\frac{Y_i}{(\sum Y_i)}\right)^2 = \frac{1}{(\sum Y_i)^2} \sum_{i=1}^{n} Y_i^2 \quad (1)$$

If $Y_i/\Sigma Y_i = y_i$, i.e., the share in output of the i^{th} state, then the index can simply be written as $\sum_i^n y_i^2$. We consider the total economic space being shared amongst individual states as consisting of the sum of their individual real GSDPs, measured at 2011-12 prices.

The minimum value of the index would be $\frac{1}{n}$ when there is no concentration, i.e., all participating states obtain equal shares. The maximum value of the index would be 1, when one state occupies the entire output, and the share of other states is zero. As the number of participating states increases indefinitely, the minimum value of H_1 i.e., $\frac{1}{n}$ tends to zero.

An increase in the number of states should lead per se to a decrease in centralization because the same output is now being shared with a greater number of participating states. Therefore, a desirable property of the index would be $\frac{\partial H_1}{\partial n} < 0$. Thus, the larger the number of participating states, the lower the magnitude of overall concentration index would be.

In a hypothetical case, when the number of participating states is increased by one, by an equal reduction in the output of all existing participants, the condition that the new index H_1^* would be smaller than the old index H_1 can be derived as follows. Let the output under the influence of the new state be Y^1, so that the reduction in each case in the output of existing governments is Y^1/n so that the total output is held constant. Thus, we have

$$H_1^* = \frac{1}{(\Sigma Y_i)^2} \cdot \left[\Sigma_i \left(Y_i - \frac{Y^1}{n}\right)^2 + (Y^1)^2\right] \quad (2)$$

and

$$H_1 = \frac{1}{(\Sigma Y_i)^2} \left[\Sigma_i Y_i^2\right] \quad (3)$$

Now

$$H_1^* - H_1 < 0 \quad \text{if}$$

$$(Y^1)^2 + \left(\frac{Y^1}{n}\right)^2 - \frac{2Y^1}{n} \Sigma Y_i < 0 \quad (4)$$

One limitation to the index H_1 is that as n changes, the lower limit $(\frac{1}{n})$ of the range of variation $1 - \frac{1}{n}$ changes and therefore the index cannot be used for comparisons in situations when, over time, the number of states keeps changing.

To overcome this limitation, standardization of H_1 with respect to range of variation can be defined in terms of H_2 as follows:

$$H_2 = \frac{n}{n-1}.H_1 \text{ for n>1} \tag{5}$$

The lower and upper limits of H_2 would respectively be $\frac{1}{n-1}$ and $\frac{n}{n-1}$ and although the extreme values change as n changes the range of variation is constant and equal to unity, i.e.,

$$\frac{n}{n-1} - \frac{1}{n-1} = 1 \tag{6}$$

The condition for H_2 to fall as n rises is

$$\frac{\partial H_2}{\partial n} < 0 \text{ if } \frac{\partial H_1}{\partial n} < \frac{H_1}{n(n-1)}$$

since

$$\frac{\partial H_2}{\partial n} = -\frac{1}{(n-1)^2}.H_1 + \frac{n}{n-1}.\frac{\partial H_1}{\partial n} \tag{7}$$

H_1 can further be standardised with respect both to the range of variation and the extreme values by defining another index H_3 in the following manner:

$$H_3 = \frac{1}{n-1}.(n.H_1 - 1) \text{ for n>1} \tag{8}$$

This coefficient varies from a minimum value of zero to a maximum value of 1. As such both the range and the extreme values are constant.

Since,

$$\frac{\partial H_3}{\partial n} = \frac{-1}{(n-1)^2}.H_1 + \frac{1}{(n-1)^2} + \frac{1}{n-1}.\frac{\partial H_1}{\partial n}$$

the condition for $\frac{\partial H_3}{\partial n}.\frac{\partial H_1}{\partial n} < 0$ is

$$\frac{\partial H_1}{\partial n} < -\frac{1-H_1}{n(n-1)} \tag{9}$$

A comparison of the three alternatives can be made with respect to three criteria, (i) the range of variation, (ii) the extreme values, and (iii) the condition required to reflect a fall in the value of the index as the number of participating states increases in the federation, i.e., $\frac{\partial H_i}{\partial n} < 0$. The relevant information regarding these is summarized in the following table.

