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ABSTRACT

Measuring Performance: Ranking State Success over Two Decades in India*

This paper proposes new composite measures of relative and dynamic state performance to improve governance and delivery of public programs in developing countries with a federal structure. We rank the performance of 19 major Indian states on two large development programs launched by the Indian government over the last two decades using publicly available data. Although we find volatility in performance over time, there exists a positive correlation between measures of state capacity, development and accountability with program outcomes. Our findings have important implications for both the design and implementation of public service programs of such large scale.

JEL Classification: H4, I38, O18, C43, R42

Keywords: MGNREGA, PMGSY, ranking, Indian states, public good delivery, state capacity, accountability, corruption, convergence

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1 Introduction

Recent research on status incentives (World Bank (2014)) has shown that ranking schemes which confer feelings of pride or shame may be a cost effective way to shift state actions.[1] India's strong federal structure provides a fertile space for experimenting with the use of rankings to incentivize better performance on development programs. In this paper, we focus on two large public programs in India and create some composite indicators of performance which are then used to provide ranking of India's major states. Our methodology can be applied to improve governance and the delivery of public programs in other countries with a federal structure.

We compare the performance of major Indian states on various composite indices for two development public programs launched by the federal government of India over the last two decades. Given the limited scope of linking programs with final outcomes (e.g. poverty alleviation, structural transformation, market integration, trade) due to limitations on data availability, we use publicly available data on metrics of performance to compare states. While funding for these programs is centralised, the implementation depends on the state level. We provide a novel within country comparison in order to isolate the patterns that drive program success with the goal of identifying best practices across states and to understand the drivers of success. We also investigate whether states are converging on these metrics over time. The answers to these questions have important implications for the design of public service programs of such scale, besides the use of our indicators for comparing and incentivizing states on a regular basis.

The first program we study is the Mahatama Gandhi National Rural Employment Guarantee Act (MGNREGA, 2005) that mandates the provision of 100 days of manual work on publicly funded projects to rural households in India – the second largest poverty alleviation program in India and the largest employment guarantee program in the world (Anderson et al. (2013), Ambasta et al. (2008), Afridi et al. (2021)). The main objective of the program

[1] Available at `https://www.worldbank.org/en/publication/wdr2015/about#1`.

is social protection through the provision of employment, but it also creates durable assets for the community (e.g., irrigation canals, ponds for water conservation, development of land for cultivation by socially disadvantaged groups and other rural infrastructure). Between 2011-19, the annual MGNREGA budget ranged from US$ 4.1 to 8.33 billion, generating 1660 to 2680 million (Kapur and Paul (2019), Kapur and Paul (2020)) person-days of work. The second program, the Prime Minister's Gram Sadak Yojana (PMGSY) aims to provide all-weather roads to connect unconnected rural habitations.[2] It is a federal government scheme and the budget was initially entirely borne entirely by it[3], funded via the tax on diesel. Over 19 years (2000-2018) since the program's roll out, more than 550,000 kms of rural roads have been constructed at a cost of US$ 40 billion (Goyal (2019)).

Using data from 19 major states, covering 96% of India's population (Census 2011), we create metrics based on publicly available data to compare state performance on MGNREGA and PMGSY. The patterns that emerge help to understand the criteria for success and failure in performance and suggest which states could be treated as best practice models for implementation. We focus especially on administrative capacity and accountability as two key factors that affect state success.

For MGNREGA, we construct indicators to measure both demographic and financial coverage and their intensity. While coverage measures the extent of the program both in terms of how many people the program employs and how much is spent, intensity is a measure of the intensive margin in the sense that it measures how many days of employment each program participant gets under the program and how much is spent on each participant.[4] We carry out both a static analysis (based on average performance over the entire sample period) and a dynamic analysis which captures the movement of the states on the performance indicators over the course of our sample period, 2011-12 to 2018-19.

[2]A habitation is defined as a "cluster of population, living in an area, the location of which does not change over time." It is a sub-village unit.

[3]PMGSY was funded entirely by the federal government till 2015-16. Subsequently, the funding pattern was changed to 60:40 between the federal and the state governments with hilly states and the north-eastern states being exceptions where 90% of the funding is borne by the federal government.

[4]We discuss in detail the construction of these indicators in Section 4.2.

Generally, states which do well on coverage also tend to do well on intensity. However, there are important exceptions which need further analysis. In terms of overall performance, some states perform consistently better. Over the 8 year period, we find evidence that there is convergence in intensity but not in coverage and with a few exceptions, states seem to perform similarly in targeting disadvantaged groups as they do overall.

For PMGSY, we construct indicators to measure length of road constructed (both new road and upgraded road construction), costs per km, contractor concentration, timeliness and road quality. Similar to the analysis for MGNREGA, we carry out both a static analysis and a dynamic analysis covering the period 2000-01 to 2018-19.[5] In contrast to the performance of states on MGNREGA indicators, we see that there are very few states which perform consistently across all indicators with very little correlation on performance across the different indicators. Unlike MGNREGA, we do see convergence across states for most of the indicators.

We highlight some interesting differences between MGNREGA and PMGSY that could be driven by the nature of the two programs: while in the case of MGNREGA, states which do well are likely to do well on all indicators while in the case of PMGSY, there is little correlation between performance on different metrics. Second, given the nature of road building over a core network, and the bigger role of the federal government, it is not surprising that we see more convergence under PMGSY.

We also ask if state capacity, corruption and level of development of the state are correlated with performance of the states on these two programs.[6] While we claim no causal relationships in this section, we show that districts with higher (district level) state capacity in 2001 performed better on the MGNREGA indicators calculated using data between 2011-12 and 2018-19, with the relationship being much stronger for intensity than coverage. For PMGSY, although for most indicators we see a positive correlation between measures of state capacity and program performance, it is not across the board as seen for MGNREGA.

[5]See Section 5.2 for details regarding the construction of the indicators.
[6]Refer to Section 6 for details.

As expected, program performance under both MGNREGA and PMGSY seem to be better in areas with lower corruption. Lastly, although program performance under both programs seem to be better in areas with higher per-capita income, higher Human Development Index (HDI) measures are more highly correlated (positively) with MGNREGA performance than with PMGSY performance.

There is now considerable research that suggests performance indicators in the form of rankings offer prestige to exemplary performance and shame under-performance thus spurring states to perform better (World Bank (2014)). Numerical ranking exercises like the one we do in this paper are performed by various international institutions such as World Bank's Doing Business rankings and the United Nations' Gender Empowerment Measure to benchmark state action and enable comparisons across nations (Doshi et al. (2019)). Performance indicators can be important instruments in creating social pressure and fostering competition among states thus motivating state action (Davis et al. (2012), Kelley and Simmons (2015)). At the sub-national level, in the Indian context, various government committees have recommended that performance indicators be a major criteria in deciding the allocation of federal funds to states with some of these recommendations having been implemented by successive federal governments (Rao and Singh (2007), Fan et al. (2018)).

Given the diversity of culture, values and administrative capacity across states in India, public ranking of state performance can motivate state governments towards meeting national development objectives. Although there exists a rich literature on both the MGNREGA and PMGSY programs in India, to the best of our knowledge, our paper is the first attempt at comprehensively assessing the performance of major states of the country and ranking them on a variety of metrics. Sukhtankar (2016) surveys the evidence on MGNREGA for the 10 years since its inception, relying only on serious theoretical and empirical research, to conclude that (1) there is large heterogeneity in implementation, (2) that access is rationed even in the best states, (3) the poorest states do the worst. Anderson et al. (2013) carry out a survey (pre-treatment) in 2 blocks of Ahmednagar district in Maharashtra over

3 months of the year 2012-2013. They provide some detail on the problems that plague MGNREGA implementation especially on last mile delivery - too little of the actual demand is registered, delays in receipt of (full) payments, and a high level of administrative complexity. Saha and Debnath (2015) carry out a comparison of "implementation efficiency" of MGNREGA across states in India based on outputs such as employment generated (extensive and intensive margin, similar to us) and the creation of assets which we do not include due to reasons discussed later. They give efficiency scores to states - from 2008-9 to 2013-14 - while we provide more detailed analysis of several different metrics. Similar to us, and other studies (e.g. Chakraborty (2007) who uses data upto 2006 to show that poorer states have substantial underutilized budgets), they find that poorer states and states with lower literacy perform worse. Farooquee (2013), using a smaller set of metrics than us, arrives at a ranking very similar to the one we propose.

Ramasamy (2015) studies the average expenditure for the period 2000-2010 incurred by various states and improvements brought about in the rural sector through PMGSY. Improvement is measured in terms of 'Progress of Total Area of New Connectivity' and 'Progress of Total Area of Roads Upgraded' for the period 2005-12. The results suggest that the program expenditure is uneven across states.[7] Kapur and Chowdhury (2011) analyzes the overall trends in allocation and expenditure under the PMGSY scheme, state-wise progress on road works completed and overall progress in ensuring rural connectivity. From time to time several government reports have also analyzed the performance of PMGSY at inter-state level based on a limited sample.[8]

The aforementioned papers which carry out a similar exercise like us, base their rankings

[7]There is a significant literature which looks at the effect of PMGSY on different economic outcomes – market integration (Aggarwal (2018)), education (Adukia et al. (2020), occupational choice (Asher and Novosad (2020)) and agricultural production (Shamdasani (2021)).

[8]Programme Evaluation Organisation Planning Commission (2010) evaluates rural roads components of Bharat Nirman, launched by the Government of India in 2005 in order to provide some basic amenities like irrigation, roads, water supply, electrification, and communication to rural India between 2000-09) covering 14 districts and 1380 households spread over 7 states. Ministry of Rural Development (2004) conducts an independent assessment of the socio-economic impact of the PMGSY on the lives of rural people in 9 states for a sample of 1380 households.

on a smaller set of performance and limited data in terms of time period and number of states compared to our paper. In contrast, our study focuses on all the major states over a significantly longer time period - 2011-12 to 2018-19 for MGNREGA and 2000-01 to 2018-19 for PMGSY - and base our rankings of states on a comprehensive range of performance metrics constructed in a similar manner as that of the indices of the Human Development Index. In addition, we study the dynamics of state level performance to measure convergence (or divergence) across India based on our metrics. We also correlate the performance of states under MGNREGA and PMGSY with various measures of state capacity, corruption and economic development.

The rest of the paper is organised as follows: Section 2 provides a brief description of the two programs. Section 3 describes the data sources. Section 4 looks at the inter state comparison for MGNREGA, while Section 5 looks at the case of PMGSY. Section 6 analyses the determinants of success and Section 7 concludes.

2 Background

The MGNREGA envisions a rights based approach - rural adults can demand work at a mandated minimum wage. Unlike the typical government transfer programs which either provide public goods (e.g., road construction) or private goods (e.g., subsidized foodgrains and school meals), the MGNREGA is unique in delivering both types of goods since it is a workfare scheme aimed at creating rural infrastructure. Moreover the program has mandated audits of program expenditures at the village level. Village level elected bodies have a direct role in the implementation of MGNREGA. The federal government pays all labour related costs (mandated to be 60% of costs) while states pay the materials costs (mandated to be 40% of costs)(Afridi et al. (2021)). The program was initially implemented in the country's poorest 200 districts in February 2006, with 130 additional districts added in the next stage (2007) and national coverage thereafter (2008). MGNREGA has been one of the flagship

schemes of the Ministry of Rural Development, with almost half of the federal government's allocations for rural development being spent on this scheme alone - US$ 4.1 to 8.88 annual MGNREGA budget between 2011-12.[9]

The preamble to the National Rural Employment Guarantee Act, 2005 states its main objective clearly – 'to provide for the enhancement of livelihood security of the households in rural areas of the country'. It also allows for secondary objectives – 'and (to provide) for matters connected therewith or identical thereto'. The program's operational guidelines list several secondary objectives: (i) social protection for the vulnerable among the rural population, (ii) creation of durable assets, improved water security, soil conservation and increasing land productivity, (iii) drought proofing and flood management, (iv) empowering the socially disadvantaged, including women, Scheduled Castes (SCs) and Scheduled Tribes (STs)[10], and (v) improving governance.

However, the preamble to the Act also states the means by which its objectives are to be met – 'by providing at least one hundred days of guaranteed wage employment in every financial year to every household whose adult members volunteer to do unskilled manual work'. The extent to which the demand for work under the Act was fulfilled is conceptually measurable and specific to MGNREGA. But there has been a significant gap between the average work demanded by potential beneficiaries and actual work provided under MGNREGA. On average, from 2014-15 to 2018-19, 89% of the households who demanded work have received work under the scheme. The number of person-days of work generated during the period 2011-12 to 2018-19 ranged from 1660 to 2680 million, but the average person-days of work generated per household have remained less than 50 (Kapur and Paul (2019), Kapur and Paul (2020)).

[9]Exchange rate as of 12 June, 2021 to convert expenditure in INR to US dollar.

[10]Scheduled Caste (SC) is an administrative category, which refers to a number of social groups (castes) who are economically and socially backward and have been historically subjected to discrimination. Similarly, Scheduled Tribe (ST) is another administrative category which comprises of a group of indigenous tribes who are economically and socially backward. Both SCs and STs are identified in a schedule of the Indian Constitution and both of these groups are beneficiaries of affirmative action policies in India (Deshpande (2011)).

The PMGSY, launched in 2000, aimed to provide all-weather roads to connect all unconnected habitations in rural areas with a population of 500 in plain areas and 250 in the case of hilly states, tribal and desert areas. Road construction was prioritized using population categories with the population figures corresponding to the 2001 Census. Habitations with populations of 1,000 or more were to be connected first followed by habitations with populations of 500-1000 followed by habitations with populations of 250-500 in eligible areas. A core network of roads was drawn up which was defined as the minimal network of roads which was required to provide basic access to all eligible habitations. Only roads that formed a part of this core network could be built (National Rural Roads Development Agency (2005)). Initially the program cost was borne entirely by the federal government while road maintenance was to be done by states. From 2015-16, however, the funding pattern was changed to 60:40 between the federal and the state governments for most states[11].

The scale of this program is large - between 2000-01 to 2016-17, the federal government's budget allocations to PMGSY have ranged from US$ 0.34 to 2.71 billion, approximately. There was a huge spike in allocation after PMGSY was included in the government's flagship 'Bharat Nirman' program in 2005. The total expenditure under PMGSY since 2000-01 has been about US$ 40 billion (Goyal (2019)). Between 2000 and 2017 (January) 487000 kilometres of road were built or upgraded under the scheme, equivalent to about 80 kilometres per day on average (Kapur and Srinivas (2017)).

3 Data

We obtain MGNREGA program data from the MGNREGA Public Data Portal.[12] We restrict our analysis to 19 major states - Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand and

[11] Hilly states and the north-eastern states are the exceptions with 90% of the funding being borne by the federal government even post 2015-16.

[12] `https://nregarep2.nic.in/netnrega/dynamic2/DynamicReport_new4.aspx`; scraped in May 2020.

West Bengal.[13] Moreover, we restrict our analysis to the years 2011-12 to 2018-19 (both inclusive) due to data availability.

We obtain our data on PMGSY from its Online Management, Monitoring and Accounting System. We restrict our analysis to the same 19 states mentioned above, except we incorporate data for Telangana into Andhra Pradesh for the entire period, so that geographic boundaries of states in our sample stay constant over time[14]. Our data contain details on all works sanctioned up to financial year 2018-19. Lastly, we restrict ourselves to PMGSY-I, since it has been in existence since 2000 and therefore provides a longer time-span for analysis relative to the later programs.[15]

We also use data from the 68th round of the National Sample Survey (NSS) in conjunction with state-level poverty line estimates for 2011-12 contained in the Tendulkar Committee Report to estimate poverty rate as well as the Consumer Price Index (Rural Labourers) state series released by the Labour Bureau of the Ministry of Labour and Employment, Government of India to deflate expenditure.

To correlate the performance of states under MGNREGA and PMGSY with various measures of state capacity, corruption and economic development, we measure various indicators of state administrative capacity at the district level using the 2001 Census.[16] Data for Human Development Index (HDI) and per-capita Net State Domestic Product (NSDP) are taken from Global Data Lab and the Ministry of Statistics and Programme Implementation respectively.

Data for corruption indicators is taken from Centre for Media Studies (CMS)- India

[13]There are 29 states and 7 Union Territories (UTs) in India. We exclude UTs since they are administered by the federal government, the North-Eastern states (except Assam), Goa and Jammu & Kashmir. We exclude Telangana since data for Telangana is missing from the MGNREGA Public Data Portal.

[14]The state of Telengana was split off from Andhra Pradesh in 2014.

[15]PMGSY-I is the first phase of the PMGSY program which we study. Two subsequent phases, PMGSY-II and PMGSY-III were started in 2013 and 2019 respectively. The later phases deal with upgradation of existing roads whereas the main focus of the original program, which we study, focused on building new roads to provide access to unconnected rural areas.

[16]We use variables like the sex ratio (females per thousand males), literacy rates, access to household amenities such as electricity, tap water and access to banking facilities as measures of state administrative capacity.

Corruption Study 2017, Transparency International's India Corruption Survey 2005 and Debroy and Bhandari (2011).[17] The first data set, CMS- India Corruption Study 2017, covers both rural and urban locations in 20 states, capturing corruption prevailing in the G2C (Government to Citizen) phase. It captures people's perception and experience with public services. It further estimates the amount paid as bribe by citizens to avail public services during the previous year. We use variables like the percentage of citizens who have heard about RTI in 2007 along with percentage of households that have experienced corruption in 2005 from this study. The second data set, Indian Corruption Study 2005, focuses on petty corruption experienced by the common man in availing of public services. This study contains a sample of 14,405 respondents, spread over 151 cities and 306 villages of 20 states. We have taken two corruption indicators from this survey: composite corruption score and mean direct experience of bribing. The last data set from Debroy and Bhandari (2011) has state level variations on anti-corruption efforts brought out with the help of an index constructed using data from 4 five year periods – 1990-95, 1996-00, 2001-05, and 2006-10.

4 Inter-state Comparison of MGNREGA Performance

4.1 Indicators of Program Success

Demand for work under MGNREGA has two facets - *coverage*, i.e. the number of people requesting work; and *intensity*, i.e. the quantum of employment demanded by the various potential participants. Official statistics record the numbers of people who demanded and received work. However, there are some limitations of official data on demand fulfilled (Anderson et al. (2013), Dutta et al. (2014) and Khera (2011)). Thus, we derive alternative indicators of program success. In doing so, we draw insights from the choice of indicators

[17] Afridi and Iversen (2014) is the only study that uses official social audit data from Andhra Pradesh between 2006 and 2010 to construct objective measures of irregularities in MGNREGA implementation at the GP level. Such audit data are largely unavailable publicly for ready analysis in most states.

used in the literature. First, poverty rates are commonly used as a proxy for the underlying demand for MGNREGA work ((Chakraborty, 2007); (Ghosh, 2013)). This choice has a logical basis – the program is self-targeting, the character of the work is manual labour and the wage rate is low, leading to the obvious conclusion that poor people would be the prime driver of demand. States with a higher proportion of poor, therefore, would be expected to have a higher underlying per-capita demand for MGNREGA work. Second, there is an attempt to evaluate how well the program performs for socially disadvantaged groups, especially women ((Bonner et al., 2012)). Third, there are attempts to evaluate the quality and durability of assets created under the program ((Farooquee, 2013)). While we acknowledge that the quality of the assets created under MGNREGA is important, our access is limited to official statistics, which contains no useful information about asset quality. We do not believe that proxying asset quality by the number of households employed per work undertaken, as in Farooquee (2013), is appropriate since the nature of assets required are very sensitive to local geography, there may be substantial differences in the scope of a work across states, and the measure does not account for efficiency or the difficulty level of the work.

4.2 Static Analysis

Keeping in consideration the principles outlined above, we derive four base indicators to measure different aspects of MGNREGA coverage and intensity.

- *Demographic Coverage*: yearly average of total persons worked under the program (official MGNREGA data) as a proportion of the 2011 rural adult population (Census 2011) below the poverty line (NSS in conjunction with Tendulkar Committee Report).

- *Financial Coverage*: the inflation adjusted average yearly expenditure (official MGNREGA data) per 2011 rural adult below the poverty line. We adjust for inflation to 2011-12 prices using the Consumer Price Index (Rural Labourers) of the Ministry of

Labour and Employment.

- *Demographic Intensity*: the average number of days worked per program participant from official MGNREGA data portal.

- *Financial Intensity*: the inflation adjusted average yearly payment per program participant using official MGNREGA data.

We also derive composite indicators which combine two or more of the base indicators. Since the four base indicators are all expressed in different units, we first normalize them using the formula *(value - benchmark)/(max - benchmark)*, analogous to the formula used to derive the dimension indices of the Human Development Index. Indices so calculated are unitless, lie between 0 and 1, and retain both the ordering and relative distance between different values and the benchmark. We set the benchmark to be the minimum value across states of the corresponding indicator. This value measures the performance of a state i relative to the best and worst performing states. Thus, if the best (worst) performance increases (decreases), the value for state i goes down (up) and vice versa. The composite indicators are calculated as geometric means of various constituent indices, analogous to the Human Development Index calculation. Due to its concavity, the geometric mean does not treat its constituents as perfect substitutes and rewards consistent performances across constituents. We calculate three composite indicators.

- *Composite Coverage*, with the Demographic Coverage and Financial Coverage indicators as constituents.

- *Composite Intensity*, with the Demographic Intensity and Financial Intensity indicators as constituents.

- *Composite Overall*, with all four base indicators as constituents.

Additionally, we also derive three indicators measuring how well the program has targeted disadvantaged groups, focusing on Scheduled Castes (SCs) and Scheduled Tribes (STs). Since

official MGNREGA data does not separately measure payments to SC and ST households, we cannot calculate financial indicators and must restrict ourselves to demographic indicators.

- *Demographic Coverage (SC/ST)*: the yearly average of the total number of SC and ST households which participated in the program (official MGNREGA data) as a proportion of the total number of SC and ST households in Census 2011 who are below the poverty line (NSS and Tendulkar Committee Report to calculate SC/ST specific poverty rates).[18]

- *Demographic Intensity (SC/ST)*, defined as the average days worked per participating SC and ST household based on official MGNREGA data.

- *Composite Demographic*, with the two previous indicators as constituents.

4.3 Rankings on MGNREGA

The values of the seven general indicators, as well as rankings derived from them, are presented in Table 1. Demographic coverage is generally high, with several states providing employment to more persons than the total number of rural adults below the poverty line in 2011. However, there is considerable variation - the maximum (Andhra Pradesh) and minimum (Bihar) demographic coverage rates differ by a factor of 15. The financial coverage indicator also shows considerable variation, with different states spending as little as INR 1,173 (Bihar) or as much as INR 20,065 (Kerala) on average per year (in 2011 prices) per rural adult below the poverty line in 2011. The intensity indicators are far less variable, indicating a more uniform performance between states with Kerala being the top ranked on both demographic and financial intensity. Figure 1 shows the performance of various states on the composite coverage and composite intensity indicators. Kerala, due to its top-notch performance on both coverage and intensity, is the standout.[19] Overall, the worst performing

[18]We cannot calculate the intensity indicators analogous to the general case since official MGNREGA data does not capture the number of SC and ST *persons* receiving employment.

[19]Figures A.1 and A.2 in the Appendix shows the performance on composite coverage and intensity for the general category.

states are Bihar, Gujarat, Karnataka, Assam and Uttar Pradesh.

As mentioned previously, we also look at program performance separately for two disadvantaged groups, Scheduled Castes (SCs) and Scheduled Tribes (STs) since one of the key stated objectives of the program is to empower socially disadvantaged groups such as SCs and STs. The values of the three SC/ST indicators, as well as rankings derived from them, are presented in Table 2. Andhra Pradesh has the highest proportion of SC and ST households participating to total 2011 SC and ST households below poverty line at 3.09. [20] In general, coverage levels are low, with a median indicator value of 0.94. Low SC and ST coverage indicates that the poorest (often SCs and STs) derive less benefit from the program than the (lower) middle class in some states. This is in line with the results in (Liu, 2012) based on an analysis of 2009-10 National Sample Survey data. There is less variability in the intensity indicator, with maximum of 56.28 days (Kerala) and a minimum of 26.97 days (Assam) of employment provided per SC or ST household.[21] While there is, in general, a positive correlation between coverage and intensity indicator values, Maharashtra stands out as an exception with a decent performance on intensity (rank 5) but an extremely bad performance on coverage (rank 19). Tamil Nadu, Andhra Pradesh, Himachal Pradesh and Kerala are the best overall performers with composite overall indicator values of over 0.75; while Bihar, Assam and Maharashtra are the worst, with overall indicator values of under 0.10.

See Figure 2 to get a quick overview (based on the composite coverage and intensity indicators) of states performance on MGNREGA. Overall what we observe is that the group of states that perform well on coverage Himachal Pradesh, Andhra Pradesh, Kerala and Tamil Nadu, also perform well on intensity, both for general population and SC/ST.

