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Regional Diversity of Development in India: Agglomeration, Skills and Access to Finance

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Abstract

This paper takes a look at regional diversity of development in India by studying economic contribution at a regional level and examining the differences and determinants for two time periods, 2004-5 and 2011-12. We calculate value added at the regional level for the first time in India covering both formal and informal sector output. We carry out a pooled regression to study the determinants of regional value added including diversity and urbanisation, along with skills and access to finance. We choose NSS region as a unit of analysis with the hypothesis that trends at the region level will be much more dynamic than what one would expect purely through state level analysis. The economic structure of the region and access to finance emerge as significant determinants of regional value added. We find that there are thresholds to diversity in its association with higher levels of regional value added. We further establish the importance of urbanisation and establish the ability of smaller urban centres to act as growth agents, as opposed to the prevalent exclusive focus on million plus cities.

JEL Classification: R11, R12, R23, R32, R58

Keywords: Regional Value Added, Diversity, Agglomeration, Finance, Skills

1. Introduction – Incidence and Causes of Regional Diversity

This paper applies the proportion of regional workers to total state workers and adjusts for the productivity differentials between regions to arrive at an estimate of regional domestic product or value added (RVA) of regions in India. The effort is to provide reasonably accurate estimates of output of specific regions for the first time in India, along with an understanding of critical factors underlying these differences over the period of 2004-05 to 2011-12 across regions in

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India. We want to understand inter-regional difference in value added in the Indian context and explain how these differences could be correlated with aspects of agglomeration like urbanisation and sectoral diversity along with issues of skill levels and access to finance.

The problem of regional definition becomes crucial whenever attempts are made to obtain estimates of regional income and output. Such estimates are often essential because policy objectives are commonly set in terms of achieving a stipulated per capita income or production level for a region. Studies pertaining to certain other developing countries like Brazil, Indonesia etc provide some level of regional granularity by using metropolitan level data (Da Mata et al., 2007) or post office codes (Deichmann et al., 2008). We draw from the above works and seek to extend our analysis to India on two aspects: One, we consider the region as a unit by applying the homogeneity principle in defining regions in India (Meyer, 1963) to calculate value added at the regional level for the first time and two, we cover both the organized and the unorganized sector in understanding regional differences. The National Sample Survey Organisation (NSSO) provides data at a more disaggregated level, called 'NSS regions' since the last two decades, which is the regional unit considered for this study.

We contend that the ranking of states in India in contribution to VA would be relatively unchanged over this time period. However, while VA per se has increased in every state, leaving relative ranks unaffected, the magnitude of the increase differs widely across states in absolute terms. We further try to analyse contribution to RVA at the more granular level of NSS regions. At a regional level, we expect to find significant variation in value added in absolute terms and test for divergence. We carry out a ranking of the top 25 regions by RVA and expect the rankings to change substantially at the regional level, as opposed to the fairly static relative picture at the state level. This would indicate that the contribution to RVA (at the region level) is much more dynamic over time, than what is revealed by analysis of state level data.

In other words, we propose that state level trends mask highly dynamic and varied regional growth patterns, both within the state and also between regions as standalone units.

This underscores the need for the next task, which is to study the determinants of these variations in greater detail at the regional level, with specific reference to three factors : agglomeration, skills and access to finance.

Firstly, spatial concentration of production and population is a critical driver of growth due to the presence of increasing returns to scale (Krugman, 1991). Empirical evidence on the existence of these agglomeration economies has been somewhat mixed. Moomaw (1981), Segal (1976) and Sveikaukas (1975) observe that productivity is generally higher in larger economic units, particularly cities. The share of urbanisation is therefore an important indicator of the degree of agglomeration economies. The presence of large cities would, as a corollary, have an impact on the overall output of the region as well, by acting as regional hubs for economic activity. Mills and Hamilton (1997) argue that the demand in any one industry (with few exceptions), can be volatile over time and be subject to random uncorrelated, seasonal, or cyclical fluctuations. As a result, it is helpful for a region to have diverse sectors driving the economy, so that in times when one sector may not be performing well, others sectors have the ability to keep the economy buoyant (Attaran, 1986). The presence of multiple industries in a region is also said to generate a higher level of employment and growth. Hence the level of sectoral diversity is also indicative of a larger productive market with greater sharing and matching opportunities (Duranton & Puga, 2004).

