Impact of MGNREGA on Rural Wages in India:
Findings from the Rural Price Collection (RPC) Surveys (2001-2011)

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Divya Pandey

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_____	_____	_____
Professor Deborah Levison, Paper Supervisor	Date, oral presentation	Date, paper completion
_____		_____
Professor Paul Glewwe, Committee Member		Date

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—Divya Pandey

1. Introduction

Governments in developing countries have experimented with a variety of poverty alleviation programs over the last few decades, including conditional and unconditional cash transfer programs, microcredit, and employment guarantee schemes, among others. The most successful and perhaps the most extensively studied poverty alleviation program has been Mexico's PROGRESA, which adopted a human-capital investment approach towards lowering poverty rates. Another increasingly studied poverty alleviation program has been India's Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) of 2005.[1] Unlike PROGRESA, however, MGNREGA seeks to alleviate rural poverty by providing guaranteed employment to beneficiaries in public works. This paper assesses the impact of MGNREGA on rural wages in India, using the National Sample Survey Office's (NSSO) Rural Price Collection (RPC) surveys from 2001-11. Additionally, I look at the gendered impacts of the program to specifically assess whether MGNREGA has led to reduction in wage inequality by gender in rural India.

MGNREGA offers 100 days of guaranteed employment in a financial year (1stApril-31st March) to rural households whose members volunteer to do unskilled manual work. With a cumulative public investment of as much as 274 million US dollars in the last five years (GoI, 2018a),

[1] A Google Scholar search points to numerous district, state and national level studies on MGNREGA. These studies explore topics as diverse as food security, rural water management, transparency and accountability, migration and so on in relation to the program.

MGNREGA is not only India's, but also the world's largest public social safety net program (Honorati, Gentilini & Yemtsov, 2015). Prime Minister Manmohan Singh first launched the program in 2006 on an experimental basis in the 200 least-developed districts of India. In 2007-08, the program was expanded to include an additional 130 districts and in 2008-09, all the remaining 295 districts were included under the program (GoI, 2018b). In fiscal year, 2017-18, MGNREGA provided 2.29 billion person-days of employment across rural India, with 53 percent of this employment being contributed by women (GoI, 2018c).

The speculation that a public works program can impact real wages is not exclusive to MGNREGA. Almost four decades ago, the government of Maharashtra, a semi-arid state in western India, introduced a similar anti-poverty Employment Guarantee Scheme (EGS) to provide income to rural households in lean agricultural seasons. Ravallion et al. (1993) and Gaiha (1997) found evidence of a slight increase in agricultural wages as a result of the program. Speculations about similar impacts on real rural wages have also been extended to MGNREGA.

The expected success of the MGNREGA program is linked to India's dominant form of agriculture. In the absence of large-scale mechanization, agriculture in India remains highly labor-intensive. Family and hired labor are heavily employed for a range of agricultural activities, including weeding, transplanting, harvesting and irrigation. Presence of a large-scale public works program such as MGNREGA during seasons when agricultural activities are at their peaks and demand for labor is high (such as during harvesting) can potentially divert labor away from farms. This shift in labor demand can thus create a shortage of labor and lead to an associated increase in rural wages of unskilled workers. This potential impact of MGNREGA on real wages in rural India has been explored by Azam (2011), Berg et al. (2012), Narayanmoorthy & Bhattarai (2013) and more recently by Imbert & Papp (2015). I contribute to this growing

body of literature on public works programs and rural wages, using panel data obtained from the National Sample Survey Office's (NSSO) Rural Price Collection (RPC) surveys from 2001 to 2011.

This remainder of this paper is organized as follows. Section 2 briefly discusses some of MGNREGA's distinctive features, including eligibility criterion and the processes for participation in the program, along with its administration. Section 3 explains the underlying theoretical model relating the introduction of MGNREGA with change(s) in labor markets, as well as an overview of the recent literature examining the impact of MGNREGA on rural wages. In Section 4, I introduce the RPC survey data (2001-11) used for the purpose of this paper and explain the empirical methodology used to assess the impact of MGREGA on rural wages. Finally, I present findings in Section 5 before concluding (Section 6).

2. MGNREGA: Program Details

Most social safety net programs in India and elsewhere around the world are targeted programs, wherein the Government is responsible for identifying the beneficiaries.[2] MGNREGA is designed on a different approach, where administrative gaps in targeting are overcome by individuals' self-selection into the program. In other words, instead of the government identifying the beneficiaries to be employed in the public works offered under the program; individuals in rural India who need to support their income can choose to be employed under the program.[3] MGNREGA thus works as a highly demand-driven social-safety net program.

[2] Poverty lines are one of the most common base on which the Indian Government identifies program participants for various social-safety net programs.
[3] For a discussion on the benefits of this "self-selection" (or self-targeting) approach over targeted programs, see Shankar & Gaiha (2013), p. 19-23.

Another powerful and distinct feature of MGNREGA is that it takes a legal and a rights-based approach. If an applicant is not assigned a job within 15 days of application, the applicant is entitled to a daily unemployment allowance as guaranteed under the Act. The applicant is not only guaranteed employment but is also guaranteed minimum wages according to the Minimum Wages Act of 1948 for agricultural laborers in the State. Men and women are entitled to the same minimum wage rates. Further, all employment is supposed to be provided within a radius of five kilometers of the applicant's residence; if not, the applicant is entitled to extra remuneration to cover the transportation costs.

MGNREGA's primary aim is to enhance the economic security of rural households. A secondary aim is to create durable and productive assets in rural areas by funding activities related to the creation of sustainable resources in the program villages. The choice of public works offered under MGNREGA, hence, spans projects including road construction, creation of irrigation canals, afforestation, renovation of lakes and desalination of tanks, flood control, and agriculture and livestock related activities.

The Central government pays 90 percent of the program costs, including payment of wages, three-fourths of the material costs, and a certain proportion of the administrative costs, while the state government is responsible for the remaining costs. Local administrative bodies, the *Gram Panchayats* (Village Councils) play a central role in the implementation of the program. Job applications are submitted to the *Gram Panchayat,* and the *Panchayat* is required to issue a Job-card to the applicants within 15 days of the receipt of application. Applicants must request at least 14 days of employment. It is important to note that multiple adult members of a single household can simultaneously participate in the program. Wages are to be disbursed weekly, increasingly through a savings account at a local bank or the post-office.

3. MGNREGA and Labor markets

Overview of Recent Literature: MGNREGA's primary objective is to maintain rural households' income above the poverty line, and its secondary objective is to generate sustainable and productive assets in the rural areas of India. Yet, in the last six years, at least five empirical studies have emerged exploring unintended "tertiary" benefit of MGNREGA—the anticipated increase in overall rural wages as a result of the program. Each of these studies exploit the phased implementation of MGNREGA for utilizing non-experimental evaluation methods to determine the program's impact on rural wages. For instance, Azam (2012) employed a differences-in-differences framework using the Employment and Unemployment schedules carried out by the National Sample Survey Office (NSSO). He found that MGNREGA has a significant positive impact of almost eight percent on the wages of female casual (or short term manual labor) workers, but only a marginal impact on that of male workers. Imbert and Papp (2015) also employed the Employment and Unemployment schedules by the NSSO (for a different time period) and a differences-in-differences framework and found evidence of increases in private sector wages.

Zimmerman (2012) on the other hand used a regression discontinuity design (RDD) for her analysis using data from NSSO's 64th round (2007-08). The fact that Phase 1 and 2 of MGNREGA had already been implemented by 2007-08 and Phase 3 was yet to be implemented generated a cut-off, allowing for the application of the Regression Discontinuity Design (RDD) framework. The paper also utilizes the fact that poor districts were the first to receive MGNREGA and that there is a discontinuity in the probability of being enrolled in MGNREGA at the cut-off in Phase 2. Her findings are similar to that of Azam's: she finds evidence of significant increase in rural wages of females but not males. Narayanmoorthi and Bhattarai

(2013) use wage data from 2001-11 from the Labor Bureau, Government of India, to assess wage rates by gender and labor tasks before and after the introduction of MGNREGA. While their results are not strictly causal, their regression results suggest a substantial increase in real wage rates post-MGNREGA for both males and females, with a higher increase rate for female workers.

Finally, Berg et al. (2012) use data from Agricultural Wages in India (2001-11) published by the Ministry of Agriculture and also employ a differences-in-differences framework; they find that MGNREGA on average increases wages by 5.5 percent. Contrary to Azam (2012), Zimmerman (2012) and Narayanmoorthi and Bhattarai (2013), however, they do not find any evidence of the program in reducing wage gaps between males and females.