[20] A further five states have high coverage indicator values of between 1.82 and 3.01 - Himachal Pradesh, Tamil Nadu, Uttarakhand, Kerala and Punjab.

[21] Apart from Kerala, four other states provide over 50 days of employment per SC or ST household - Andhra Pradesh, Tamil Nadu, Rajasthan and Maharashtra. At the other end, in addition to Assam, three other states provide under 35 days of employment per SC or ST household - Punjab, Haryana and Uttar Pradesh.

4.4 Dynamic Analysis

In this section, we analyze how the various indicators move over the eight years our data cover (2011-12 to 2018-19, both inclusive). We calculate indicators in the same way as above; however, while calculating the constituent indices of the composite indicators, we set the minimum and maximum values equal to the minimum and maximum values achieved by the associated indicator across all states and across the eight years. Changes in the values of the seven general indicators from 2011-12 to 2018-19, along with ranks derived from them, are presented in Table 3. Graphs showing the evolution of all the seven indicators over time are presented in the Appendix (Figures A.3–A.9).

From Table 3, which presents results for the general population, we see that ten of the nineteen states increase demographic coverage over the eight year period, while nine decrease. Punjab and Andhra Pradesh do the best over time while the most deterioration is seen for Tamil Nadu. The situation is better with regard to financial coverage, with only four states seeing declines in real expenditure. Kerala and Andhra Pradesh stand out, increasing their outlay by over INR 9,000 per rural adult below the poverty line in 2011 while the biggest decline of INR 1,547 is seen in Tamil Nadu. Overall, Andhra Pradesh is the most improved state on composite coverage, while the greatest deterioration is seen for Tamil Nadu.

Changes in the intensity indicators paint a different picture, with far more improvements. From Table 3, we see that West Bengal records the largest increase in demographic intensity, providing an extra 26.80 days of employment to each participant in 2018-19 compared to 2011-12. Four states see minor deterioration with up to 5 fewer days of employment per participant - Himachal Pradesh, Uttarakhand, Maharashtra and Assam. The situation is even better with regard to financial intensity, all but two states (Himachal Pradesh and Maharashtra) seeing an rise in the (real) outlay per participant. Again, West Bengal improves the most followed closely by Kerala. Overall, West Bengal is by far the most improved on composite intensity while Himachal Pradesh fares the worst. Interestingly, when we view these results together with the static analysis, Karnataka is among the worst performers on

intensity (static), but it improves substantially over time.

To summarize, we see that from Table 3, no state saw a decline in both coverage and intensity. However, there is not much correlation between changes in coverage and intensity, indicating that different factors drive improvements in either. Intuitively, coverage may be improved by better outreach and promoting new works in districts which have historically employed few people; while intensity may be improved by sanctioning more works in districts which have historically employed many people and by increasing wages. West Bengal's outstanding improvements are focused on intensity, while Andhra Pradesh's and Punjab's improvements are focused on coverage. Only Kerala sees large improvements in both. This is reflected in changes in the composite overall indicator.

Combined with the results of the static analysis, the above results reveal that Kerala and Andhra Pradesh are simultaneously among the top performing and most improved. Himachal Pradesh, on the other hand, is among the top performers but sees a deterioration in performance over time. Uttar Pradesh is among the worst performing states and also sees a deterioration over time.

Do states converge over time? In Table 4, we try to check for convergence by regressing Compound Annual Growth Rates (CAGR) on the earliest values (2011) of each indicator. A negative and statistically significant coefficient would indicate that states with lower initial values are growing faster compared to states with higher initial values thus indicating convergence across states. We see from Table 4, that as suggested by Figure A.8, there is indeed convergence on the intensity indicators. We also find evidence for convergence on the overall composite indicator. However we find no such convergence in the coverage indicators. This is a puzzling fact that needs further exploration.

Coming now to the SC/ST population, changes in the values of the three SC/ST indicators from 2011-12 to 2018-19, along with ranks derived from them, are given in Table 5. Graphs depicting the values of the these indicators in each of the eight years are presented in the Appendix (Figures A.10 to A.12).

From Table 5, we see that all but six states increase coverage of SC and ST households over time. Punjab sees the largest improvement by far, with the largest deterioration occurring in Tamil Nadu. All but five states see increases in intensity. The most improved state is one of the worst performing on coverage - West Bengal, which sees a monumental increase of 48.32 days of employment on average per SC or ST household. Andhra Pradesh sees the most drastic decline of 15.29 days per SC or ST household. Figure A.11 in the Appendix, however, reveals that intensity is quite volatile over time.

Overall, despite West Bengal's poor showing on coverage, its stunning improvement in intensity catapults it to pole position when changes to the composite overall indicator are considered. Its indicator value increases by 0.30, followed by Kerala, with an increase of 0.26. Five states saw declines of between 0.03 and 0.09 - Uttar Pradesh, Andhra Pradesh, Jharkhand, Haryana and Tamil Nadu. .

Taken together with the static analysis for SC/ST (Table 2), this analysis reveals that some states e.g. Kerala and Rajasthan perform well and improve with time; others e.g. Tamil Nadu and Andhra Pradesh perform well but deteriorate over time; and still others e.g. Haryana perform badly and also deteriorate over time.

Significantly, Kerala, West Bengal and Punjab are amongst the four most improved states on both the general and SC/ST dynamic indicators. Andhra Pradesh, on the other hand, is amongst the most improved on the general indicators but amongst the least improved on the SC/ST indicators. Uttar Pradesh and Haryana are among the least improved on both general and SC/ST indicators.

5 Inter-State Comparison of PMGSY Performance

5.1 Indicators of Program Success

We measure five aspects of the PMGSY program - road completion rates, cost efficiency, contractor concentration, timeliness, and quality. We exclude indicator values derived from

less than 25 underlying observations from our analysis as they are very unlikely to be representative or informative.

5.2 Static Analysis

Completion Rates. Given the uneven distribution of the core network among states, we focus on completion rates rather than total length.[22] We derive three indicators of completeness.

- *Completion Rate (New) Indicator*: percentage of new road length required to be built to complete the core network in 2000 which have been completed as of 31 March, 2019.
- *Completion Rate (Upgrades) Indicator*: percentage of cumulatively identified upgrade works length that have been completed as of 31 March, 2019. We obtained the total length of completed upgrade works directly from official PMGSY data. [23]
- *Composite Completeness Indicator*, calculated analogously to the composite indicators in MGNREGA, with the Completion Rate (New) and Completion Rate (Upgrades) as its constituents.

Cost Efficiency. We focus on the expenditure per kilometer of completed road. We obtain both completed road length and total expenditure from official PMGSY data. We deflate total expenditure figures using the Consumer Price Index (Rural Labourers) as for MGNREGA. Since we do not have information about how expenditure on any given work was distributed across time, we attribute the entire expenditure to the financial year in which the work was completed, and deflate it using that year's index value. We derive three indicators of cost efficiency:

[22]The program guidelines aimed to connect all habitations based on population thresholds (based on Census 2001), starting with larger habitations. Because of these rules, villages that were above these somewhat arbitrary thresholds were prioritised. For details on the core network see `https://darpg.gov.in/sites/default/files/PMGSY_0.pdf`

[23]The total length of cumulatively identified upgrade works is not directly captured in the official data. We estimate this using two separate sets of official data - one of all proposals that have been made under the program, and another of works currently identified as pending.

- *Cost Efficiency (New) Indicator*: the average cost in lakh[24] (0.1 million) INR of each kilometer of completed new road length.

- *Cost Efficiency (Upgrades) Indicator*: the average cost in lakh INR of each kilometer of completed upgrade works.

- *Composite Cost Efficiency Indicator*, with the two other cost efficiency indicators as constituents. With cost efficiency indicators, lower values are more desirable than higher values. Therefore, the indices derived from the constituents measure the relative distance from the minimum rather than the maximum (using the formula *(benchmark - value)/(benchmark - min)*, with the benchmark set to the empirically found maximum across states value of the corresponding indicator, so that the resulting indicator is ordered in the traditional way, i.e. higher values are more desirable.

Contractor Concentration. We use the Herfindahl Hirschman Index (HHI)[25] value of less than 0.15 as 'unconcentrated'; between 0.15 and 0.25 as 'moderately concentrated'; and over .25 as highly concentrated. We derive a single Contractor Concentration Indicator, defined as the absolute distance of the average district level HHI from 0.2.

It is reasonable to expect that more competitive bidding for contracts would be associated with a good overall performance. However, the antitrust literature holds that excessive fragmentation in capital intensive industries is inefficient as players do not function at an efficient scale. An inverted-U shape relationship between concentration and efficiency is widely accepted (see e.g. Aghion et al. (2005)) - cost reductions from increasing scale initially dominate the weakening of competitive constraints resulting from increasing concentration, with balance attained at the peak and shifting the other way to its right. While curves for different industries peak at different points depending on characteristics of individual production processes, some guidance on desirable levels of concentration may be sought from

[24]Lakh is an Indian unit of measurement which corresponds to 100,000 or 0.1 million.

[25]An index of market concentration obtained by summing the squares of market shares of each player. It takes values between 0 (perfect competition) and 1 (monopoly), though it is sometimes multiplied by 10,000 for ease of exposition.

the experiences of antitrust authorities. US authorities consider markets with a Herfindahl Hirschman Index (HHI) value of less than 0.15 as 'unconcentrated'; between 0.15 and 0.25 as 'moderately concentrated'; and over 0.25 as highly concentrated.

Given the capital intensive nature of road-building, we expect efficiency to be maximized somewhere in the moderately concentrated market range. For our purposes, we consider the midpoint, i.e. 0.2. We derive a single *Contractor Concentration Indicator*, defined as the absolute distance of the average district level HHI from 0.2. We initially calculate the HHI at the district level, since tenders are floated at this level, and for the state level analysis we average using the total road length of contracts awarded in a district as weights. We obtain the identities of the contractor for each work from official PMGSY data. Since works are awarded through an online tendering process, and there are very few works awarded in any given year, we calculate the HHI using contracts awarded over the entire period in the concerned geography.

Timeliness. We obtain data on the stipulated and actual dates of completion in the official PMGSY data to derive three indicators related to timeliness.

- *Delay Coverage Indicator*: the proportion of completed projects for which the actual date of completion was later than the stipulated date of completion.
- *Delay Intensity Indicator*: the average delay per kilometer within delayed projects.
- *Composite Delay Indicator*, with the other two delay indicators as constituents. Like the Composite Cost Efficiency Indicator, the constituent indicators are ordered such that lower values are more desirable, so we measure the relative distance from the minimum using the maximum as the benchmark in calculating the corresponding indices.

Quality. We use official PMGSY data on quality inspections by National and State Quality Monitors (NQMs and SQMs). The data indicate that quality inspections only began in 2010, so the time span for quality data is more recent. We calculate three indicators:

- *Quality Coverage Indicator*: the percentage of inspectable road length that was inspected by either an NQM or SQM at least once. Quality monitors often inspect works under progress, so we considered all works which were either sanctioned or completed during our time period. For completed works we considered the completed road length, and for sanctioned but incomplete works we considered the stipulated road length.

- *Quality Intensity Indicator*: the percentage of inspected length that was graded satisfactory. Here, multiple inspections of the same work count as separate, since it is possible for one inspection to fail quality standards and the next to pass them once adequate repair work has been carried out.

- *Composite Quality Indicator*, with the other two quality indicators as constituents, calculated in a way analogous to the Composite Completeness Indicator.

Overall Performance. We calculate one *Composite Overall Indicator* with five constituents relating to each of the five aspects outlined above. For completion rates, cost efficiency, timeliness and quality, we use the corresponding composite indicator. For contractor concentration, we use the Contractor Concentration Index.

5.3 Rankings on PMGSY

We now look at the results of the static analysis. Tables 6 and 7 show the values of all the indicators described above at the state level, as well as ranks derived from them. Note that certain states have missing indicator values. This is due to different data issues which we discuss below when discussing the results for a specific indicator.

The first thing to note from Table 6, is that new road completion rates are extremely low, especially given that the program had been active for nineteen years as of 31 March, 2019. The highest completion rate was only 71% (West Bengal). Secondly, there is considerable variation across states- Punjab, ranked 10th among the 18 states for which we have values,

has a indicator value of 43%, and the lowest value is only 13% (Karnataka). The situation is similar with regard to upgrade completion rates with low completion rates across the board. Tamil Nadu has the highest completion rate of 63%, while Jharkhand has the lowest completion rate of 13%.[26] Thirdly, there is no discernible relationship between new and upgrade completion rates. For instance, Bihar has amongst the highest new work completion rates, but amongst the worst upgrade completion rates; while the opposite is true for Andhra Pradesh. Only Madhya Pradesh is within the top five for both new and upgrade completion rates, and consequently has the best composite completeness indicator by a very large margin. The worst performers are Jharkhand and Karnataka.[27]

High variance is also observed in cost efficiency indicators. Regarding new roads, top performer Karnataka (INR 9.94 lakh per km) builds at less than a third of the cost of worst performer Assam (30.55). Variability is slightly lower for upgrades, with the best performer Himachal Pradesh building at INR 10.28 lakh per km and bottom performer Kerala building at INR 25.41 lakh per km. States which build new roads at a lower cost also tend to upgrade at a lower cost, and vice versa. In terms of overall performance on cost efficiency, Rajasthan and Himachal Pradesh are at the top with composite indicator values of 0.93, followed closely by Karnataka (0.87). At the other end of the spectrum, Odisha, Bihar and Kerala have composite indicator values of below 0.50. [28]

Raw HHI numbers (not presented) reveal that most states have extremely fragmented markets, with all but two states having HHI values of below 0.10. The *Contractor Concentration Indicator* numbers reveal that Gujarat and Haryana have HHI values closest to 0.20, while Himachal Pradesh, Odisha and Jharkhand have HHI values the farthest away.

From Table 7, regarding the delay indicator, the main finding is bad performance overall with wide variation. Even best-performing Gujarat witnesses 49% of works delivered late.

[26]Figure A.13 in the Appendix displays the states performance on completion.

[27]Note that Haryana does not have a new completion rate while Assam does not have an upgrade completion rate as there were fewer than 25 works completed in these categories in these states. Consequently, neither of them have a composite indicator either.

[28]Note that Haryana does not have a value for new roads, Assam for upgrades, and neither for the composite indicator, for reasons outlined earlier.

Most states see over 80% of works delivered late, with Kerala (91%) and Odisha (91%) performing the worst. There is a wide variation in the extent of delay among delayed projects. Haryana has the lowest average delay duration per km among delayed projects at 23 days. In all, 12 of the 19 states have average delays of at least 100 days per km for delayed projects. Generally, states which see late delivery in more works also tend to have a higher average delay duration per km among those delayed projects. Overall, Gujarat and Rajasthan perform the best on the composite delay indicator while the worst performers are Kerala and Odisha.

Lastly, with regard to quality, the coverage indicator shows wide variation. While over 80% of inspectable road length was inspected in West Bengal, Uttarakhand, Jharkhand and Bihar; only 15% was inspected in Haryana. The quality intensity indicator, on the other hand, shows far less variability. Gujarat sees the highest percentage of inspected road length receiving a satisfactory rating (93%), followed closely by Kerala (92%); while Bihar saw the lowest (63%), followed by Assam (65%). Uttarakhand's consistent performance over both coverage and intensity puts it in pole position overall with a composite quality indicator value of 0.89, followed closely by Kerala (0.88). The worst performers are Bihar and Haryana.

To summarize, the overall picture that emerges from this discussion is one where there are very few clear star performers, unlike with MGNREGA. Different states perform exceedingly well at some aspects of the program, and badly at others. No state consistently ranks in the top five across the five aspects, and only Gujarat manages to rank in the top ten across all four composite indicators and the concentration indicator. Consequently, from the last two columns of Table 7, we see that Gujarat is the best performer on the overall composite indicator, with a value of 0.83. Punjab, with only one bottom-half ranking, follows at a fair distance with a value of 0.57. Rounding off the top five are Madhya Pradesh, Tamil Nadu and Chhattisgarh. At the other end are Bihar, Jharkhand, Karnataka, Kerala and Odisha, with values of 0.00 by virtue of being at the bottom of at least one of the constituent indicators. However, some of these worst performers did quite well on a few of the indices

such as Kerala doing quite well on the quality and contractor concentration indicators while Karnataka doing well on the cost efficiency indicator.[29]

Figure 3 summarizes this overall picture and shows that there is no clear pattern with respect to which states are doing well overall. Table 8 shows the pairwise correlation coefficients between the overall composite indicator's five constituent indicators, and confirms that a good performance on one indicator is not associated with a good performance on another. There is only one moderate coefficient of 0.60 between the cost efficiency and timeliness indicators, while the rest are quite low in value.

5.4 Dynamic Analysis

We analyze how various indicators move over the nineteen years our data cover (2000-01 to 2018-19, both inclusive). We carry out this exercise for all indicators except the contractor concentration indicator, since there are too few contracts awarded in any given year for market shares and the HHI to be informative. For the rest, we calculate the indicators in the same way as we did for static analysis in Section 5.2; however, while calculating the constituent indices of the composite indicators we set the minimum and maximum values equal to the minimum and maximum values achieved by the associated indicator across all states and across the nineteen years. To calculate the overall composite indicator, we use five constituents as earlier - we attribute the appropriate static value (derived in the previous sub-section, Section 5.2) for the concentration indicator to each state for each year. Further, we ignore indicator values calculated using fewer than 25 underlying observations. Since PMGSY data are much sparser than MGNREGA data, there are many such ignored and missing indicator values across states and years. Hence, we calculate the average yearly change between the first and last years for which we have informative indicator values.[30] Average yearly changes in the values of various indicators between the earliest and latest

[29]Note that Assam and Haryana do not have values for the overall composite indicator since they are missing values for the composite completeness indicator.

[30]For MGNREGA, we looked at absolute changes between the final and initial years since we did not have the problem of missing indicator values due to very few underlying observations as is the case for PMGSY.

available data points, along with ranks derived from them, are presented in Tables 9 and 10. Graphs depicting the values of the indicators in each year are presented in the Appendix (Figures A.14- A.26). We document the main findings below.

From Table 9, we see that changes in the completion rate (new) and (upgrade) indicators follow the exact same pattern as that in the static analysis, given that these indicators are cumulative over time. Changes in the composite completion rate indicator also follow broadly the same pattern, with Madhya Pradesh performing the best and Karnataka the worst.

Average yearly changes in the cost efficiency indicators show that only 7 out of 18 states reduce costs over time for new roads, and only 2 out of 17 do so for upgrades. For new roads, Assam has the steepest reduction averaging INR 0.94 lakh per km annually. At the other end, Uttar Pradesh, Tamil Nadu and Karnataka see annual average cost increases of over INR 0.50 lakh per km.

All the timeliness indicators fluctuate considerably over time for several states (as can be seen from Figures A.20, A.21 and A.22 in the Appendix), so it is hard to derive many strong conclusions. From Table 10, we see that delay coverage increases over the entire period for all but two states. Similarly the delay intensity indicator increases for most states. With regard to the composite indicator, high volatility again makes strong conclusions difficult. However, there is a general deterioration as evidenced by falls in the indicator values over time for all but one state.

The situation with respect to quality indicators is much clearer. Majority of states see increases in coverage with Kerala showing by far the largest average annual increase of 5.2 percentage points and Maharashtra does the worst with an average annual decline of 1.8 percentage points. Kerala is also the most improved with regards to intensity, with an average annual increase in satisfactory ratings of 6.1 percentage points. On the composite quality indicator too, Kerala is the most improved state, followed by West Bengal and Bihar.

Similar to the static analysis, the broad picture that emerges is again that of four different

stories relating to four different aspects of the program. With regard to completion, different states see spurts of activity during different periods. There is a general deterioration in both cost effectiveness and timeliness over the period, with some states seeing larger deterioration than others on some constituent indicators. With respect to quality, there is a general improvement, with Kerala, West Bengal and Bihar seeing the best improvements.

Is there convergence in PMGSY indicators over time? Table 11 shows that there is convergence over time for most indicators of program success- this is especially noticeable for completeness, cost efficiency, delay coverage and quality intensity, which is encouraging. This is a significant difference from MGNREGA outcomes.

6 Determinants of Program Success

While several studies investigate the effect of social programs like MGNREGA and PMGSY success on various social indicators, very few investigate the determinants of program success. Bonner et al. (2012) found that only literacy was significantly correlated with MGNREGA success. Jha et al. (2011) used household survey data to show that in three states (Rajasthan, Andhra Pradesh and Maharashtra) females had a lower chance of being selected for MGNREGA work, and being educated to secondary level or above increased the duration of employment once selected. We are not aware of any studies investigating the determinants of PMGSY success. In this section, we analyse the relationship between the program indicators (for both MGNREGA and PMGSY) with other indicators that may play a role in program success. We use indicators for state capacity, corruption and development to check how these factors are correlated with the program success indicators.

6.1 State Capacity

Sate capacity is broadly defined as the "degree of control that state agents exercise over persons, activities, and resources within their government's territorial jurisdiction" (McAdam

et al., 2001, p. 78). Hanson and Sigman (2013), in keeping with the consensus view in the Political Science literature, consider state capacity to have three main dimensions – extractive (raising revenue), coercive (maintaining order and enforcing policies) and administrative (producing and delivering public goods and services). Clearly, administrative state capacity is the relevant dimension for our purpose.

Quantitatively measuring administrative state capacity is extremely hard, so it is common practice to use indicators that measure outcomes of public goods and service delivery as proxies (Hanson and Sigman, 2013). We use indicators of successful public goods and service delivery from 2001 and see if they are correlated with MGNREGA and PMGSY performance. We choose 2001 for two reasons. First, 2001 was a census year that has rich data availability at granular geographic levels. Second, it is conceivable that the successful delivery of MGNREGA and PMGSY make it easier to achieve good outcomes in other programs, giving rise to spurious correlation. We thus choose indicators of state capacity from a time when MGNREGA did not exist and PMGSY was in its infancy in order to minimize the scope for spurious correlation. Our indicators are derived from the 2001 census data, and include the sex ratio (females per thousand males), the total literacy rate, the female literacy rate, the difference between the female and male literacy rates, the percentage of households living in permanent dwellings, the percentage of households with access to tapped water, the percentage of households with access to electricity, the percentage of households with a bathroom inside the dwelling, and the percentage of households with access to banking facilities.

We conduct a simple correlation analysis between values of the MGNREGA and PMGSY success indicators, and those of the 2001 administrative capacity indicators. We undertake this analysis at the district level to allow for enough observations to conduct statistical tests, and to take advantage of variations in administrative state capacity within states. Since Indian administrative boundaries have changed since 2001, with several new districts and some new states being added, we calculate all indicators with reference to 2001 district

boundaries.[31]

Table 12 shows pairwise correlation coefficients between the MGNREGA performance indicators respectively on the one hand, and 2001 state capacity indicators on the other. All the general MGNREGA indicators have statistically significant (at the 5% level) positive correlations with one or more of the 2001 state capacity indicators. For the intensity and overall composite indicators, the vast majority of correlations are statistically significant at the 1% level. The story is similar with regard to the SC/ST indicators. While each of the coverage and intensity indicators are positively and statistically significantly correlated with at least four 2001 state capacity indicators, the number of statistically significant correlations and their level of significance are both higher for the intensity indicator. The composite SC/ST indicator is also statistically significantly positively correlated with all but one of the 2001 state capacity indicators. Thus, districts with higher state capacity in 2001 performed better on the MGNREGA indicators calculated using data between 2011-12 and 2018-19, with the relationship being much stronger for intensity than coverage.

Tables 13 and 14 show pairwise correlation coefficients between the PMGSY performance indicators and 2001 state capacity indicators on the other. Most PMGSY indicators have statistically significant (at the 5% level) correlations suggesting that districts with better PMGSY performance also had better 2001 state capacity indicators. However, there are two exceptions - the cost efficiency (upgrade) and quality coverage indicators. For the former (where lower values are more desirable) costs are positively correlated with better 2001 state capacity in five instances, and negatively in two instances. For the latter (where higher values are more desirable) higher inspection coverage is attained in districts with worse 2001 state capacity according to six indicators, and better according to only one. Thus, while 2001 state capacity is largely correlated with better PMGSY performance, some aspects of

[31]Where new districts have been carved entirely out of districts, MGNREGA and PMGSY observations in such districts are allocated to the old undivided district. Where new districts have been carved out of several old districts, we allocate observations based on sub-district regions like blocks where possible. However, where this is not possible, we create 'district clusters' pooling together the 2001 districts which were carved up so as not to lose data.

the program bucked the trend. A valuable avenue for future research would be to identify the mechanisms through which the state capacity disadvantage was overcome in these aspects, and whether those lessons can be applied to other contexts and, specifically, to future public goods and service programs.