Secondly, the dichotomy of a large segment of unemployed population coexists with the reality that several sectors deplore the lack of skilled labour. Growth in any one sector has a tendency to spill over to other sectors through the mechanism of forward and backward linkages (Romer, 1986). This is best utilized when there is an availability of human capital to best leverage the labour matching opportunities and technological advances that economic development brings with it (Duranton & Puga, 2004). It is argued that in the Indian context high skill levels raise average productivity and hence contribute to growth (Rajan, 2006).

Thirdly, access to finance largely determines the spatial location and growth of enterprises, which are critical for high levels of value added in any region. The shortage of finance is one of the most critical problems faced by unorganized manufacturing enterprises, service sector enterprises, start-ups, small entrepreneurs and R&D intensive efforts[3]. The availability of finance at a regional level gives insights about both the presence of institutional structures and the ability of individuals to access the same. Access to the formal banking system is expected to

[3] At an all India level as per the NSS 62nd round data, this figure is said to stand at 42% (with the highest being Tripura at 93%).

significantly improve the economic and social outcomes of the region through enhanced savings, entrepreneurship and investments, in addition to building resilience to shocks. Where the institutional finance footprint is weak, the dependence on moneylenders and subsequent increase of interest rates is also high. Thus the ability of enterprises and households to engage in productive growth is constrained by the limitations of financial access.

Thus the importance of region as a unit of analysis is well established in the literature. Most earlier studies in India explaining regional variation in development (Bhat & Siddharthan, 2012; Drèze & Sen, 2013; Panagariya, A., Chakraborty, P., & Rao, 2014; Veeramani & Goldar, 2005) have been primarily at the state or provincial levels[4]. One observes substantial variation even within a state across NSS regions. This study is an attempt to analyse the determinants of inter regional differences in levels of development over a period of time in the Indian context.

2. Model, Variable Construction and Data

Following Combes (2000) and Bhat & Siddharthan (2012), we apply a production function approach (Cobb & Douglas, 1928) to calculating output in terms of value added:

$$Q = F(L, K, \varepsilon) \quad such\ that$$

$$RVA_r = F(L_r,\ K_r,\ Z_r)$$

Where RVA= Regional Value Added, L = Labour Related factors, K = Capital Related factors and Z = Other Agglomeration Variables, each being measured for region r.

We construct a measure for regional value added since there are no official estimates for the same. We also construct a diversity index to reflect the degree of diversity of the regional economy. For labour and capital related factors, we consider skills and access to finance respectively. Traditionally several studies have considered variables like education levels and workforce participation rate to measure labour related factors (Maiti & Mitra, 2010) and for capital related factors, FDI approvals, projects commissioned etc (Mukim and Nunnenkamp,

[4] A few exceptions (Kathuria, Rajesh Raj, & Sen, 2010) combine ASI with NSSO datasets to give a regional picture, but their focus is more on total factor productivity. The few pertinent studies in India at district level are based on the Annual Survey of Industries (ASI) which collects plant level data and therefore focus purely on the organized manufacturing sector (Mukim & Nunnenkamp, 2012)

2012) have been considered. For the purpose of our study, these may not directly denote better labour matching potential or greater finance flowing into the region and hence we focus on direct outcome indicators of 'skills' and 'access to finance' as elaborated later in this section.

We carry out a pooled analysis of cross sectional data across two time periods 2004-05 and 2011-12. Net state domestic product (NSDP) at constant 2004-5 prices and data on access to finance, is drawn from Handbook of Statistics on Indian economy (RBI). For all other variables we use the NSSO 61 st round (2004-5) and the 68th round (2011-12) surveys on employment and unemployment. The NSSO conducts these surveys periodically and the 68th round is the latest round of data available. The selected years are also equidistant from 2007-08 which was the year of the global meltdown, such that short term factors related to the meltdown which might affect regional output, would be reduced if not eliminated.

From a regional standpoint, India is administratively divided into 29 States and 7 Union Territories. The NSSO further divides each administrative unit into National Sample Survey (NSS) regions based on homogeneity related to agro-climatic conditions, demography etc . We have considered 75 NSS regions (Refer Annexure 1 for State-wise list) across India in each period, giving us 160 observations over the 2 years under study[5]. A multi-stage stratified sampling design has been adopted by the NSSO for the 61st round survey and the 68th round survey that defines our data set and hence makes it representative of the regions under consideration.

We now present the detailed method adopted for construction of each variable.

