THREE ESSAYS ON THE ROLE OF INSTITUTIONS IN INDIAN AGRICULTURE

Kartik Misra
University of Massachusetts Amherst

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THREE ESSAYS ON THE ROLE OF INSTITUTIONS IN INDIAN AGRICULTURE

A Dissertation Presented

by

KARTIK MISRA

Submitted to the Graduate School of the University of Massachusetts Amherst in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2020

Department of Economics
THREE ESSAYS ON THE ROLE OF INSTITUTIONS IN INDIAN AGRICULTURE

A Dissertation Presented

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KARTIK MISRA

Approved as to style and content by:

____________________________
Deepankar Basu, Chair

____________________________
James Boyce, Member

____________________________
Michael Ash, Member

____________________________
Lynnette Leidy Sievert, Member

Léonce Ndikumana, Department Chair,
Department of Economics
DEDICATION

To my parents, Nirmala, Urmila and Abhay Misra who inspired me to begin this endeavor

To my wife and best friend, Uttara who gave me the strength to complete it

To Bimla and Harsh whom I have missed every single day.
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Rural labor markets in India are characterized by high inequality in landownership, concentration of political power and caste fragmentation. Consequently, small and marginal farmers are vulnerable to land grabs by local landlords and large urban industrial corporations. Further, agricultural workers lack bargaining power in wage negotiations with monopsonistic employers. This dissertation analyzes the role of these power asymmetries in landownership, wage determination and the implementation of government programs aimed at poverty alleviation and structural transformation. My research suggests that development policy must focus on addressing the bottlenecks to structural transformation as a means to improving the standard of living for over 140 million small farmers and landless workers in the Indian countryside.
The first chapter “Land Acquisition and Rural Labor Markets: Evidence from Special Economic Zones in India” examines whether Special Economic Zones (SEZs) effectively induce structural changes in India’s rural economy by shifting workers from agricultural to non-agricultural employment? This chapter analyzes the labor market impacts of land acquisition for SEZs in a difference-in-differences and event time framework. We find that land acquisition leads to a significant reduction in time spent in self-farming. Paradoxically, this leads to a significant increase in workers’ reliance on the traditional agricultural sector for subsistence as time spent in non-agricultural employment does not increase significantly. These effects are present both, in the short and medium-run. The main mechanism explaining the results is increased uncertainty about landownership after land acquisition leading to a reduction in area under cultivation. This reduces labor demand in agriculture, suppressing agricultural wages and worsening income inequality. Our analysis suggests that there are important distributional effects of the SEZ policy. While land acquisition for SEZs converts small and marginal farmers into landless agricultural workers, it provides large farmers with an opportunity to diversify towards higher productivity non-agricultural production.

The second chapter of this dissertation “Does Historical Land Inequality Attenuate the Positive Impact of India’s Employment Guarantee Program?” analyzes the labor market impact of the National Rural Employment Guarantee Act (NREGA). By providing 100 days of guaranteed employment to every rural household, NREGA can challenge the hegemony of landed elites as major employers in the Indian countryside. Using the colonial classification of landlord and non-landlord based land-revenue institutions in India, this chapter provides a political economy explanation for regional variation in the labor market impact of NREGA. The extractive landlord-based system led to high inequality in landownership and political domination by a large landlord class. Comparing the labor market impacts of NREGA between the
landlord and non-landlord districts in a difference-in-differences and triple-difference framework, we find that the provision of public employment under NREGA and correspondingly, its impact on rural wages is muted in landlord districts. In these districts, public employment under NREGA substitutes for self-farming but has no impact on private wage employment. However, the program is highly successful in raising wages by generating more public employment in non-landlord districts. In these districts, the provision of public employment under NREGA crowds-out labor primarily from unpaid domestic work, reflecting an increase in women’s participation in the program. These findings suggest that NREGA has not become a credible alternative to private employment in regions historically characterized by exclusionary economic and political institutions since large land-owning elites in these regions have managed to keep wages depressed by virtue of their position as major employers in the countryside.

