

Impact of MGNREGA on labour wage rate dynamics in India *

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This study is the first one to examine the impact of Mahatma Gandhi National Rural Employment Guarantee Act 2005 (MGNREGA) on market wage rates for manual labourers, validating against the workers' responses. We use a unique database, namely Workers Level Schedule (WLS), sourced from the All India Coordinated Report by the Planning Commission (now, NITI Aayog) of the government of India. As MGNREGA may have been differentially implemented across districts in India, we control factors such as the number of days worked under MGNREGA, number of days worked for creating MGNREGA assets, number of days worked for non-MGNREGA related works, wage rate per day for MGNREGA work, wage rate per day for non-MGNREGA work, number of hours worked per day under MGNREGA work, and number of hours worked per day under non-MGNREGA work. Using the data from 12 different states in India, we find that the impact of MGNREGA in increasing market wage rate is not uniform. We conclude with the argument that unless location based regional characteristics are included within the MGNREGA scheme, a pan-Indian policy of such nature can not reach the targeted group of poor rural households in an extremely heterogeneous country like India.

* A study based on Mahatma Gandhi National Rural Employment Guarantee Act 2005 (MGNREGA) Workers Level Schedule (WLS).

Introduction

Government of India (GOI) introduced Mahatma Gandhi National Rural Employment Guarantee Act 2005 (MGNREGA) to ensure 100 days of employment for every rural household.¹ As per the State's Minimum Wage Act, the workers are paid at the minimum rural wage rate prevailing in the respective states.² Under the clause, 'conditional cash-transfer', the beneficiary of this programme is required to work manually and is expected to get jobs within 15 days of the application. The 'manual' aspect of the work ensures that there is no self-selection bias and no moral hazard associated with the identification of the poor.³ MGNREGA is expected to provide additional employment opportunities to rural households, especially the landless class, who are largely dependent on manual labour. Since its inception in 2005, MGNREGA has been able to provide employment to 7.5 million rural households every year (Bhaskar–Yadav 2015). People in the landless labour class in India do not usually possess agricultural land for farming, and typically work as agricultural wage labourers during the cropping seasons.⁴

One of the objectives behind introducing Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) was to ensure that these landless labourers can avail employment opportunities to sustain their livelihood during times when they do not have work.⁵ At the same time, while making use of unskilled manual labour, MGNREGA is designed to create durable productive assets (Clause 3 of Schedule I of the Act). These productive assets, such as rural roads, micro-irrigation, water conservation, drought proofing, land development, flood control and protection, farm ponds and dug wells, are expected to increase farm productivity, increase agricultural incomes, and reduce rural

¹ The term 'household' is synonymous with 'family', wherein a group of people related to each other (by birth and marriage) share a meal and live together.

² India is a federal union comprising of 28 states and 9 union territories. Each state is further sub-divided into administrative divisions known as a district. According to the 2011 Census, Government of India, there are 627 districts in India. In the Indian Constitution, 'agriculture' has been placed as 'Entry 14' in the State List, with the minimum agricultural wage rates fixed by the respective state governments. Typically, any state government links the MGNREGA wage rate with the Consumer Price Index of Agricultural Labour (CPIAL) prevailing in the respective state.

³ In 2011, new poverty line was introduced in India. An individual spending less than 31 INR in urban areas and 25 INR in rural areas on food, health, and education per day is considered as poor. On 31 December 2011, 1 USD was equivalent to 53.06 INR.

⁴ There are three main cropping seasons in India: Kharif, Rabi, and Zaid. The Kharif season starts in June and ends in October, the Rabi season crops are sown in mid-November and harvested in April, and lastly, the Zaid season crops are harvested between April and June.

⁵ In Phase I (between 2005 and 2006), MGNREGS was implemented in 200 of the most backward districts in the country. In Phase II (between 2007 and 2008), the scheme was implemented in an additional 130 districts. In Phase III (starting 1 April 2008), the remaining rural districts were brought under the scheme.

poverty.⁶ MGNREGA was further amended in July 2014 (Clause 4 of Schedule II of the Act), and specifically mandates that at least 60% of the expenditure in a district shall be used for the creation of productive assets, which are directly linked to agriculture and allied activities such as fisheries and dairies.

Box 1

Major features and achievements of the MGNREGA in India

- Ensuring social protection for the most vulnerable people living in rural areas by providing employment opportunities to the tune of 100 days per household;
- Ensuring a secure livelihood for the poor through the creation of durable assets such as water supply, soil conservation, rural connectivity, strengthening drought-proofing, flood control, etc.;
- Aiding in the empowerment of marginalised communities, especially women, Scheduled Castes (SC), and Scheduled Tribes (ST) through the process of rights-based reservation;
- Strengthening decentralised, participatory planning through the convergence of various anti-poverty and livelihood initiatives;
- Deepening democracy at the grass root level by strengthening Panchayati Raj Institutions;
- Ensuring greater transparency and accountability in governance through social auditing.

Source: GOI (2005).

Literature on MGNREGA suggests that the programme has helped in reducing rural poverty by providing additional employment opportunities. Klonner and Oldiges (2014) found that MGNREGS reduced poverty by almost half during the lean seasons by enabling the smoothening of seasonal spikes in the consumption of the poorest families. By using data from the 66th Round of the National Sample Survey Office (NSSO) of GOI, Kumar and Joshi (2013) found that MGNREGA provided average wage employment for 43 days, benefiting 22.5% of the rural households, resulting in a reduction in the level of poverty by 4%. Using a different set of data involving a cohort of 28,000 rural households in 2004–2005 (before MGNREGA) and comparing it with the same households in 2011–2012 (after the implementation of MGNREGA in all districts), a study by the National Council of Applied Economic Research (NCAER) found that MGNREGS reduced poverty by 32%. The scheme, as a result, has managed to prevent a staggering cumulative of 14 million people from falling into the poverty trap (NCAER 2015).