2.1 Value Added: For state level measurement of Value Added (VA), we take the National State Domestic Product (NSDP) data as provided by the Reserve Bank of India (RBI) for 2004-5 and 2011-12. Official estimates of VA are only available at the state level. Hence how does one work towards providing further granularity at the regional level? This means that we have to meaningfully extrapolate state level VA into a regional framework by applying relevant weights. A new method was introduced by Mitra and Mehta (2011) to convert state output values to reflect city level output, since all official estimates of output are available only up to the state

[5] The Union Territories of Lakshadweep, Daman and Diu and Dadra and Nagar Haveli have not been considered for this analysis due to the unavailability of complete data.

level. In this study we take this a step further by applying this methodology to construct the Regional Value Added (RVA) for NSS regions. This is a unique contribution of this paper, in that VA at NSS region level has not been computed so far or used for regional analysis in India.

This method draws from the UN Habitat guidelines for measuring urban data which provides an approach for calculating VA in a situation where micro level data points are not available. It involves extrapolation of data at a national or state level by applying appropriate weights. This method assumes that the unit level share of output is proportionate to the employment share. There is however, a difference in productivity across regions which accounts for differential contribution to VA. This difference is said to be captured in the wage rates. One limitation is that there might be differences in productivity originating from the differences in technology used. While the RVA variable in itself does not account for it, we seek to address this by including skill intensity as one of the independent variables, which we expect to have a significant impact on the level of RVA. Mitra and Mehta (2011) follow the UN guidelines to arrive at city output such that

$$City\ Output = Urban\ Domestic\ Product * \frac{City\ Employment}{Urban\ Employment} * \frac{City\ Wage}{Urban\ Wage}$$

We apply this method to calculate RVA, our measure of regional output, since it is a similar case as the regional output not being available and find that the conditions for arriving at city output hold true at the regional level too.

$$Regional\ Domestic\ Product\ or\ Regional\ Value\ Added\ (RVA)$$
$$= State\ Domestic\ Product * \frac{Regional\ Employment}{State\ Employment} * \frac{Regional\ Wage}{State\ Wage}$$

For each worker the survey collects information on place of residence. Based on this, we calculate state employment, as well as regional employment in terms of regions as defined by NSS. However, data on wages in the Indian context is incomplete. NSS captures wages for regular workers and casual workers, but earnings of the self-employed are not collected. As an alternate to the wage ratio, we follow Mitra and Mehta (2011) and consider that the ratio of the work force participation rates at the regional and state level reflects the wage ratio.

$$Regional\ Domestic\ Product\ or\ Regional\ Value\ Added\ (VA)$$
$$= State\ Domestic\ Product * \frac{Regional\ Employment}{State\ Employment} * \frac{Regional\ WPR}{State\ WPR}$$

The rationale for this is that a region with a higher wage ratio, i.e. better work opportunities relative to the state average, is likely to reflect in higher labour flows and hence higher workforce participation rate in the region, relative to others. In order to capture details of economic activity at the individual level, we need to first identify those persons who are a part of the workforce. These individual level details are then aggregated by region, using the usual principle activity status data to calculate workforce participation rate. We then calculate Regional Value Added (RVA) applying the formula mentioned above.

2.2 Determinants of Inter regional variations in value-added

2.2.1. Agglomeration: We consider sectoral diversity and urbanisation as two important dimensions of agglomeration for the purpose of our study. To capture sectoral diversity we construct a Diversity Index (DV). Every subsector is assigned a code as per the National Industrial Classification (NIC), which seeks to provide a basis for the standardized collection, analysis and dissemination of industry (economic activity) wise economic data for India. We calculate the percentage employment shares by industry using 2 digit level data across 14 industry sectors. The Diversity Index (DV) is given by:

$$DV_r = 1 - H_r$$

$$\text{where, } H_r = \sum_j \left[\frac{E_{jr}}{E_r}\right]^2 \quad \text{and} \quad 0 \leq DV_r \leq 1$$

Such that H_r is the sum of squares of employment shares of all industries j in region r. For our analysis, we also consider the squared value of the diversity index, since we wish to test for non-linearity as well.

Rapidly urbanizing regions are expected to have greater contribution to value added and the urban share is calculated as the proportion of urban population to the total population in the state based on the NSSO sectoral classification. We also include a dummy for million plus cities

which takes the value of 1 or zero depending on the presences or absence of a million plus city in a given region. This helps us examine, in addition to the degree of urbanisation itself, whether the existence of a million plus city in the region account for its contribution to value added.