The seasonal demand for agricultural labor in rural India and the year-round functioning of MGNREGA merits some discussion here. MGNREGA's intended benefits are primarily for the lean agricultural seasons, when agricultural activities are relatively slack. For instance, in the months of March and April, temperatures in most regions are high, there is no or limited rainfall, and few farmers cultivate summer crops. It is during these months of slack in agricultural activities that farm laborers lose their potential sources of income and are at a risk of "going hungry" or in debt. MGNREGA, by providing these laborers guaranteed employment, is expected to help them maintain their wages and smooth their consumption. Thus, for the lean seasons, when agricultural activities are relatively low and demand for private labor is also low, one would *not* expect to see a substantial increase in private rural wages.

In practice, however, MGNREGA is operational throughout the year, not just during the lean seasons. Figure 1 shows that in the last fiscal year (2017-18), more than 1 billion person-days of

employment was generated under the program in the peak agricultural months of July, August and September. By diverting labor away from the fields, MGNREGA can potentially create labor shortages in the peak agricultural months and lead to a substantial increase in rural wages.

Theoretical Model: The implicit theoretical model employed by most relevant papers is that of demand and supply in labor markets. Bhargava (2014), in his paper on MGNREGA and the use of resource saving technology in agriculture, highlights different theoretical models that can be applied to understand the impacts of the program on labor markets.

One of the most intuitive models included in Bhargava's (2014) paper is from Narayan, Parikh & Srinivasan's (1988) theoretical study of Maharashtra's EGS program, which distinguishes between labor demand in peak and lean agricultural seasons (Figure 3). L is the total labor available for work in a lean agricultural season. The demand for labor represented by D_L is low and only L_L number of laborers are in fact hired. This leaves a labor surplus or unemployment of $L- L_L$ in a lean season. With the introduction of public works program such as MGNREGA, there is an outward shift in the demand for labor, reflected by $D_{L'}$ and new total lean season labor is now at L_T. As Bhargava (2014) notes that this shift to L_T will be determined by how much demand is generated as a result of the public works program. If the L_T remains less than L or in other words the public works program does not exhaust the available labor, there will be no effect on labor employment for agriculture (which remains at L_L in the lean season). Laborers now, however, benefit from increased program wages (W_N).

This simple theoretical framework of demand and supply, is complicated by two scenarios inherent to Indian agriculture. First, extreme climatic conditions hound Indian agricultural frequently. Anticipation of, say, a drought condition may cause farmers to not invest in crop

cultivation at a usual scale, which in turn can lower the demand for farm-labor. In such an event one would not expect to see a noticeable increase in rural wages, even in the peak agricultural-activity months.

A further consideration is to take into account migration rates in lean seasons or drought years, when laborers often migrate to cities in search for employment (distress-migration). If such migration is a prominent feature in a region and the availability of MGNREGA is unable to contain it, we again might not observe an increase in wages due to the program's limited impact on labor supply. Any results on impact on wages due to shifts in the supply curve would have to be understood in light of these two very plausible scenarios.

Before we delve into our own analysis of MGNREGA's impact on rural wages, it is also important to conceptually understand whether the anticipated wage impacts of a public works program are desirable in rural India. There emerge two critical dimensions to the program's impact on rural wages.

First is the potential impact of wage increases on the profitability and viability of agriculture. Though these characteristics vary widely from state to state, an average farmer has about 1.5 hectares of land, a monthly income of 6,426 INR (99 USD) and would spend about 493 INR or 22.5 percent of the total input costs on labor (S. Rukmani, 2017). The extent to which an increase in rural wages due to MGNREGA could impact farmers' profitability would greatly depend on the economic conditions (land holding size, income from other sources etc.) of the farmers who are using hired labor for their farm operations. The majority of the farmers in the country are small and marginal, owning less than a hectare of land. An increase in rural wages is likely to

impact this group of farmers the most, posing a risk to not only their profitability but also the very viability of agriculture.

The second dimension pertains to wage equity in rural India. While there is wide variation among states, Rani & Belser (2012) find that minimum wages are weakly enforced across several states in India. For instance, more than 40-50 percent of agricultural workers in major agrarian states such as Maharashtra and Karnataka were paid below the state-defined minimum wages in 2009-10 (ibid). A public works program such as MGNREGA, by diverting labor away from farms, can potentially increase wages and bring them up to the legal minimum.

Moreover, despite the minimum wages, women in rural India have historically been paid lower than men for the same labor activities (Mahajan, 2011). Women form about 55-66 percent of the total labor force engaged in agriculture (Bhattacharya & Goyal, 2017). Yet, their wages are about 30 percent lower on average than their male counterparts for various agricultural operations (ibid). MGNREGA, however, entitles males and females to the same wages. Thus, effectively, a rise in rural wages due to MGNREGA, should also lead to convergence between male and female wages for agricultural labor.

In a country as diverse as India, the exact trade-offs between equity in rural India and profitability as well as the viability of agriculture would greatly depend upon the specific socio-economic context of a region. By providing broad estimates of the extent of the anticipated impact on rural wages, if any, due to the introduction of MGNREGA, this paper helps develop an understanding towards both these dimensions.

4. Data and Methodology

RPC Survey: The data on rural wages used here are drawn from the Rural Price Collection (RPC) surveys conducted between 2001 and 2011 by the NSSO. Since 1950-51, the NSSO has been collecting rural price data with the aim of determining the consumer price index (CPI) for agricultural and rural populations. In 1986, following the recommendations of NSSO's *Technical Working Group on Retail Prices*, the RPC surveys added a schedule on wage rate data for major agricultural and non-agricultural occupations. Data were to be used for (i) enforcement of Government stipulated minimum wages; (ii) implementation of the wage policy; and (iii) for the estimation of the state gross domestic product and income. Along with the price data of 260 commodities in the rural commodity basket, the survey now also includes data on rural wage rates (INR/day) for agricultural and rural occupations.

The NSS has identified 66 regions across the 24 Indian states for the RPC surveys. These regions are further divided into a total of 187 strata from which 603 sample villages have been drawn. These sample villages remain unchanged for the yearly RPC surveys, and wage rate data from them are collected on a monthly basis for 11 agricultural and seven non-agricultural occupations. In instances where wage rates are reported for fewer or more than the normal working hours of eight hours per day, the data are adjusted and then reported. Village level authorities, including the *Panchayat* (village council) secretary, Progress Assistant, *patwari* (local level land record official) along with some Block level officials, serve as the chief informants for average daily wage rates.

Data: I use the monthly RPC data merged with the district level phase identifiers for MGNREGA. If MGNREGA was introduced in a district in 2006 (treatment), the corresponding

phase identifier takes a value of 1. In 2007 and 2009, the MGNREGA identifier takes a value of 2 and 3 respectively.

The final dataset consists of panel data of village level average monthly real wage rates for a range of rural occupations for all years from 2001 to 2011 (except 2008)[4] for 597 villages and 378 districts across 24 Indian states, for a total of 439,805 observations. Monthly wage data for 2001 are available for October, November and December. For 2009 the data are available from July to December and for 2011 the data are available from January to June. For all the remaining years, wage data exists for all the twelve months, except 2008.

One of the key features of the program that allows me to test for the impact on rural wages is the phase-wise implementation of the program. 140 of the 378 districts in the dataset fall in Phase 1 of MGNREGA, 83 in Phase 2 and 155 in the third Phase of the program (Table 1). As will be explained below, availability of such data allows me to estimate the impact of the program on rural wages by using differences-in-differences estimation.

To effectively assess the impact of MGNREGA on rural wages, I draw a distinction between agricultural and non-agricultural labor, since labor demand for these two groups is likely to be different across the year. Following NSSO's classification of occupations, I classify the 21 occupations in the RPC schedule as agricultural and non-agricultural. Tables 2 and 3 provide the overall distribution of the various labor occupations in agricultural and non-agricultural activities in the data. This distribution does not change substantially from one year to the other. The average daily wage rates for various rural occupations for males and females for 2001 are reported in Table 4. As expected, average male wages were higher by about 27 Indian Rupees

[4] I was unable to obtain the RPC data for 2008, presumably because the survey was not carried out that year.

(INR) per day. The gender wage gap is much higher for non-agricultural wages (38 INR per day) compared to the gap in agricultural wages (14 INR per day).