The third chapter “No Employment without Participation: An Evaluation of India’s Employment Program in Eastern Uttar Pradesh” documents the bottlenecks in the functioning of NREGA in one of the poorest districts in India. Existing research shows that at the national level, NREGA has been highly successful in providing an income safety-net to small peasants and landless workers. However, in the poorer states of Uttar Pradesh, Bihar and Jharkhand the provision of public employment under NREGA has been inadequate. Using evidence from field research in the Mirzapur district of Uttar Pradesh, this chapter aims to study how awareness among program beneficiaries about their legal entitlements and at various levels of government determines the provision of NREGA employment in one of the poorest regions of the country. Further, we discuss the impact of NREGA on agricultural productivity and wage bargaining by landless workers who are the intended beneficiaries of NREGA. Our findings suggest that patron-client exchanges between the local elite and NREGA beneficiaries determines the provision of public employment and generates rents for the local elite.
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CHAPTER 1

LAND ACQUISITION AND RURAL LABOR MARKETS: EVIDENCE FROM SPECIAL ECONOMIC ZONES IN INDIA

1.1 Introduction

Economic development has traditionally focused on tackling two related manifestations of underdevelopment - ‘rural underemployment’ and ‘late industrialization’ (Hirschman, 1981). In order to tackle these challenges, policy recommendations have stressed on the need to divert labor away from agriculture and have advocated for the role of the state in directing industrial policy (Sen (1983); Agarwala and Singh (1958)). Special Economic Zones (SEZs) in developing countries like China, India, Malaysia and Vietnam are examples of policies designed to tackle these structural challenges to economic development. SEZs are created to increase exports, generate gainful employment and contribute to economic growth (Aggarwal, 2007). These SEZs are an example of ‘induced industrialization’, which can increase complementarities of investment by creating backward linkages with the rural economy thereby lead to greater productivity and employment creation in the non-agricultural sector.

1Rural underemployment or disguised unemployment refers to the concentration of surplus population in the agricultural sector of developing countries (Rosenstein-Rodan, 1956). Lewis (1954) argued that the ‘traditional’ agricultural sector in developing countries like India is characterized by ‘unlimited supplies of labor’ which implies that the population share engaged in agriculture is very large relative to capital and natural resources. Consequently, the marginal product of labor is negligible or zero. Similar to underemployment, late industrialization is also a major challenge to economic development. The problem of late industrialization refers to the lack of well functioning financial markets, adequate entrepreneurship and other challenges to industrialization in developing countries (Hirschman (1981); Gerschenkron (1962)).

2For instance, McMillan and Rodrik (2011) discuss how labor flows from low productivity traditional agricultural sectors to high productivity manufacturing sectors have contributed to rising incomes and higher economic development in Asia. The relative inability of countries in Latin America and Africa to achieve this structural transformation has contributed to the reduction in income growth rates since the 1990s.
(Hirschman, 1981). However, if the rate of absorption of labor in the non-agricultural sector is low, they will perpetuate dependence of landless workers on agriculture and other forms of informal employment (Todaro (1969); Anant et al. (2006)). This would exacerbate inequality between the landowning elite and landless workers. In this context, this chapter examines whether SEZs in India were successful in addressing the problem of rural underemployment or does the diversion of agricultural land for setting up of SEZs increase rural distress by converting farmers into landless wage workers relying on low productivity agriculture for subsistence.

Policies like SEZs which transfer ownership of the means of production from some social groups to others have been common throughout history.\textsuperscript{3} For instance, the eighteenth century Enclosure Movement in England led to the forceful eviction of small farmers while the twentieth century land reforms in East Asia led to a transfer of land away from large farmers. In both cases, changing ownership of agricultural land induced structural changes in the economy which impacted agricultural productivity and capital accumulation.\textsuperscript{4} In the Indian experience, the process of land acquisition for setting up SEZs was often involuntary and farmers losing their land were not offered adequate or fair compensation for their land (Jenkins, Kennedy, and Mukhopadhyay, 2014).