6.2 Accountability

As mentioned in the section on data, Section 3, our data for corruption indicators is taken from Centre for Media Studies (CMS)- India Corruption Study 2017, Transparency International's India Corruption Survey 2005 and data contained in Debroy and Bhandari (2011). Unfortunately we did not have data at the district level for perceptions of corruption. The correlations at the state level are only suggestive because we have such few data points. Tables 15, 16 and 17 show pairwise correlation coefficients between the MGNREGA and PMGSY performance indicators with corruption indicators respectively.

In Table 15, which depicts the correlation between MGNREGA performance and corruption measures, most of the correlations are negative; however, only a few of them are statistically significant. The relationship between composite corruption score and all performance indicators are negative and statistically significant except one. There is an inverse relationship between bribe paid and all performance indicators, with the correlation with the composite overall indicator being statistically significant. There is a positive correlation between RTI[32] awareness in 2007 and performance indicators. Most performance indicators have higher values in states where households experienced less corruption. To summarize, we see that there is an inverse relationship between most corruption measures and MGNREGA program performance. However, many of these correlations are not statistically significant due to state level data being used and the consequent low statistical power.

Tables 16 and 17 show the correlation between PMGSY program success indicators and corruption. There is a positive and statistically significant relationship between completion

[32]Right to Information Act, 2005 is a law which sets out the rules and procedures for citizens to get information from government.

rate (upgrade) and anti-corruption index, whereas the relationship is negative and statistically significant for contractor concentration and quality coverage. Lower value of delay coverage and intensity indicators are associated with higher anti-corruption effort index. Since higher composite delay is desirable given the manner in which we constructed that index, we have a positive correlation between anti-corruption index and composite delay indicators. These correlations between the delay indicators and corruption measures are also statistically significant. The overall composite measure has a positive and statistically significant correlation with the anti-corruption index. The relationship between the quality indicators (both intensity and composite) and some of the other corruption indicators such as composite corruption score, percentage of households who have experienced corruption and mean direct experience of bribing is also negative and statistically significant. Clearly, where accountability is higher we see higher completion, lower delay, better quality and lower contractor concentration.

To conclude this section, although we do not have much statistical power in this exercise given all the analysis here is carried out at the state level, the results in this section present significant evidence that program outcomes for both MGNREGA and PMGSY are better in areas where there is less corruption.

6.3 Level of development

Data for Human Development Index (HDI) and per-capita Net State Domestic Product (NSDP) are taken from Global Data Lab and the Ministry of Statistics and Programme Implementation respectively. HDI is an index that measures a state's achievement on both social and economic dimensions. It comprises of – health, education and standard of living (UNDP (2010)).

Using per-capita income (NSDP per-capita) in 2000 for PMGSY and MGNREGA, we find a generally positive correlation between performance of states and level of development for both programs. This is not unexpected as state capacity is usually higher for more

developed states. Figures 4 and 5 show the relationship for the two programs.

Using HDI index in 2000 for PMGSY and MGNREGA, Figure 6 show a positive correlation for MGNREGA and HDI. From Figure 7, we see that although there exists a positive relationship between HDI and PMGSY, the relationship is much weaker compared to the relationship for MGNREGA. We would expect states who devote more effort into HDI activities to also be better at delivering MGNREGA which provides a social safety net compared to PMGSY which is more of an infrastructure program.

7 Conclusion

In this paper, we contribute to the existing literature on measuring state performance within a federal structure of government. We focus on two large federal government programs in India - MGNREGA (2011-2018) and PMGSY (2000-2018) - providing new performance indicators which can be used to track progress and rank states. While in the case of MGNREGA, the same set of states perform well across all indicators, this is not the case with PMGSY where we find little correlation between our five different indicators. We also investigated whether states are converging over time in their performance - which may be expected for MGNREGA since it was always a demand driven program - and poorer states therefore get more resources. However, we find that there is convergence only in intensity but not on coverage. Surprisingly, there is convergence on most indicators in PMGSY.

We find a positive correlation between various measures of state capacity and performance on the two programs, and negative correlation between measures of corruption and performance indicators. However, all the corruption indicators are only available at the state level so these results are only suggestive. Per-capita NSDP and HDI are both positively correlated with program success indicators. Overall, the divide between well performing states and others comes down to the well known differences between developed states relative to others. However, some states (e.g. Rajasthan and Andhra Pradesh) perform significantly

well on MGNREGA indicators despite not being very developed underlining the role of 'social' accountability, although its impact on reducing corruption in the program itself may be weak (Afridi and Iversen (2014)).

The indicators we propose can be used to rank states regularly which may help to improve average performance as suggested by recent research. Exploring why some districts within states deliver better than others is a fruitful topic for future research.

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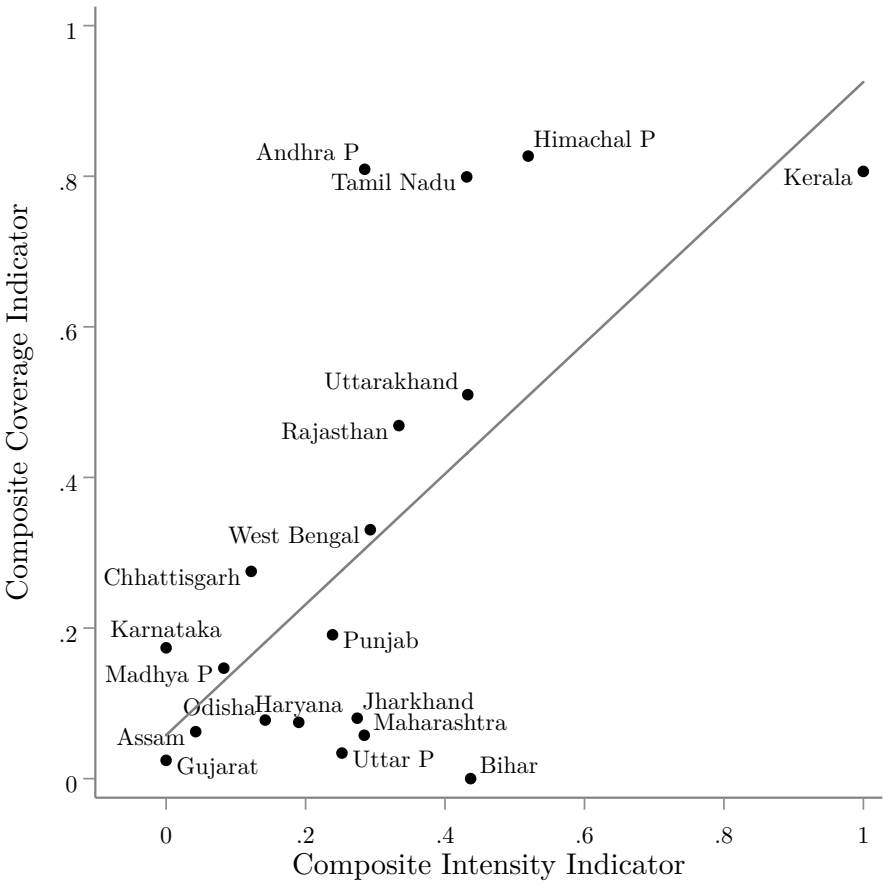

Figure 1: MGNREGA Static Analysis: State Performance on Coverage and Intensity

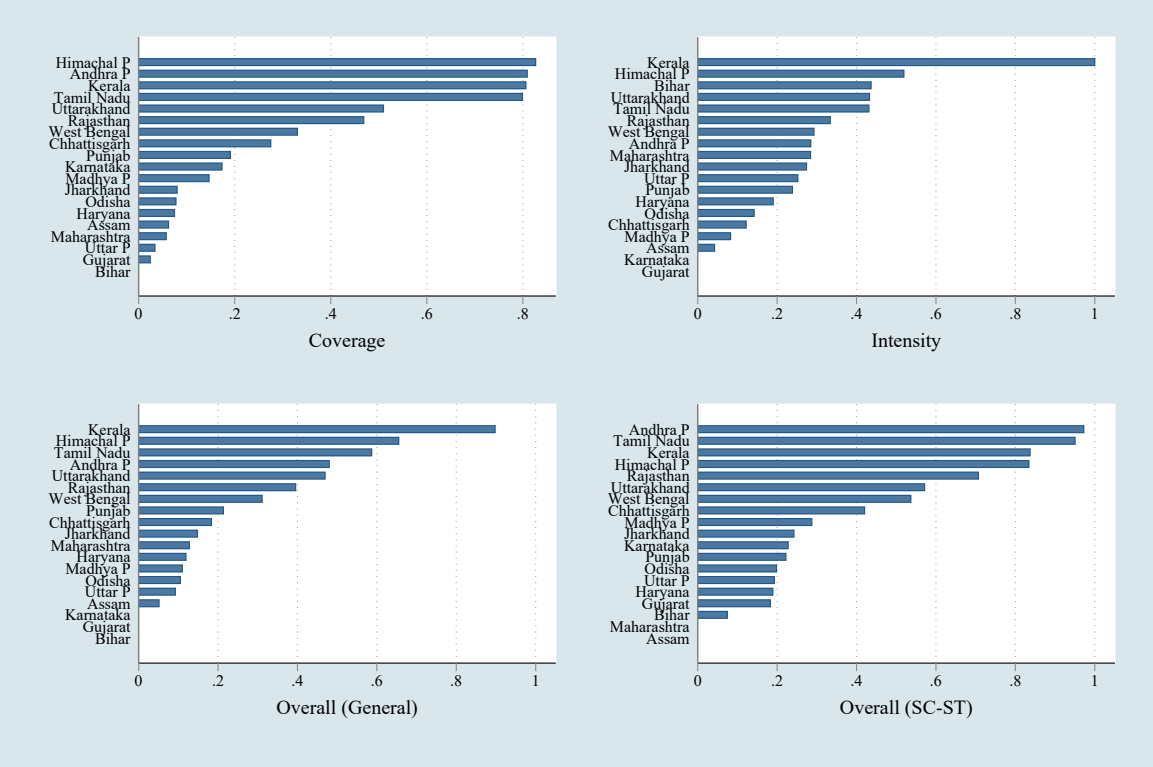

Figure 2: MGNREGA Static Analysis: State trends of Composite Indicators

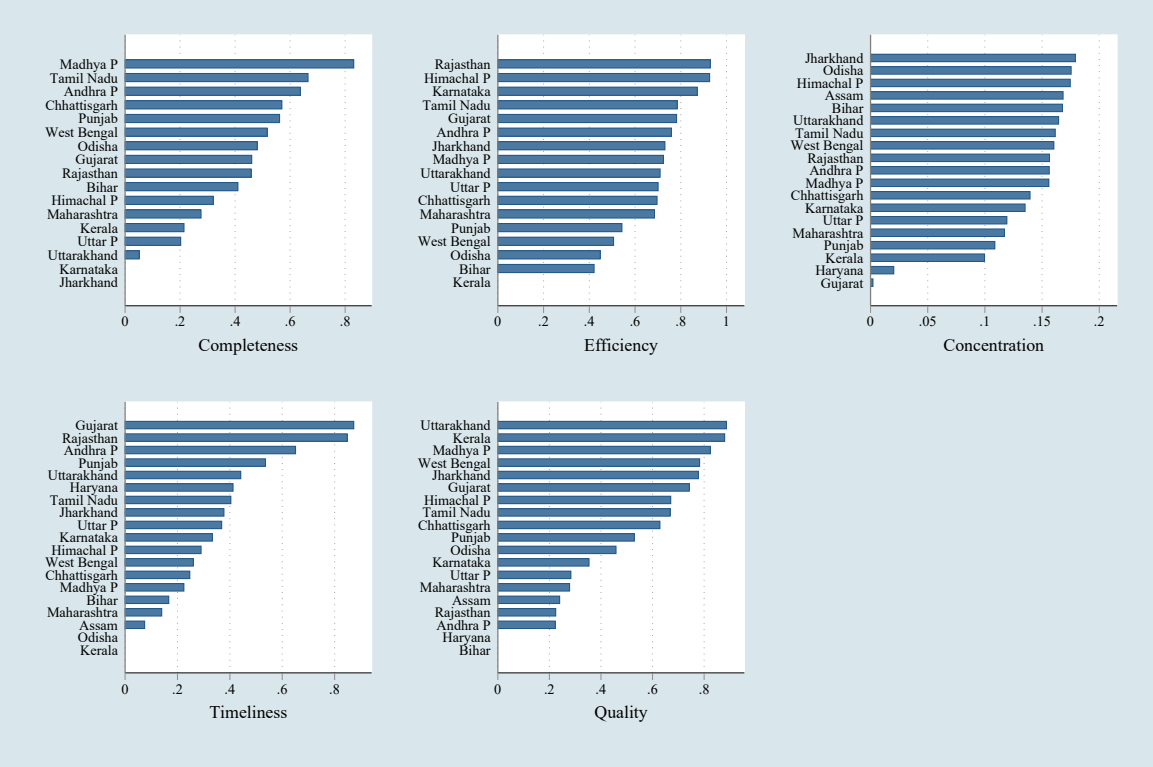

Figure 3: PMGSY Static Analysis: State trends of Composite Indicators

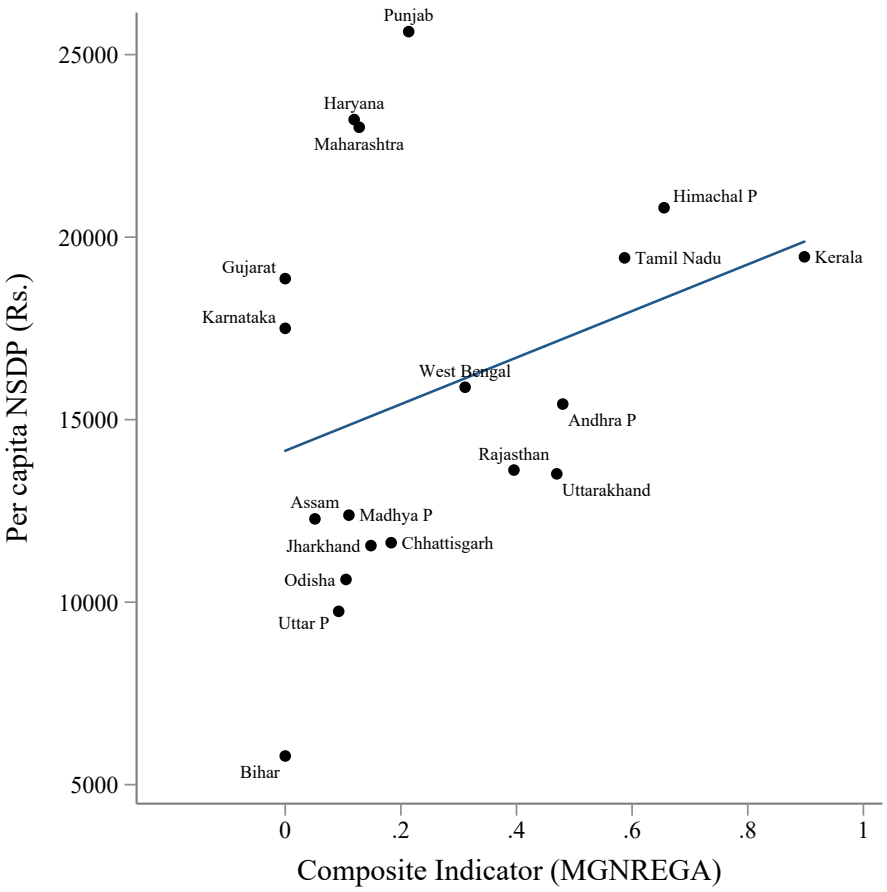

Figure 4: MGNREGA: State Performance of Composite Indicator and Per-Capita NSDP (2000)

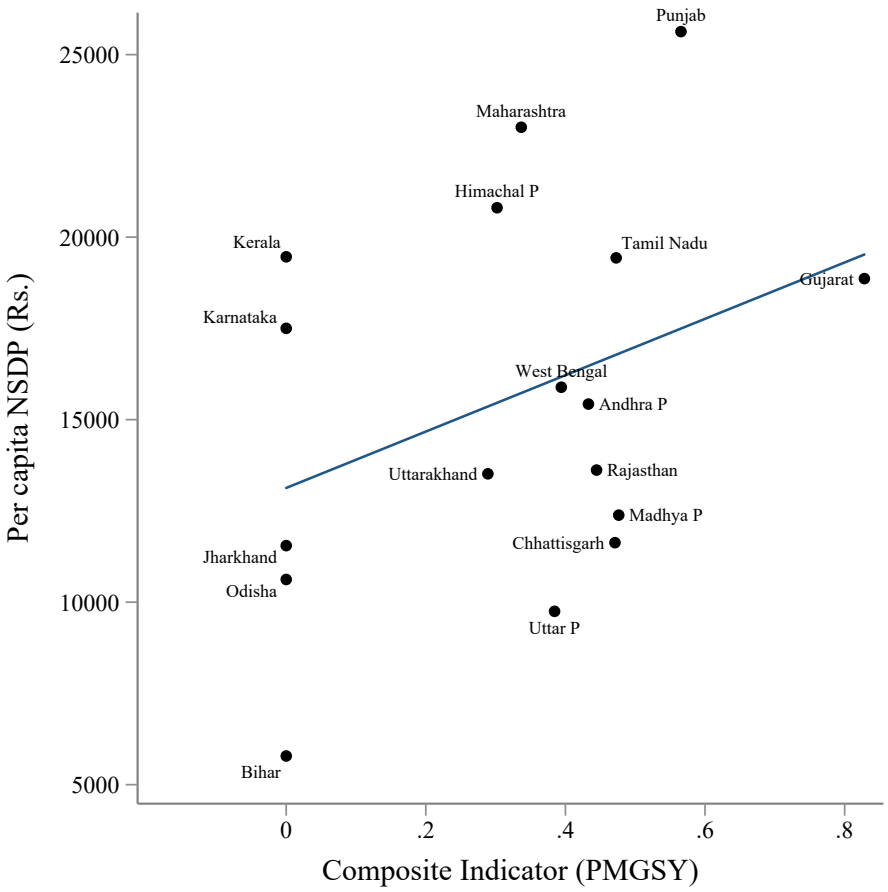

Figure 5: PMGSY: State Performance on Composite Indicator and Per-Capita NSDP (2000)

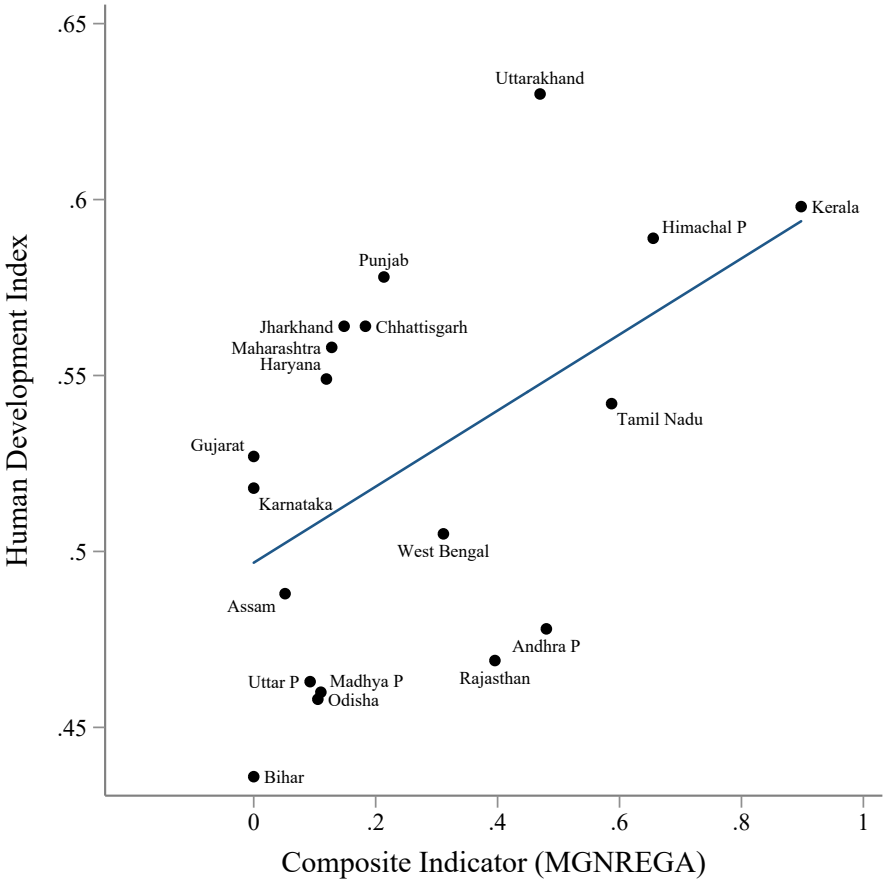

Figure 6: MGNREGA: State Performance on Composite Indicator and HDI (2000)

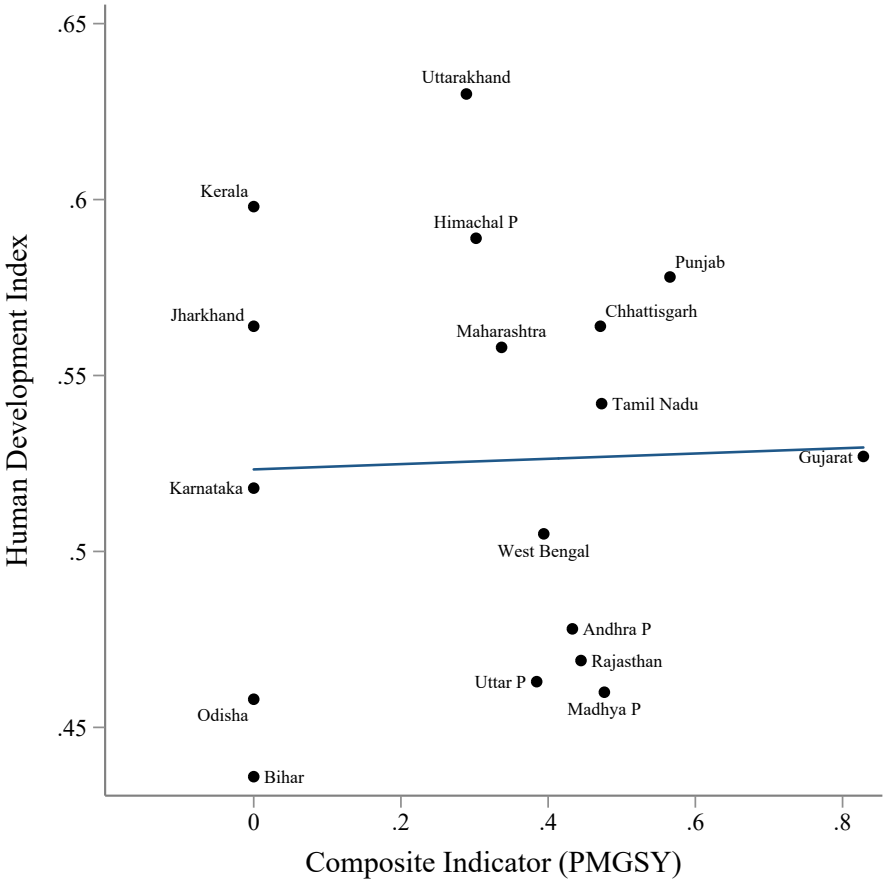

Figure 7: PMGSY: State Performance on Composite Indicator and HDI (2000)

Table 1: MGNREGA Static Analysis: Inter-State Comparison (General)

State	Dem Coverage		Fin Coverage		Comp Coverage		Dem Intensity		Fin Intensity		Comp Intensity		Comp Overall	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Andhra P	4.17	1	13 543	4	0.81	2	32.42	7	3252	13	0.29	8	0.48	4
Assam	0.70	13	1851	16	0.06	15	20.39	18	2656	18	0.04	17	0.05	16
Bihar	0.28	19	1173	19	0.00	19	32.87	6	4252	3	0.44	3	0.00	17
Chhattisgarh	1.74	8	4981	8	0.28	8	23.95	14	2867	15	0.12	15	0.18	9
Gujarat	0.54	17	1336	18	0.02	18	21.94	17	2467	19	0.00	18	0.00	17
Haryana	0.61	15	2416	12	0.07	14	22.23	16	3987	5	0.19	13	0.12	12
Himachal P	3.66	3	16 020	2	0.83	1	37.25	3	4380	2	0.52	2	0.66	2
Jharkhand	0.68	14	2356	13	0.08	12	28.62	9	3487	10	0.27	10	0.15	10
Karnataka	1.24	9	3482	10	0.17	10	19.18	19	2817	16	0.00	18	0.00	17
Kerala	2.80	4	20 065	1	0.81	3	46.52	1	7155	1	1.00	1	0.90	1
Madhya P	1.12	11	3043	11	0.15	11	22.71	15	2715	17	0.08	16	0.11	13
Maharashtra	0.55	16	2066	15	0.06	16	27.17	11	3762	6	0.28	9	0.13	11
Odisha	0.72	12	2164	14	0.08	13	24.14	13	2988	14	0.14	14	0.11	14
Punjab	1.14	10	4272	9	0.19	9	24.89	12	3745	7	0.24	12	0.21	8
Rajasthan	2.54	5	8299	6	0.47	6	37.08	4	3265	12	0.33	6	0.40	6
Tamil Nadu	3.92	2	14 039	3	0.80	4	40.60	2	3579	9	0.43	5	0.59	3
Uttar P	0.47	18	1601	17	0.03	17	28.11	10	3379	11	0.25	11	0.09	15
Uttarakhand	2.44	6	10 008	5	0.51	5	33.82	5	4106	4	0.43	4	0.47	5
West Bengal	1.80	7	6458	7	0.33	7	28.89	8	3598	8	0.29	7	0.31	7