The wage data in cash as well as imputed wages for kind (meals, food grains, tea, fuel, cigarettes, fodder and so on) are provided for males, females, as well as children. Since child labor forms a small fraction of our data, I restrict the analysis to adult males and females, aged 18 or more. I work with two sets of wages for both males and females in this paper for the main analysis (difference-in-difference): (i) a *total* wage that includes both cash and imputed wages for kind; and (ii) wages solely in cash. Doing so allows me to address two concerns. First, the monetization of in-kind payments is likely to be affected by some calculation errors during the data collection process. Second, it is plausible that any change in wages due to a public works program is more likely to be reflected in wages in cash and not in-kind (especially if the wages in-kind include meals). The wages in the RPC schedule are in nominal terms. I convert them into 2000 real wages by using January 2000 CPI data for India for agricultural and rural workers. All the descriptive statistics are reported in terms of total wages (cash and kind) in 2000 constant prices.

I restrict the analysis to hired labor. Around four percent of the observations for male cash wages and 66 percent of female cash wages are reported as zero, suggesting two probable cases. First, the corresponding labor was either mostly generated from within the family and was thus not paid. Second, the wage data were not reported (i.e. the data are missing). The impact of a public works program would be reflected in changes associated with only the hired labor. These null values of wages are, therefore, extraneous to our analysis and I exclude them from our dataset. Finally, for the difference-in-difference estimation I generate variables for the following: (i) monthly averages of wage rates for agricultural occupations, for males and females separately

and (ii) monthly averages of wage rates for non-agricultural occupations, for males and females separately.

Methodology: Differences-in-differences is a widely employed non-experimental technique that allows us to determine the impact of a program with a treatment and control group and with pre- and post-treatment values of the outcome variable. I exploit the phased implementation of MGNREGA between 2006 and 2009 to conduct a multi-period difference-in-difference analysis. The treatment refers to the introduction of MGNREGA in a district.

Equation 1 represents the underlying model used for this difference-in-difference estimation. W_{it} is the outcome variable calculated as the log of daily wage rate in district *i* and month *t*. The district fixed effects (controlling for the time invariant characteristics of the districts) are captured by α_i, while M_t controls for any time trends that would affect the districts in the same way, and ε_{it} is the error term. The presence of the program in district *i* and month *t* is given by the dummy D_{1it}, which takes a value of 0 before the introduction of the program in a district and a value of 1 after its introduction. The interaction term between the treatment (D_{1it}) and time variable (M_t), given by D_{2it}, allows for a change in the time trend in the effect of MGNREGA on wages following its introduction in district *i*. Before MGNREGA is introduced in a district, D_{2it} takes a value of 0 and following the introduction of the program, it increases by one every month

$$W_{it} = \alpha_i + \beta \mathrm{M}_t + \acute{o} D_{1it} + \theta D_{2it} + \varepsilon_{it} \qquad (1)$$

The coefficient $\acute{o}$, gives the initial 'jump' or discontinuity in rural wages at the very beginning of the program introduction in a district *i* (Figure 8). The coefficient corresponding to D_{2it}, θ, is the difference-in-difference estimator, which indicates whether or not the program has had a significant impact on rural wages since its introduction. This model assumes that the effect of the program can be different in the three implementation phase districts.

5. Results and Discussion

Ploughing (17.81 percent), weeding (14.23 percent), harvesting (13.73 percent), tractor driving (13.12 percent), transplanting (9.64 percent) formed the highest proportion of agricultural occupations in the sample (Table 2). Among non-agricultural occupations unskilled labor (21.26 percent), carpenter (20.38 percent), mason (20.24 percent), and blacksmith (14.37 percent) were the most common occupations (Table 3).

The data clearly reflect the gender wage gap prevailing in all rural occupations in India. In 2001 a male laborer (agricultural or non-agricultural) was likely to receive 1.6 times the female wage rate on average for the same occupation (Table 4). For agricultural labor specifically, females received around 43 INR per day on average whereas males received as much as 57 INR per day. The wage gap was much higher for non-agricultural wages, where the average wages for male labor were about 80 INR per day and only 41 INR per day for females.

Figures 4-7 depict the trends in average monthly wages for male and female agricultural and non-agricultural wage rates from 2001 to 2011 in the three implementation phase districts. The

vertical lines indicate the time of introduction of MGNREGA in the districts. Two key points emerge from these.

First, average wage rates in Phase 1 districts are the lowest across the three phases. This is not surprising, considering that the Government had made a deliberate effort to include the poorest districts in the first phase of the program. Wage rates in Phase 3 districts are much higher, reflecting the fact that they were indeed economically better-off districts as compared to the others. Second, the trend lines indicate that the wage rates have been following an approximate parallel trend in the three implementation phase districts. This allows the data to meet the key identifying assumption of parallel trends, which is crucial to get unbiased difference-in-difference estimates. By just looking at these figures, it is difficult to discern whether there is a significant 'jump' or effect in wages, post the introduction of MGNREGA. Female agricultural wages (Figure 6) and non-agricultural wages (Figure 7), however, do suggest some convergence in wage rates between Phase 2 and Phase 3 districts.

The results from the difference-in-difference estimation are presented in Tables 5 (dependent variable is daily wage rate in cash and kind) and Table 6 (dependent variable is daily wage rate in cash only). The variables *treatp1, treatp2* and *treatp3*, indicate the initial effect of the program on wages for Phase 1, Phase 2, and Phase 3 districts, respectively. Positive and significant coefficients found for *treatp2* and *treatp3* (given by *ó* in Equation 1) suggest that MGNREGA had initially raised rural wages in Phase 2 and 3 districts. The negative coefficients on *treatp1* for most wage categories, however, are counterintuitive as they suggest that the program in fact initially lowered wages in the Phase 1 districts. As mentioned earlier, districts included in the first phase of MGNREGA were the most marginalized districts of the country. A possible explanation could be that in the initial stages of the program, its administration and impact were

both heavily constrained by the relatively lower administrative capabilities of these districts, but the (negative) direction of the coefficient still remains surprising.

The key variables of interest are the interaction variables for the three phases (*trend1*, *trend2* and *trend3*). In both Tables 5 and 6, the coefficients on the trend variables (given by θ in Equation 1) suggest that the effect of the program were positive and highly significant for male and female agricultural as well as non-agricultural wages. Looking at the highly significant and positive coefficients for *trendp1* across all four labor categories, it appears that after nine months of the introduction of the program, the wage trend associated with the program overcame the initial drop in wages in Phase 1 districts (given by the coefficient on *treatp1*). In other words, the effect of MGNREGA on rural wages over time, in even the most marginalized districts of the country, was significant and positive—varying between 1.92 and 4.91 per cent for male agricultural and female non-agricultural wages, respectively.

Across all labor categories and phases, the effect of the program appears to be the lowest for male agricultural and non-agricultural wages in Phase 1 districts. Effects are higher for other labor groups and phases. For example, in Table 5 the coefficient for *trendp1* in Column 3 suggests that MGNREGA increased female agricultural wage rates on average by about 0.41 percent per month or about 4.92 percent annually, in Phase 1 districts. The corresponding impact of the program on female agricultural wage rates in Phase 2 districts was around 0.62 percent per month or a 7.44 percent annual increase. Overall, it appears that Phase 2 and Phase 3 districts observed a higher increase in male and female wage rates compared to Phase 1 districts. (Table 5).

6. Conclusion

This paper uses data from the *Rural Price Collection* (RPC) surveys conducted between 2001 and 2011 by the National Sample Survey Office (NSSO), Government of India to assess whether the world's largest public workfare program—the Mahatma Gandhi Rural Employment Guarantee Act (MGNREGA)—led to an impact on male and female agricultural and non-agricultural wage rates in rural India. The paper contributes to a growing body of literature trying to understand the impact of public welfare programs, such as MGNREGA in India.

The paper uses the non-experimental evaluation technique of difference-in-difference to assess the impact of MGNREGA on male and female wages rates in each of the three program implementation phase districts. Two broad findings emerge from the study. First, the impact of the program appears to be higher in magnitude in Phase 2 and Phase 3 districts, as compared to Phase 1 districts. For instance, Phase 1 districts suggest an average monthly increase of 0.23 percent (or 2.76 percent annual increase) in male agricultural wage rates. The corresponding annual increase in wage rates in Phase 2 and 3 districts is about 7.44 percent and 9.69, respectively. Similarly, Phase 1 districts suggest an average annual increase of only about 4.8 percent in the wage rates of female agricultural workers, compared to 7.28 percent in Phase 2 and 7.22 percent in Phase 3 districts.