While the above studies have brought into light the positive impact of MGNREGS in reducing poverty, there are also other studies that have looked into the problems of corruption and self-selection bias around the scheme's implementation, which have resulted in the scheme being ineffective in achieving its

⁶ Clause 4(3) of MGNREGA excludes works that are non-tangible, not measurable, repetitive (such as removing grass, pebbles), and agricultural operations. The employment of the MGNREGA workers for farm operations is not included in the provisions of the Act.

targeted goals (Shankar–Gaiha 2013). Also, MGNREGS is a supply-driven initiative, and the success depends on the willingness of the respective state governments to implement the programme. The central government continues to bear a major share of the scheme's expenditure. As per the provision of MGNREGA, 2005, the central government bears: (i) the entire cost of wages of unskilled manual workers, (ii) 75% of the costs of material, wages of skilled and semi-skilled workers, and administrative expenses, which include inter alia, the salary, and the allowances of the programme officer and his supporting staff at the worksite facilities, and maintenance of the website to upload documents related to MGNREGA activities. The State Government bears: (i) 25% of the costs of material and wages of skilled and semi-skilled workers, and (ii) unemployment allowances, which are payable in case the state cannot provide wage employment on time as per the MGNREGA.

Under normal circumstances, if implemented properly, MGNREGS is expected to positively affect market wage rate for unskilled labourers and improve agricultural productivity using MGNREGS assets. MGNREGS means the availability of additional jobs. If the relative demand for unskilled manual workers go up, this may eventually lead to an increase in wage rates. This may happen even though the labour market in India is extremely imperfect, with high costs on the part of the rural poor to find and switch to alternate employment.⁷

Using a panel of 249 districts spread across 19 states, Berg et al. (2012) examined the impact of MGNREGA on agricultural wage rates for the period between 2000 and 2011. They observed that MGNREGA boosted the real daily agricultural wage rates by 5.3% on average. It took 6 to 11 months for an MGNREGA intervention to culminate into higher wages. The agricultural productivity also improved. Banik (2018) found approximately 52% (73.2 million hectares out of 141.4 million hectares) of the net sown area in India to still be rain-fed and not yet irrigated. MGNREGS assets are expected to increase agricultural productivity. Bhaskar and Yadav (2015) documented that MGNREGA wells in Jharkhand have improved the agriculture productivity by 6%. In 2018, the Institute of Economic Growth (IEG) published a report to ascertain the impact of MGNREGS on agricultural productivity. The study, which covered 30 districts, spread over 21 states and 14 agro-climatic zones, found that rice and wheat productivity increased by 12%. For bajra, maize, pulses, and oilseeds, the productivity increased by 16–17%.

However, the market wage rates may not increase in the case of corruption and poor implementation of MGNREGS. While surveying six states during 2007–2008, Dreze and Khera (2009) found that the programmes did not reach the targeted group of poor households on several occasions and observed leakages of benefits to those above the poverty line.⁸ The study found that, while there were 98% workers in the sample who were ready to work for 100 days in a year, only 13% of the

⁷ There are elements of collusion and social power held by the employer, which keep the wage rates low.

⁸ The six states were Chhattisgarh, Bihar, Uttar Pradesh, Jharkhand, Madhya Pradesh, and Rajasthan.

respondents were able to secure employment. The manual field workers have the information of the extent of corruption and faulty implementation in the MGNREGS. Ghosh et al. (2019) found that MGNREGA failed to increase the consumption of the rural poor households. Unfortunately, there has not been a study that has examined the impact of MGNREGA by considering the responses of the workers, on whether they feel that there has been an increase in the market wage rates as a result of MGNREGS.

This study is the first one to examine the impact of MGNREGA on market wage rates for manual labourers, validating against the workers' responses. We make use of a unique database, namely Workers Level Schedule (WLS), which was sourced from the All India Coordinated Report, by the Planning Commission (NITI Aayog now) of GOI. As MGNREGS may be differentially implemented across districts, we control for a number of variables, namely the number of days worked under MGNREGS, number of days worked for creating MGNREGS assets, number of days worked for non-MGNREGS related works, wage rate per day for MGNREGS work, wage rate per day for non-MGNREGS work, number of hours worked per day under MGNREGS work, and number of hours worked per day on non-MGNREGS jobs. For instance, say the unskilled manual labourers are not hired at all for the MGNREGS related work, instead the fund is used for undertaking capital expenditure to buy heavy agricultural machinery and create rural assets which are not legally permitted, then the market wage rate for unskilled workers may not increase at all. While examining the creation of assets under MGNREGA, GOI (2016a) found that the southern states of Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu, spent more money on assets creation and as a result, did not hire manual labourers. Likewise, Rajasthan also slowed down the implementation of MGNREGS (Himanshu et al. 2015). All these factors justify the need for considering these control factors to understand the effect of MGNREGA on market wage rates. We hypothesise that for any particular state, MGNREGA is successful if both these criteria are simultaneously satisfied: (i) higher market wage rates, given the predictor variables, and (ii) a higher proportion of workers are in agreement that increase in market wage rate has resulted from a successful implementation of MGNREGA. The rest of the paper is organised as follows. Section II contains narratives as to why the performance of MGNREGA is uneven across different states in India. Section III deals with the database and preliminary observations (summary statistics) emerging from this database. Section IV deals with modelling, methodology and results, and Section V provides the conclusion of the study.

Why MGNREGA had differential impacts across Indian states?

The MGNREGA with an average annual expenditure of over 5 billion USD is the largest workfare programme in the world (United Nations Development Programme (UNDP 2015). Yet in actual reality, the impact of the programme varied enormously across states and districts. There are three important factors that contribute to the success (or, for that matter the failure) of MGNREGA in any particular state.

Matching demand and supply: The case of political commitment

MGNREGA is a demand-driven rural development programme. The state machinery should make an attempt to reach out to the poor to make them aware of this programme. Also, as the expense is shared by the states alongside the central government, there should be willingness on the part of state governments and bureaucracies to run this program. The capacity of the state in terms of implementing MGNREGS and its ability to reach out to the potential beneficiaries are important for the success of the programme. The success of the MGNREGA programme depends on whether the state has the willingness to run the programme. While some of the low-income states such as Chhattisgarh and Tripura did well in terms of implementing MGNREGA, others such as Bihar did not do well.⁹ The study by NCAER (2015) found that nearly 60% of the poor rural households participated in building MGNREGA rural assets in Chhattisgarh. Whereas for Bihar, NCAER (2015) found the number to be only 11%. Among the eight north-eastern states, Tripura did well in terms of the implementation of MGNREGS. Even Mizoram and Sikkim did a good job of implementing the scheme (GOI 2016c). While Tripura provided employment of 94.5 days per household, the corresponding figures for Mizoram and Sikkim were 68.5 and 66.9 days, respectively (UNDP 2015). In sharp contrast, two other north-eastern states, namely Arunachal Pradesh and Manipur, which were at the bottom among the 28 states, provided only 27.5 and 15.6 days of employment per households (Ibid).