Table 2: MGNREGA Static Analysis: Inter-State Comparison (SC/ST)

State	Dem Coverage		Dem Intensity		Comp Overall	
	Value	Rank	Value	Rank	Value	Rank
Andhra P	3.09	1	54.68	2	0.97	1
Assam	1.02	9	26.97	19	0.00	18
Bihar	0.31	18	40.76	12	0.07	17
Chhattisgarh	0.94	10	48.98	6	0.42	8
Gujarat	0.53	15	38.18	15	0.18	16
Haryana	0.74	11	33.44	17	0.19	15
Himachal P	2.95	3	48.39	7	0.83	4
Jharkhand	0.64	14	40.30	14	0.24	10
Karnataka	0.50	17	46.46	8	0.23	11
Kerala	2.25	4	56.28	1	0.84	3
Madhya P	0.70	12	43.30	10	0.29	9
Maharashtra	0.28	19	50.80	5	0.00	18
Odisha	0.52	16	40.45	13	0.20	13
Punjab	1.82	6	29.61	18	0.22	12
Rajasthan	1.80	7	53.99	4	0.71	5
Tamil Nadu	3.01	2	54.21	3	0.95	2
Uttar P	0.69	13	34.44	16	0.19	14
Uttarakhand	1.96	5	42.98	11	0.57	6
West Bengal	1.67	8	44.09	9	0.54	7

Table 3: MGNREGA Dynamic Analysis: Change in Indicator Values between 2011-12 and 2018-19 (General)

State	Dem Coverage		Fin Coverage		Comp Coverage		Dem Intensity		Fin Intensity		Comp Intensity		Comp Overall	
	Change	Rank	Change	Rank	Change	Rank	Change	Rank	Change	Rank	Change	Rank	Change	Rank
Andhra P	1.15	1	9209	2	0.29	1	0.53	15	1111	8	0.09	12	0.17	3
Assam	0.31	7	901	11	0.04	9	−0.30	16	16	17	−0.00	16	0.03	13
Bihar	0.12	9	826	12	0.03	11	6.91	10	929	10	0.14	10	0.07	11
Chhattisgarh	−0.51	18	729	13	−0.02	15	9.92	6	1151	7	0.19	6	0.09	8
Gujarat	−0.16	12	554	14	0.01	13	11.22	3	1324	5	0.21	5	0.08	10
Haryana	−0.23	14	−672	18	−0.03	18	0.57	14	519	14	0.03	15	−0.02	19
Himachal P	0.65	3	1450	8	0.09	6	−4.54	19	−463	19	−0.08	19	−0.01	18
Jharkhand	−0.32	16	−217	16	−0.03	17	9.24	7	1252	6	0.18	7	0.02	15
Karnataka	−0.18	13	1769	6	0.03	10	11.16	4	1686	3	0.25	3	0.15	5
Kerala	0.35	6	11 389	1	0.21	2	15.99	2	3047	2	0.38	2	0.29	1
Madhya P	−0.33	17	986	10	0.00	14	10.58	5	1465	4	0.21	4	0.10	7
Maharashtra	0.08	10	87	15	0.01	12	−1.05	17	−353	18	−0.03	18	−0.00	16
Odisha	0.19	8	1215	9	0.05	8	7.19	9	965	9	0.15	9	0.08	9
Punjab	1.15	2	4832	4	0.20	3	2.73	13	708	13	0.07	14	0.15	4
Rajasthan	0.56	4	3264	5	0.12	4	4.77	12	503	15	0.08	13	0.10	6
Tamil Nadu	−1.56	19	−1547	19	−0.15	19	8.50	8	913	11	0.15	8	0.04	12
Uttar P	−0.23	15	−391	17	−0.03	16	5.71	11	881	12	0.12	11	−0.00	17
Uttarakhand	0.38	5	1764	7	0.07	7	−1.15	18	35	16	−0.01	17	0.03	14
West Bengal	−0.12	11	4850	3	0.10	5	26.80	1	3200	1	0.50	1	0.28	2

Table 4: MGNREGA Dynamic Analysis: Beta Coefficients from Regressing Compound Annual Growth Rates on Earliest Values

Indicator	Beta Coefficient
Demographic Coverage	−0.006 863 3
	(0.0105)
Financial Coverage	−0.000 001 52
	(0.00000246)
Composite Coverage	−0.056 588 9
	(0.0727)
Demographic Intensity	−0.002 659 5***
	(0.000886)
Financial Intensity	−0.000 016 6**
	(0.00000664)
Composite Intensity	−0.423 460 6***
	(0.107)
Overall Composite	−0.146 729 8*
	(0.0702)
SC/ST Coverage	−0.007 137 9
	(0.0130)
SC/ST Intensity	−0.001 746 5**
	(0.000748)
SC/ST Composite	−0.077 461 8
	(0.0496)

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: MGNREGA Dynamic Analysis: Change in Indicator Values between 2011-12 and 2018-19 (SC/ST)

State	Dem Coverage		Dem Intensity		Comp Overall	
	Change	Rank	Change	Rank	Change	Rank
Andhra P	0.65	2	−15.29	19	−0.05	16
Assam	0.23	5	2.73	13	0.06	7
Bihar	0.07	10	5.89	9	0.05	9
Chhattisgarh	−0.14	14	13.45	3	0.04	10
Gujarat	0.04	12	6.45	8	0.04	11
Haryana	−0.18	15	−6.63	17	−0.08	18
Himachal P	0.23	6	−0.54	15	0.02	14
Jharkhand	−0.32	17	2.34	14	−0.06	17
Karnataka	0.17	8	7.50	6	0.08	5
Kerala	0.52	3	22.35	2	0.26	2
Madhya P	0.05	11	7.72	5	0.05	8
Maharashtra	0.10	9	−7.06	18	0.04	13
Odisha	0.17	7	6.68	7	0.08	6
Punjab	1.63	1	4.74	11	0.20	3
Rajasthan	0.43	4	8.01	4	0.13	4
Tamil Nadu	−0.47	19	−3.13	16	−0.09	19
Uttar P	−0.32	16	5.01	10	−0.03	15
Uttarakhand	0.03	13	3.78	12	0.04	12
West Bengal	−0.42	18	48.32	1	0.30	1

Table 6: PMGSY Static Analysis: Inter-State Comparison (Part 1)

State	Compl New		Compl Upgrade		Comp Compl		Efficiency New		Efficiency Upgrade		Comp Efficiency		Concentration	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Andhra P	0.37	14	0.62	2	0.64	3	13.79	6	14.69	9	0.76	6	0.16	10
Assam	0.49	8					30.55	18					0.17	16
Bihar	0.68	2	0.22	16	0.41	10	21.70	17	19.17	15	0.42	16	0.17	15
Chhattisgarh	0.68	3	0.30	10	0.57	4	16.78	12	14.43	7	0.70	11	0.14	8
Gujarat	0.46	9	0.31	9	0.46	8	15.66	10	12.62	3	0.78	5	0.00	1
Haryana			0.52	4					19.30	16			0.02	2
Himachal P	0.40	12	0.24	15	0.32	11	12.87	3	10.28	1	0.93	2	0.18	17
Jharkhand	0.53	7	0.13	18	0.00	16	14.72	8	14.90	11	0.73	7	0.18	19
Karnataka	0.13	18	0.39	6	0.00	16	9.94	1	13.90	4	0.87	3	0.14	7
Kerala	0.21	16	0.28	11	0.21	13	18.56	14	25.41	18	0.00	17	0.10	3
Madhya P	0.64	4	0.52	3	0.83	1	15.63	9	14.45	8	0.72	8	0.16	9
Maharashtra	0.23	15	0.34	8	0.28	12	17.72	13	14.01	5	0.69	12	0.12	5
Odisha	0.58	5	0.28	12	0.48	7	21.20	16	18.72	14	0.45	15	0.18	18
Punjab	0.43	10	0.43	5	0.56	5	13.34	5	20.07	17	0.54	13	0.11	4
Rajasthan	0.57	6	0.27	13	0.46	9	10.75	2	11.81	2	0.93	1	0.16	11
Tamil Nadu	0.39	13	0.63	1	0.67	2	13.31	4	14.28	6	0.78	4	0.16	13
Uttar P	0.18	17	0.36	7	0.20	14	14.59	7	15.81	12	0.70	10	0.12	6
Uttarakhand	0.42	11	0.13	17	0.05	15	15.89	11	14.70	10	0.71	9	0.16	14
West Bengal	0.71	1	0.26	14	0.52	6	20.21	15	17.68	13	0.51	14	0.16	12

Table 7: PMGSY Static Analysis: Inter-State Comparison (Part 2)

State	Delay Coverage		Delay Intensity		Comp Delay		Quality Coverage		Quality Intensity		Comp Quality		Comp Overall	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Andhra P	0.69	3	66	5	0.65	3	0.24	18	0.74	13	0.22	17	0.43	7
Assam	0.88	16	217	18	0.07	17	0.64	9	0.65	18	0.24	15		
Bihar	0.85	12	187	17	0.17	15	0.80	4	0.63	19	0.00	18	0.00	13
Chhattisgarh	0.86	14	109	10	0.25	13	0.57	10	0.83	8	0.63	9	0.47	5
Gujarat	0.49	1	73	7	0.87	1	0.55	11	0.93	1	0.74	6	0.83	1
Haryana	0.84	9	23	1	0.41	6	0.15	19	0.86	6	0.00	18		
Himachal P	0.84	10	128	14	0.29	11	0.71	8	0.80	12	0.67	7	0.30	11
Jharkhand	0.78	4	137	15	0.38	8	0.82	3	0.82	10	0.78	5	0.00	13
Karnataka	0.85	11	66	6	0.33	10	0.27	17	0.85	7	0.35	12	0.00	13
Kerala	0.91	18	233	19	0.00	18	0.72	7	0.92	2	0.88	2	0.00	13
Madhya P	0.87	15	100	8	0.23	14	0.77	5	0.87	5	0.82	3	0.48	3
Maharashtra	0.89	17	109	11	0.14	16	0.38	14	0.70	17	0.28	14	0.34	10
Odisha	0.91	19	143	16	0.00	18	0.74	6	0.70	15	0.46	11	0.00	13
Punjab	0.78	5	36	2	0.54	4	0.45	13	0.83	9	0.53	10	0.57	2
Rajasthan	0.56	2	52	3	0.85	2	0.29	16	0.70	16	0.23	16	0.45	6
Tamil Nadu	0.79	6	110	12	0.40	7	0.52	12	0.89	3	0.67	8	0.47	4
Uttar P	0.80	7	120	13	0.37	9	0.36	15	0.71	14	0.28	13	0.38	9
Uttarakhand	0.81	8	63	4	0.44	5	0.83	2	0.88	4	0.89	1	0.29	12
West Bengal	0.86	13	100	9	0.26	12	0.87	1	0.81	11	0.78	4	0.39	8

Table 8: PMGSY Static Analysis: Correlation Between the Five Constituents of the Overall Composite Indicator

	Completeness	Cost Efficiency	Concentration	Timeliness	Quality
Completeness	1.00				
Cost Efficiency	0.02	1.00			
Concentration	−0.01	0.11	1.00		
Timeliness	0.13	0.60	−0.36	1.00	
Quality	−0.03	−0.16	0.11	−0.05	1.00

Table 9: PMGSY Dynamic Analysis: Average Yearly Change Between Earliest and Latest Indicator Values (Part 1)

State	Compl New		Compl Upgrade		Comp Compl		Efficiency New		Efficiency Upgrade		Comp Efficiency	
	Change	Rank	Change	Rank	Change	Rank	Change	Rank	Change	Rank	Change	Rank
Andhra P	0.020	14	0.035	2	0.040	3	0.45	14	0.22	8	−0.014	9
Assam	0.027	8					−0.94	1				
Bihar	0.038	2	0.012	16	0.032	9	−0.50	2	0.38	12	−0.015	11
Chhattisgarh	0.038	3	0.017	10	0.038	4	0.18	11	0.20	7	−0.005	6
Gujarat	0.026	9	0.017	9	0.032	10	0.46	15	0.31	9	−0.015	10
Haryana			0.029	4					−2.37	1		
Himachal P	0.022	12	0.013	15	0.026	11	0.25	12	0.65	14	−0.014	8
Jharkhand	0.030	7	0.007	18	0.022	13	−0.12	5	0.09	5	−0.001	3
Karnataka	0.007	18	0.022	6	0.018	17	1.14	18	0.75	16	−0.016	12
Kerala	0.012	16	0.016	11	0.020	15	−0.37	3	0.01	4		.
Madhya P	0.036	4	0.029	3	0.048	1	0.13	10	0.31	10	−0.008	7
Maharashtra	0.013	15	0.019	8	0.023	12	0.02	8	0.84	17	0.001	1
Odisha	0.032	5	0.015	12	0.033	7	0.10	9	0.12	6	−0.003	4
Punjab	0.024	10	0.024	5	0.036	6	−0.29	4	−0.66	2		
Rajasthan	0.032	6	0.015	13	0.032	8	−0.11	6	0.33	11	−0.004	5
Tamil Nadu	0.021	13	0.035	1	0.041	2	0.86	17	0.42	13	−0.023	14
Uttar P	0.010	17	0.020	7	0.021	14	0.64	16	0.68	15	−0.022	13
Uttarakhand	0.023	11	0.007	17	0.020	16	0.32	13				
West Bengal	0.040	1	0.015	14	0.036	5	−0.03	7	0.00	3	0.000	2

Table 10: PMGSY Dynamic Analysis: Average Yearly Change Between Earliest and Latest Indicator Values (Part 2)

State	Delay Coverage		Delay Intensity		Comp Delay		Quality Coverage		Quality Intensity		Comp Quality		Comp Overall	
	Change	Rank	Change	Rank	Change	Rank	Change	Rank	Change	Rank	Change	Rank	Change	Rank
Andhra P	0.025	10	6.73	11	−0.019	7	0.001	12	0.051	2	0.014	11	0.039	2
Assam	−0.023	1	6.03	9	0.013	1	0.012	8	0.008	11	0.018	10		
Bihar	−0.003	2	9.77	17	−0.004	3	0.030	4	0.000	14	0.052	3	0.003	10
Chhattisgarh	0.015	8	12.48	18	−0.019	8	−0.001	16	0.005	13	−0.000	13	0.026	4
Gujarat	0.035	15	2.80	5	−0.023	9	0.001	13	−0.016	17	−0.005	15	0.060	1
Haryana	0.048	18	6.77	12	−0.075	19	−0.001	15	−0.035	19	−0.084	19		.
Himachal P	0.040	17	4.24	7	−0.031	14	0.016	5	−0.010	16	0.019	8	0.006	9
Jharkhand	0.012	5	9.59	16	−0.015	6	0.015	7	0.022	6	0.029	5	0.000	11
Karnataka	0.034	14	−0.99	1	−0.037	16	−0.007	18	0.010	9	−0.018	18		
Kerala	0.015	7	27.35	19	−0.030	12	0.052	1	0.061	1	0.079	1		
Madhya P	0.010	4	6.82	13	−0.014	5	0.006	10	−0.004	15	0.005	12	0.006	8
Maharashtra	0.023	9	8.58	14	−0.025	10	−0.018	19	0.015	8	−0.017	17	−0.003	12
Odisha	0.029	12	6.00	8	−0.027	11	0.016	6	0.010	10	0.023	7	0.014	7
Punjab	0.026	11	−0.77	2	−0.033	15	0.031	3	0.006	12	0.045	4		
Rajasthan	0.039	16	9.23	15	−0.046	17	0.004	11	0.038	4	0.018	9	0.037	3
Tamil Nadu	0.056	19	6.49	10	−0.049	18	−0.005	17	0.020	7	−0.002	14		
Uttar P	0.030	13	3.56	6	−0.030	13	0.008	9	0.041	3	0.026	6	0.015	6
Uttarakhand	0.013	6	−0.76	3	−0.014	4	−0.000	14	−0.027	18	−0.014	16		
West Bengal	0.000	3	1.76	4	−0.001	2	0.037	2	0.028	5	0.056	2	0.025	5

Table 11: PMGSY Dynamic Analysis: Beta Coefficients from Regressing Compound Annual Growth Rates on Earliest Values

Indicator	Beta Coefficient
Completeness (New)	−126.6094***
	(20.78)
Completeness (Upgrade)	−102.207**
	(23.68)
Completeness Composite	−62.093 87*
	(19.30)
Cost Efficiency (New)	−0.003 649 7***
	(0.00104)
Cost Efficiency (Upgrade)	−0.006 508 5***
	(0.00112)
Cost Efficiency (Composite)	−0.048 569 1**
	(0.0212)
Concentration	
Delay Coverage	−0.265 917 4***
	(0.0334)
Delay Intensity	−0.001 120 4***
	(0.000354)
Delay Composite	0.055 865 9
	(0.376)
Quality Coverage	−1.026 201**
	(0.458)
Quality Intensity	−0.165 040 5***
	(0.0279)
Quality Composite	−0.352 819 6**
	(0.157)
Overall Composite	0.063 328 4
	(0.155)

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: MGNREGA: Pairwise Correlation Coefficients between Program Success Indicators and 2001 State Capacity Indicators

2001 State Capacity Indicator	Coverage			Intensity			Overall Comp	SC/ST		
	Dem	Fin	Comp	Dem	Fin	Comp		Cov	Int	Comp
Sex ratio	0.08*	0.11**	0.09**	0.22***	0.14***	0.19***	0.27***	0.07	0.31***	0.17***
Lit rate (total)	0.07	0.11**	0.08*	0.18***	0.30***	0.24***	0.31***	0.09*	0.17***	0.18***
Lit rate (F)	0.07	0.11**	0.09*	0.18***	0.34***	0.26***	0.32***	0.11**	0.15***	0.19***
Lit rate gap (F-M)	0.07	0.10**	0.08*	0.13***	0.35***	0.25***	0.23***	0.14***	0.00	0.17***
% permanent dwel	0.07	0.09**	0.08*	0.31***	0.33***	0.33***	0.24***	0.03	0.07	0.13***
% tapped water	0.10**	0.12**	0.11**	0.17***	0.07	0.12**	0.28***	0.15***	0.24***	0.24***
% electrified	0.08*	0.10**	0.09**	0.02	0.06	0.02	0.26***	0.10**	0.26***	0.22***
% bath inside	0.05	0.07	0.06	0.04	0.27***	0.14***	0.16***	0.04	0.07	0.11**
% bank access	0.00	0.02	0.01	0.12**	0.34***	0.24***	0.09*	−0.01	−0.06	0.00

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: PMGSY: Pairwise Correlation Coefficients between Program Success Indicators and 2001 State Capacity Indicators (Part 1)

2001 State Capacity Indicator	Completion Rate			Cost Efficiency			Concentr
	New	Upgr	Comp	New	Upgr	Comp	
Sex ratio	0.06	0.04	0.13**	0.08	0.12**	−0.18***	0.18***
Lit rate (total)	0.08	0.10*	0.16***	−0.07	0.21***	−0.13**	−0.17***
Lit rate (F)	0.08	0.10*	0.16***	0.00	0.26***	−0.19***	−0.16***
Lit rate gap (F-M)	0.04	0.06	0.09	0.30***	0.41***	−0.35***	−0.09*
% permanent dwel	−0.02	0.10*	−0.01	−0.40***	−0.05	0.26***	−0.24***
% tapped water	0.04	0.32***	0.18***	−0.30***	−0.32***	0.25***	−0.11**
% electrified	0.08*	0.34***	0.29***	−0.36***	−0.17***	0.21***	−0.26***
% bath inside	0.11**	0.11**	0.10*	−0.34***	0.05	0.10*	−0.39***
% bank access	−0.01	0.01	−0.11*	−0.31***	0.13**	0.02	−0.25***

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14: PMGSY: Pairwise Correlation Coefficients between Program Success Indicators and 2001 State Capacity Indicators (Part 2)

2001 State Capacity Indicator	Timeliness			Quality			Overall Comp
	Cov	Int	Comp	Cov	Int	Comp	
Sex ratio	0.07	0.10**	−0.09*	0.15***	0.22***	0.23***	−0.02
Lit rate (total)	0.03	0.02	−0.05	−0.11**	0.31***	0.08*	0.01
Lit rate (F)	0.05	0.07	−0.07	−0.07	0.31***	0.10**	0.00
Lit rate gap (F-M)	0.10**	0.23***	−0.14***	0.06	0.20***	0.14***	−0.03
% permanent dwel	−0.17***	−0.21***	0.19***	−0.25***	0.06	−0.18***	0.08
% tapped water	−0.18***	−0.29***	0.21***	−0.30***	0.25***	−0.15***	0.13**
% electrified	−0.14***	−0.35***	0.18***	−0.28***	0.41***	−0.06	0.28***
% bath inside	−0.10**	−0.21***	0.11**	−0.44***	0.24***	−0.28***	0.10*
% bank access	−0.04	−0.16***	0.06	−0.25***	0.10**	−0.15***	−0.06

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: MGNREGA: Pairwise Correlation Coefficients between Program Success Indicators and Corruption Indicators

Corruption Indicators	Coverage			Intensity			Overall Comp	SC/ST		
	Dem	Fin	Comp	Dem	Fin	Comp		Cov	Int	Comp
Anti-Corruption Effort Index (2001-2005)	0.04	−0.05	−0.01	−0.08	−0.13	−0.14	−0.12	0.04	0.00	0.01
Composite Corruption Score (2005)	−0.48**	−0.67***	−0.59**	−0.44**	−0.54**	−0.53**	−0.70***	−0.52**	−0.35	−0.50**
Mean Direct Experience of Bribing (%)(2005)	−0.22	−0.40	−0.31	−0.18	−0.37	−0.32	−0.46*	−0.28	−0.09	−0.25
Heard about RTI (%)(2007)	0.30	0.29	0.29	0.05	0.03	0.03	0.20	0.20	0.33	0.16
Households Experienced Corruption (%)(2005)	0.02	−0.19	−0.08	−0.02	−0.31	−0.19	−0.26	−0.04	−0.03	−0.01

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 16: PMGSY: Pairwise Correlation Coefficients between Program Success Indicators and Corruption Indicators (Part 1)

Corruption Indicators	Completion Rate			Cost Efficiency			Concentr
	New	Upgr	Comp	New	Upgr	Comp	
Anti-Corruption Effort Index (1996-2000)	−0.06	0.48*	0.32	−0.35	0.02	0.12	−0.58**
Composite Corruption Score (2005)	0.36	0.09	0.10	0.12	−0.14	0.27	0.23
Mean Direct Experience of Bribing (%)(2005)	0.11	0.17	−0.01	0.02	−0.11	0.23	0.29
Heard about RTI (%)(2007)	−0.44*	0.31	−0.11	0.10	−0.13	0.08	0.16
Households Experienced Corruption (%)(2005)	0.39	0.08	0.24	−0.06	−0.18	0.25	0.46*

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 17: PMGSY: Pairwise Correlation Coefficients between Program Success Indicators and Corruption Indicators (Part 2)

Corruption Indicators	Timeliness			Quality			Overall Comp
	Cov	Int	Comp	Cov	Int	Comp	
Anti-Corruption Effort Index (1996-2000)	-0.50^{**}	-0.57^{**}	0.59^{**}	-0.53^{**}	0.24	-0.26	0.46^{*}
Composite Corruption Score (2005)	0.00	-0.14	0.05	-0.05	-0.42^{*}	-0.50^{**}	-0.13
Mean Direct Experience of Bribing (%)(2005)	0.01	-0.11	0.03	-0.19	-0.45^{*}	-0.59^{***}	-0.28
Heard about RTI (%)(2007)	0.02	0.21	-0.07	-0.24	-0.07	-0.06	-0.12
Households Experienced Corruption (%)(2005)	-0.01	-0.07	0.05	0.03	-0.44^{*}	-0.45^{*}	-0.23

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A Appendix: Additional Figures (For Online Publication)