2.2.2 Skills : Studies so far have measured human capital using data on literacy and education levels For our analysis, we have looked at access to human capital in terms of 'skilling' as this is more directly related to the occupational structure and economic output. In order to assess the regional skill levels, we draw from the National Classification of Occupations (NCO) at a single digit level to look at differences between states across industry subsectors. The NCO occupational classifications have been linked to skill levels for the first time in 2004. It now becomes possible to connect the occupational division codes with the skill level to assess the regional distribution of different types of jobs and skill levels.

Table 1: Mapping occupational classifications to skill levels

Code	Type	Skill Level	Degree	Education
2	Professionals	IV	Post grad	>15 years formal education
3	Associate Technicians	III	1st university degree	13-15 years formal education
4	Clerks	II	Secondary education	11-13 years formal education
5	Service	II	Secondary education	11-13 years formal education
6	Skilled Agricultural workers	II	Secondary education	11-13 years formal education
7	Crafts and other trade based work	II	Secondary education	11-13 years formal education
8	Plant operators and assemblers	II	Secondary education	11-13 years formal education
9	Elementary occupations	I	Primary education	Upton 10 years and or informal skills

Source: National Occupational Classification Report 2004

2.2.3 Access to Finance: We study access to finance in terms of both outreach and volume to assess its impact on regional value-added (RVA). There appears to be a significant disparity in the availability of banking services across the country, with a positive correlation between per capita income and banking penetration with an increasing disparity in banking outreach (Basu & Srivastava, 2004).

Table 2: Variables and data sources

Nature of Indicator	Independent Variables	Variable Name	Measurement	Data Source
Agglomeration	Diversity index	DV	Sectoral mix on a scale of 0 to 1	61 st and 68th Round NSSO Employment Unemployment Survey
	Diversity index squared	DVSQ	Squared value of DV	
	Urbanisation share	Urbshare	Proportion of population living in urban areas as a measure of urbanisation	
	Dummy for million plus cities	Mn_plus	Dummy variable takes a value of 1 if the region contains a million plus city, else 0	N.A.
Skills	Share of high end skills	SkillsIV	Proportion of total workforce having level IV skills corresponding to occupations 0 to 2 as per the NCO codes	61 st and 68th Round NSSO Employment Unemployment Survey
Access to Finance	Bank branch offices	Lnbankoffices	No. of bank branch offices (logged)	Reserve Bank of India – Scheduled Commercial Banks
	Credit per branch	Lncredit/branch	Volume of credit outstanding in Rs. Lakhs/ no. of branch offices (logged)	
Sectoral Shares	Share of construction	Constr	Proportion of total workers engaged in construction as per NIC codes	61 st and 68th Round NSSO Employment Unemployment Survey
	Share of construction squared	Sqconstr	Squared value of constr_share	
	Share of services	Svstot	Proportion of total workers engaged in service sector occupations as per NIC codes	
Year Dummy	Year dummy (2004-05 as base)	Yd	Dummy variable takes a value of 1 for the year 2011-12, and 0 for the base year 2004-5	N.A.

We measure access to finance in terms of availability of bank branch offices and volume of credit per branch. The numbers of bank branch offices in the region provide a measure of the penetration and institutional access. The presence of bank branches is critical as it determines the ability of individuals as well as businesses and other institutions to access credit and engages in robust savings behavior thus enabling savings and capital formation. The volume of credit per branch measures the degree of participation in promoting the multiplier effect at a regional level.

We have considered the RBI data on Scheduled commercial banks, which includes all private, foreign and nationalised banks operating in India. This covers almost the entire banking footprint across the nation. This data is available at the district level, which we have compiled at NSS region level for each district by mapping it to the concerned region. This appears to be the first time this dataset has been used at NSS region level to capture access to capital and hence is an important contribution of this paper.

We further include sectoral shares, as control variables to assess whether the variations in sectoral shares explain some of the differences in value added. We filter the employment data from the NSS rounds by NIC codes and construct sectoral shares at a macro level. For the purpose of our analysis, we include construction and service sector shares in particular, since they have accounted for most of the growth in this time period. We also provide for non-linearity in the case of construction, as we would expect it to increase at lower levels of VA, but reach a saturation point and begin to decline beyond a certain level. In addition to the million plus city dummy described earlier, we also apply a year dummy taking 2004-5 as the base year to account for differences arising due to measurements over a period of time.