One would have expected all the north-eastern states to participate in implementing MGNREGA, especially when this region is poorly developed without any industrial base. As per the 2011 Census, GOI, the north-eastern states, home to 45.4 million people, have limited employment opportunities. The labour market interventions such as MGNREGA was supposed to make a difference in the region. However, only three states, Tripura, Mizoram, and Sikkim were able to do well in terms of providing employment opportunities. In Tripura, good governance, efficient implementation, and proper monitoring of the programmes resulted in the

⁹ The national average annual per-capita income for India was 1964 USD during 2018–2019. The corresponding figures for Chhattisgarh, Bihar, Rajasthan, and Tripura were 1416, 646, 1616, and 1653 USD, respectively (Ministry of Statistics and Programme Implementation, GOI, 2020).

success of the MGNREGA. Similarly, Chhattisgarh, an economically backward state has shown political commitment to run MGNREGS and ensure that the rural households are aware of the programme by getting the civil societies and non-governmental organisations involved (Chopra 2015). Whereas the government of Rajasthan, despite having a higher per-capita income than Chhattisgarh, was unwilling to award jobs under MGNREGS (Ibid). In a related study, Himanshu et al. (2015) found that in many villages in Rajasthan, people did not demand work because they were told that they could request work only when it is available. While examining the MGNREGS data for the state of West Bengal, Dey and Sen (2014) found the *Gram Panchayat* (village council) leaders from the elected ruling party were spending more on their own party constituency. In fact, the village council leaders implemented MGNREGS better if the party they were affiliated to did not win many village council seats in an area. However, if their party had a majority, these leaders were less committed to implement MGNREGS (Bardhan–Mookherjee 2010).

Economic hardship and MGNREGS

The poorer states are more likely to use MGNREGA funds as there are less alternative job opportunities available. However, data show that the correlation between poverty levels and implementation of MGNREGS was not very high. A total of 46% of the rural poor households in India live in the states of Bihar, Maharashtra, and Uttar Pradesh (CAG 2013). However, the utilisation of the central government's portion of the MGNREGA funds in the case of these three states is less than 20%. The government and bureaucratic machinery of these states are not serious about the implementation of MGNREGS (Ibid). Using the National Sample Survey data for 2009–2010, Dutta et al. (2012) found that the poor households, particularly in Bihar and Uttar Pradesh, were not able to find MGNREGS work despite making demands for it. Some of the relatively rich states such as Punjab and Haryana, where the demand for MGNREGS work was low, were also not serious about implementing MGNREGS. According to the CAG (2013), as of March 2012, seven years since the inception of MGNREGA, the states of Haryana and Punjab had still not formulated the rules and issued job cards to implement MGNREGS. Drawing from NSSO (66th Round data), conducted during 2009–2010, Liu and Barrett (2012) found that 11 states, namely Assam, Bihar, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Maharashtra, Odisha, Punjab and Uttar Pradesh, did not effectively undertake MGNREGS, and the rural poor of these states did not receive MGNREGA work when they wanted. Implementation of work under MGNREGA does not depend on the fiscal space that a state enjoys, it depends more on the willingness of the state political leadership to implement this programme. Some of the poorer states such as Chhattisgarh did well in comparison to the rich states like Punjab, Haryana, and Rajasthan. Saxena (2016) found that the southern states, namely Andhra Pradesh (including Telangana) and Tamil Nadu, did

better at implementing MGNREGS than the northern states such as Bihar and Uttar Pradesh.

Corruption and nepotism

On carrying out a review of MGNREGS, the Comptroller and Auditor General (CAG) of GOI found many loopholes in the implementation process across various parts of the country (CAG 2007). Among the 26 states, 558 *village panchayats* spreading over 68 districts and 141 blocks were identified for the survey.¹⁰ The study observed that in as many as 70% of the villages there were no proper records available on the number of households who demanded jobs and the actual number of people who benefited from the job guarantee scheme. In many cases it was found that the jobs were allocated on a 'verbal basis', and no documentation was available with the village body. This record strengthens the picture of disparity and irregularity due to the self-selection bias, which is primarily due to the undesirable and unlawful political intervention. Shankar and Gaiha (2013) pointed out the leakages and faultiness in the implementation of MGNREGS. Their study identifies the factor of political proximity of the vulnerable group to the local leaders as an important factor determining who gets to work under the MGNREGA. Carried out in the state of Andhra Pradesh, Tamil Nadu, Madhya Pradesh, and Rajasthan, the respective study found political decentralisation, community social audits, access to information, and political competitions as the factors which could reduce corruption and leakages. Along the same lines, Das's (2015) study of the survey data on MGNREGA from the state of West Bengal found that households who were politically active and supporters of the local ruling party were more likely to receive the benefits of the MGNREGS. Marcesse (2018) showed that the demand for work benefits did not emerge spontaneously from self-selecting rural citizens, but was articulated by the local elected representatives who are pressurised to accommodate the demands for rents from the bureaucracy through various concealed ways. Using primary data from the MGNREGA official evaluation, Ghosh and Roy (2015) showed the numerous ways money was stolen, including false documentation, false worker lists and a significant proportion of missing assets. Himanshu et al. (2015) found that the rural households were aware that they are not likely to get jobs from the village-head if they belong to a different political group, and knowing this, they did not apply for the MGNREGS jobs. As a result, although almost 94% of respondents wanted more work, only half of them put in their applications for it. In

¹⁰ Villages are sub-divisional units of a district. According to the 2011 census, there are 649,481 villages in India. Gram panchayats stand for village councils. The rural societies are accustomed to the regulation of their domestic, religious, social, economic, socio-political, and judicial affairs at the grassroots level through their traditional village councils and the collective wisdom of the people in the village. Gram Panchayat, comprising of more than one village, is the primary unit of local self-governance in rural India. There are 250,000 village panchayats.

terms of transparency, the Himalayan states of Himachal Pradesh, Jammu and Kashmir, and Uttarakhand were more unbiased in terms of doling out MGNREGS work to rural households, irrespective of their political affiliation (GOI 2016b).