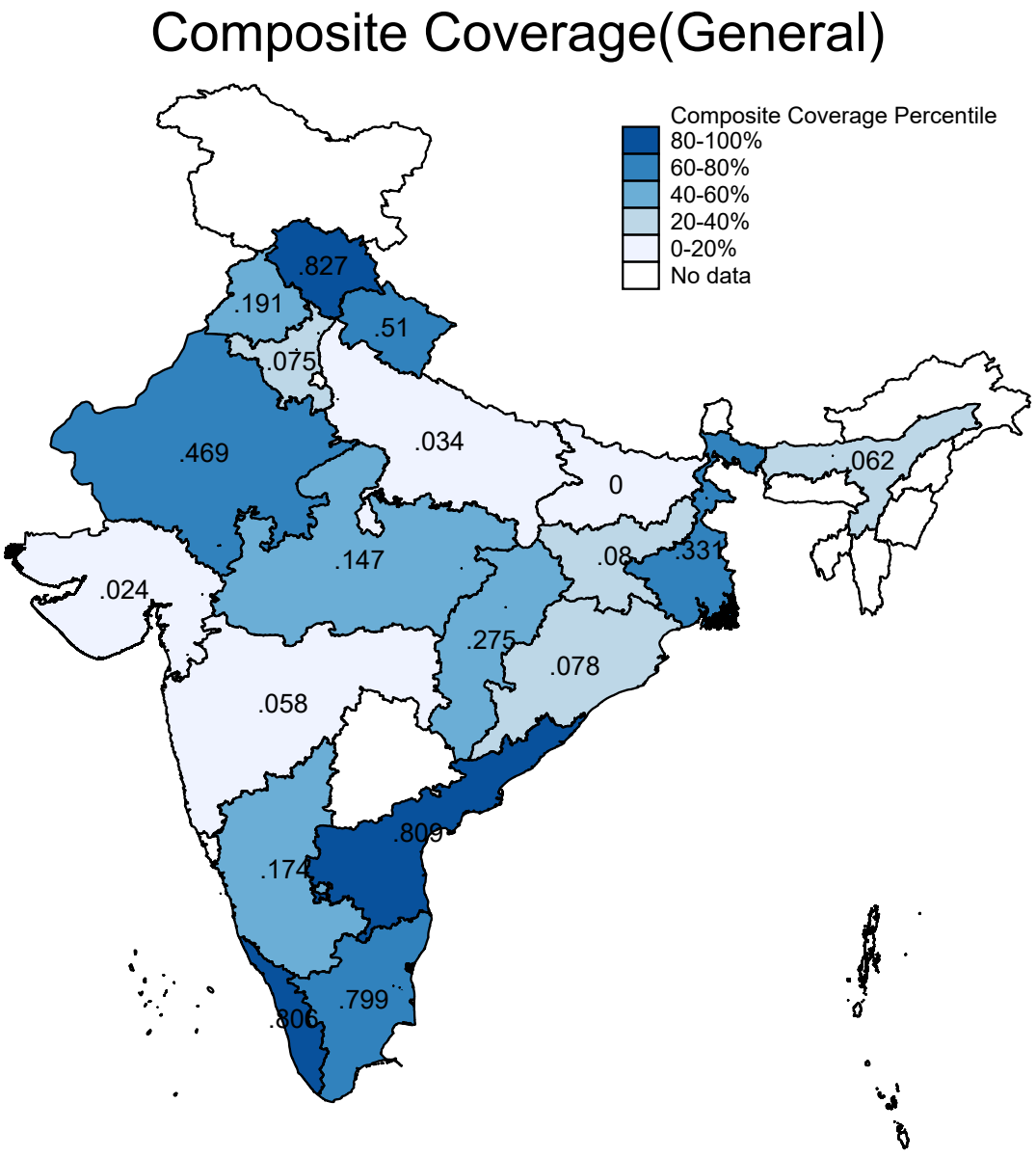

Figure A.1: Composite Coverage (MGNREGA)

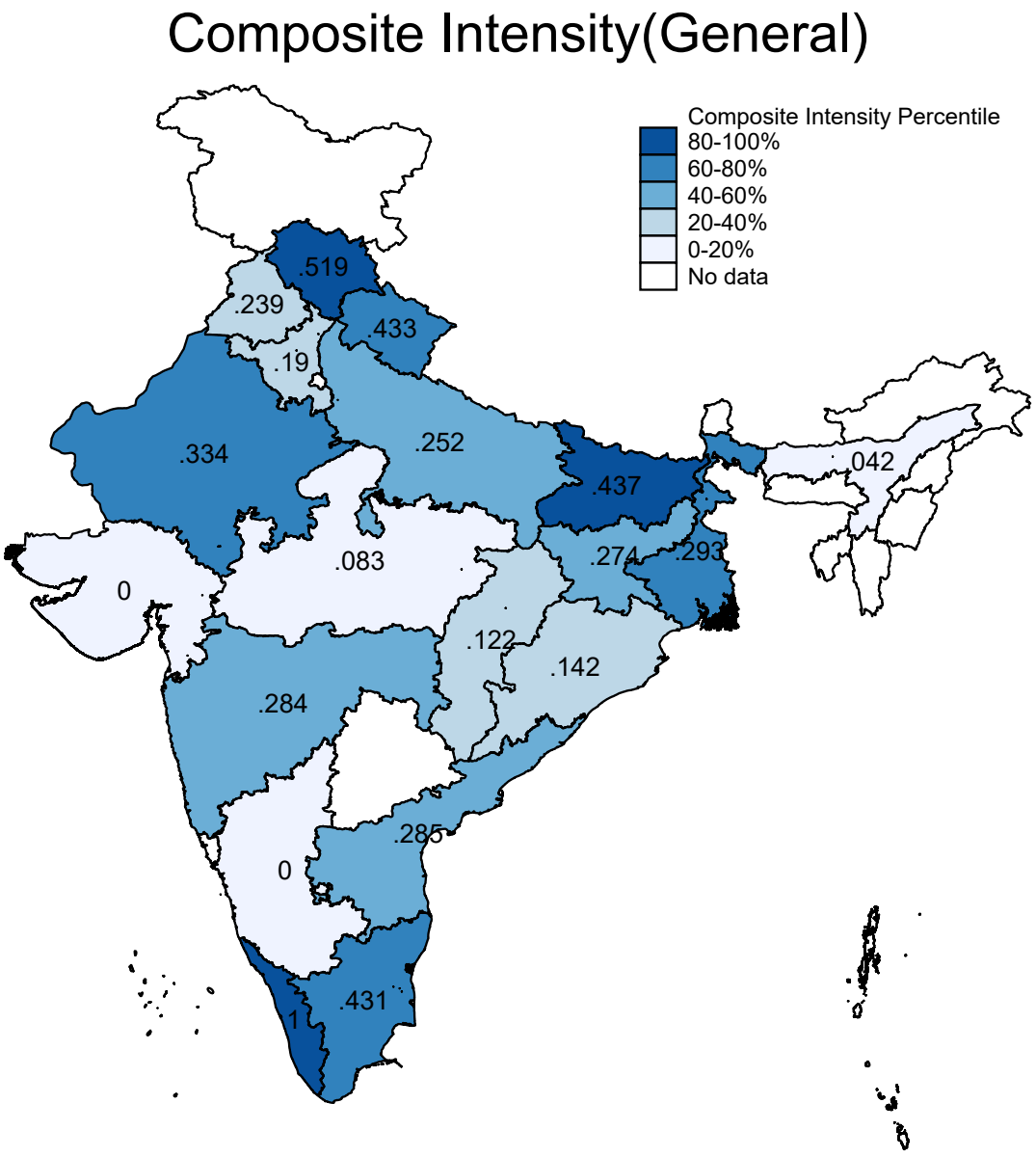

Figure A.2: Composite Intensity (MGNREGA)

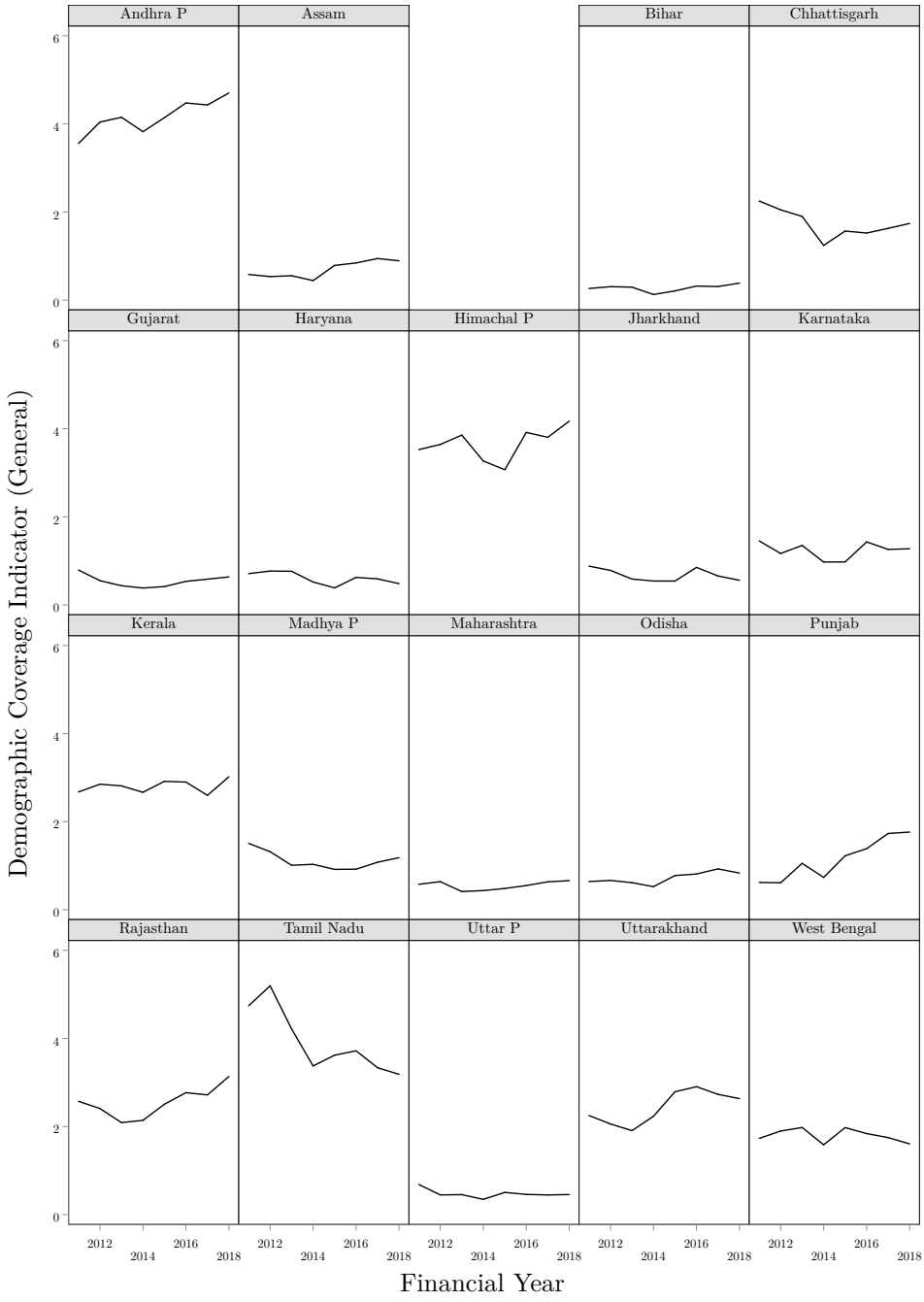

Figure A.3: MGNREGA: Movement of Demographic Coverage Indicator (General) over Time

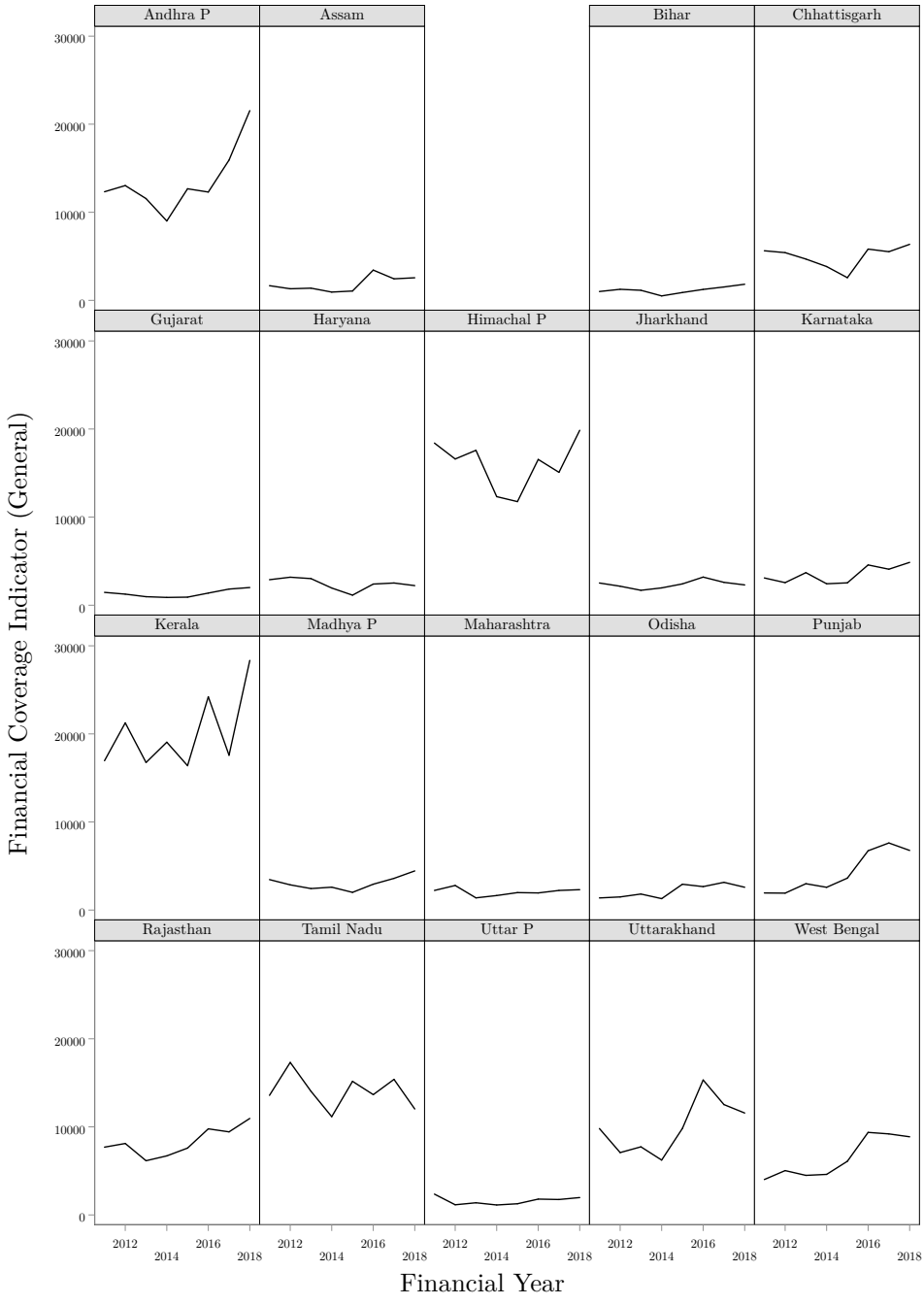

Figure A.4: MGNREGA: Movement of Financial Coverage Indicator (General) over Time

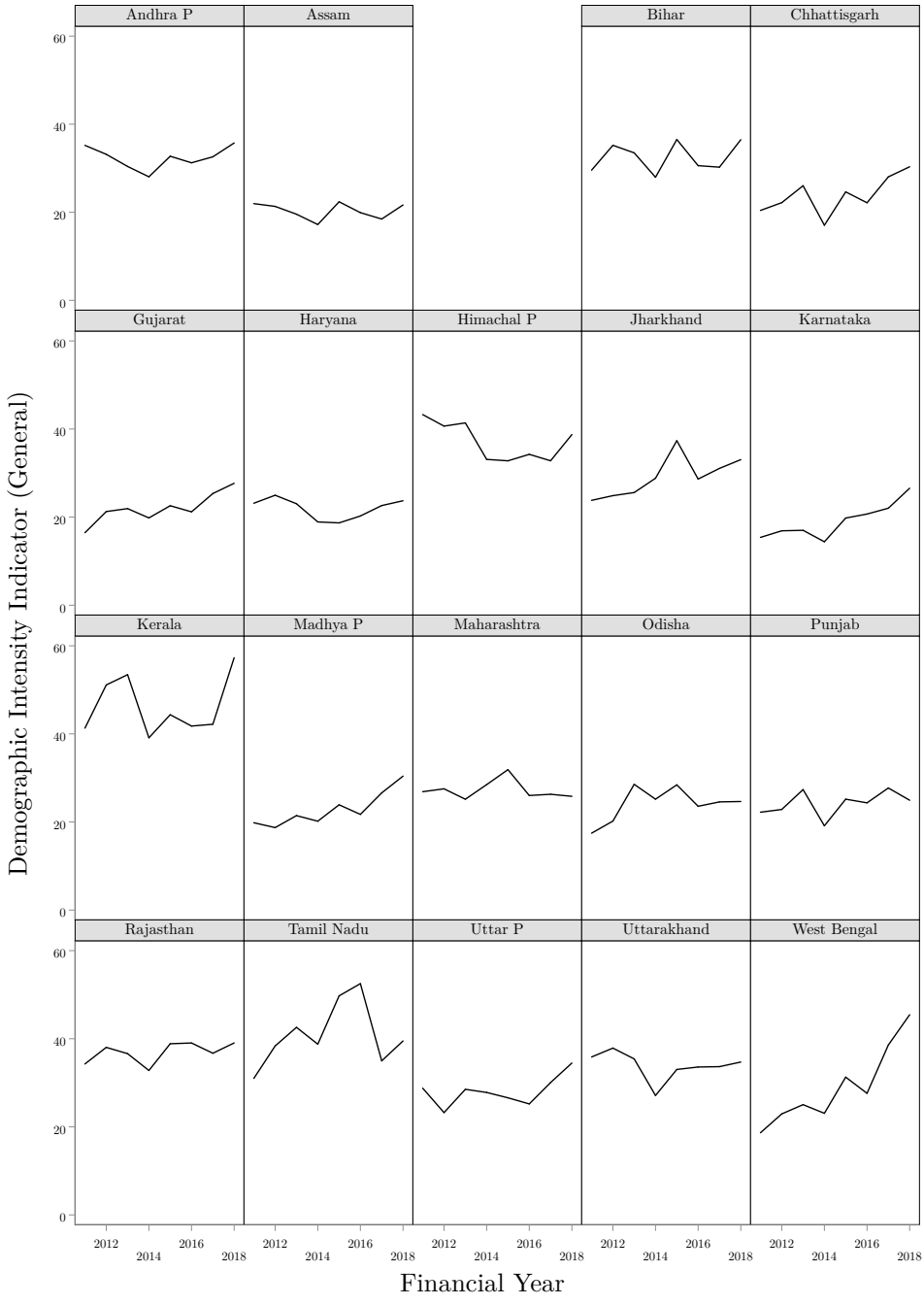

Figure A.5: MGNREGA: Movement of Demographic Intensity Indicator (General) over Time

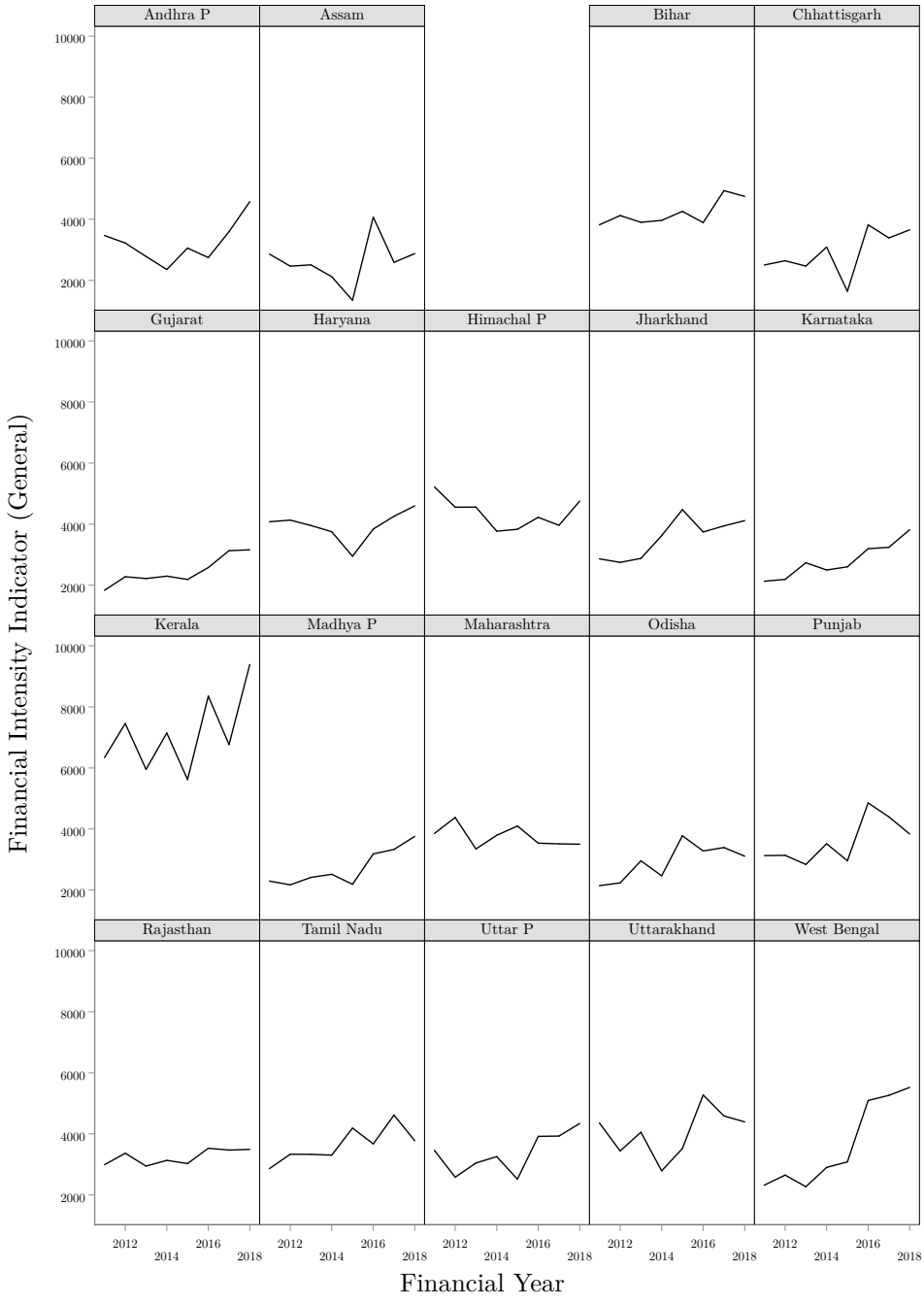

Figure A.6: MGNREGA: Movement of Financial Intensity Indicator (General) over Time

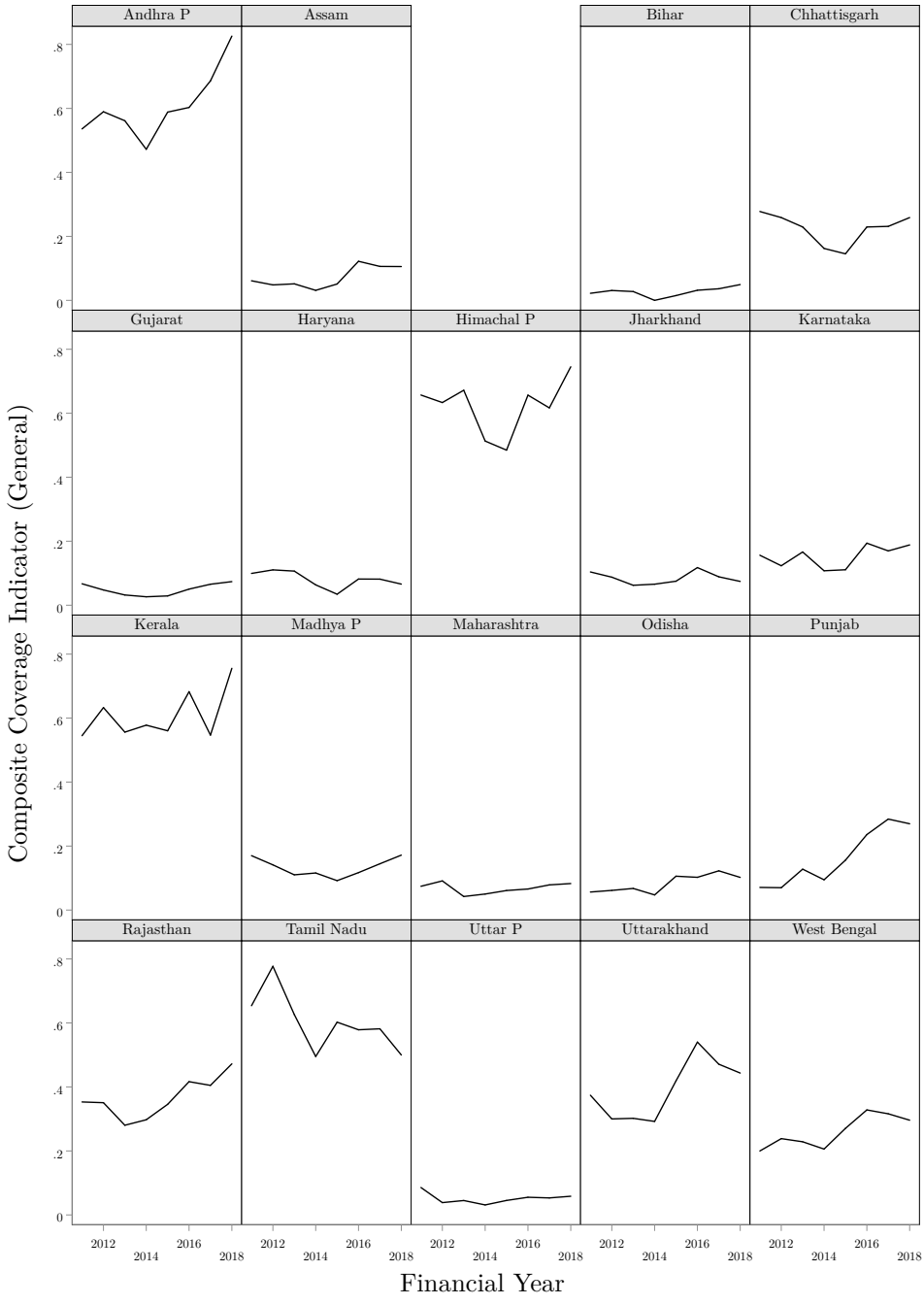

Figure A.7: MGNREGA: Movement of Composite Coverage Indicator (General) over Time