The districts where MGNREGA was first introduced in 2006 (Phase 1) were in fact the most marginalized districts in the country with relatively weak administrative systems. It is likely that the effect of the program on rural wages was limited by its weak implementation in Phase 1 districts. Even though one would expect fewer people to gain from an anti-poverty program in better-off districts, the relatively developed Phase 3 districts might have in fact witnessed a higher program enrollment due to stronger and more efficient local administrative mechanisms

pertaining to information sharing and allocation of MGNREGA jobs as well as disbursal of payment.

This study thus sheds light on the importance of administrative capabilities in program implementation. The poorer districts in Phase 1, include states in central and eastern India, including parts of Bihar—the poorest state in India. My own field experience from Bihar and other parts of India suggests that the most well-intentioned public schemes can often be constrained by administrative factors. For instance, a study I conducted with my co-authors on a conditional cash subsidy scheme for irrigation in drought years in Bihar, highlighted the fact that the delays and uncertainties around the disbursal of the subsidy money, severely constrained the effectiveness of the scheme (Kishore, Joshi & Pandey, 2015). MGNREGA, while also a well-designed scheme, may be limited in its impact due to weak local administrative systems. A further step in checking the robustness of this analysis would be to bring in district level rainfall controls and a control for the intensity of program implementation and participation.

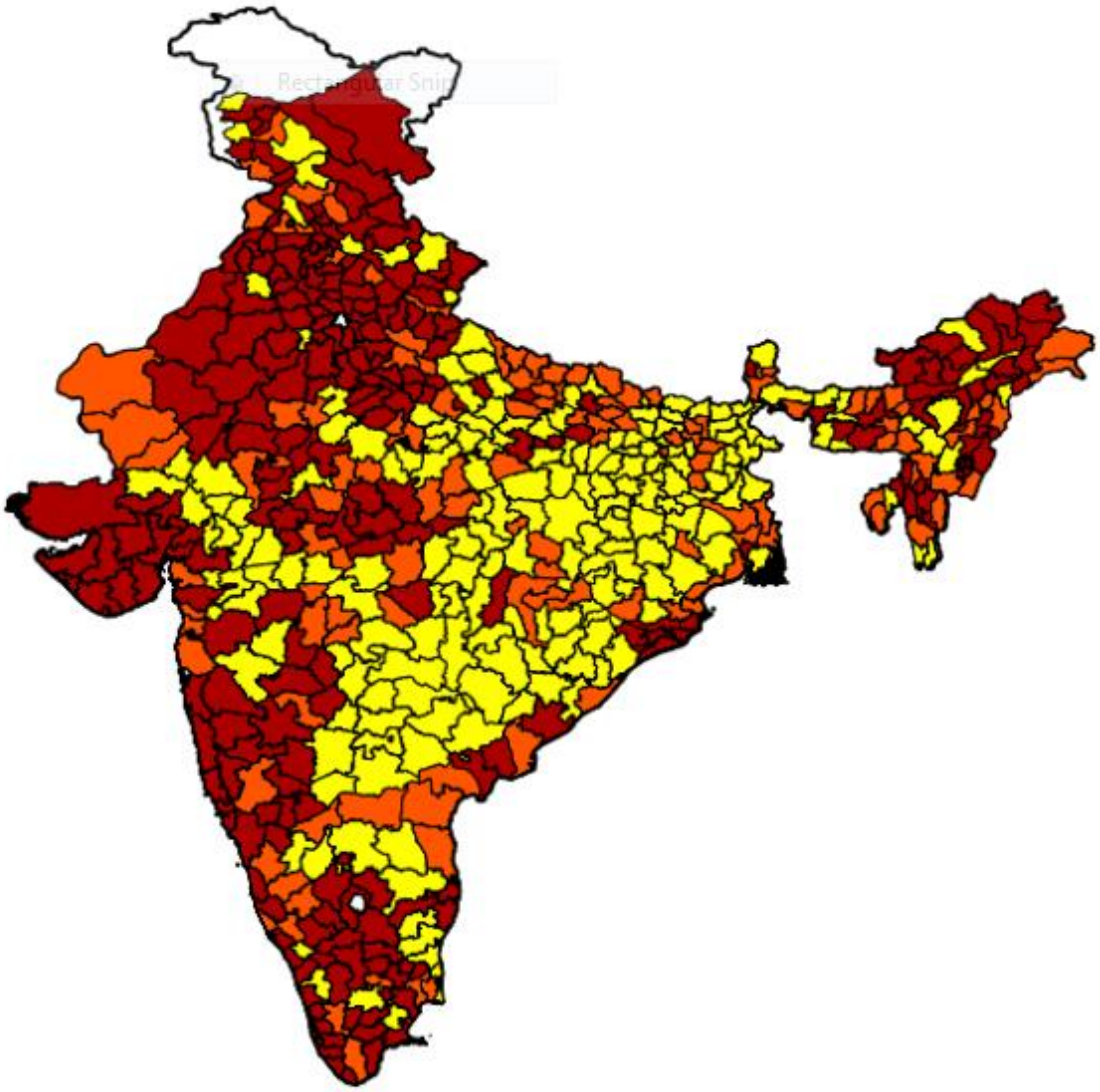
Second, the results suggest a slightly higher effect on female wages as compared to male wages, but this too varies across the three phases. This difference is particularly noticeable in Phase 1 districts, where the impact of MGNREGA on female agricultural and non-agricultural wages is around 4.9 percent, while that on male wages is only about 1.9 to 2.4 percent. In Phase 2 districts, effects on male and female agricultural wages are almost similar. Female *non-agricultural* wages, however, show a higher increase of around 8.5 percent compared to 6.6 percent for male *non-agricultural* wages in Phase 2 districts. Finally, Phase 3 districts show a comparatively higher increase in male wage rates as compared to female wage rates, for both agricultural and non-agricultural activities.

High enrollment of women in MGNREGA coupled with the fact that women were traditionally being paid lower than men across all labor categories, provides a rationale for why we see a greater impact on female wages compared to male's in Phase 1 and Phase 2 districts. It is extremely likely that wage gaps were even higher to begin with in the more marginalized districts included in Phase 1 and Phase 2 of MGNREGA. The findings suggest that MGNREGA may have been effective in converging male and female rates and thus reduce the gender wage gap in these marginalized regions. This is encouraging, considering that women across the country have reported lower wages across all labor categories. The findings that a national employment guarantee program has in fact played a role in converging these wages, even if unintentionally, also hold relevance for policy-makers in other parts of the developing world that are exploring social-safety net programs and facing similar issues in gender-wage equality.

A further step in this analysis would be to assess whether these wage impacts vary between lean and peak agricultural seasons. An analysis of this nature would further help to capture and understand the more transient changes in rural labor markets that a large public works program such as MGNREGA can potentially induce.

Figures

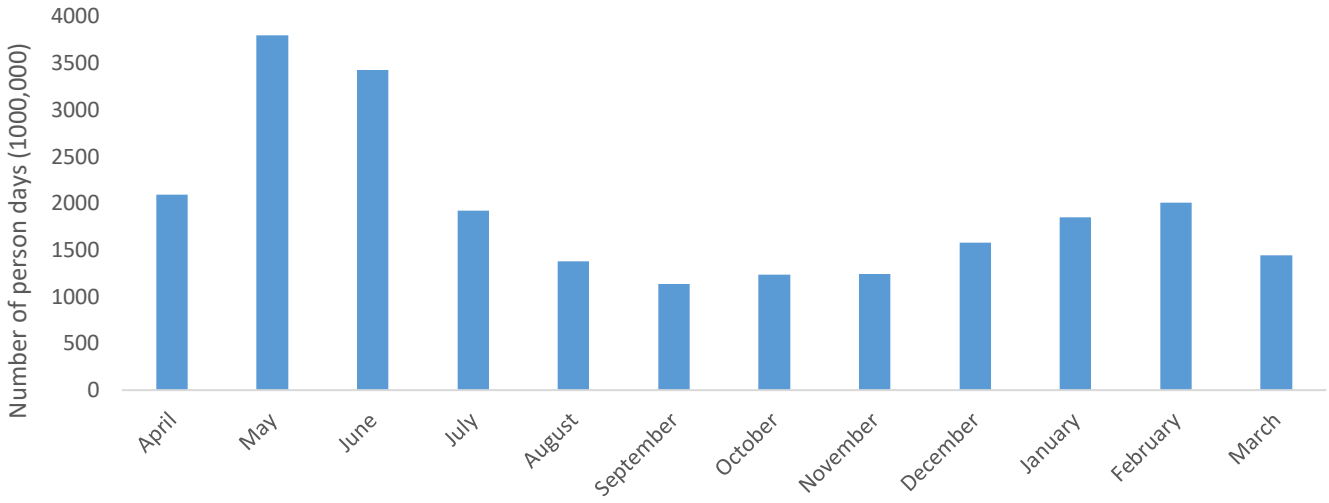
Figure 1: Map of India highlighting the three implementation phases of MGNREGA



Notes: The map shows all rural districts of mainland India, colour-coded according to NREG implementation phase. Phase I districts are shown in yellow, Phase II districts in orange and Phase III districts in brown.