Data and preliminary observations

We use data from MGNREGA workers, WLS, which is based on an all India evaluation study conducted under the auspices of the Planning Commission, GOI during 2012–2013 and published in 2015–2016. The sampling for this study was carried out by the Planning Commission with the help of the Ministry of Statistics and Programme Implementation (MOSPI), GOI. There were eight types of questionnaires prepared pertaining to the state, district, district-blocks, gram panchayat level, verification of all selected assets by a qualified engineer, worker-level, beneficiary non-worker level, and focused group discussions. This study is conducted using data from 15 states, namely Andhra Pradesh, Assam, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Odisha, Punjab, Rajasthan, Tamil Nadu, West Bengal, Meghalaya, Tripura, and Uttarakhand. However, states such as Meghalaya, Tripura, and Uttarakhand have been dropped from our analysis owing to the paucity of data. We have considered the remaining 12 states. In total, 6580 raw data points were collected from 40 districts, covering a range of 162 village panchayats. These districts and villages are chosen on the basis of a stratified, multistage random sampling method. The data have been reconfigured and reorganised to ensure the removal of a few missing observations with the help of Yates' missing plot technique and remove the outliers from the data set.

WLS provides indication of the number of hours and days of work available under MGNREGS and non-MGNREGS, as well as the wage rates for these two types of work. WLS also provides information about the increment in market wage rates for unskilled workers arising from MGNREGS and non-MGNREGS related works, in accordance with the perception of the MGNREGS workers. There have been allegations of corruption (over-reporting of the number of days and hours worked under the MGNREGA scheme) and nepotism (self-selection bias associated with recruiting ruling political party workers) concerning the implementation of the scheme. As a result, the data reported in WLS has been cross-validated with the responses of the manual workers. This has been done to ascertain whether the market wage rates actually increased as a result of MGNREGS. The dependent variable takes the value one, if the worker(s) agree that the information provided in the WLS about increment in manual wage rate is true, and takes the value zero otherwise. A preliminary analysis using the Jarque–Bera test statistic suggests that the data does not satisfy the assumption of normality; thus, a non-parametric modelling approach is followed. Further, we use the logistic regression modelling technique.

Table 1

List of districts in our sample by Indian states

Sr. No.	State name	District name in		
		phase I (2005–2006)	phase II (2007–2008)	phase III (2008–2012)
1	Andhra Pradesh (AP)	Adilabad Anantpur Nalgonda	Srikakulam	Krishna
2	Assam (AS)	Goalpara	Marigaon	Golaghat
3	Haryana (HA)	Sirsa		Gurgaon Faridabad
4	Himachal Pradesh (HP)		Kangra	Shimla
5	Jammu & Kashmir (JK)	Kupwara		Budgam Pulwama
6	Karnataka (KA)	Chitradurga	Belgaum	Bagalkot Dharwad
7	Kerala (KE)	Kandhamal	Idukki Bhadrak	Thiruvananthapuram Kendrapara
8	Odisha (OD)	Malikangiri Sambalpur Sundargarh		
9	Punjab (PU)		Nawanshahr	Bathinda Kapurthala
10	Rajasthan (RA)	Karuli	Chittorgarh	Baran Sikar
11	Sikkim (SK)		South Sikkim	
12	Tamil Nadu (TN)	Dindigul	Thanjavur	Ariyalur, Virudhunagar

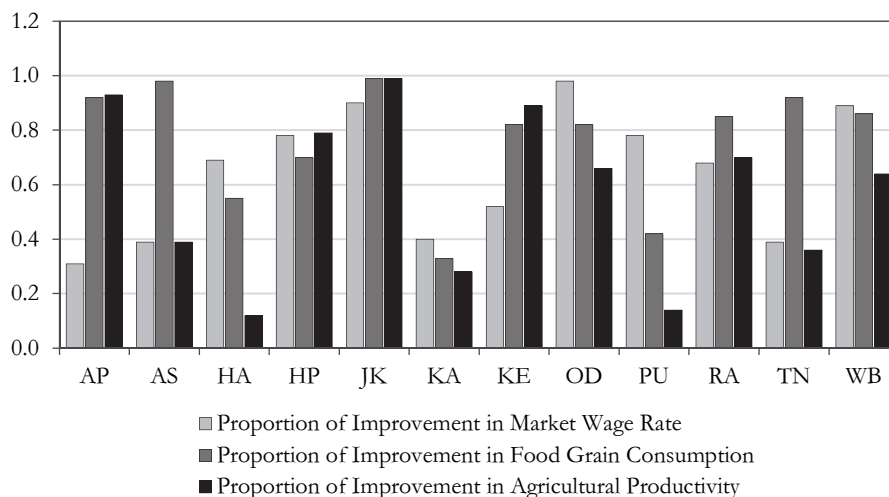
MGNREGA as it was designed is expected to have a positive impact on market wage rates, food grains consumption, and agricultural productivity. Preliminary results, after validating with the workers' responses, show that the impact of MGNREGA in raising market wage rates for unskilled workers is not uniform at the pan-Indian level. While market wage rates have increased in Assam, Odisha, Haryana, Himachal Pradesh, Jammu and Kashmir, West Bengal, Punjab, and Rajasthan, however, for states such as Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu, MGNREGA has failed to increase the market wage rates. Thus, one of the basic objectives of MGNREGA has remained unfulfilled across many regions.

As per WLS, the percentage of workers in the respective states (figures are in the parenthesis) who felt their wage rates have increased are Punjab (78%), West Bengal (89%), Odisha (98%), Himachal Pradesh (78%), and Jammu and Kashmir (90%) (see Figure 1). The workers seem to believe that the market wage rates improved due to the proper implementation of MGNREGS, resulting in the demand for unskilled manual labourers.

On the contrary, states like Andhra Pradesh, Tamil Nadu, Karnataka, and Kerala have recorded no drastic improvement in market wage rates. As discussed earlier, this may be due to the poor implementation of the MGNREGS, inability to use labourers for MGNREGS, and leakage of funds due to corruption. For instance, although the southern states of Andhra Pradesh, Karnataka, and Tamil Nadu have fared well in terms of implementing MGNREGS, however, most of these funds have been used for buying heavy machinery for the construction of MGNREGA assets. In Kerala, there is also evidence of corruption in the implementation of the scheme. On the one hand, there were not many workers available for MGNREGA work, and on the other hand, the *Panchayat Pradhans* were instructed to submit wage bills, wherein the beneficiaries were the local party workers (GOI, 2016a).