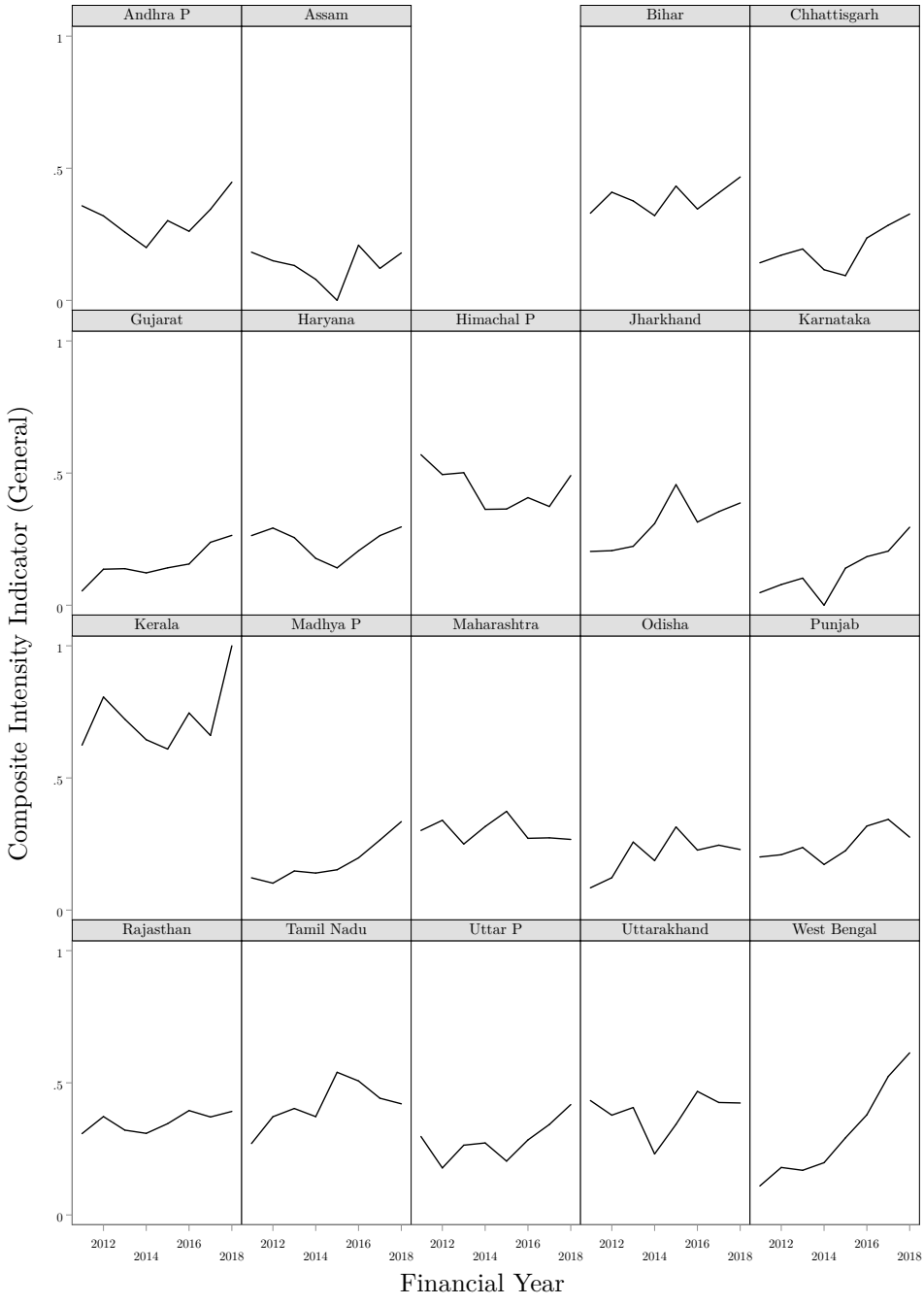

Figure A.8: MGNREGA: Movement of Composite Intensity Indicator (General) over Time

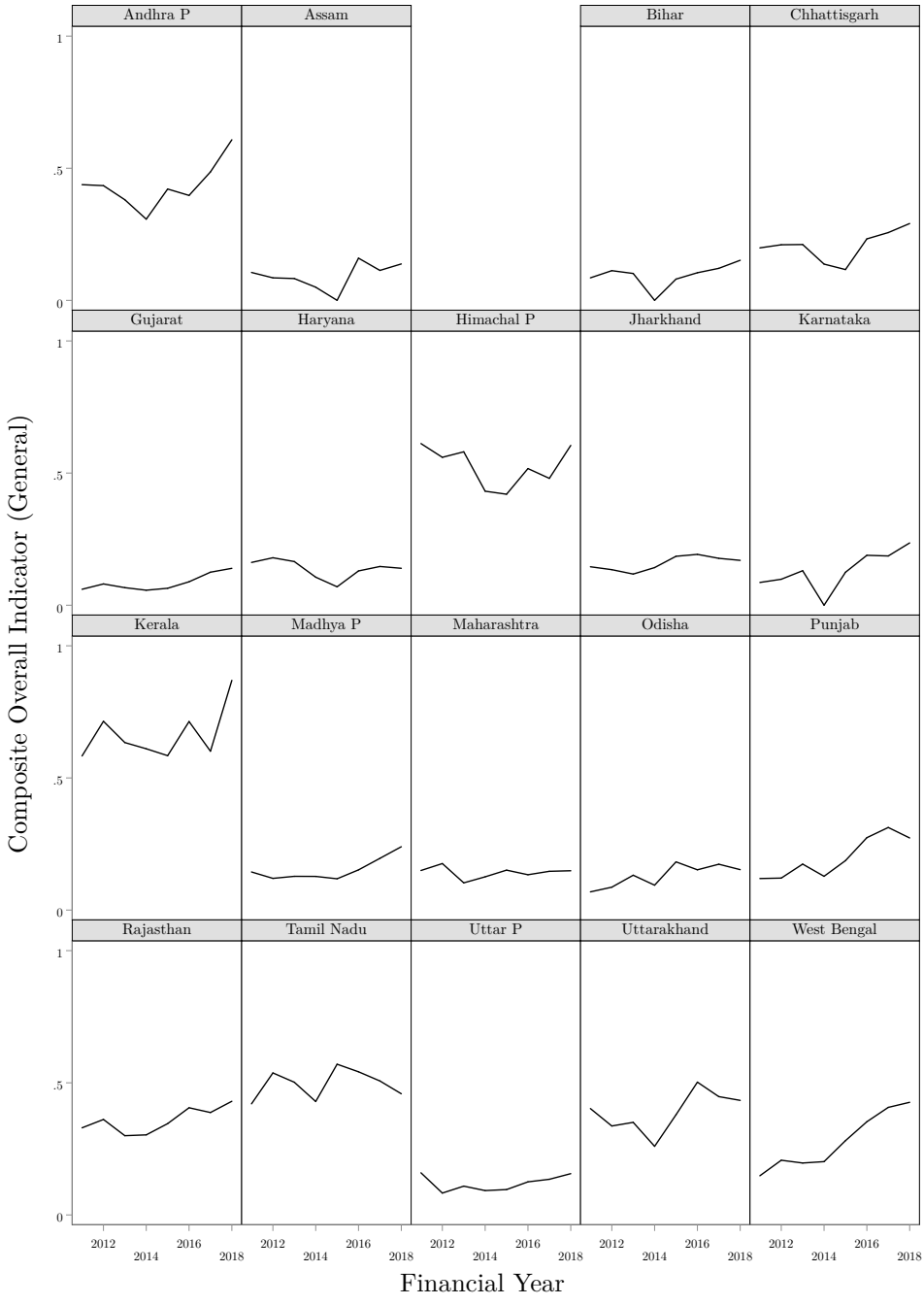

Figure A.9: MGNREGA: Movement of Composite Overall Indicator (General) over Time

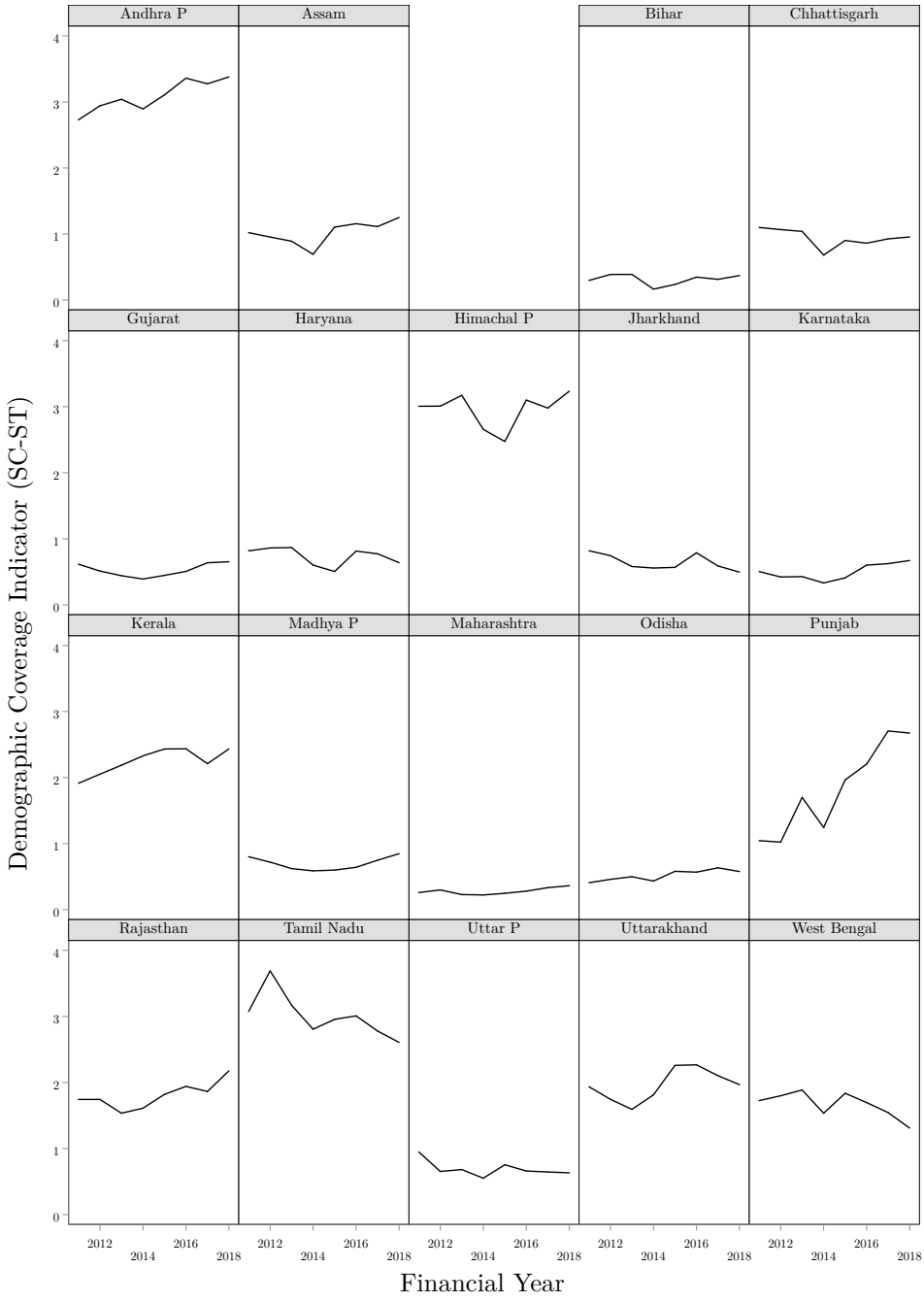

Figure A.10: MGNREGA: Movement of Demographic Coverage Indicator (SC-ST) over Time

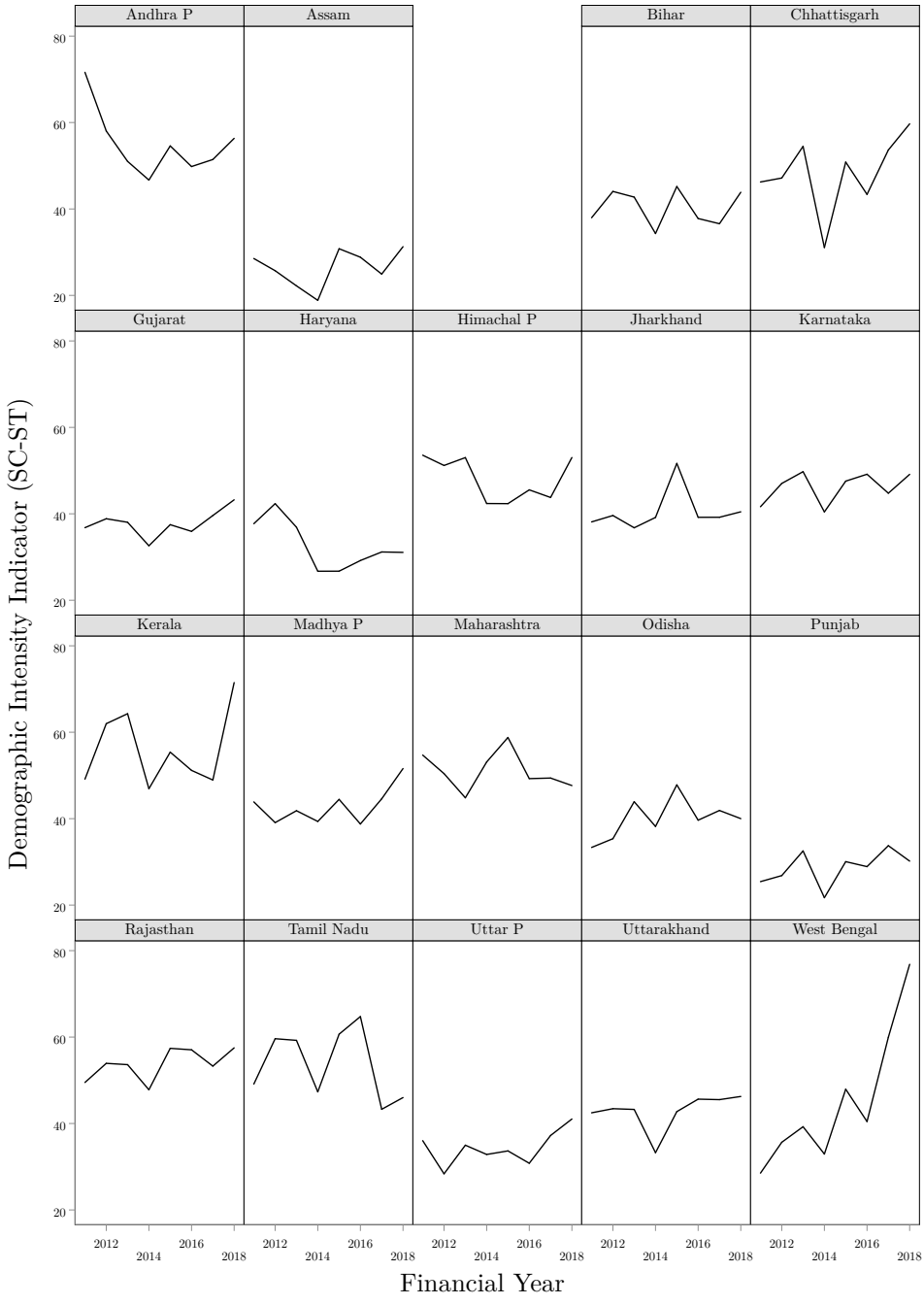

Figure A.11: MGNREGA: Movement of Demographic Intensity Indicator (SC-ST) over Time

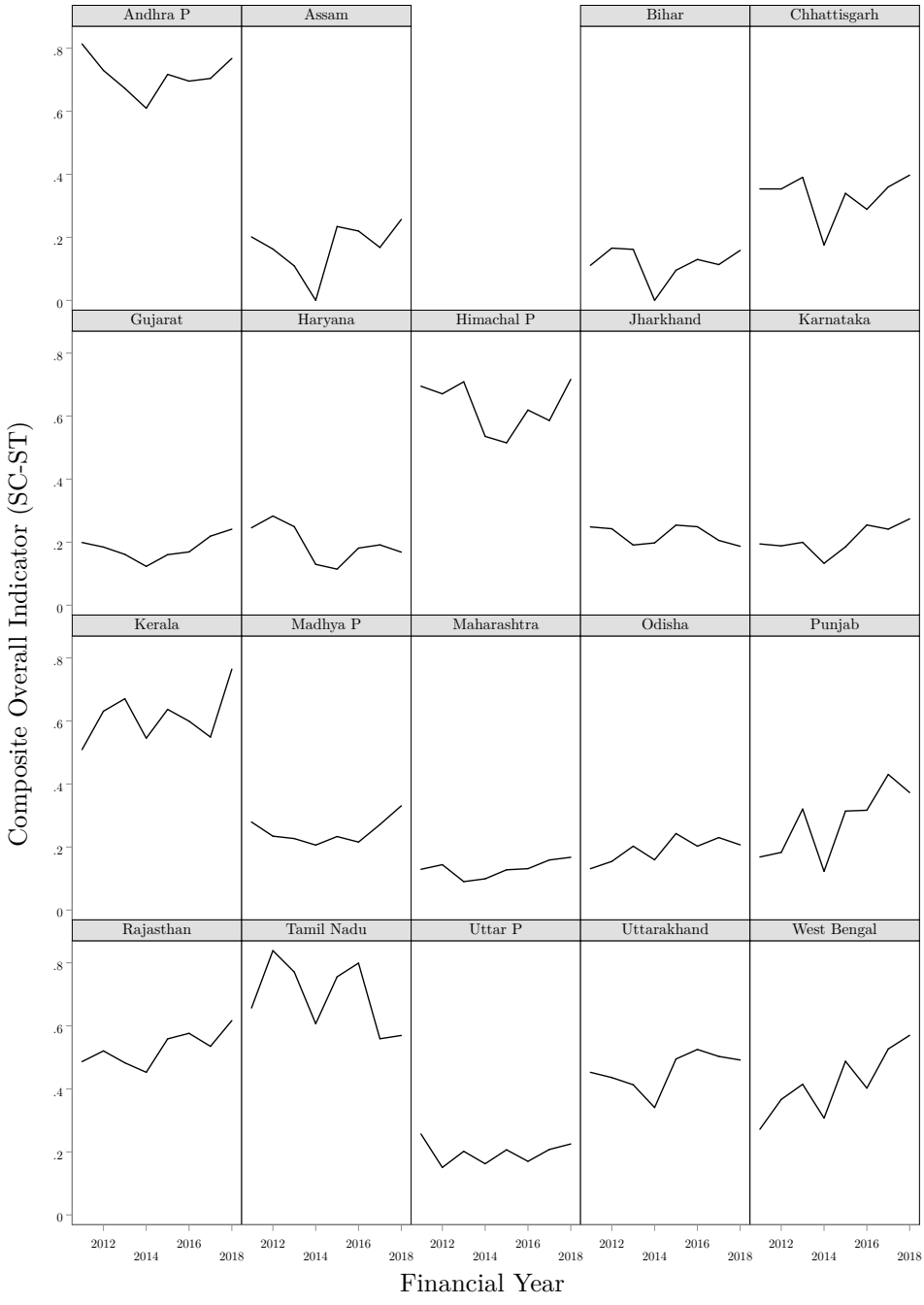

Figure A.12: MGNREGA: Movement of Composite Overall Indicator (SC-ST) over Time

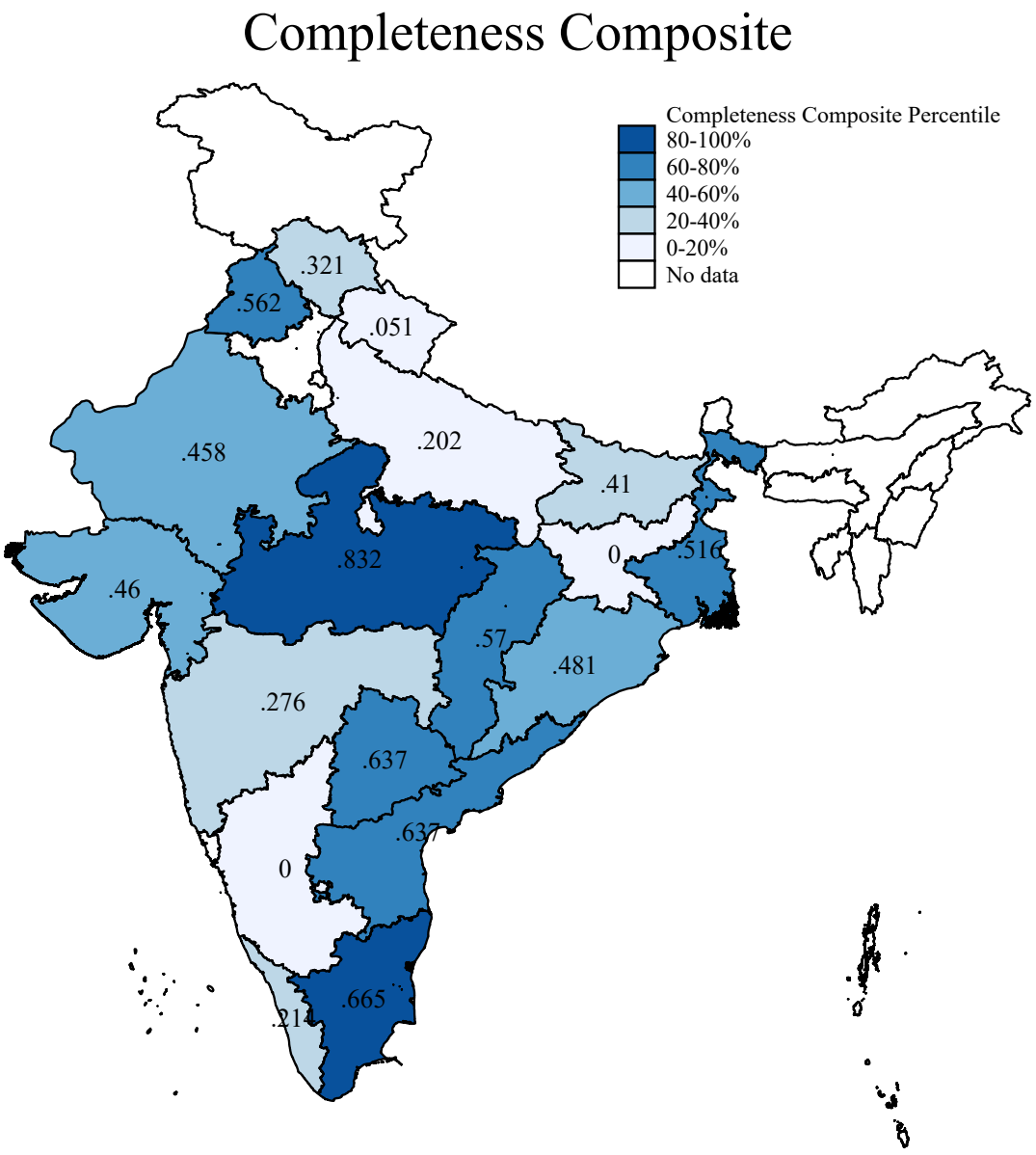

Figure A.13: Completeness Composite (PMGSY)