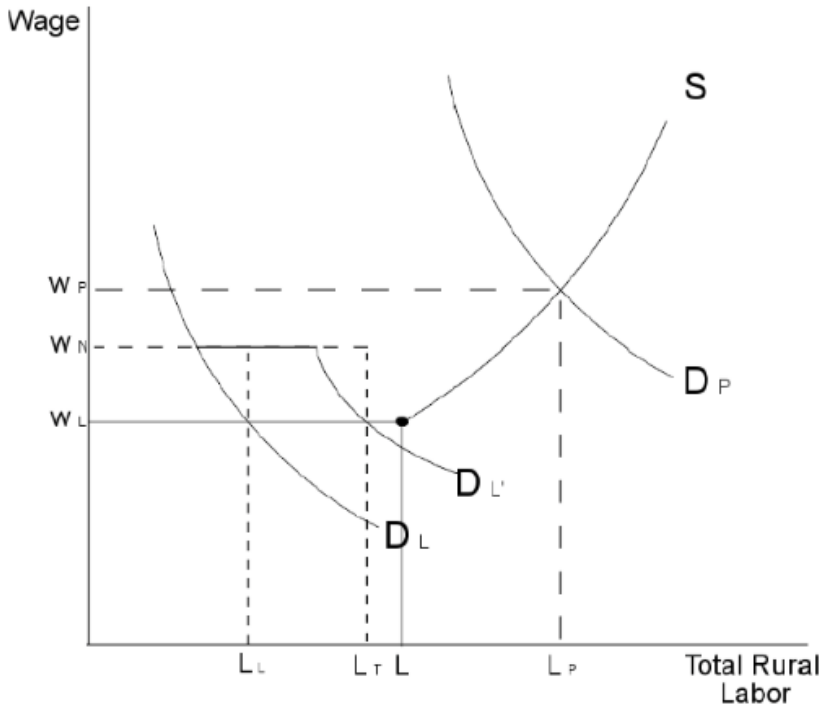
Source: Berg et al. (2017)

Figure 2: Month-wise number of person-days employment carried out under MGNREGA in India (2017-18)



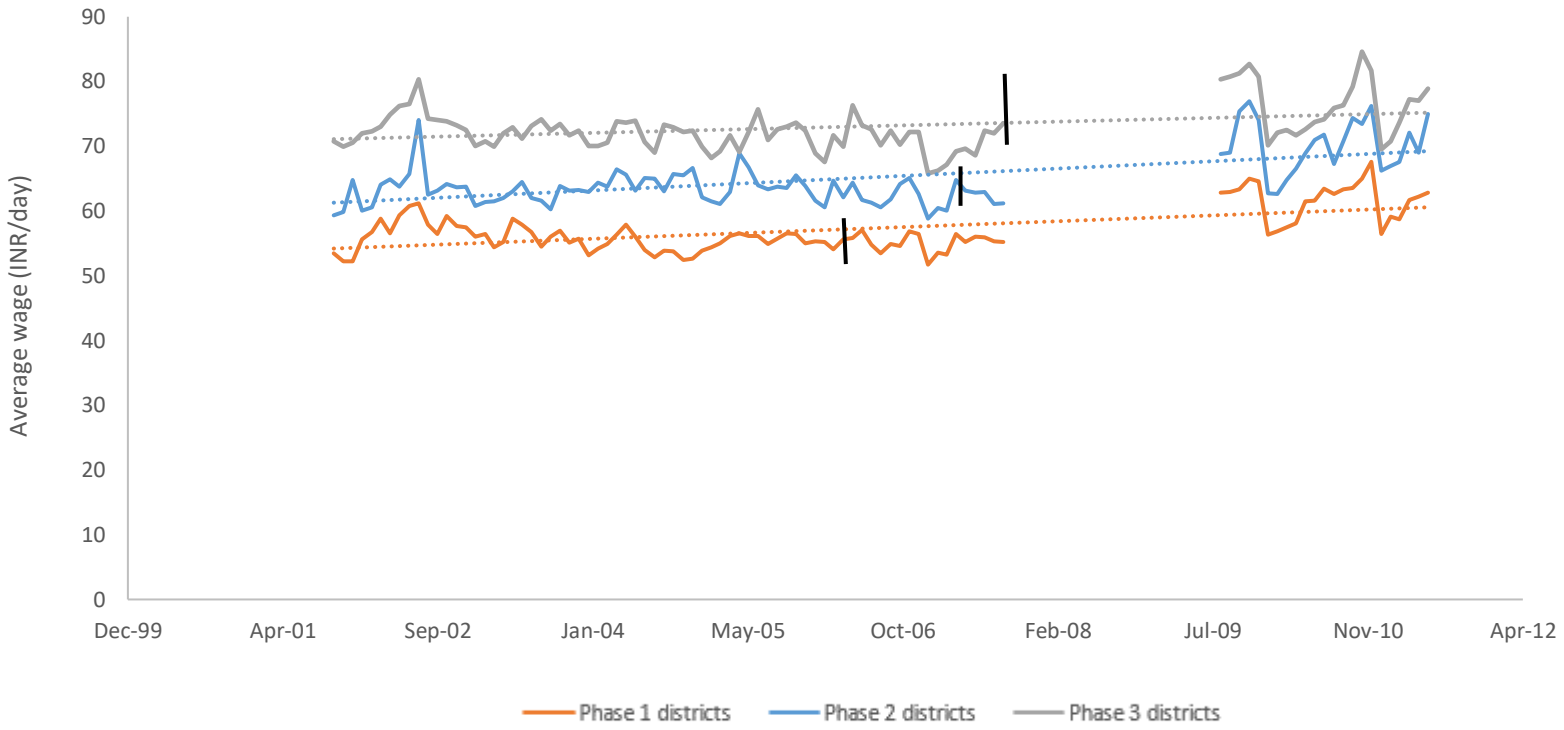
Data source: GoI (2018d)

Figure 3: Labor supply in peak and lean seasons in rural India



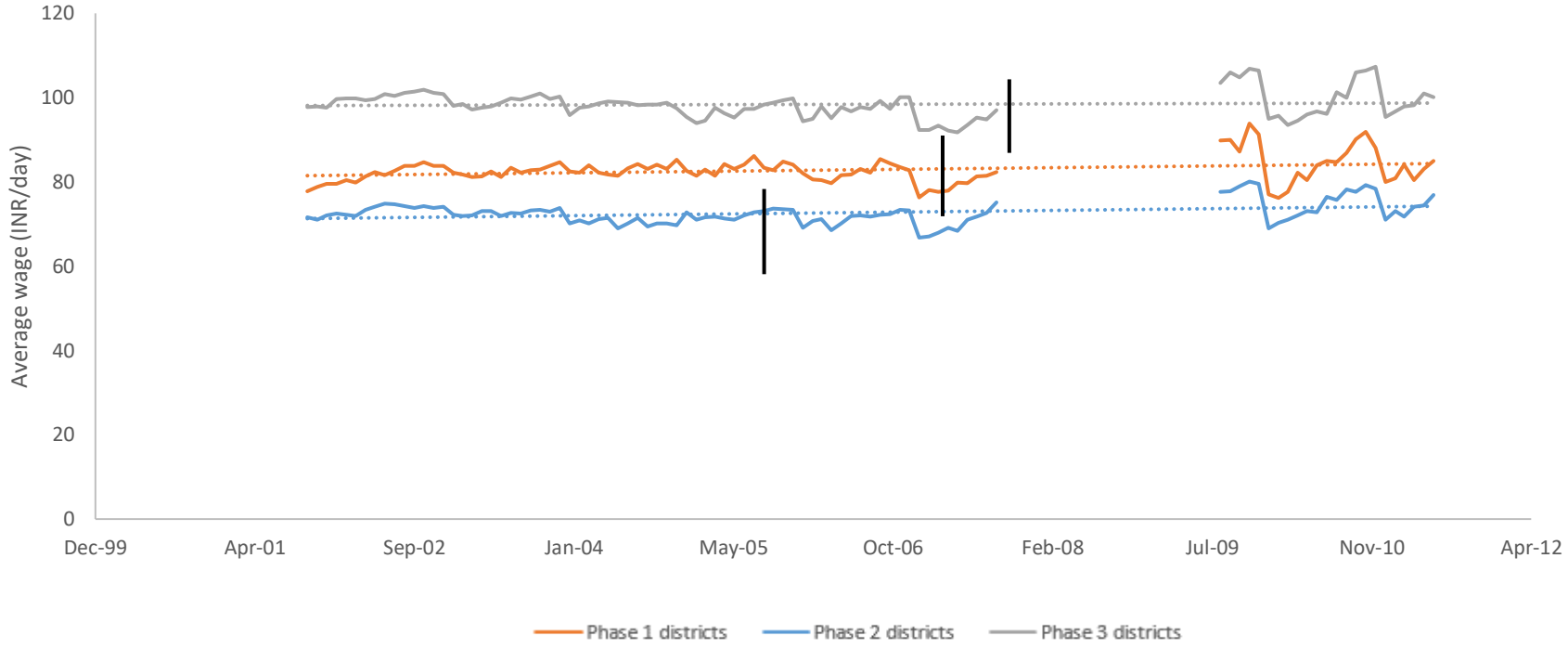
Source: Bhargava (2014)