Figure 1

Proportions of improvement in market wages, food grains consumption, and agricultural productivity by Indian states, 2012–2013



Note: here and hereafter Andhra Pradesh (AP), Assam (AS), Haryana (HA), Himachal Pradesh (HP), Jammu and Kashmir (JK), Karnataka (KA), Kerala (KE), Odisha (OD), Punjab (PU), Rajasthan (RA), Tamil Nadu (TN), West Bengal (WB).

If we look at the proportion of responses of workers with respect to the increase in food grains consumption resulting from MGNREGA work (Figure 1), we find that the states of West Bengal, Odisha, Assam, Rajasthan, Jammu and Kashmir, Andhra Pradesh, Tamil Nadu, and Kerala have yielded a strong positive impact. The food grains consumption increased because of two reasons. First, the 100 days of work increased the income of rural unskilled workers. Second, a healthy competition among the employers of non-MGNREGA related work, which led to an increase in the market wage rates. While there has been a positive impact in the states of Haryana and Himachal Pradesh, it is not as strong as in the case with the former group of states.

On the contrary, MGNREGA has failed to increase food consumption in Punjab and Karnataka. In terms of agricultural per-capita income, Punjab is already a wealthy state, and thus, the marginal increment in consumption resulting from MGNREGA intervention is expected to be lower. Also, the average land holding size per household in Punjab is exceptionally high (3.78 hectares) when compared to the rest of the country (1.1 hectare). Kerala reflects an entirely contrasting picture when it comes to food grains consumption. Kerala is blessed with a fertile soil, favourable agro-climatic conditions, and high remittances of income from abroad among Indian states. The state also has bustling tourism and tea industries, providing employment opportunities to many workers. Agricultural productivity and food grains consumption are not dependent on a project like MGNREGS, which is more suitable for the backward states. Further, the economy of Kerala is highly resilient, among others, as it is one of the highest sources of spice trade in the country.

Figure 2

Proportions of improvement in market wage rate, in food grains consumption, and in agricultural productivity in India, 2012–2013



Notes: In market wage rate (marked in blue), in food grains consumption (marked in red), and in agricultural productivity (marked in green).

Summary statistics of control variables

Number of days worked under MGNREGS

If the number of workers working under MGNREGS is low, it does not necessarily imply that there is an absence of work, or workers are uninterested to work under the MGNREGS. It may also indicate inefficient governance in the diverse rural regions of India. If the number of workers under MGNREGS is high, then unless otherwise proved, it may raise questions of more controlled corruption in those regions that are taking advantage of the helpless unemployed rural workers. Although the scheme provides 100 days of employment, in practice the responses are varied. To compare the effectiveness of the regularity of the programme, we compare the average number of days worked under MGNREGS across 12 different states. As can be observed from Table 2, the states of Kerala, Tamil Nadu, Himachal Pradesh, and Rajasthan have the highest average for the number of days worked; in all of these cases, the average is above 50 days, with a maximum legal ceiling of 100 days. Whereas the states of Assam (20.1 days per year) and Karnataka (23.0 days per year) have the lowest averages for the number of days worked under the MGNREGS, which is to say that the workers did not have the opportunity to work for the promised 100 days, or there is an absence of willingness to work under MGNREGS. The number of days worked under non-MGNREGA is very high in the case of Assam (194.3 days per year) (see Table 3). The average wage rates under MGNREGS and non-MGNREGS for Assam are Rs.75 and Rs.544.5, respectively. This seems to be the reason for the low work force participation rate under MGNREGA in Assam. We find a similar result in the case of Kerala as well.

Table 2

Number of days worked under MGNREGS (summary statistics), 2012–2013

Indian states ^{a)}	Minimum	Q1	Median	Mean	Q3	Maximum
AP	1	35	50	49.3	60	95
AS	14	14	16	20.1	30	84
HA	4	20	32	38.7	50	90
HP	1	40	62	61.8	85.8	100
JK	13	28	39	39.0	50	81
KA	3	14	22	23.0	30	52
KE	6	75	79	79.0	94	100
OD	6	24	30	34.8	45	75
PU	1	13	25	36.7	55.5	100
RA	3	30	50	53.9	77.8	100
TN	10	45	60	65.9	90.5	100
WB	2	20	32	32.6	42	80

a) See Figure 1 for the full names of the states.

Number of days worked under non-MGNREGS

If a worker is working under MGNREGS, it is not possible for him or her to work under non-MGNREGA related work on the same day, unless there is corruption. Ideally, the number of days worked under MGNREGS and non-MGNREGS are supposed to be exclusive. The summary statistics based on the responses of the workers concerning the number of days worked under non-MGNREGS is presented in Table 3.

The employment opportunities for rural area workers in the states of Himachal Pradesh and Jammu and Kashmir are scarce. This may be due to the rough mountainous terrains and militant activities, making it impossible for the employers to initiate any asset creation activities. Whatever little activities that took place under MGNREGA, the level of corruption is low in the three Himalayan states of Himachal Pradesh, Uttarakhand, and Jammu and Kashmir. The workers of these states feel that the proportion of food grains consumption and agricultural productivity have increased after the implementation of MGNREGA.

Table 3

Number of days worked under non-MGNREGS (summary statistics), 2012–2013

Indian states ^{a)}	Minimum	Q1	Median	Mean	Q3 Qu.	Maximum
AP	10	90	100	120.4	170	270
AS	100	150	200	194.3	250	260
HA	4	100	130	135.7	180	300
HP	49	49	49	50.0	49	55
JK	38	50	54	54.0	60	72
KA	11	130	170	162.5	210	300
KE	10	150	150	149.8	180	350
OD	30	120	142	143.0	180	270
PU	20	100	140	154.3	200	320
RA	8	70	118	117.5	150	270
TN	5	90	120	133.8	160	260
WB	75	120	160	146.4	200	300

a) See Figure 1 for the full names of the states.

Wage rate of workers under MGNREGA

It is observed that the average MGNREGA wage rates are the lowest for Assam and Tamil Nadu (Table 4). In Tamil Nadu, although there is an abundant supply of rural labour force, the cost of living is low. As a result, the minimum wage is also very low. In the case of Assam, the availability of surplus rural labour force is low. However, the incessant migration of millions of unskilled manual workers from adjacent Bangladesh has resulted in the flooding of Assam's rural labour market. As a result, the MGNREGS wage rates are low in Assam, in paripassu with their respective Minimum Wage Act.