Our expanded equation, therefore, takes the form:

$$LnRVA_r = \alpha_r + \beta_1 DV_r + \beta_2 DVSQ_r + \beta_3 Urbshare_r + \beta_4 Mn\_plus_r + \beta_5 SkillIV_r + \beta_6 LnBankoffices + \beta_7 Ln\,Credit/Branch_r + \beta_8 Constr_r + \beta_9 Sqconstr_r + \beta_{10} Svstot_r + \beta_{11} Yd_r + \varepsilon_r$$

3. Preliminary Analysis

We divide our analysis into three segments, where we first address our hypothesis related to state level variations in VA as measured by NSDP. Secondly, we construct and examine the RVA variable at a regional level and finally study its association with determinants related to capital, labour and agglomeration.

3.1. State Perspective

Hypothesis 1: We contend that the ranking of states in contribution to value added would be relatively unchanged. While value added per se has increased in every state, the magnitude of the increase differs widely across states.

Table 3: Value-added levels and frequency

VA Level	Range of VA Rs. Cr.	Number of States (2011-12)	Number of States (2004-5)
High	200-700	7	2
Medium	100-200	7	7
Moderate	10-100	9	10
Low	0-10	9	13

We tabulate state level VA for both periods 2004-5 and 2011-12. We classify the states in terms High , Medium, Moderate and Low based on VA levels of 2011. We plot the change in value added over the two time period as well as the growth over the time interval. We rank the states in order of highest VA to lowest VA. As per Table 4, the difference between the highest and lowest VA figures has doubled. The Mean VA has increased by 1.88 times. The standard deviation has almost doubled. The coefficient of variation indicates divergence through a slight increase. However the ratio of the state with the highest VA to the lowest VA has declined which indicates that the increase in the output of the state with the lowest VA state has been more than the increase of the output of the state with the highest contribution to VA. This is likely since the base value of the lowest state is likely to be less in any case.

Table 4: Summary statistics for regional value-added as computed

RVA	2004	2011
Difference	330,576	635,800
Mean	69,716	131,329
SD	79348	155593
Cov	113.81	118.48
VA Ratio	197.07	189.68

Source: Authors own calculations

We find that the quantum of change and the growth rate vary across regions substantially. As per Table 5, the fastest growth is witnessed by Madhya Pradesh (MP) at 324% (cumulative), while the lowest is West Bengal (WB). However states seem to have retained their positions in terms of contribution as the relative ranking of states has not changed much. The key exceptions are the rise of MP to second place in 2011, the fall of Uttar Pradesh (UP) from 2nd to 5th place and the negative growth of WB and its resultant fall to 8th place.

While ranks are more or less stable, the disparity between VA across states has gone up. This finding is reinforced by Panagariya et al. (2014).

Table 5: State-wise ranking by value added (Rs, in Crores) with 2011-12 as reference year

Rank 2011	Rank 2004	State	VA 2004	VA 2011	VA Change	Growth	VA Level
1	1	Maharashtra	332,262	639,169	306,908	0.92	High
2	10	Madhya Pradesh	93,238	395,514	302,276	3.24	High
3	5	Tamil Nadu	168,151	383,504	215,353	1.28	High
4	3	Andhra Pradesh	182,218	342,094	159,876	0.88	High
5	2	Uttar Pradesh	212,607	324,714	112,107	0.53	High
6	6	Gujarat	152,414	323,942	171,528	1.13	High
7	7	Karnataka	130,512	280,641	150,129	1.15	High
8	4	West Bengal	179,254	178,833	-421	-0.0023	Medium
9	8	Rajasthan	103,671	171,105	67,434	0.65	Medium
10	9	Kerala	98,014	163,696	65,681	0.67	Medium
11	11	Haryana	81,669	149,230	67,560	0.83	Medium
12	13	Delhi	74,411	142,297	67,886	0.91	Medium
13	12	Punjab	77,800	118,556	40,756	0.52	Medium
14	15	Bihar	56,249	118,130	61,882	1.10	Medium
15	14	Odisha	65,744	92,576	26,832	0.41	Moderate
16	16	Jharkhand	43,382	67,625	24,243	0.56	Moderate
17	18	Chattisgarh	40,038	62,526	22,488	0.56	Moderate
18	17	Assam	41,498	59,686	18,188	0.44	Moderate
19	20	Uttarakhand	19,432	49,211	29,778	1.53	Moderate
20	19	Himachal Pradesh	20,216	30,975	10,759	0.53	Moderate
21	21	Jammu and Kashmir	14,517	28,295	13,778	0.95	Moderate
22	22	Goa	7,984	17,289	9,305	1.17	Moderate
23	23	Tripura	7,846	13,279	5,433	0.69	Moderate
24	26	Pondicherry	4,023	9,690	5,667	1.41	Low
25	25	Meghalaya	4,941	8,504	3,563	0.72	Low
26	24	Chandigarh	6,519	8,009	1,490	0.23	Low
27	27	Manipur	3,627	5,170	1,543	0.43	Low
28	28	Nagaland	2,319	5,153	2,834	1.22	Low
29	31	Sikkim	1,301	3,838	2,537	1.95	Low
30	29	Arunachal	2,244	3,639	1,396	0.62	Low
31	30	Mizoram	1,686	3,370	1,684	1.00	Low
32	32	Andaman and Nicobar Islands	1,139	2,256	1,117	0.98	Low