Table 1: Features of Herfindahl's Index

Name	*Definition*	*Range*	*Minimum Value*	*Maximum Value*	*Condition for* $\frac{\partial H}{\partial n} < 0$
H_1	$\Sigma_i r_i^2$	$1 - \frac{1}{n}$	$\frac{1}{n}$	1	$\frac{\partial H_1}{\partial n} < 0$
H_2	$\frac{n}{n-1}\Sigma_i r_i^2$	1	$\frac{1}{\mathrm{n}} - 1$	$\frac{\mathrm{n}}{(\mathrm{n}-1)}$	$\frac{\partial H_1}{\partial n} < \frac{H_1}{n(n-1)}$
H_3	$\frac{n}{n-1}(\Sigma_i r_i^2 - 1)$	1	0	1	$\frac{\partial H_1}{\partial n} < \frac{H_1 - 1}{n(n-1)}$

Source: based on Srivastava and Aggarwal (1979)

Although H_3 is more useful when comparisons over time and space are involved it needs to satisfy a stronger condition in order to obtain the properly decomposable equation. When only comparisons of the level of centralization are involved H_3 may be better than H_2 because its extreme values are independent of the number of observations. However, the term (1/n-1) does create a problem when one is concerned with decomposing the index as this term is independent of the output shares and does not yield to any straightforward allocative scheme. Thus, for comparisons one would find H_3 better than H_2 and H_2 better than H_1 and for decomposition H_1 and H_2 better than H_3. For our purposes, we have utilised various schemes of decomposition utilizing H_1. However, for one case we have reported H_3 for reference.

4. OVERALL CONCENTRATION AMONG INDIAN STATES

This empirical study has been done in three parts. First, the concentration of economic power for Indian states is studied in terms of the share of their relative real GSDPs in the sum of their GSDPs which is close to GDP. In the second stage, we divide the Indian states into two groups, namely, Group 1 consisting of five largest states and Group 2 consisting of the remaining states. Thirdly, we divide the states into four broad categories consisting of general category states and Northeastern and Himalayan states which are subdivided into two groups each according to the level of per capita GSDP. Thus, the three parts of this study pertain to the following specifications.

Table 2: Categorisation of states for analysis

Individual States	*Five largest and remaining states*	*#*	*General states and Northeastern and Himalayan states divided into two sub-groups (GS1, GS2, NEH1 and NEH2)*
Andhra Pradesh	**Five largest**		**GS1**
Arunachal Pradesh	Maharashtra	1	Bihar
Assam	Gujarat	2	Uttar Pradesh
Bihar	Tamil Nadu	3	Jharkhand
Chhattisgarh	Karnataka	4	Madhya Pradesh
Goa	Uttar Pradesh	5	Chhattisgarh
Gujarat	**Remaining states**	6	West Bengal
Haryana	Bihar	7	Odisha
Himachal Pradesh	Jharkhand	8	Rajasthan
Jammu and Kashmir	Madhya Pradesh		**GS2**
Jharkhand	Chhattisgarh	9	Punjab
Karnataka	West Bengal	10	Andhra Pradesh
Kerala	Odisha	11	Kerala
Madhya Pradesh	Rajasthan	12	Maharashtra
Maharashtra	Punjab	13	Gujarat
Manipur	Andhra Pradesh	14	Tamil Nadu
Meghalaya	Kerala	15	Haryana
Mizoram	Haryana	16	Karnataka
Nagaland	Telangana	17	Telangana
Odisha	Goa	18	Goa
Punjab	Manipur		**NEH1**
Rajasthan	Assam	19	Manipur
Sikkim	Meghalaya	20	Assam
Tamil Nadu	Nagaland	21	Meghalaya
Telangana	Tripura	22	Nagaland
Tripura	Arunachal Pradesh	23	Tripura
Uttar Pradesh	Mizoram		**NEH2**
Uttarakhand	Himachal Pradesh	24	Arunachal Pradesh
West Bengal	Uttarakhand	25	Mizoram
	Sikkim	26	Himachal Pradesh
		27	Uttarakhand
		28	Sikkim

One important dimension of the study of centralisation of economic power is to look at centralisation within group of states. In this context, it is useful to highlight the relatively larger concentration of economic power in the relatively larger states.