Table 4

Wage rate of workers under MGNREGA (summary statistics), 2012–2013

Indian state ^{a)}	Minimum	Q1	Median	Mean	Q3	Maximum
AP	70	100	108	107.3	120	150
AS	45	57	59	75.02	136	136
HA	161	179	180	181.6	191	200
HP	100	120	130	128.7	138	140
JK	110	121	121	124	131	145
KA	80	100	125	116.6	125	160
KE	125	125	150	144.7	150	180
OD	124	125	125	125.4	126	126
PU	96	123	123	134.9	153	184
RA	65	92	100	100.5	110	133
TN	56	80	90	87.4	100	130
WB	130	130	130	130	130	130

a) See Figure 1 for the full names of the states.

Wage rate of workers under non-MGNREGA

This is an important variable. We model the responses of workers to understand whether the MGNREGA programme has led to the improvement of market wage rates. We find that the wage rates for workers under non- MGNREGS are evidently higher than that under MGNREGS. We also find that the average market wage rates are higher for Assam, Kerala, Haryana, Jammu and Kashmir, and Himachal Pradesh (see Table 5). The market wage rates are found to be lower in the cases of Andhra Pradesh, Odisha, Rajasthan, and Tamil Nadu.

Table 5

Wage rate of workers under non-MGNREGA (summary statistics), 2012–2013

Indian state ^{a)}	Minimum	Q1	Median	Mean	Q3	Maximum
AP	80	120	150	142.8	150	180
AS	500	500	510	544.5	600	650
HA	150	200	250	238.2	250	300
HP	130	200	240	220.4	250	300
JK	240	250	250	257.6	280	300
KA	80	125	150	162.8	200	300
KE	275	300	284	284.4	400	700
OD	90	130	150	156.2	180	250
PU	100	250	300	292.8	322.5	400
RA	30	150	192	192.7	250	400
TN	40	90	100	122.9	150	220
WB	100	150	200	188.6	200	250

a) See Figure 1 for the full names of the states.

Number of hours worked under MGNREGA

This variable determines the amount of work a laborer puts on an average per day under MGNREGS and the wage rate he or she gets paid under MGNREGS (see Table 6). We find that the average number of hours worked in Andhra Pradesh is substantially low. This is a result of corruption, wherein the workers in connivance with the village heads work for couple of hours early in the morning, before leaving the sites for other market-based works. We find regular working hours in all states, except Andhra Pradesh, where it is between 6 and 8 hours.

Table 6

**Number of hours worked under MGNREGA (summary statistics),
2012–2013**

Indian state ^{a)}	Minimum	Q1	Median	Mean	Q3	Maximum
AP	3	4	5	4.9	6	7
AS	6	7	7	7.4	8	8
HA	8	8	8	8.0	8	8
HP	6	6	6	6.0	6	6
JK	7	7	7	7.0	7	7
KA	3	6	8	7.0	8	9
KE	6	7	8	7.8	8	9
OD	6	7	8	7.5	8	9
PU	8	8	8	8.0	8	8
RA	6	7	8	7.6	8	9
TN	6	7	7	7.2	8	9
WB	8	8	8	8.0	8	8

a) See Figure 1 for the full names of the states.

Number of hours worked under non-MGNREGS

We find that Assam, among all the other states, has the lowest average number of working hours (see Table 7). The average number of working hours under non-MGNREGS is around seven to eight hours. For Assam, the number of hours worked under MGNREGS is less than that under non-MGNREGS. This is because of the significant difference between MGNREGS wage rates and market wage rates, which is high in Assam. Assam has the second oldest oil well (fossil fuel extraction) in the world, an extensive tea plantation, and various tourism attractions. All this has led to a higher market demand for labour, resulting in the highest market wage rate for labour among all the north-eastern states. Manual work under MGNREGA is usually undertaken by migrant workers, and with it being a state subject, the government of Assam has kept the minimum wage rate very low.

Table 7

**Number of hours worked under non-MGNREGS (summary statistics),
2012–2013**

Indian state ^{a)}	Minimum	Q1	Median	Mean	Q3	Maximum
AP	6	7	7	7.6	8	9
AS	3	4	5	4.7	5	6
HA	7	8	8	8.5	9	10
HP	6	6	6	6.0	6	6
JK	8	8	8	8.0	8	8
KA	6	7	8	7.5	8	9
KE	3	6	7	7.1	8	10
OD	6	7	8	7.6	8	9
PU	7	8	8	8.8	10	12
RA	8	8	8	8.0	8	8
TN	5	6	7	6.7	7	8
WB	8	8	8	8.0	8	8

a) See Figure 1 for the full names of the states.

Empirical model, methodology and results

Model and methodology

We use a logistic regression model to determine whether there has been an increment in the market wages, given the different predictors as obtained from WLS. We construct the model based on the binary response of the workers working in various Indian states. The logistic regression model does not make many assumptions that correspond to the linear regression model, particularly, the assumption of linearity between the dependent and independent variables, normality, and homoscedasticity of the error terms (residuals). Also, the distributional assumptions of the residuals are not required in the case of logistic regression model. Given the above predictors for a particular worker, the increment, or stagnation in market wages for unskilled workers can be determined by the value of the indicator variable. If $Y = 1$, MRWAGE is said to have increased; If $Y = 0$, MRWAGE is said to have no change. We consider the cut-off point as β , wherein, $0 < \beta < 1$. If $Y < \beta$, the value of Y is rounded off to 0, and if $Y \geq \beta$, then the value of Y is rounded off to 1. This is done to obtain a maximum coincidence between the observed and predicted values of Y . We hypothesise that for any particular state MGNREGA will be successful only if both these criteria are simultaneously satisfied: (i) higher market wage rates, given the predictor variables, and (ii) a higher proportion of workers agreeing that the increase in market wage rate is a result of the successful implementation of MGNREGA.

The number of explanatory variables used for different states is seven at the maximum. We checked for the presence of multicollinearity among the explanatory variables. A variance inflation factor of more than five indicates the presence of multicollinearity. The convenient approach is the construction of correlation matrices, separately for every state. If the correlation between pairs of independent variables is high, one of the variables is dropped in accordance with the criteria to ensure that the variable which ensured higher frequency in the diagonal elements of a confusion matrix (Figure 3) is retained, and hence, a higher probability of coincidence corresponding to the logistic model for every state.