Source : Ranking based on NSDP data published in the Handbook of Statistics on Indian economy

3.2 Regional Perspective

Hypothesis 2: At a regional level, we expect to find significant variation in value added in absolute as well as relative terms.

We calculate value added at a regional level (RVA) following the methodology outlined in the previous section. We contend that within respective states, the experience across state-regions is also varied and so it is important to understand these inter-regional differences. Based on mean, standard deviation and coefficient of variation, we examine the hypothesis of *increasing inequality in value added*. If we take the mean regional value added in 2011, and divide the entire sample at this midpoint, we take the set of regions below the mean as 'Low RVA' and above the mean as 'High RVA'. We find that the increase in value added between Low RVA and High RVA regions (highlighted) is highly unequal.

Table 6: Summary statistics across low regional value-added and high regional value-added regions

RVA	2004	2011	Change	CV 2004	CV 2011
Low RVA	15,288	22,338	7,050	103	73
High RVA	45,408	92,537	47,129	45	34

Increases in RVA therefore seem to be concentrated, with high RVA regions cornering higher shares of the increase. The standard deviation (SD) also varies, with the SD of high RVA regions in 2011 being twice that of the low RVA regions. We carry out a ranking of the top 25 regions by VA and as expected, find substantial variations at the regional level as revealed by the color coding. Green represents an increase in ranking and yellow, a decline. Six regions which were in the top 25 in 2004, have dropped out of the list in 2011. The new additions marked green and 'New' are regions of Madhya Pradesh (Rajgarh, Shajapur, Indore, Ujjain, Ghar, Barwani, Dewas, Hoshangabad, Betul, Khargone etc), Gujarat (Vadodara, Panchmahal, Dahod Bharuch, Navsari, Valsad, Sundarnagar, Bhavnagar, Rajkot, Jamnagar, Porbandar etc), Andhra Pradesh (Warangal, Khamam, Karimnagar and Adilabad) and Punjab (Ludhiana, Firozpur, Fatehgarh sahib, Bhathinda, Mansa etc).

Table 7: Region-wise ranking in order of regional value-added (RVA)

Rank 2011	Rank 2004	Region	State	2004	2011	Change	Growth
1	2	272	MAH	84,673	152,128	67,455	0.80
2	7	282	AP	70,249	148,624	78,375	1.12
3	**New**	241	GUJ	36,642	146,435	109,793	3.00
4	10	271	MAH	61,932	144,858	82,926	1.34
5	5	71	DEL	74,411	142,297	67,886	0.91
Average of top 5 Regions				**65581**	**146868**	**81287**	**1.43**

Rank 2011	Rank 2004	Region	State	2004	2011	Change	Growth
6	11	294	KTK	59,218	132,606	73,388	1.24
7	6	91	UP	72,248	127,169	54,920	0.76
8	15	334	TN	48,277	120,948	72,670	1.51
9	9	274	MAH	65,923	119,063	53,139	0.81
10	16	293	KTK	47,605	116,828	69,222	1.45
11	1	93	UP	88,157	116,284	28,127	0.32
12	14	331	TN	53,911	107,189	53,278	0.99
13	8	322	KER	67,056	105,199	38,142	0.57
14	12	275	MAH	57,019	103,170	46,151	0.81
15	13	61	HAR	54,902	97,824	42,922	0.78
16	**New**	233	MP	25,969	96,158	70,188	2.7
17	23	333	TN	39,590	92,159	52,569	1.33
18	**New**	245	GUJ	32,445	79,527	47,082	1.45
19	24	273	MAH	38,690	76,496	37,806	0.98
20	**New**	235	MP	12,038	73,823	61,784	5.13
21	**New**	101	BIH	32,007	73,163	41,157	1.29
22	18	192	WB	44,077	72,182	28,105	0.64
23	**New**	284	AP	13,795	70,956	57,161	4.14
24	**New**	32	PUN	30,563	69,275	38,712	1.27
25	19	201	JRK	43,382	67,625	24,243	0.56

*State wise break-up of NSS Regions provided in Annexure 1

3. Determinants of Inter-regional Differences in Value Added

Given the substantial variations across regions, we examine the determinants of RVA across the two time periods of 2004-5 and 2011-12. Given the significant differences in output as well as variables under consideration across regions, it is important to study certain critical factors that have an impact on output levels. The correlation coefficients and p values have been calculated and provided in Table 8.