The index of concentration amongst states is defined as below.

$$H_1 = \frac{(Y_s^1)^2}{Y_s^2} + \cdots + \frac{(Y_s^5)^2}{Y_s^2} + \frac{(Y_s^6)^2}{Y_s^2} + \cdots + \frac{(Y_s^n)^2}{Y_s^2} \quad (10)$$

Accordingly, H_3 can be defined as given in equation (8) earlier:

$$H_3 = \frac{1}{n-1}.(n.H_1 - 1)$$

In the period under consideration, the number of states 'n' has changed twice. First because of the split of Andhra Pradesh into Andhra Pradesh and Telangana in 2014. Later the status of Jammu and Kashmir was changed to Union Territory in 2019. Thus, the number of states have changed from 28 to 29 in 2014-15 and 28 again in 2019-20 during the sample period 2011-12 to 2023-24. Given this, the H_3 values are different from the H_1 values. These values are summarized in Table 3.

Table 3: Overall concentration Index amongst states: real GSDP

Year	H_1	H_3
(1)	*(2)*	*(3)*
2011-12	0.0747	0.0404
2012-13	0.0748	0.0405
2013-14	0.0751	0.0408
2014-15	0.0715	0.0384
2015-16	0.0715	0.0383
2016-17	0.0716	0.0384
2017-18	0.0711	0.0379
2018-19	0.0703	0.0371
2019-20	0.0718	0.0374
2020-21	0.0710	0.0366
2021-22	0.0715	0.0371
2022-23	0.0722	0.0378
2023-24	0.0723	0.0379

Source: (basic data): MoSPI, GoI

The patterns for H_3 show that there was a fall in concentration index 2014-15 onwards uptil 2018-19. It fell further to its lowest in 2020-21 before marginally increasing upto 2023-24, although remaining below its peak level in 2013-14.

Chart 1 shows that the overall concentration index was mostly range bound during the period 2014-15 to 2023-24.

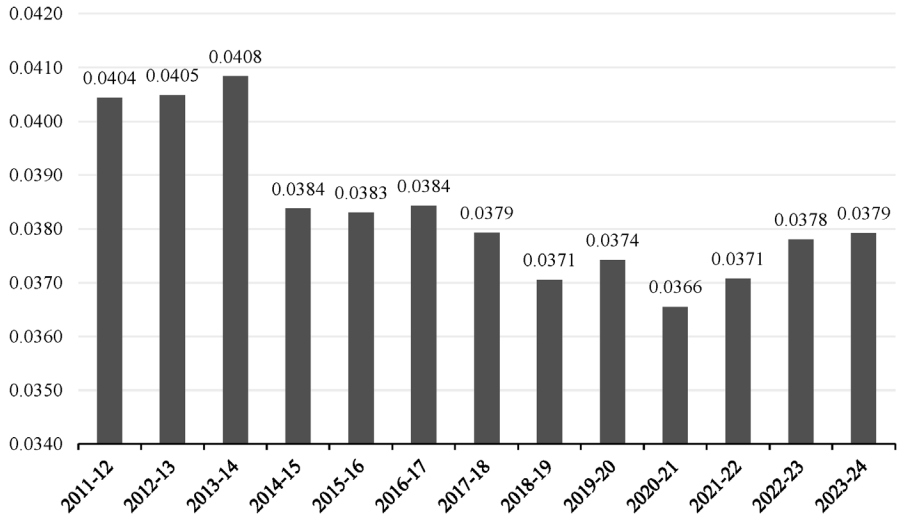

Chart 1: Overall concentration Index amongst states (H3)

Source: (basic data): MoSPI, GoI

5. CLASSIFYING STATES INTO TWO GROUPS: FIVE LARGEST STATES AND OTHER STATES

We now consider patterns of concentration by dividing states in India into two groups where Group 1 (G1) consists of the five largest states and Group 2 (G2) consists of the remaining states. In this section we study the magnitude of concentration individually within the G1 and G2 groups and then their relative contributions to the overall concentration index amongst all states. For this purpose, we utilize a decomposition formula as given by equation (11). This pertains to the index defined by H_1. H_3 is not amenable to a decomposition scheme and it is relevant only when the number of states is varying within the sample period. Given the current composition of states in India, we have a situation where there are 28 states. Jammu and Kashmir has become a Union

Territory. As such it is dropped from the sample. After three initial years of the sample, that is in 2014-15, Telangana and Andhra Pradesh had become separate states. However, data is available for Andhra Pradesh and Telangana even for the period prior to their bifurcation. Using these, we have constructed a uniform set of 28 states for the entire sample period, 2011-12 to 2023-24. This has been used for estimation of H_1 and its decomposition.