\textsuperscript{3}The process of capitalist economic development is historically characterized by the forcible separation of labor from the means of production, a process described by Marx (1867) as the primary (or original) accumulation of capital. This process involves involuntary land acquisition using extra-economic methods, ranging from coercion by powerful groups to the use of legislation enacted by the state to transfer ownership of productive resources like agricultural land from the peasants to large corporations.

\textsuperscript{4}The evidence on the impact of enclosures on agricultural productivity is mixed. Turner (1986) finds considerable improvements in agricultural productivity on enclosed lands while Allen (1999) argues that the enclosures did not cause significant productivity gains in English agriculture which was already witnessing productivity improvements since the seventeenth century. Correspondingly, Thompson (2016) conceptualizes enclosures as forceful eviction of peasants to create a class of rural and urban labor force. On the other hand, evidence on the impact of land reforms on agricultural productivity, wherein ownership was transferred from large landlords to small farmers, is unambiguously positive. Putzel (2000) shows that land reforms in South Korea contributed to rapid economic growth in the post-World War II period. Land reform in East Asia accelerated economic growth while its absence retarded productivity gains in Latin America (Kay, 2002).
India has a long history of pursuing policies and programs that acquire private land for public purposes like dams and infrastructure projects. However, Levien (2015a) argues that contrary to land acquisition for public projects, SEZs involve transferring land from farmers to large capital for the development of private industry. This represents an important departure from previous forms of land acquisition which corresponds to changes in the nature of the state and polity since the economic liberalization of the 1990s. Bardhan (1984) identifies capitalists, rich farmers and the bureaucracy as dominant classes in the pre-liberalization power structure of India. These classes competed and aligned with each other for political space and rent appropriation. This characterization situated the interests of farmers at the forefront of political discourse in the country. Correspondingly, Bardhan (2015) shows that during the period 1967 - 2004, 85 percent of the decline in average landholding size in the state of West Bengal is explained by demographic factors and attempts by the state to acquire agricultural land have been few. This coalition between the dominant classes weakened after economic liberalization leading to the emergence of a larger and much more powerful capitalist class enjoying greater political power in comparison to the landed elite (Chatterjee, 2011). Not only does this class benefit immensely from proximity to the political elite but they also enjoy considerable ideological support from the urban middle-classes. Since farmers are no longer part of the ruling coalition in the neoliberal regime, policies that are inimical to their interests (like land acquisition for SEZs) can now be pursued vigorously by the various state governments in India (Basu, 2007).

5 Adivasis or tribal population living in forest regions of central and eastern India have been predominant victims of land acquisition attempts by the state. However, farmers in other parts of the country were relatively insulated before the 1990s (Bardhan, 2015).

6 The emergence of the influential capitalist class changed policy making in India as the political elite facilitated capital accumulation at the expense of farmers. In order to assuage political tensions owing to policies favoring the capitalist class, governments enact income transfers and welfare schemes like rural employment guarantee programs (Sanyal, 2014).
In this context, the SEZ Act, passed in 2005 envisioned the establishment of comprehensive industrial townships with social facilities like housing blocks, schools and hospitals (Hyun, Ravi, et al., 2018). The SEZ policy had five stated objectives including: (a) generation of additional economic activity, (b) promotion of exports of goods and services, (c) promotion of investment from domestic and foreign sources, (d) creation of employment opportunities, and (e) development of infrastructure facilities (Sharma, 2009). To pursue these objectives, the SEZ Act allowed large corporations and state governments to acquire agricultural land for setting up SEZs. It was argued that if SEZs raise rural wages by creating non-agricultural employment, they would create positive spillovers for the local economy which would compensate farmers for the loss of their land. Further, non-agricultural employment created by SEZs could cause a reduction in labor engaged in agriculture, which would improve the living conditions and incomes of workers in this sector. Therefore, by increasing the demand for non-agricultural labor, SEZs would bring structural transformation in the Indian economy which would increase the standard of living for workers in both agricultural and non-agricultural sectors ((Nurkse, 1953); (Datta, 1960)). For instance, Alvarez-Cuadrado and Poschke (2011) show that improvements in industrial technology attracted labor to non-agricultural employment in the US since 1800, which had a positive impact on real wages in the economy.