Table 8 : Correlation matrix

	Ln RVA	DV	DV SQ	Urb share	Mn_ plus	Skills IV	LnBank offices	LnCredit /branch	Constr	Sq constr	Svstot	Yd
LnRVA	1											
DV	0.13	1										
	0.1											
DVSQ	0.10	0.99	1									
	0.21	0										
Urbshare	0.21	0.57	0.60	1								
	0.01	0	0									
Mn_plus	0.42	0.13	0.12	0.25	1							
	0	0.09	0.14	0								
SkillsIV	0.09	0.61	0.64	0.71	0.16	1						
	0.23	0	0	0	0.04							
LnBank offices	0.89	0.17	0.15	0.18	0.39	0.10	1					
	0	0.03	0.06	0.02	0	0.21						
LnCredit/ branch	0.44	0.54	0.55	0.73	0.37	0.62	0.37	1				
	0	0	0	0	0	0	0					
Constr	-0.01*	0.44	0.43	-0.10	-0.07	0.08	-0.03*	0.06	1			
	0.91	0	0	0.2	0.41	0.31	0.74	0.43				
Sqconstr	-0.07	0.29	0.28	-0.15	-0.11	0.02*	0.09	-0.01*	0.93	1		
	0.4	0	0	0.06	0.17	0.82	0.21	0.9	0			
Svstot	-0.03*	0.91	0.91	0.52	0.06	0.65	0.01*	0.50	0.57	0.46	1	
	0.67	0	0	0	0.45	0	0.93	0	0	0		
Yd	0.22	0.25	0.24	0.07	0.17	0.23	0.04*	0.46	0.40	0.33	0.32	1
	0.01	0	0	0.37	0.03	0	0.62	0	0	0	0	

Note: Against each variable, first row denotes coefficient value and second row the corresponding p value. Coefficients with p values above 0.5 are marked with an asterisk.

We apply a pooled cross sectional regression model across two time periods 2004-5 and 2011-12, to estimate the determinants of value added across regions and test for causality. While there are scholars who have concerns regarding pooling of cross sectional data (Pesaran & Ron, 1995; Robertson & Symons, 1992), proponents of pooling (Maddala, 1991) have acknowledged the potential heterogeneity among cross sectional units but assume that 'the efficiency gains from pooling outweigh the costs'(Baltagi & Griffin, 1997).

Table 9: Determinants of regional value added (RVA)

Independent Variables	Variable Name	Regular		Robust	
		Coef.	t-value	Coef.	t-value
Diversity index	DV	6.7591	2.7***	6.7591	2.76***
Diversity index squared	DVSQ	-4.1374	-2.25***	-4.1374	-2.33***
Urbanisation share	Urbshare	1.1002	2.52***	1.1002	2.01***
Dummy for million plus cities	Mn_plus	0.0995	0.96	0.0995	1.01
Share of high end skills	SkillsIV	0.4298	0.41	0.4298	0.41
Bank branch offices	LnBankoffices	0.8403	19.69***	0.8403	22.44***
Credit per branch	LnCredit/branch	0.0523	0.58	0.0523	0.49
Share of construction	Constr	0.3842	0.18	0.3842	0.17
Share of construction squared	Sqconstr	5.8199	0.98	5.8199	1.11
Share of services	Svstot	-1.302	-3.8***	-1.302	-3.32***
Year dummy (2004-05 as base)	Yd	0.4799	4.57***	0.4799	4.53***
Constant term	Cons	-0.2971	-0.24	-0.2971	-0.23
F(11, 148)	83.19				
Prob > F	0				
Adj R-squared	0.8504				
VIF Test for Multicollinearity					
Mean VIF Value	19				
Breusch-Pagan Test for Heteroscedasticity					
Chi Square	6.78				
Probability (Chi Square)	0.0092				