We can decompose H1 as follows.

$$H_1 = \left[\frac{Y(5)_s^2}{Y_s^2}\right]\left[\frac{\left(Y_s^1\right)^2}{Y(5)_s^2} + \frac{\left(Y_s^2\right)^2}{Y(5)_s^2} + \cdots + \frac{\left(Y_s^5\right)^2}{Y(5)_s^2}\right] + \left[\frac{Y(n-5)_s^2}{Y_s^2}\right]\left[\frac{\left(Y_s^6\right)^2}{Y(n-5)_s^2} + \cdots + \frac{(Y_s^n)^2}{Y(n-5)_s^2}\right] \quad (11)$$

The relative contribution of the two groups of states in the overall concentration index is given by equation (12).

$$H_{1,s} = \left(\frac{Y_5}{Y_s}\right)^2 H_{1,5} + \left(\frac{Y_{n-5}}{Y_s}\right)^2 . H_{1,n-5} \quad (12)$$

The first term represents the largest five Indian states in terms of their contribution to all state GSDP.

Table 4: Intrastate concentration index: H1

Year	*weight attached to H_1-index of 5 largest states*	*H_1-index of five largest states*	*weight attached to H_1-index of remaining states*	*H_1-index of remaining states*	*H_1-index of all states*	*Relative contribution (%)*	
						Five largest states	*Remaining states*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2011-12	0.237	0.220	0.263	0.076	0.072	72.3	27.7
2012-13	0.240	0.219	0.260	0.076	0.072	72.8	27.2
2013-14	0.244	0.218	0.256	0.075	0.073	73.5	26.5
2014-15	0.246	0.218	0.254	0.075	0.073	73.8	26.2
2015-16	0.247	0.217	0.253	0.075	0.073	73.8	26.2
2016-17	0.250	0.216	0.250	0.075	0.073	74.2	25.8
2017-18	0.250	0.214	0.250	0.075	0.072	74.0	26.0
2018-19	0.246	0.213	0.254	0.075	0.071	73.4	26.6
2019-20	0.250	0.212	0.250	0.075	0.072	73.9	26.1
2020-21	0.250	0.209	0.250	0.075	0.071	73.6	26.4
2021-22	0.252	0.209	0.248	0.075	0.071	73.8	26.2
2022-23	0.257	0.210	0.243	0.075	0.072	74.7	25.3
2023-24	0.258	0.210	0.242	0.075	0.072	75.0	25.0

Source (basic data): MoSPI, GoI

Table 4 shows that the magnitude of the concentration index amongst the five largest states is nearly three times as large as the magnitude of the concentration index for the remaining states.

It is shown in Column (7), that the five largest states account for concentration of economic power in the group of states in the range of 72.3% to 75.0%. In fact, it is the relative share attached to these five states that has increased over time as a result of which the relative contribution of the five highest GSDP states to the overall index has increased over time.

6. CLASSIFYING STATES INTO FOUR GROUPS ACCORDING TO GENERAL AND HILLY STATUS

States in India differ with each other in terms of economic conditions as well as cost and geographic characteristics. States that are in the plain area have different cost conditions as compared to the hilly and mountainous states. By looking into two characteristics of states namely 1) the level of per capita GSDP which determines their fiscal capacity and tax base and 2) the nature of their terrain which determines the cost conditions and environmental contributions, we can divide the states into four groups, GS1, GS2, NEH1 and NEH2 as already specified in Table 1. In this context we ensure that the number of states does not change over time and it is possible to look at a suitable scheme of the decomposition of the concentration index so that the relative contribution of the concentration indices of individual groups in the overall concentration index can be worked out. This has been made possible by dividing the GSDP figures of the older Andhra Pradesh into Telangana and new Andhra Pradesh for the three years from 2011-12 to 2013-14 as mentioned earlier. These figures have been estimated by the NSO. Further we have dropped Jammu and Kashmir from the sample which later becomes a Union Territory. Thus, the number of states remains 28 throughout the study period. The scheme of decomposition is given below.