In light of these potential benefits, it seemed paradoxical that farmers posed stiff resistance against land acquisition attempts by the state for setting up SEZs. For instance, farmer agitations against land acquisition in West Bengal contributed to ending over three decades of left-front rule in the state (Chatterjee, 2009). This led

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7 According to the National Sample Survey Office (2013), around 64 percent of rural labor force was employed in the traditional agricultural sector in 2011-2012. The proportion of male labor force working in agriculture was 59 percent while 75 percent of the female labor force was working in the agricultural sector. However, agriculture’s contribution to India’s GDP was only 25 percent (Arjun, 2013).

8 Syrquin (1988) describes structural change as a movement of labor from the traditional agricultural sector to the modern manufacturing sector.
to the cancellation of land acquisition attempts by successive governments in the state and elsewhere.\textsuperscript{9} Movements opposing land acquisition in India have been ubiquitous and, on several incidents, successful in stymieing the progress of SEZs across India (Jones, 2009). One possible explanation for farmer agitations against SEZs could be that farmers did not expect to benefit from the creation of SEZs but anticipated that they would be dispossessed of their agricultural land and be converted into wage workers in agriculture which would depress their incomes. Existing research shows that land acquisition adversely affected small and marginal farmers who were often undercompensated for their land which resulted in substantial economic hardship for large sections of the rural population (Ghatak, Mitra, et al., 2013).

Policies like SEZs derive political and economic legitimacy by conceptualizing the involuntary acquisition of agricultural land as \textit{productivity enhancing} redistribution of the means of production to the most efficient economic agents in order to facilitate economic growth in developing countries. However, the expectation that land acquisition for private accumulation will result in a structural transformation is predicated on the assumptions of well functioning labor markets and flexible wages. Further, such an analysis does not account for asymmetries of power (Basu, 1986), imperfect factor markets (Bardhan, 1980) and imperfect labor substitution between the traditional agricultural sector and the modern SEZ (industrial) sector (Weisskopf, 1972). These political economy factors play a significant role in determining the distributional impact of SEZs. Baran (1958) argued that the appropriation of economic rents created by land acquisition is determined by the distribution of political power between large capital, the rural elite and the state. Political institutions often determine choice of

\textsuperscript{9}Given the political sensitivity of these issues, there has been significant political reluctance to amend the 1894 Land Acquisition Act to provide farmers with adequate and fair compensation for their land. For instance, two attempts by the government to change land acquisition rules failed between 2009 and 2011 (Das, 2011). In the third attempt in 2012, the government proposed to provide farmers with four times the value of their land as compensation for acquisition. See Sathe (2011) for an overview of policies related to land acquisition in India.
economic policies and the distribution of economic ‘rents’ ensuing from them (Acemoglu and Robinson (2006); Acemoglu and Robinson (2008)). SEZs may increase capitalist accumulation and generate rents for rural landowners while suppressing labor demand and wages in the agricultural sector. This may result in uneven economic development which exacerbate social and economic inequalities. For instance, Weisskopf (1972) argues that foreign investment in developing countries often relies on capital-intensive technologies which create problems of underemployment for the unskilled rural labor force. This benefits the skilled or educated labor at the expense of farmers and agricultural workers who would be dispossessed.

In this context, using nationally representative sample survey data on employment and a new data set on land acquisition, this chapter provides the first empirical estimates of the impact of land acquisition for SEZs on rural labor markets. Specifically, using archival research we determine the date of land acquisition for SEZs using three sources of data. First, we use records maintained by the minutes of SEZ Board of Approvals (BoA) to infer the timing of land acquisition. Second, we use answers to parliamentary questions on land acquisition and SEZ development raised in the Rajya Sabha (Upper House) of the Indian Parliament. Finally, we triangulate data on the date of land acquisition using archival research of newspaper articles which reported extensively on farmer agitations across the country. These three sources of data allow us to determine the timing of land acquisition for each SEZ used in the study.