We check for the robustness of our model using the following two criteria:

(i) Probability of coincidence (p-coincidence)

The probability that an observed response from a worker coincides with the predicted response in the logistic regression model.

Figure 3

Confusion matrix

Observed values		0	1
	Expected values	0	1
0		a	b
1		c	d

The observed values are obtained from the data for the increment of market wage rates in every state. The estimated values of responses are obtained from the corresponding logistic model. The values of these responses are rounded off, setting a cut-off value. The cut-off value is determined in order to achieve the maximum value of probability of coincidence. The probability of coincidence measure, as given by the confusion matrix is p-coincidence, wherein, $p\text{-coincidence} = (a+d)/(a+b+c+d)$.

(ii) Sensitivity analysis: 'Hosmer-Lemeshow' goodness of fit test

The 'Hosmer-Lemeshow' test is a statistical test used to find out the goodness of fit for the logistic regression models. The data set is first regrouped by ordering the predicted probabilities and forming the 10 subgroups setting the cutoffs as deciles. In practice, as soon as some of our model covariates are continuous, each observation will have a different predicted probability, and thus, the predicted probabilities will vary in each of the groups that we have formed. To calculate the number of Y=1 observations we expect, the Hosmer-Lemeshow test takes the average of the predicted probabilities in the group and multiplies it by the number

of observations in the group. The test also performs the same calculation for $Y=0$, and then calculates the Pearson goodness of fit statistic. The Hosmer-Lemeshow test statistic is as follows:

$$G^2_{HL} = \sum_{j=1}^{10} \frac{(O_j - E_j)^2}{E_j \left(1 - \frac{E_j}{n_j}\right)} \sim \chi^2_8$$

wherein, G^2_{HL} = chi-squared, n_j = number of observations in the j^{th} group, O_j = number of observed cases in the j^{th} group, E_j = number of expected cases in the j^{th} group. The output returns a chi-square value (a Hosmer-Lemeshow chi-squared), and a p-value ($\text{Pr} > \text{chi-square}$).

The model specification is as follows:

$$Y_i^* = \gamma X + \varepsilon_i$$

wherein, $i = j^{th}$ worker, $\varepsilon =$ error term, and γX is defined as $Y_i = 1$ (the worker believes that the wage rate has increased) if $Y_i^* \geq \beta$, and $Y_i = 0$ if $Y_i^* < \beta$, with $0 < \beta < 1$.

X_i are the vectors of control variables for the j^{th} state in India.

These variables are: (i) number of days worked under MGNREGA (X_1), (ii) number of days worked for creating MGNREGA assets (X_2), (iii) number of days worked for non-MGNREGA related works (X_3), (iv) wage rate per day for MGNREGA work (X_4), (v) wage rate per day for non-MGNREGA work (X_5), (vi) number of hours worked per day under MGNREGA work (X_6), (vi) number of hours worked per day under non-MGNREGA work (X_7), and (vii) ε_i is the random component.

Given the above predictors for a particular worker, the increment or stagnation in market wages for unskilled workers can be determined by the value of the indicator variable. If $Y=1$, MRWAGE has increased; If $Y = 0$, MRWAGE has not increased. For example, let us consider the cut-off point to be β , wherein, $0 < \beta < 1$. If $Y < \beta$, the value of Y is rounded off to zero, and if $Y \geq \beta$, then the value of Y is rounded off to one. This is done to obtain maximum coincidence between the observed and predicted values of Y .

Results

The regression coefficients offer change in the odds ratio of the outcome for a one-unit increase in the predictor variable. For example, if we consider the predictor X_1 from the logistic model, then for every unit increment in X_1 , the odds ratio corresponding to increment in MRWAGE (in accordance with the workers' perspective) changes by γ_1 . The same is true for all the other predictors. Table 8 shows the coefficients corresponding to each predictor.

Table 8

Coefficients of the logistic regression model

Indian state ^{a)}	Intercept	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇
AP	-0.682936	–	-0.1623	–	-0.0004	–	0.531285	-0.08334
AS	-13.83	0.02578	–	-0.0006	-0.005	–	1.881	–
HA	-4.982405	-0.0235	–	–	–	0.01763	0.159425	0.162173
HP	4.830306	-0.0347	0.02209	–	0.00917	–	–	0.790139
JK	16.89735	-0.0264	–	–	–	–	0.74395	-2.32861
KA	-3.830822	0.01116	–	-0.0035	–	–	0.190186	0.012748
KE	-0.372383	–	–	0.00352	0.00784	-0.0031	–	-0.08182
OD	5.30175	-0.0273	–	–	-0.032	–	0.49373	0.0444
PU	-11.241796	–	–	–	-0.0344	0.01735	–	2.487096
RA	-3.254186	-0.0064	–	0.0021	0.00758	-0.004	–	0.505992
TN	-1.170234	-0.0083	–	-0.0045	0.0077	–	–	–
WB	3.003869	-0.0133	–	-0.0072	-0.0071	–	0.281094	–

a) See Figure 1 for the full names of the states.

Note: “–” denotes that the predictor is not included in the models.

The following models have been constructed to help realise the optimum values of predictors in a fashion to ensure that the threshold cut-off point for each state is achieved. The models were tested for reliability using two different measures – the Hosmer-Lemeshow test for the goodness of fit and probability of coincidence using confusion matrix.

The following table (Table 9) demonstrates the corresponding values of the aforesaid measures for 12 states.

Table 9

Measures to Test the Reliability of the Logistic Regression Models

Indian state ^{a)}	(Predicted Values, Observed Values)				Cut-off value	p-coincidence		p-value
	(0,0)	(0,1)	(1,0)	(1,1)				
AP	229	36	51	87	0.4	0.78	2.6	0.96
AS	176	48	58	103	0.5	0.72	1.0	0.99
HA	37	30	58	188	0.6	0.72	11.8	0.48
HP	43	3	23	265	0.6	0.92	7.5	0.48
JK	24	8	9	292	0.6	0.95	0.03	1
KA	244	94	61	90	0.4	0.68	9.4	0.30
KE	81	34	30	37	0.4	0.65	0.4	1
OD	5	10	15	1125	0.9	0.98	1.3	0.99
PU	34	20	15	154	0.6	0.84	0.6	0.99
RA	97	102	120	346	0.6	0.67	2.2	0.97
TN	124	52	60	60	0.4	0.62	0.92	0.99
WB	22	61	49	531	0.8	0.83	2.27	0.97

a) See Figure 1 for the full names of the states.