The index of concentration amongst states is defined as below.

We divide states into four groups. States are indicated by the subscript 'i' where:

For group 1, i=1,2,…,j (where j=8)

For group 2, i=j+1,j+2,…,k (where k=18)

For group 3, i=k+1,k+2,…,l (where l=23)

For group 4, i=l+1,l+2,…,m (where m=28)

The relevant variable for which concentration is being measured is indicated by 'Y'. We can write as follows:

$$\sum_{i=1}^{j} Y_i = YY_j, \sum_{i=j+1}^{k} Y_i = YY_k, \sum_{i=k+1}^{l} Y_i = YY_l, \sum_{i=l+1}^{m} Y_i = YY_m$$

For all states considered together,

$$\sum_{i=1}^{m} Y_i = YY_j + YY_k + YY_l + YY_m = YY \tag{13}$$

We can define the H index for all states considered together as below:

$$H = \sum_{i=1}^{m} \frac{(Y_i)^2}{(YY)^2} \tag{14}$$

$$H = \frac{1}{(YY)^2} \sum_{i=1}^{m} (Y_i)^2 \tag{15}$$

This can be decomposed as:

$$H = \frac{1}{(YY)^2} \left[\sum_{i=1}^{j} (Y_i)^2 + \sum_{i=j+1}^{k} (Y_i)^2 + \sum_{i=k+1}^{l} (Y_i)^2 + \sum_{i=l+1}^{m} (Y_i)^2 \right] \tag{16}$$

$$H = \frac{1}{(YY)^2} \left[\frac{(YY_j)^2}{(YY_j)^2} \sum_{i=1}^{j} (Y_i)^2 + \frac{(YY_k)^2}{(YY_k)^2} \sum_{i=j+1}^{k} (Y_i)^2 + \frac{(YY_l)^2}{(YY_l)^2} \sum_{i=k+1}^{l} (Y_i)^2 + \frac{(YY_m)^2}{(YY_m)^2} \sum_{i=l+1}^{m} (Y_i)^2 \right] \tag{17}$$

$$H = \frac{(YY_j)^2}{(YY)^2} \cdot \frac{1}{(YY_j)^2} \cdot \sum_{i=1}^{j} (Y_i)^2 + \frac{(YY_k)^2}{(YY)^2} \cdot \frac{1}{(YY_k)^2} \cdot \sum_{i=j+1}^{k} (Y_i)^2 + \frac{(YY_l)^2}{(YY)^2} \cdot \frac{1}{(YY_l)^2} \cdot \sum_{i=k+1}^{l} (Y_i)^2 + \frac{(YY_m)^2}{(YY)^2} \cdot \frac{1}{(YY_m)^2} \cdot \sum_{i=l+1}^{m} (Y_i)^2 \tag{18}$$

$$H = \frac{(YY_j)^2}{(YY)^2} \cdot \frac{\sum_{i=1}^{j} (Y_i)^2}{(YY_j)^2} + \frac{(YY_k)^2}{(YY)^2} \cdot \frac{\sum_{i=j+1}^{k} (Y_i)^2}{(YY_k)^2} + \frac{(YY_l)^2}{(YY)^2} \cdot \frac{\sum_{i=k+1}^{l} (Y_i)^2}{(YY_l)^2} + \frac{(YY_m)^2}{(YY)^2} \cdot \frac{\sum_{i=l+1}^{m} (Y_i)^2}{(YY_m)^2} \tag{19}$$

This can be written as

$$H = W_j . H_j + W_k . H_k + W_l . H_l + W_m . H_m \tag{20}$$

Where W_j is equal to ratio of square of the sum of incomes of the states of the jth group divided by the square of the sum of incomes of all states. Thus,

$$W_j = \frac{(YY_j)^2}{(YY)^2}, W_k = \frac{(YY_k)^2}{(YY)^2}, W_l = \frac{(YY_l)^2}{(YY)^2}, W_m = \frac{(YY_m)^2}{(YY)^2}$$ and

$H_j, H_k, H_l, and\ H_m$ are the HHI indices for the concerned sub-group of states.