Figure 4: Trends in Male agricultural wages (INR/day) in the three implementation phase districts of MGNREGA (wages are in INR 2000 constant prices)



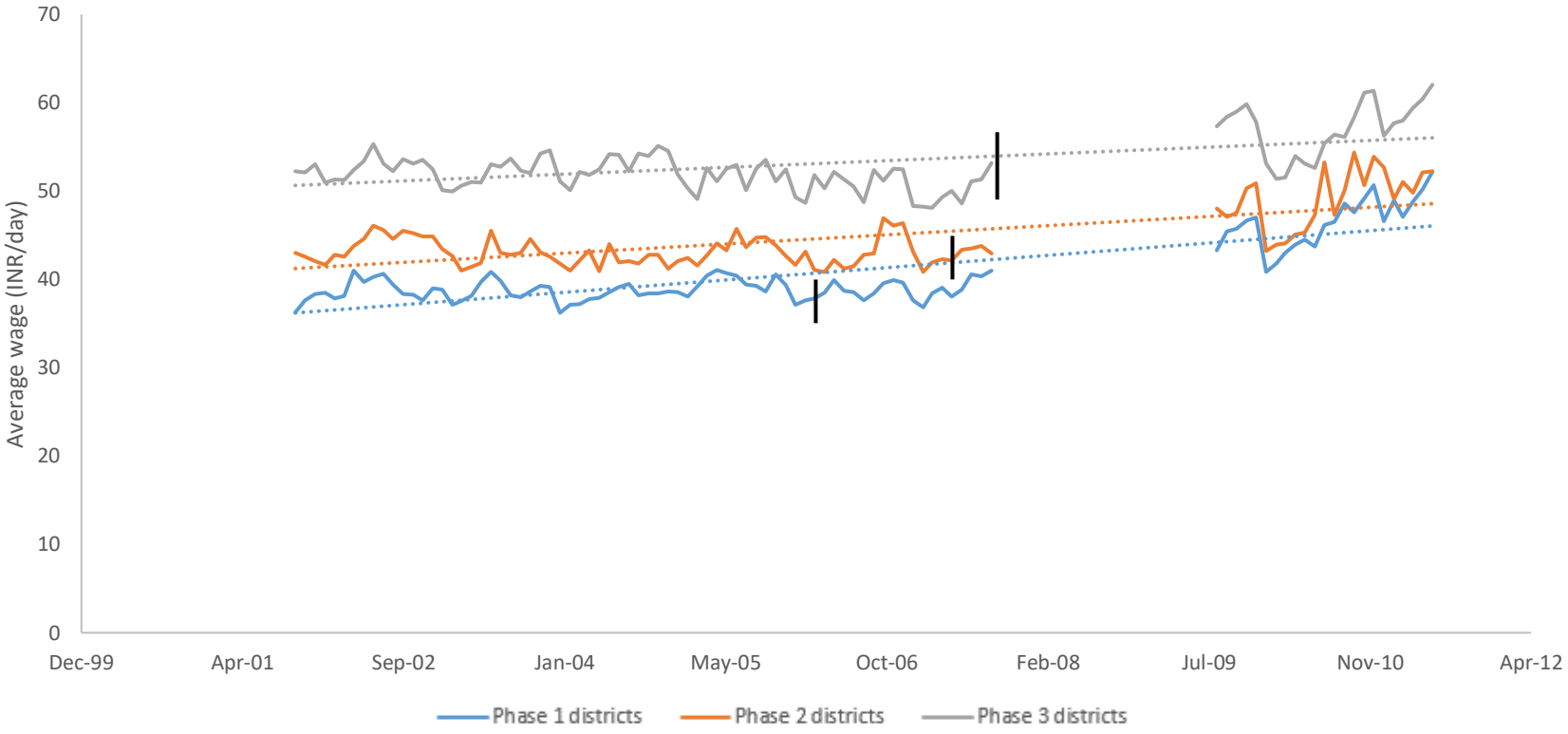
Notes: Black line indicates the year MGNREGA was introduced in these districts.
Wage rate data for 2008 is missing.

Figure 5: Trends in Male non-agricultural wages (INR/day) in the three implementation phase districts of MGNREGA (wages are in INR 2000 constant prices)



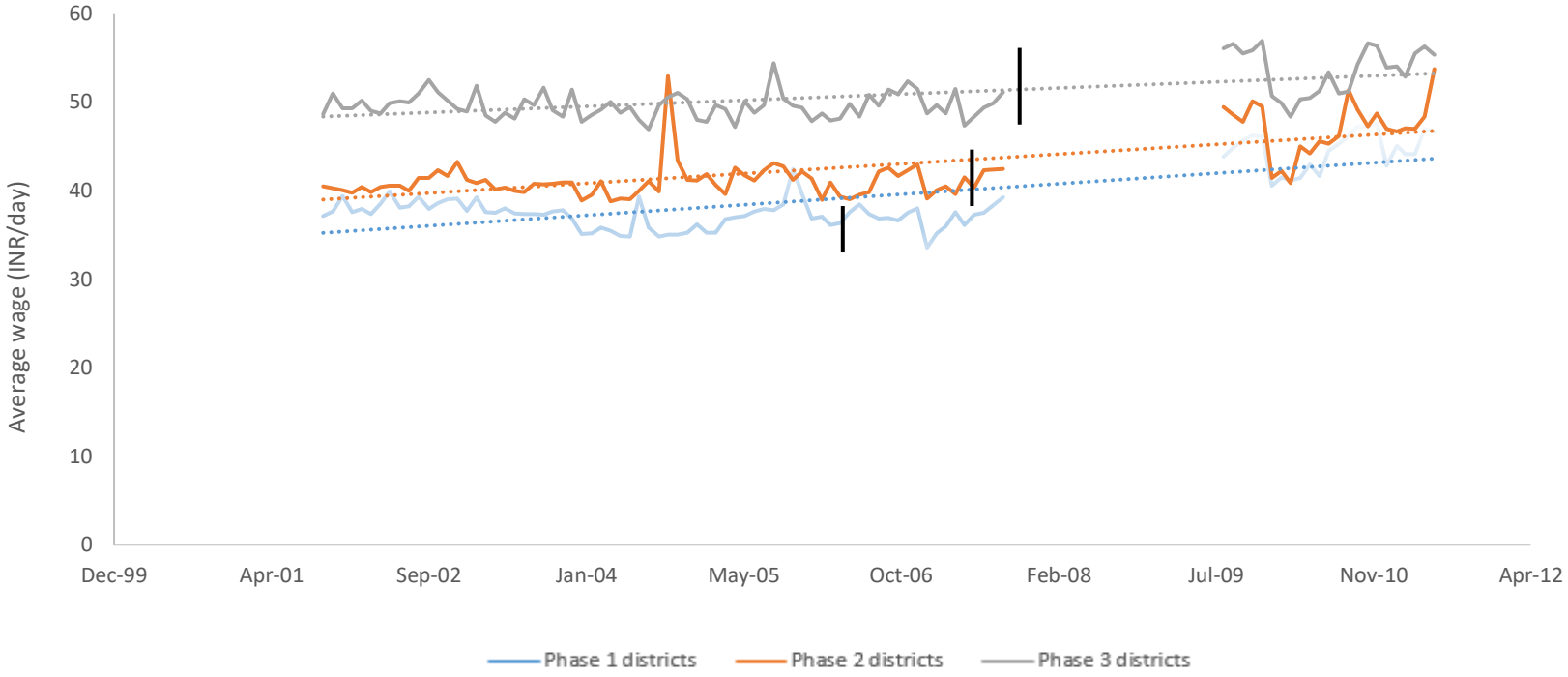
Notes: Black line indicates the year MGNREGA was introduced in these districts.
Wage rate data for 2008 is missing.