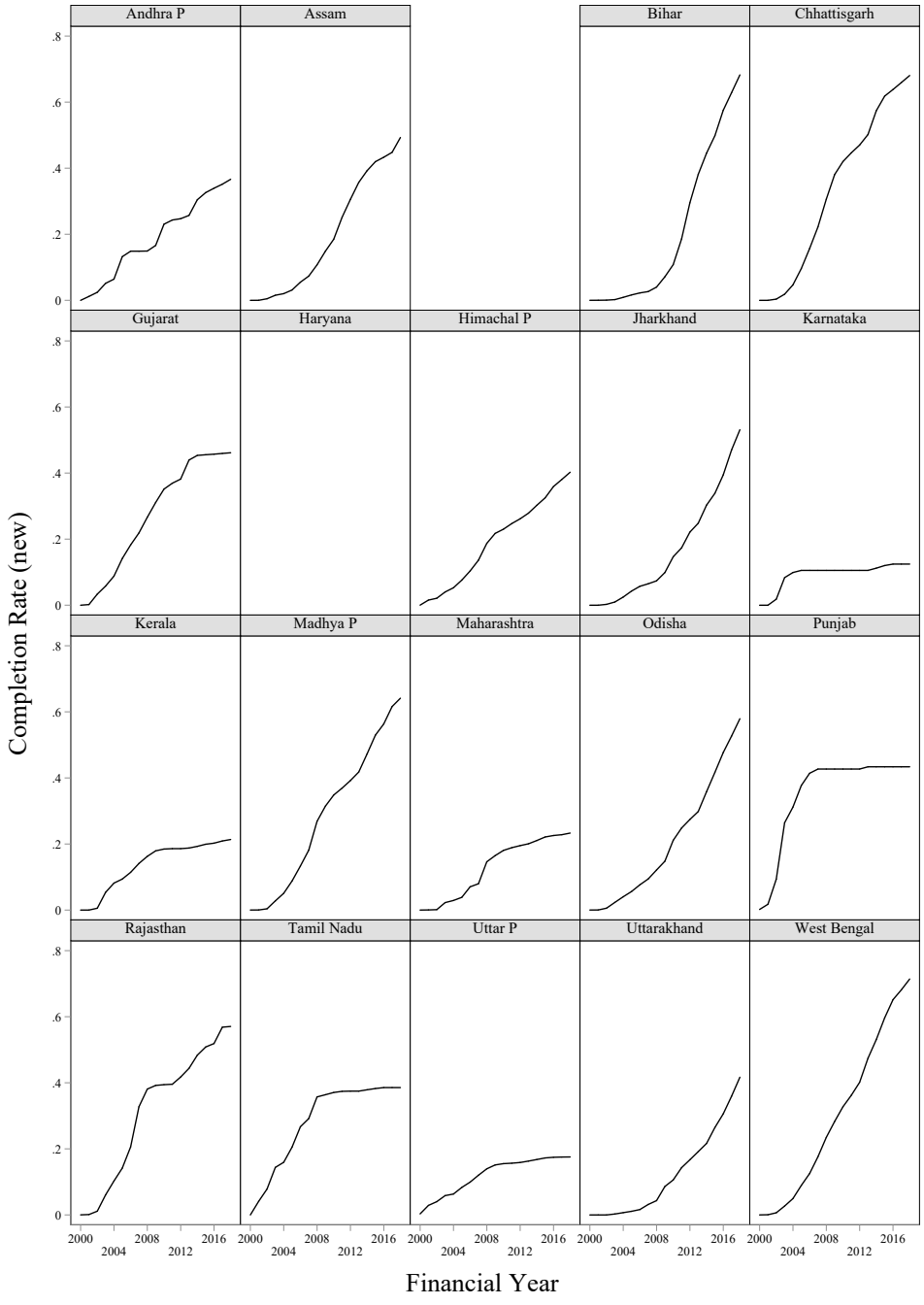

Figure A.14: PMGSY: Movement of Completion Rate (New) Indicator over Time

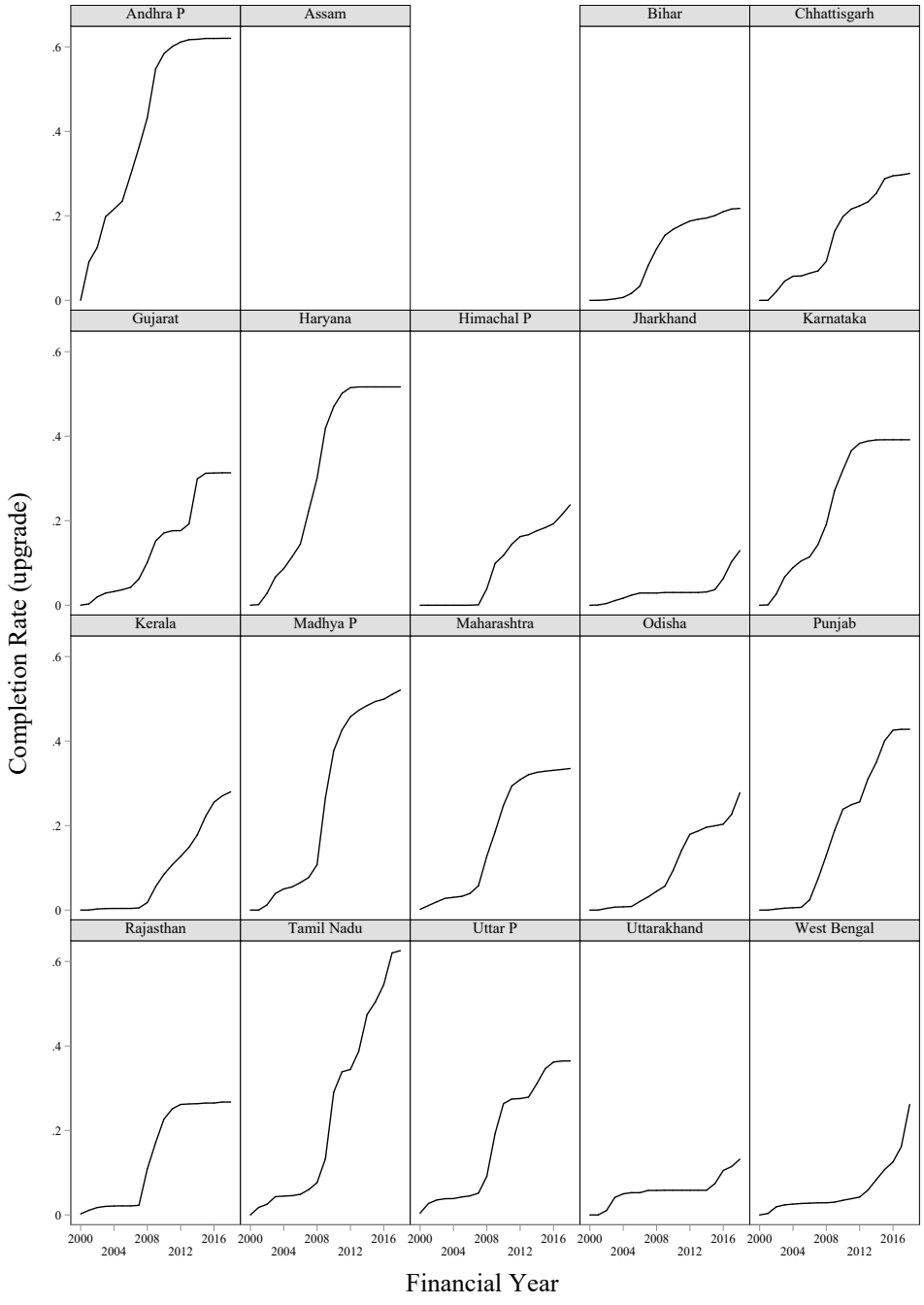

Figure A.15: PMGSY: Movement of Completion Rate (Upgrade) Indicator over Time

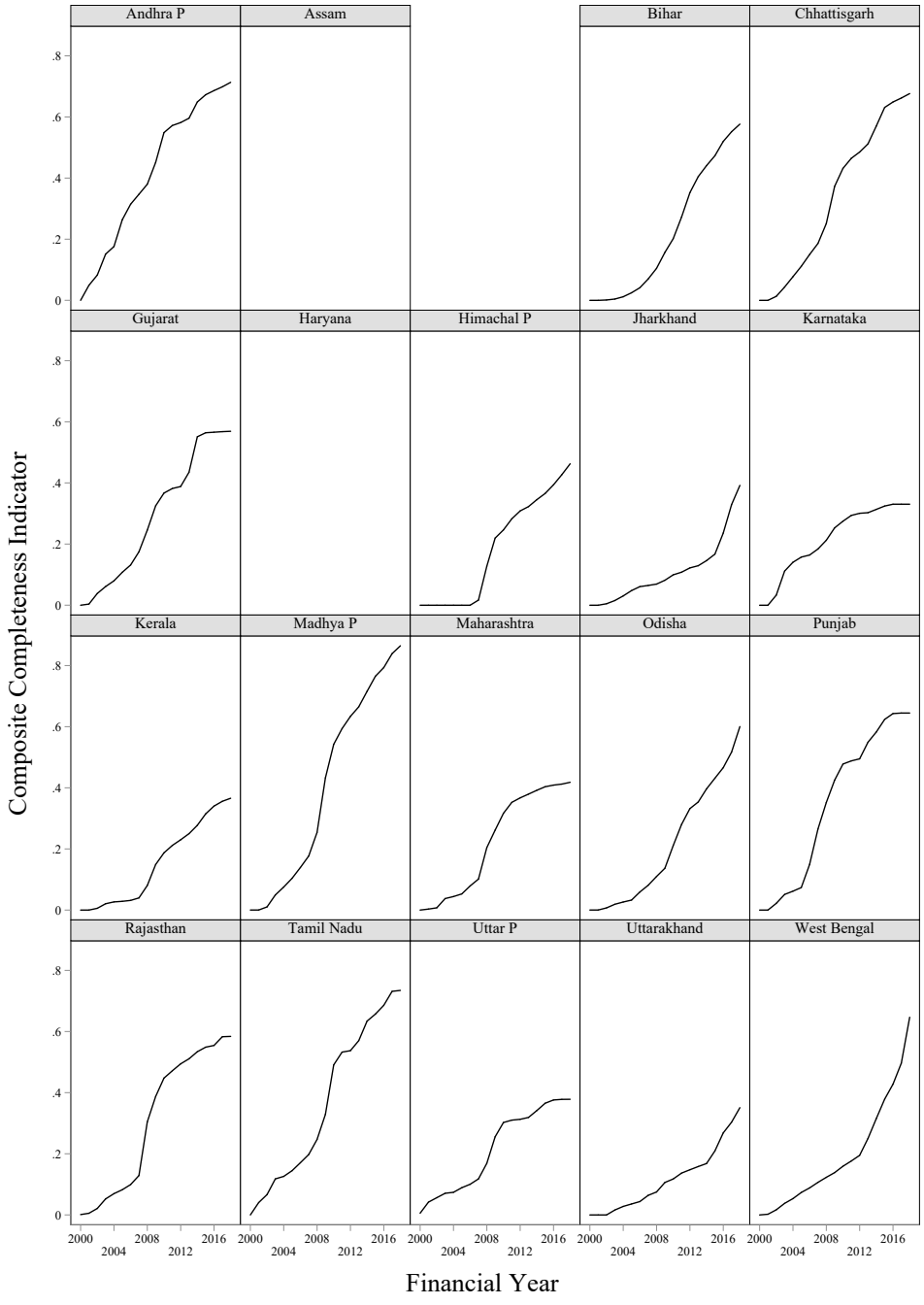

Figure A.16: PMGSY: Movement of Composite Completion Rate Indicator over Time

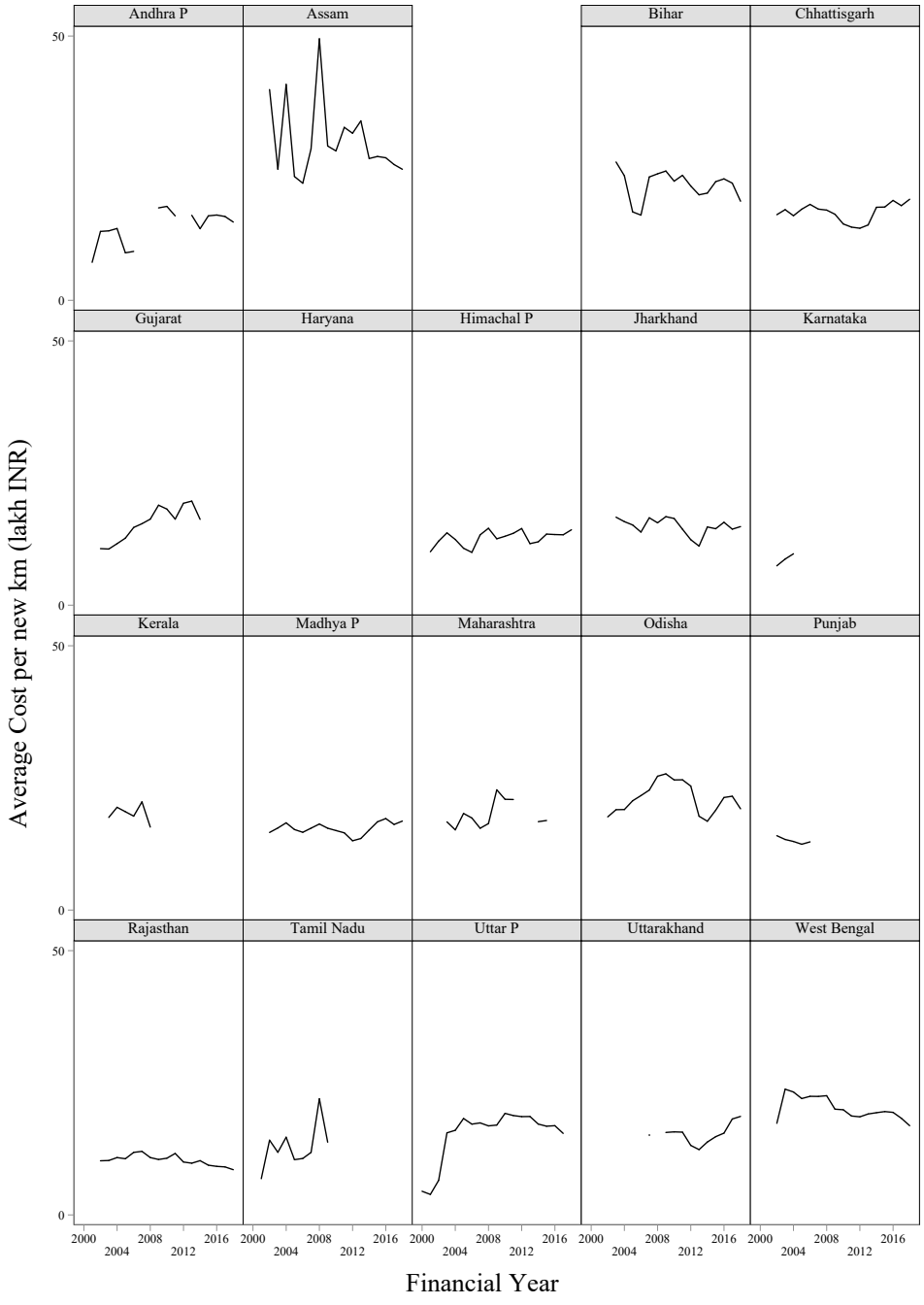

Figure A.17: PMGSY: Movement of Cost Efficiency (New) Indicator over Time

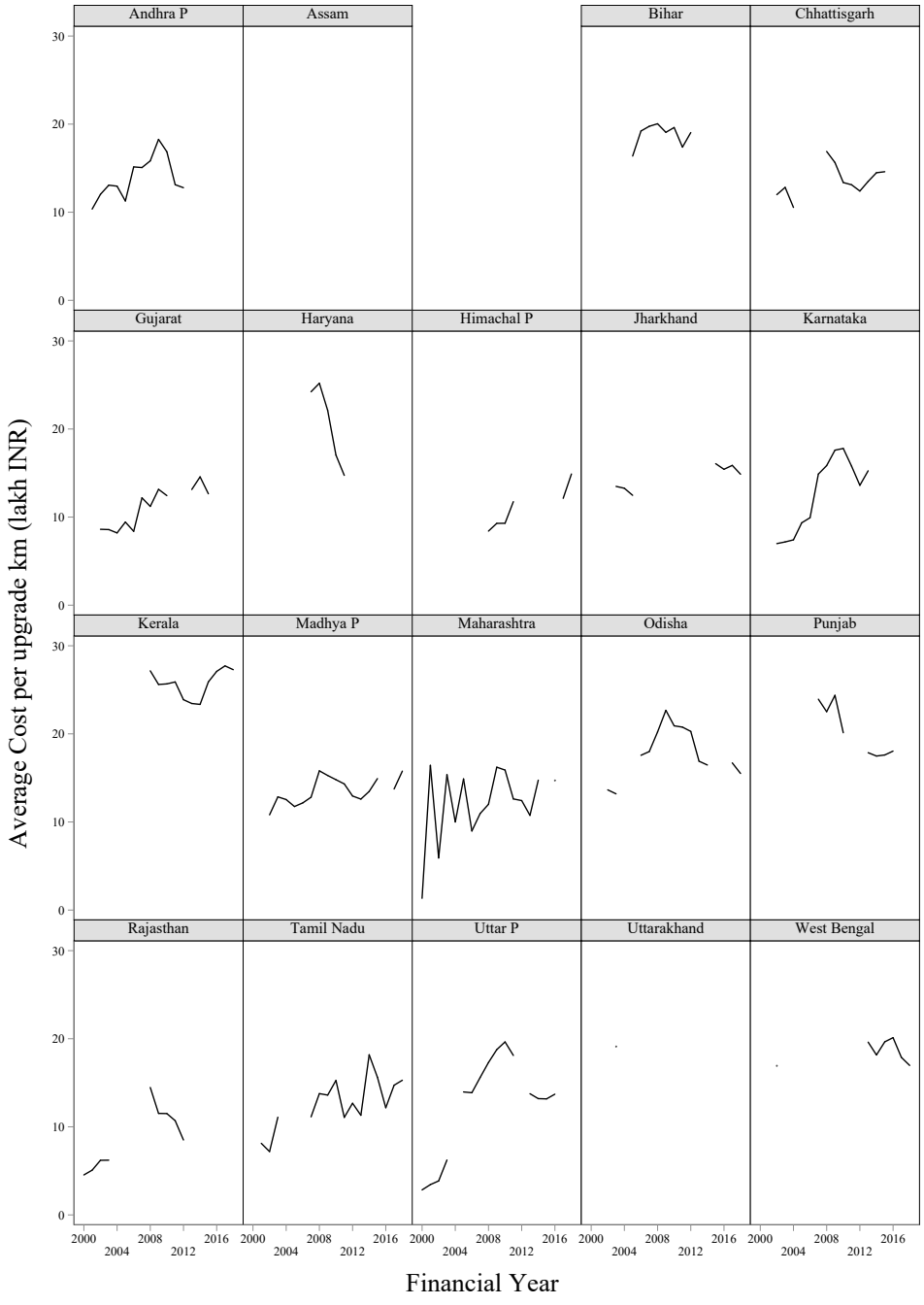

Figure A.18: PMGSY: Movement of Cost Efficiency (Upgrade) Indicator over Time

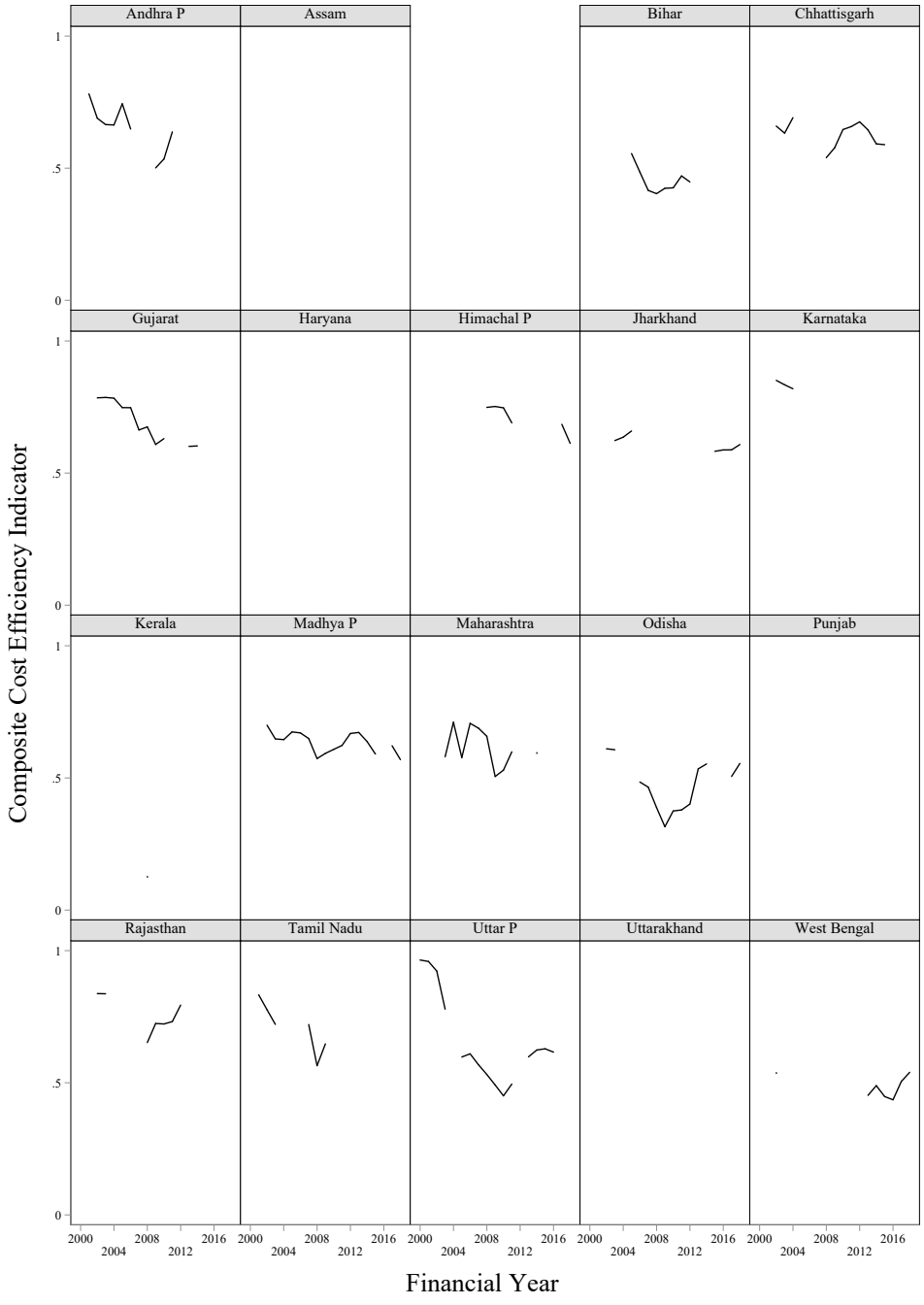

Figure A.19: PMGSY: Movement of Composite Cost Efficiency Indicator over Time

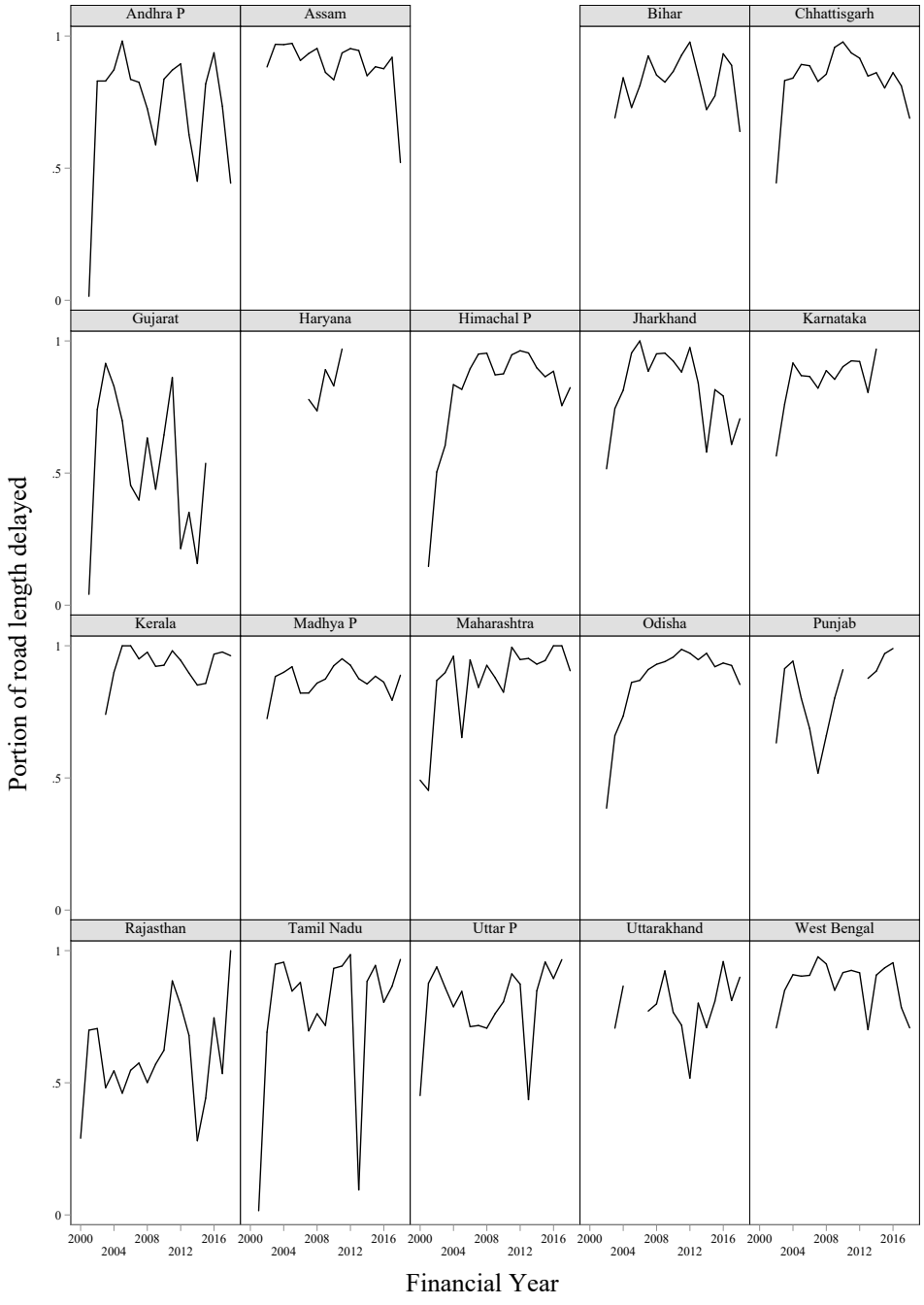