Table 6: Group-wise contribution to overall concentration index

	H index				Weights				Contribution (%)			
	GS1	GS2	NEH1	NEH2	GS1	GS2	NEH1	NEH2	GS1	GS2	NEH1	NEH2
2011-12	0.161	0.143	0.502	0.399	0.116	0.369	0.0006	0.0007	25.9	73.2	0.45	0.39
2012-13	0.160	0.144	0.498	0.403	0.116	0.37	0.0006	0.0007	25.6	73.6	0.42	0.4
2013-14	0.160	0.144	0.494	0.402	0.113	0.374	0.0006	0.0007	24.9	74.3	0.41	0.41
2014-15	0.159	0.144	0.493	0.392	0.11	0.379	0.0006	0.0008	24.1	75.0	0.42	0.41
2015-16	0.162	0.142	0.525	0.394	0.107	0.385	0.0007	0.0008	23.8	75.3	0.47	0.41
2016-17	0.161	0.143	0.519	0.398	0.108	0.384	0.0006	0.0007	23.9	75.2	0.44	0.41
2017-18	0.160	0.141	0.524	0.397	0.105	0.388	0.0006	0.0007	23.4	75.7	0.46	0.41
2018-19	0.158	0.139	0.524	0.392	0.105	0.389	0.0006	0.0007	23.2	75.9	0.45	0.4
2019-20	0.158	0.140	0.521	0.383	0.104	0.391	0.0006	0.0007	23.0	76.2	0.45	0.38
2020-21	0.158	0.138	0.543	0.372	0.104	0.391	0.0007	0.0007	23.1	76.0	0.52	0.35
2021-22	0.158	0.138	0.534	0.371	0.105	0.392	0.0006	0.0006	23.3	75.9	0.47	0.31
2022-23	0.158	0.140	0.537	0.372	0.104	0.394	0.0006	0.0006	22.8	76.4	0.47	0.31
2023-24	0.158	0.141	0.543	0.371	0.104	0.393	0.0007	0.0006	22.8	76.3	0.51	0.31

Source (basic data): Ministry of Commerce

As Table 6 shows, the highest magnitude of the concentration index within the general states is for GS1 group and within the Northeastern and Himalayan states for the NEH1 group. However, the weight attached to the GS2 group is the highest amongst all the four groups and the relative weights attached to the NEH groups are quite low. Accordingly, it is the GS2 group that accounts for a concentration in the range of 73.2% to 76.4%. The relative contribution of the two NEH groups is quite small and that of the GS1 group is just about one-third of the GS2 group. Thus, it is the relatively higher income states in the group of general states that accounts for the largest contribution to the overall concentration index.

7. CONCLUDING OBSERVATIONS

In this paper, we have examined the issue of concentration of economic powers amongst the Indian states where economic power is proxied by real GSDPs of the states. We have alternatively divided the states into two groups and four groups. In the first classification scheme, the five largest states are considered in one group and the remaining in the second group. In the second classification, we have distinguished between general states that are mostly in plain areas as compared to states located in Northeastern and Himalayan regions that can be considered as the hilly and mountainous states of India.

It is shown that in the first classification scheme, it is the group of five states that accounts for nearly three times as large a concentration of economic power as that of the remaining 23 states. Nearly three-fourths of the overall concentration index is attributable to the concentration in the five largest states. In the second classification scheme, the main findings are summarized below.

1. The highest magnitude of the concentration index within the general states is for GS1 group and within the Northeastern and Himalayan states for the NEH1 group.
2. The weight attached to the GS2 group is the highest amongst all the four groups and the relative weights attached to the NEH sub-groups are quite low.
3. The GS2 group's contribution to the overall concentration index is in the range of 73.2% to 76.4%.
4. The relative contribution of the two NEH groups is quite small and that of the GS1 group is just about one-third of the GS2 group.

5. Thus, it is the relatively higher income states in the group of general states that accounts for the largest contribution to the overall concentration index.

Overall, there is considerable concentration of economic activities amongst the Indian states as measured by the size of their real GSDP. The maximum contribution to the overall concentration index is coming from the relatively richer states in the category of general states. The NEH group of states do not contribute much to the overall concentration index due to their relatively low share in the sum of real GSDPs.

Disclaimer

Views or perspectives in this article are solely those of the authors and do not necessarily reflect the views, policies, or positions of any organization, employer, or affiliated group.

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