In Table 9, we put forward the results of the regression model for determinants of value added at the NSS region level. Given that certain variables exhibit strong correlation with each other, before applying other techniques, the data is tested for multi-collinearity using VIF. The average VIF is 19 due to the inclusion of square terms. We also apply the Breusch-Pagan test for

heteroscedasticity and reject the null hypothesis, implying that there is indeed heteroscedasticity in the data. As a result, we run the regression again with robust standard errors. There is no change in the signs of coefficients or significance levels. As can be observed, the coefficient of determination (Adjusted R-squared) is high and F value is statistically significant, therefore, the results can be interpreted meaningfully. We find that the degree of diversification and urbanisation, along with access to finance in terms of outreach, are highly significant. The year dummy coefficient is significant as expected.

Agglomeration: The DV and DV Squared variables are statistically significant. This is a very pertinent finding, since it not only underscores the value of sectoral diversity in determining the levels of regional output, but is also indicative of the fact that there might be a threshold limit beyond which diversity has a negative relationship with output. In other words, while diversification into more than one sector is very desirable and strongly associated with economic development of a region, there may be limits to which a region should diversify. Specialised diversification may be a better model to follow and hence policy makers may be better advised to ensure that already diversified regions consolidate and strengthen their performance in sectors where they have competitive advantage. This also builds the case that while specialisation is risky for long term economic sustainability; specialized diversification appears to be an avenue worthy of examination. Urbanisation rate is also found to be very significant and has a positive coefficient sign. At the same time the fact that the million plus cities dummy is insignificant, gives an interesting insight. This could indicate that urbanisation definitely accounts for growth, but this is not supported by million plus cities alone.

Skills: The coefficient of variable SkillsIV denoting the share of high level skills is positive, though statistically insignificant. The coefficient is the expected positive sign, but its value is not very high. This could be because the share of high end skill levels in the workforce have been low in general, and some part of their impact may be captured by the diversity variable, since skill levels are directly associated with the levels of diversity. Not all growth is propelled by high end skills alone, given that a large proportion of employment in certain states continues to be significantly agrarian, although these shares are changing. This is reflected by the significance of the share of employment in services. The coefficient is negative possibly due to the nature of construction of the value added variable which includes employment shares and workforce

participation rate. Given that service sector employment is in highly productive sectors, it is seen to go hand in hand with a reduction in workforce participation rate.

Access to Finance: The study confirms a very strong association of regional value added with the number of bank branches in the region while the volume of transaction per branch, measured as credit in Rs. Lakhs does not appear to be very significant. The signs of both variables are as expected (positive). This underscores access to finance as a critical growth-driver and builds the case for Government schemes like the Jan Dhan Yojana to expand beyond opening of accounts and go the extra mile in ensuring access, either through expanding branch networks, or taking banking to people's doorsteps through a robust banking correspondent model. It is evident from the data that access to finance through the formal institutional network is essential for high regional output levels and hence policy measures to boost financial inclusion are likely to result in a direct impact on the local economy.

4. Summary

Our analysis of regions across India over 2004-5 and 2011-12 reveals significant increases in value added during this period coupled with differences in the level of increase across locations. The results confirm our hypothesis that while the relative rankings across states remain fairly unchanged, the rankings across regions, especially the top 25, vary significantly. We note the rise of Madhya Pradesh and specifically its regions of Ujjain, Indore, Dewas etc which are new entrants in the list of top 25 NSS regions by value added.

From a methodological standpoint, our paper attempts to deepen the lens of regional analysis, through four fresh aspects. Firstly we begin with state level analysis and then move one step ahead by considering the NSS region as the unit of analysis to examine differences at the sub-state level, by applying the principle of heterogeneity. We calculate value added at the regional level for the first time in India using appropriate techniques following the UN Habitat guidelines and adapted by other scholars. This is unique since this measure of value added covers both formal and informal sector output and is hence provides a more holistic picture of regional level output. This is of particular importance in a country like India where the unorganized sector accounts for the lion's share of total employment.

We find that much of the RVA differences can be explained by agglomeration economies and access to finance related factors. We observe that specialized diversification is emerging as an interesting trend in high growth regions and has the potential to be examined as an important aspect of regional and industrial planning. Our results indicate that there are thresholds to the ability of diversification in high growth regions thus pointing in the direction of specialised diversification, which has not been studied so far in the Indian context. We also find that higher levels of urbanisation account for higher output levels, and this experience is not restricted to million plus cities alone. This builds a case for investment in the smaller cities as possible growth engines.

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