Figure 6: Trends in Female agricultural wages (INR/day) in the three implementation phase districts of MGNREGA (wages are in INR 2000 constant prices)



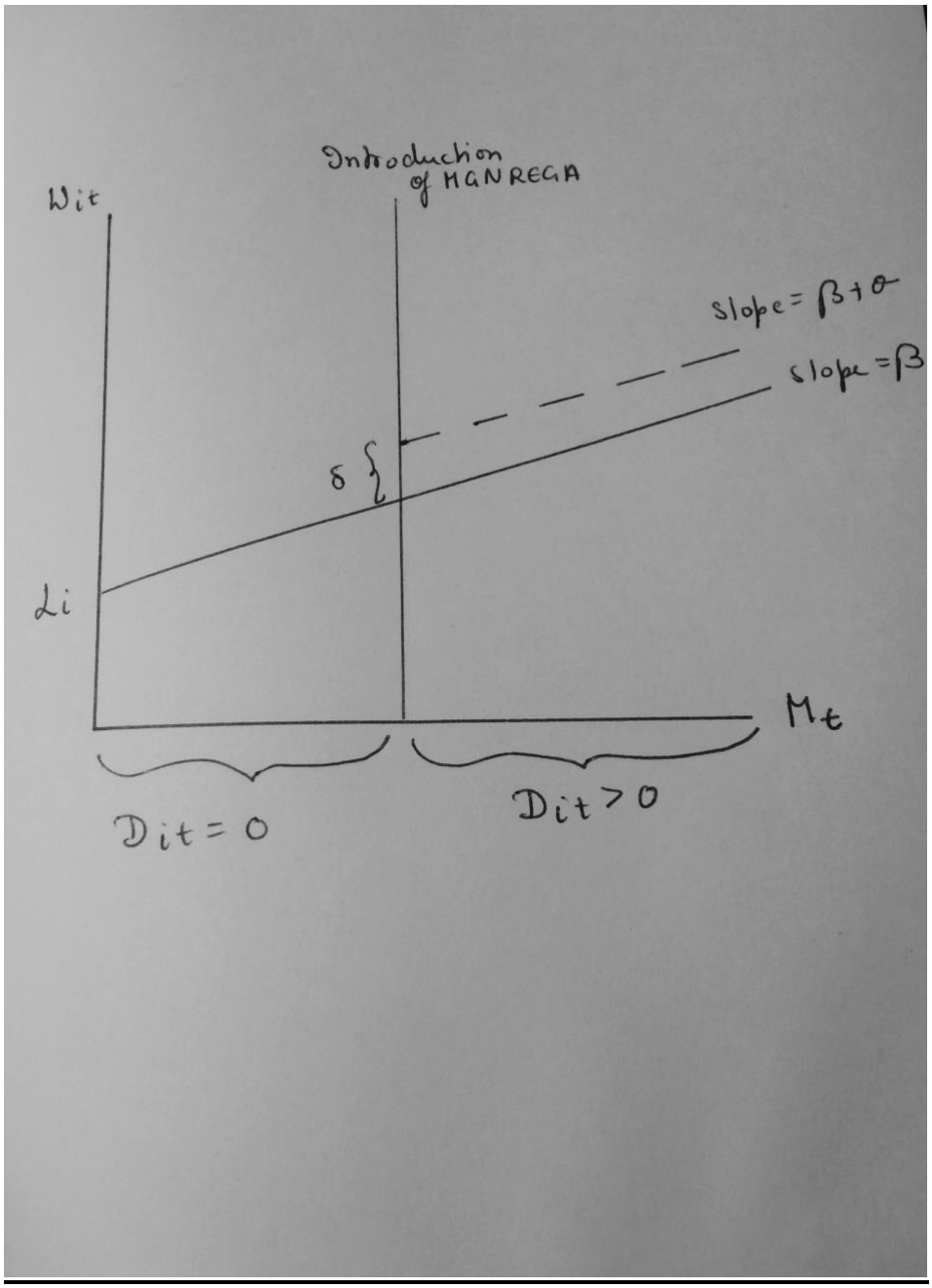
Notes: Black line indicates the year MGNREGA was introduced in these districts.
Wage rate data for 2008 is missing.

Figure 7: Trends in Female non-agricultural wages (INR/day) in the three implementation phase districts of MGNREGA (wages are in INR 2000 constant prices)



Notes: Black line indicates the year MGNREGA was introduced in these districts.
Wage rate data for 2008 is missing.

Figure 8: Graphical representation of the effect of MGNREGA on rural wages



Note: W_{it} is the log of daily wages and M_t indicates the time trend that affects all districts similarly. The initial slope of the equation is represented by β. After the introduction of the program, the slope shifts to $\beta + \theta$, capturing the effect of the program on rural wages over time. The 'jump' or discontinuity in wages is represented by ó.

Tables

Table 1 - Districts in different phases of MGNREGA

(a) MGNREGA Phase 1 (2006-07) districts in sample

Kupwara	Bhojpur	Malkangiri	Nizamabad
Chamba	Bhabua	Koriya	Karimnagar
Hoshiarpur	Rohtas	Surguja	Medak
Tehri Garhwal	Jehanabad	Jashpur	Ranga Reddy
Sirsa	Gaya	Raigarh	Mahboob Nagar
Mahendragarh	Nawada	Bilaspur	Nalgonda
Jaipur	Tamenglong	Rajnandgaon	Warangal
Dungarpur	Dhalai	Dhamtari	Khammam
Banswara	West Garo Hills	Kanker	Vizianagaram
Jhalawar	Kokrajhar	Bastar	Cuddapah
Kheri	Goalpara	Dantewada	Anantpur
Sitapur	Lakhimpur	Tikamgarh	Chittoor
Hardoi	Karbiaglong	Chhatarpur	Gulbarga
Unnao	North Cachar Hills	Satna	Bidar
Rai Bareli	Jalpaiguri	Umaria	Raichur
Jalaun	South Dinajpur	Shahdol	Davanagere
Lalitpur	Maldha	Sidhi	Palakkad
Banda	Murshidabad	Jhabua	Villupuram
Fatepur	Birdhum	Dhar	Dindigul
Pratapgarh	Bankura	Indore	Cuddalore
Gorakhpur	Puruliya	East Nimar	Nagapattinam
Kushi Nagar	Midnapur	Jabalpur	Sivgangai
Azamgarh	Palamau	Mandla	Adilabad
Jaunpur	Chatra	Seoni	Nalanda
Chaundli	Giridihi	Balaghat	Patna
Mirzapur	Godda	Bans Kantha	Sonepur
Sheohar	Dhanbad	Kadana	Bolangir
Madhubani	Ranchi	Palsana	Aurangabad
Supaul	Gumla	Dangs	Ahmadnagar
Kishanganj	Jharsuguda	Dhule	Munger
Purnea	Deogarh	Amaravati	Gajapati
Katihar	Sundargarh	Bhandara	Nanded
Darbhanga	Keonjhar	Gondiya	
Muzaffarpur	Mayurbhanj	Gadchiroli	
Vaishali	Dhenkanal	Chandrapur	
Samastipur	Ganjam	Yavatmal	

(b) MGNREGA Phase 2 (2007-08) districts in sample

Anantnag	Cachar
Jammu	Darjeeling
Kangra	Kochbihar
Mandi	Burdwan
Amritsar	Nadia
Jalandhar	Hooghly
Ambala	Deoghar
Sawai Madhopur	Paschim Singhbhum
Jaisalmer	Baleshwar
Jalor	Jajpur
Chittaurgarh	Angul
Etah	Korba
Budaun	Raipur
Kanpur Nagar	Mahasamund
Ambedkar Nagar	Datia
Sultanpur	Guna
Bahraich	Panna
Balrampur	Damoh
Gonda	Rewa
Basti	Dewas
Maharajganj	Rajgarh
Ballia	Chhindwara
West Champaran	Ahmedabad
East Champaran	Buldana
Saharsa	Akola
Gopalganj	Washim
Siwan	Wardha
Saran	Thane
Begusarai	Osmanabad
Bhagalpur	Srikakulam
Chandel	East Godavari
West Tripura	Guntur
South Tripura	Prakasam
East Khasi Hills	Nellore
Jaintia Hills	Kurnool
Barpeta	Bellary
Nalbari	Shimoga
Darrang	Chikmagalur
Morigaon	Hassan
	Tirunelveli
Thanjavur	