Note: The p-value corresponds to the “Hosmer-Lemeshow” test for the goodness of fit, and χ^2 is the “Hosmer-Lemeshow” test statistic.

It is certain from the table that the *p-values* for the models of every state are above 0.1. While the null hypothesis postulates the model to be a good fit, however, the alternative hypothesis implies otherwise. The probability of coincidence between the expected and the observed values for all the models provide suitable evidence on the aspect of reliability. It is quite evident from the above table that there is a minimum of 60% coincidence between expected and observed values, which transcends to a maximum of 98% in the case of Odisha. Out of 12 states, five states achieved more than 80% coincidence. The models for the states of Jammu and Kashmir, Himachal Pradesh, Odisha, West Bengal, and Punjab provide the best fits. Taking all the measures into consideration, we conclude that the models provide a good fit for the response variable.

The summary statistics for the 12 different states present a diverse picture of the effects of MGNREGA in improving the market wage rates. We observe higher market wage rates for Assam, Haryana, Himachal Pradesh, Jammu and Kashmir, Kerala, West Bengal, Punjab, and Rajasthan. A survey of workers' perception in the states of Himachal Pradesh, Jammu and Kashmir, Odisha, Punjab, and West Bengal show that the workers believe MGNREGA to be a reason for the increase in the market wage rate. While Odisha shows an increment in market wage rates from the workers' perspective, however, the real data shows Odisha to still have low market wage rates. Odisha is one of the poorest states in India. It is also the most drought-prone and industrially backward state in the country. Rural-Odisha does not have non-agricultural income as a source of livelihood. There is an unlimited supply of labour at the prevailing wage rate. Naturally, the market wage rate has remained low. On another extreme, Karnataka is one of the states to show extremely low wage rates and a lower proportion of affirmative responses of workers. MGNREGS funds in Karnataka are mostly used for buying heavy machinery items, not much is spent on employing MGNREGA workers. The state boasts a thriving agricultural sector and is a pioneer in the electronic national agriculture market (e-NAM), with less demand for work under MGNREGA.

Results from the logistic regression analysis show that the number of days worked under MGNREGA (assets) and wage rate (non-MGNREGA) do not affect the responses of workers, as far as the increment in market wages is concerned. On the contrary, it is quite evident that the variables, such as number of days worked under MGNREGA, wage rate (MGNREGA), and number of hours worked (non-MGNREGA), are included in most of the models. These variables are found to be important and robust when any project is successfully implemented under MGNREGA.

Conclusion

This paper examined the impact of MGNREGA on market wage rates for manual labourers, validating against the workers' responses. We used a unique database, WLS, sourced from the All India Coordinated Report, by the Planning Commission (NITI Aayog now) of GOI. Considering data from 12 different states in India, we found that the impact of MGNREGA on increasing the market wage rate is not uniform. Survey of workers' perception from the states of Himachal Pradesh, Jammu and Kashmir, Odisha, Punjab, and West Bengal showed that the workers believe MGNREGA to be a reason for the increase in market wage rate. On the contrary, workers from states like Andhra Pradesh, Tamil Nadu, Karnataka, and Kerala felt no drastic improvement in market wage rates to arise from MGNREGA. This may be due to the poor implementation of the MGNREGS, inability to use labourers for MGNREGS, and leakage in funds resulting from corruption.

We also found that there are numerous ways by which the money meant for MGNREGA work would have been stolen. This may include false documentation, false worker lists, and a significant proportion of missing assets, i.e., without actually constructing the assets, the assets are mentioned in the web feedback system. For example, in the state of Kerala, not many workers are available for MGNREGA work, and the *Panchayat Pradhans* are instructed to submit wage bills, where the beneficiaries are the local party workers. Workers are not available for MGNREGA work in Kerala because the state is blessed with fertile soil and has favourable agro-climatic conditions. The state also has bustling tourism and tea industries, providing employment opportunities to many workers. Other southern states, such as Andhra Pradesh, Karnataka, and Tamil Nadu, although fared well in terms of implementing MGNREGS, however, most of the funds are used for buying heavy machinery for the construction of MGNREGA assets. In Kerala, there is evidence of corruption.

With respect to the eastern state of Assam, there is a great demand for market-related work emerging from tea plantation, oil industry, and tourism sector. The market wage rate is high in Assam, and the native population of Assam typically prefers to work in non-MGNREGA activities. Punjab and Haryana are among the richer states in India, wherein the impact of MGNREGA in reducing poverty is limited. We also did not find evidence suggesting that the poorer states have been implementing the MGNREGS vigorously. In the case of Odisha, while the workers' perspective show an increment in market wage rates, real data shows Odisha to still have low average market wage rates. Odisha is one of the poorest states in India. It is also the most drought-prone and industrially backward state in the country. Rural-Odisha does not have non-agricultural income as an alternate source of livelihood, and the market wage remained low. Unfortunately, India still faces the challenge of effective implementation of the Act even after 15 years of its inception in 2005. This paper shows that there is hardly any noteworthy uniformity across the major

states of India regarding market wage and MGNREGS wage. Rather, there are considerable heterogeneities, even for rural manual workers, regarding unit earning, which has led to scepticism concerning MGNREGA in a country as diverse as India. A uniform model, without considering the significant variations of location parameters, is close to a blunder for such a massive investment. Therefore, if the variations due to the diversity of the different states of India are not incorporated in the Act, implementation cannot be perfect. Both the model and the method of implementation of MGNREGA must be customised according to the needs of every region, with minimum leakage of funds due to corruption in various administrative layers. Fortunately for India, the NSSO has divided the country into 88 independent agro-climatic regions depending on soil, rainfall, and agricultural productivities. For the programmes to be effective, it is advisable that the MGNREGS is implemented as per the requirements of the geographical characteristics, taking into consideration the occupational patterns of the local people. The implementation of the projects should be undertaken under constant supervision of a national body. Otherwise, the collective political corruption will continue to take away the livelihood of the rural poor in such an imperfect democracy.

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