Figure A.20: PMGSY: Movement of Delay Coverage Indicator over Time

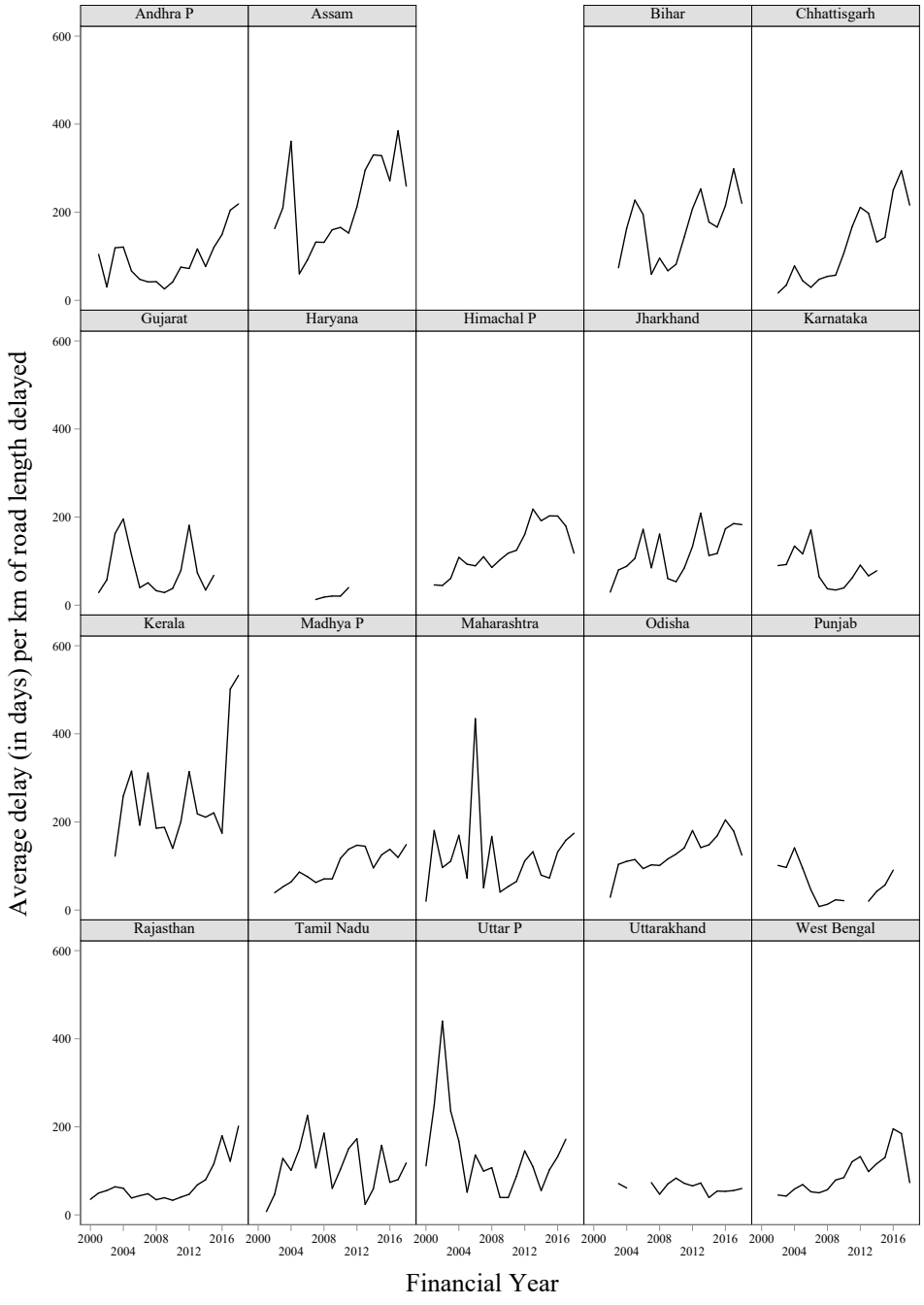

Figure A.21: PMGSY: Movement of Delay Intensity Indicator over Time

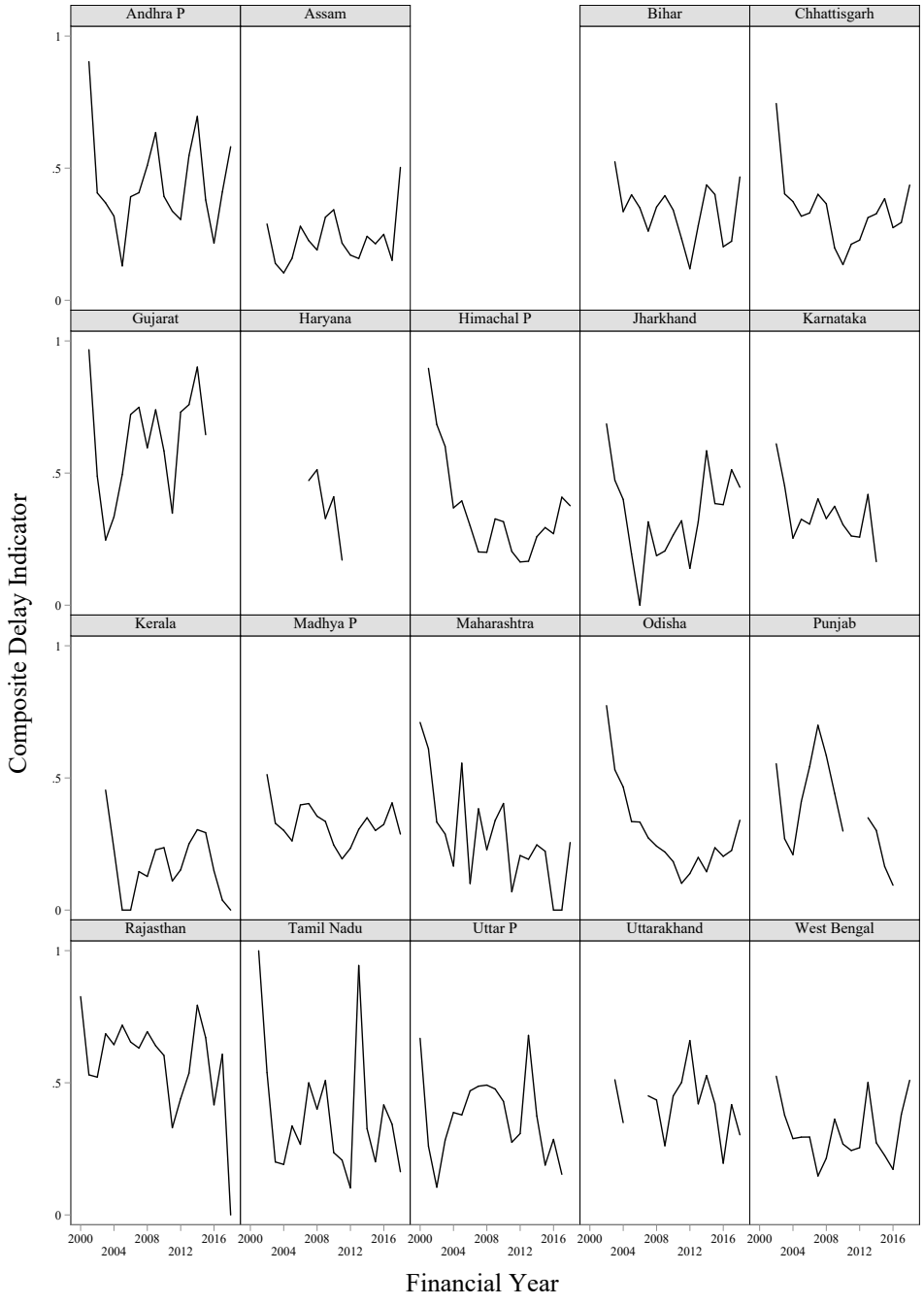

Figure A.22: PMGSY: Movement of Composite Delay Indicator over Time

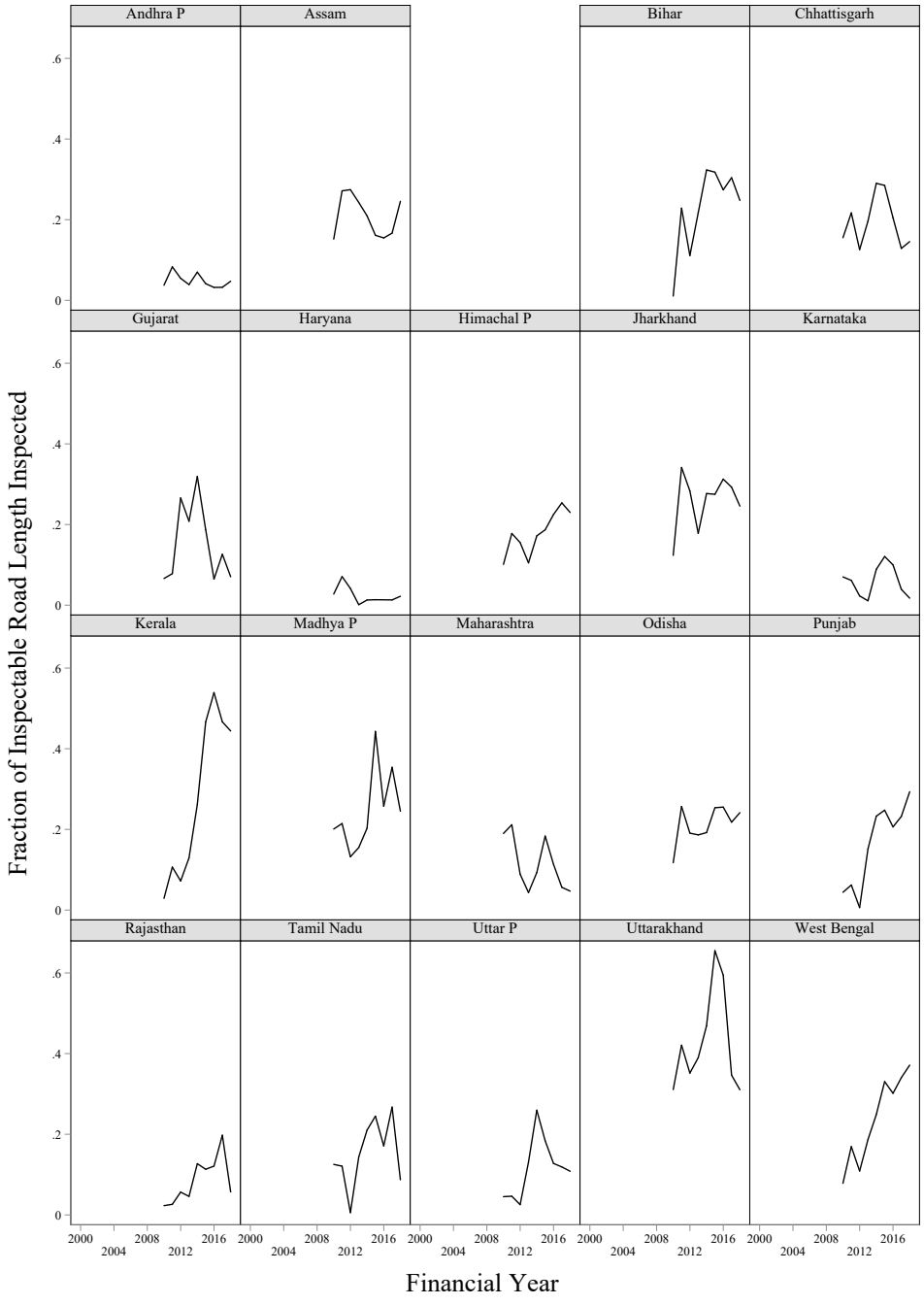

Figure A.23: PMGSY: Movement of Quality Coverage Indicator over Time

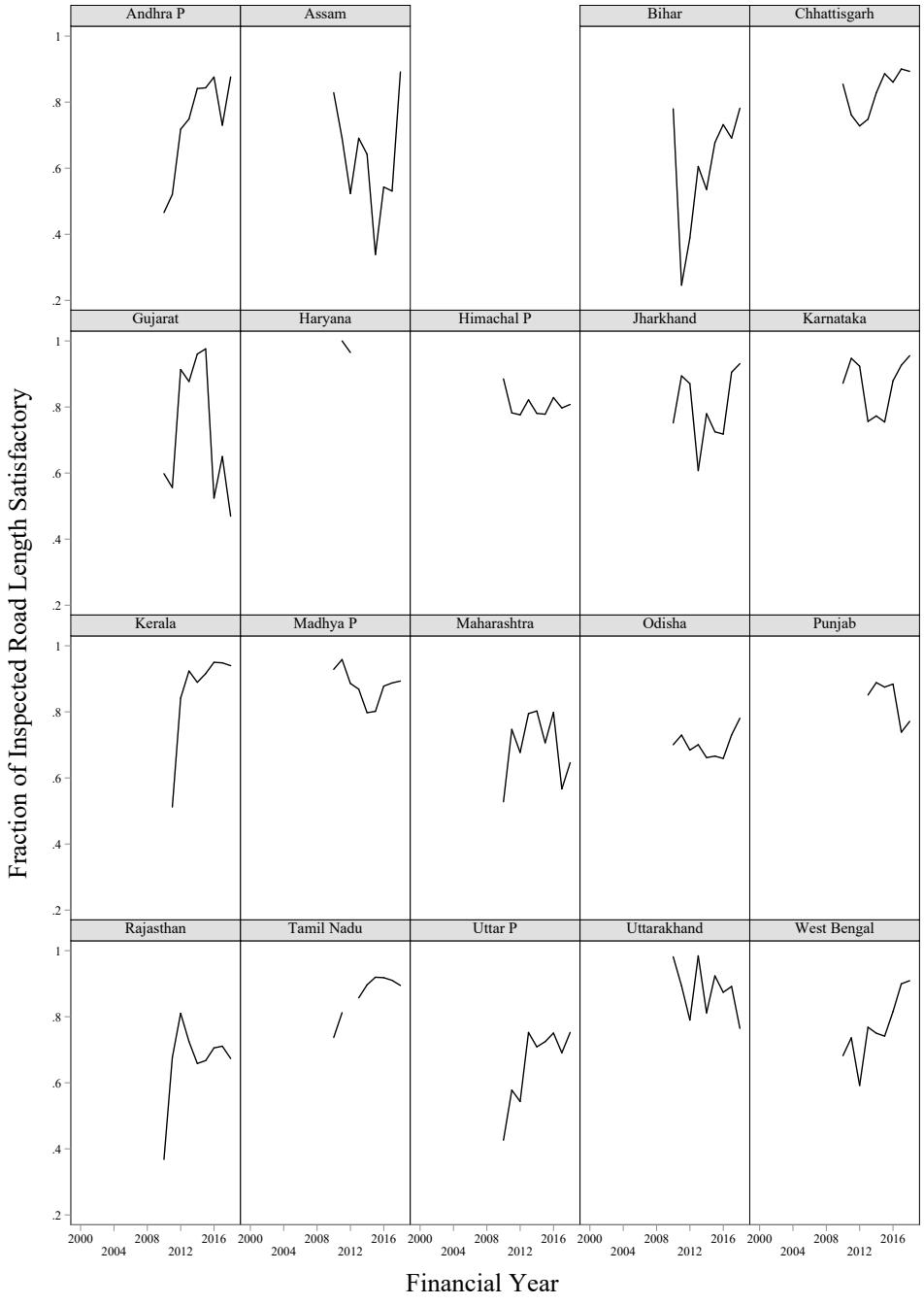

Figure A.24: PMGSY: Movement of Quality Intensity Indicator over Time

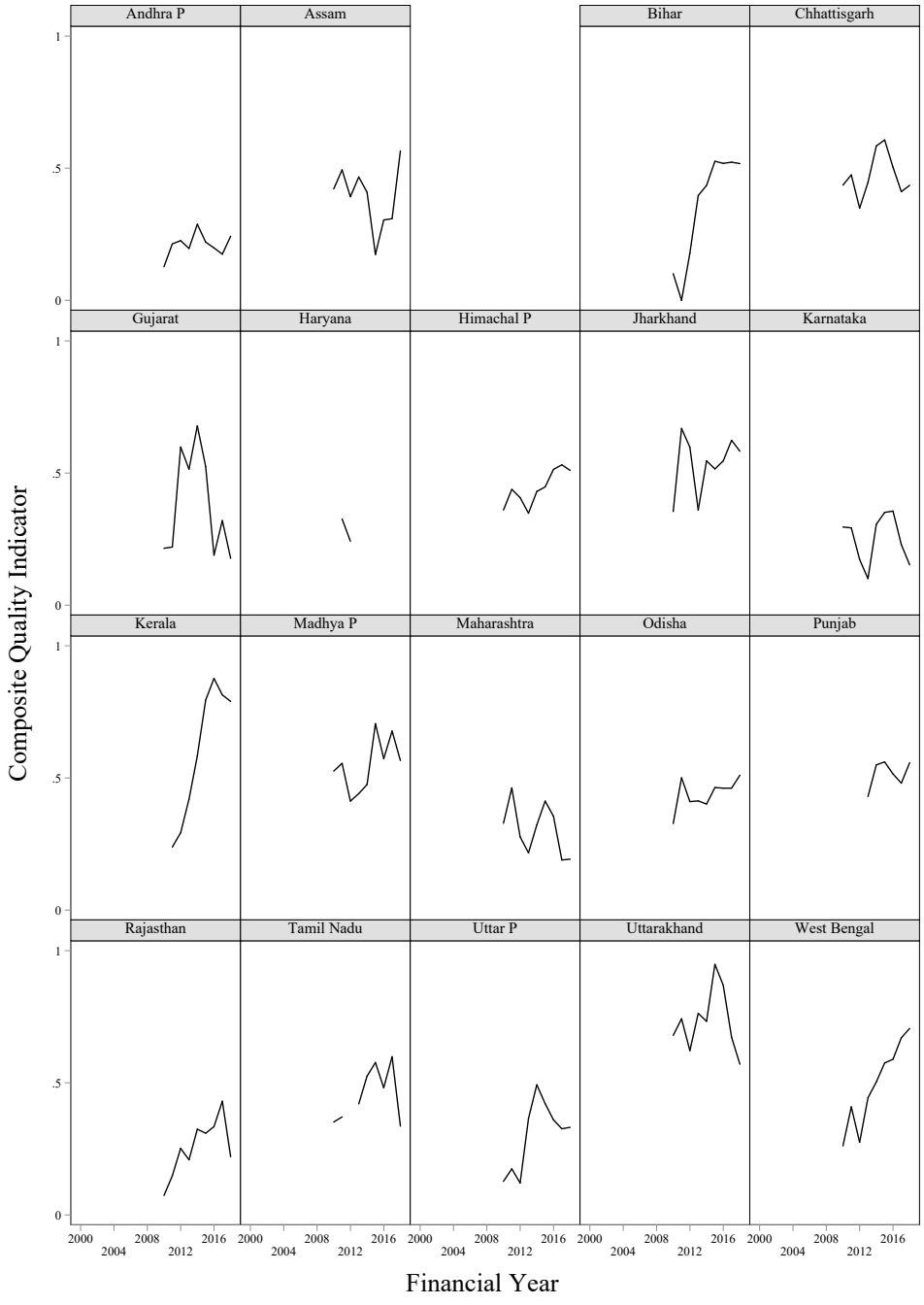

Figure A.25: PMGSY: Movement of Composite Quality Indicator over Time

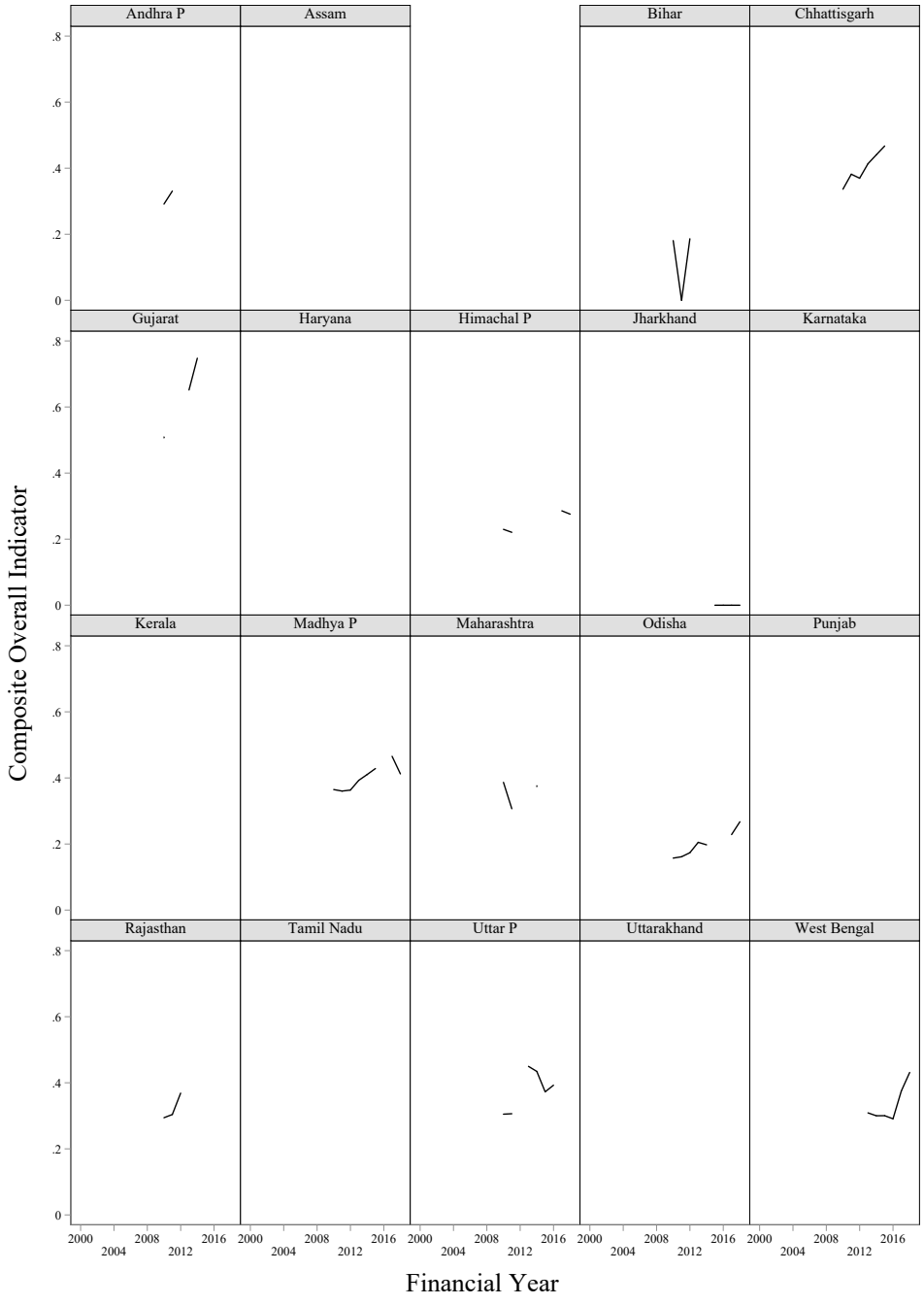

Figure A.26: PMGSY: Movement of Overall Composite Indicator over Time