(c) MGNREGA Phase 3 (2008-09) districts in sample

Barmula	Bulandshahr	Sehore	Bangalore Rural
Badgam	Aligarh	Raisen	Mandya
Pulwama	Hathras	Hoshangabad	Dakshin Kannad
Udhampur	Mathura	Narsimhapur	Mysore
Rajouri	Mainpuri	Kachchh	Chamarajnagar
Kathus	Bareilly	Harij	Kannur
Una	Pilibhit	Kheralu	Kozhikode
Solan	Shahjahanpur	Talod	Malapuram
Shimla	Kannauj	Kalol	Trichur
Kapurthala	Auraiya	Surendranagar	Ernakulam
Rupnagar (Ropar)	Allahabad	Rajkot	Kottayam
Ludhiana	Deoria	Jamnagar	Alappuzm
Firozpur	Ghazipur	Junagadh	Pathanamthitta
Muktsar	S.Ravidas Nagar	Amreli	Kollam
Bhatinda	Senapati	Bhavnagar	Triruvananthapuram
Sangrur	Thoubal	Anand	Tiruvallur
Patiala	Imphal West	Kheda	Kahchipuram
Pauri Garhwal	Imphal East	Sinor	Vellore
Almora	Notrh Tripura	Dharampur	Dharampuri
Yamuna Nagar	East Garo Hills	Jalgaon	Salem
Kurukshetra	West Khasi Hills	Nagpur	Namakkal
Panipat	Nangpoh	Parbhani	Erode
Sonipat	Kamrup	Jalna	Perambalur
Jind	Tinsukia	Nashik	Pudukottai
Hisar	Dibrugarh	Raigarh(Kulaba)	Madurai
Rewari	Sibsagar	Pune	Virudhu Nagar
Gurgaon	Karimganj	Latur	Toothukudi
North West	Howrah	Solapur	Kannyakumari
Ganganagar	Kendrapara	Satara	Dharampuri
Churu	Jagatsinghpura	Ratnagiri	Shajapur
Alwar	Nayagarh	Sindhudurg	West Nimar
Bharatpur	Puri	Kolhapur	Vidisha
Nagaur	Phulbani	Sangli	Tumkur
Ajmer	Durg	Vishakhapatnam	Kolar
Kota	Morena	West Godawari	Bangalore Urban
Saharanpur	Gwalior	Krishna	
Muzaffarnagar	Sagar	Bijapur	
Bijnor	Mandsaur	Gadag	
Moradabad	Ratlam	Uttar Kannad	
G. Buddha Nagar	Ujjain	Haveri	

Table 2 – Distribution of agricultural labor occupations in the Retail Price Collection (RPC) survey dataset (2001-11)

Labor	Observations	%
Ploughing	37,647	17.81
Sowing	31,494	14.90
Weeding	30,074	14.23
Transplanting	20,370	9.64
Harvesting	29,018	13.73
Winnowing	12,385	5.86
Threshing	13,871	6.56
Cane crushing	3,658	1.73
Tractor driver	27,744	13.12
cotton picking	1,678	0.79
Jute picking	33	0.02
Tea picking	10	0
Other picking	3,403	1.61
n	211,385	

Table 3 – Distribution of non-agricultural labor occupations in the Retail Price Collection (RPC) survey dataset (2001-11)

Occupation	Observations	%
Herd man	16,935	7.41
Well digging	11,504	5.04
Carpenter	46,560	20.38
Blacksmith	32,826	14.37
Cobbler	20,071	8.79
Mason	46,242	20.24
Sweeper	5,727	2.51
Unskilled labor	48,555	21.26
n	228,420	

Table 4 – Average male and female wage rates (INR/day) for different agricultural and non-agricultural occupations in the Retail Price Collection (RPC) survey dataset in 2001 (2000 constant prices)

Occupation	Male (INR/day)	Female (INR/day)
Agricultural Labor		
Ploughing	63.17	44.71
Sowing	55.91	42.52
Weeding	48.45	41.58
Transplanting	51.01	45.45
Harvesting	51.92	43.54
Winnowing	48.83	43.29
Threshing	49.28	44.35
Cotton picking	45.99	34.35
Jute picking	48.51	-
Others picking	61.73	43.03
Tractor driver	78.01	-
Mean agricultural wages	**57.41**	**43.04**
Non-Agricultural Labor		
Carpenter	100.71	40.80
Blacksmith	77.77	-
Cobbler	57.12	-
Mason	110.46	41.26
Herd man	39.05	31.93
Well digging	79.21	44.48
Sweeper	42.53	39.26
Unskilled labor	54.55	42.10
Mean non- agricultural wages	**79.78**	**41.43**
Mean (all labor)	**69.51**	**42.56**

Table 5 – Difference-in-difference results for Male and Female agricultural and non-agricultural wages *(cash and kind)* for the three implementation phase districts of MGNREGA (wages are in INR 2000 constant prices)

VARIABLES	(1) Male agricultural wages	(2) Male non-agricultural wages	(3) Female agricultural wages	(4) Female non-agricultural wages
Time (in months)	-0.000148	-0.000490***	-.0000128	-0.000110
	(0.000180)	(0.000136)	(0.000178)	(0.000218)
treatp1	-0.0130	-0.0183**	-0.0406***	-0.0463***
	(0.0133)	(0.00878)	(0.0149)	(0.0152)
treatp2	0.0389**	-0.0115	0.0591**	0.0435*
	(0.0195)	(0.0145)	(0.0243)	(0.0241)
treatp3	0.0265	0.00400	0.0826***	0.0620**
	(0.0196)	(0.0149)	(0.0231)	(0.0255)
trendp1	0.00230***	0.00161***	0.00400***	0.00409***
	(0.000463)	(0.000399)	(0.000528)	(0.000520)
trendp2	0.00620***	0.00544***	0.00607***	0.00708***
	(0.000716)	(0.000638)	(0.000952)	(0.00101)
trendp3	0.00808***	0.00679***	0.00602***	0.00527***
	(0.000530)	(0.000470)	(0.000752)	(0.000783)
Constant	4.089***	4.393***	3.734***	3.674***
	(0.00720)	(0.00554)	(0.00741)	(0.00873)
Fixed Effects	Yes	Yes	Yes	Yes
Observations	30,439	31,631	24,779	24,245
R-squared	0.046	0.024	0.104	0.091
Number of districts	377	378	368	351

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6 – Difference-in-difference results for Male and Female agricultural and non-agricultural wages *(cash only)* for the three implementation phase districts of MGNREGA (wages are in INR 2000 constant prices)

VARIABLES	(1) Male agricultural wages	(2) Male non-agricultural wages	(3) Female agricultural wages	(4) Female non-agricultural wages
Time (in months)	-0.000250	-0.000491***	.0000883	-.0000259e
	(0.000194)	(0.000140)	(0.000191)	(0.000226)
treatp1	-0.0306**	-0.0269***	-0.0350**	-0.0428**
	(0.0137)	(0.00847)	(0.0147)	(0.0167)
treatp2	0.0635***	-0.000932	0.0639***	0.0533**
	(0.0195)	(0.0145)	(0.0242)	(0.0239)
treatp3	0.0691***	0.0258*	0.0878***	0.0752***
	(0.0201)	(0.0149)	(0.0243)	(0.0270)
trendp1	0.00298***	0.00178***	0.00410***	0.00406***
	(0.000481)	(0.000397)	(0.000555)	(0.000542)
trendp2	0.00591***	0.00520***	0.00609***	0.00664***
	(0.000766)	(0.000654)	(0.00107)	(0.00105)
trendp3	0.00605***	0.00544***	0.00578***	0.00523***
	(0.000530)	(0.000481)	(0.000760)	(0.000787)
Constant	4.018***	4.354***	3.641***	3.590***
	(0.00774)	(0.00568)	(0.00792)	(0.00885)
Observations	30,396	31,624	24,023	24,245
R-squared	0.058	0.025	0.124	0.105
Number of districts	377	378	367	351

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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