To measure the causal impact of land acquisition on rural labor markets we exploit the temporal and geographic variation in the timing of land acquisition for each SEZ.

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10 Owing to large scale farmer unrest and agitations created by SEZs, opposition leaders asked the government to provide details of land acquisition status of various SEZs and compensation paid to farmers. We use the detailed replies given by the government to verify the dates of land acquisition for several SEZs.

11 Since our data allows us to trace the status of an SEZ project since its inception, we are able to identify projects where land was acquired for SEZs but was subsequently returned to farmers owing to judicial intervention or farmer agitations. We remove these SEZs from our study.
Geographic variation arises because SEZs were notified in only certain districts and temporal variation stems from the phased rollout of the SEZ policy: each SEZ in a district was notified in a different month and year. We use these sources of variation in a difference-in-differences framework. A district is considered as ‘treated’ from the year it receives the first notified SEZ. Additional SEZs in the same districts do not add treatment districts to our study. To ensure that the timing of SEZs is not correlated with pre-existing characteristics in the local labor market, we confine our sample to SEZs in the western and southern states of Gujarat, Maharashtra, Andhra Pradesh (including present day Telangana), Karnataka, Kerala and Tamil Nadu. These states account for over 72 percent of all notified SEZs in the country. We find no evidence of a pre-existing trend in any of our estimates. We supplement the difference-in-differences design with an event time framework, which allows us to disaggregate short and medium-run impacts of land acquisition for SEZs. Importantly, the event time framework also acts as a robustness check to our results because it makes fewer assumptions than a traditional difference-in-differences design.

This chapter finds that land acquisition for SEZs has strong direct and indirect effects on rural labor markets. Specifically, there are two main direct effects. First, as agricultural land is diverted for setting up SEZs, the proportion of labor time in casual non-agricultural employment increases by 0.5 percentage points. This translates to around two work days in a year. This result shows that propensity of SEZs to create non-agricultural employment is marginal. Second, we find that proportion of labor time spent in self-farming witnesses a sharp decline of 3 percentage points which translates to around 11 days per year. This decline in self-farming is caused by a significant increase in the proportion of small and marginal farmers after land acquisition as shown in Figure 1.4.
Further, by dispossessing farmers of their agricultural land, SEZs indirectly impact agricultural labor supply and income in two ways. First, contrary to expectations of a structural transformation, the proportion of labor time spent in casual agricultural labor increases by 2 percentage points which translates to an increase of 7 days per year. Therefore, we find that dispossession of agricultural land for setting up SEZs increases the proportion of small and marginal farmers who depend on agricultural employment for subsistence. This implies that employment generated by the SEZ sector is not robust to absorb labor supply in non-agricultural employment. This sluggish pace of employment generation by the SEZ sector is similar to the formal manufacturing sector in India. For instance, Sanyal (2014) discusses the low rate of absorption by the capitalist sector.12

Second, we find that real incomes in the agricultural sector remain unchanged. The increase in labor supply in the traditional agricultural sector has adverse consequences on earnings which are determined by the average product of labor (Lewis, 1954). Further, land acquisition also reduces the proportion of land held by large and medium farmers who are net employers of agricultural labor as shown in Figure 1.4. These factors exert a downward pressure on the earnings of workers in the agricultural sector. Consequently, we see that even when district level real agricultural wage rates are rising over time (Figure 1.5), the daily earnings of agricultural workers remain constant in SEZ districts. Therefore, we find that SEZs have both direct and indirect effects on rural labor markets which contribute to lowering of earnings for agricultural labor.13

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12 See Chaurey (2015) and Besley and Burgess (2004) for factors impacting labor demand in India’s manufacturing sector.

13 This chapter also examines changes in agricultural productivity and land use to determine that the increase in labor time allocated to agricultural labor is not in response to an increase in agricultural productivity which would increase labor demand. As agricultural productivity remains unaffected, we conclude that the increase in labor time spent in the agricultural sector is caused by an increase in labor supply reliant on agriculture for subsistence.
This chapter contributes to the following strands of literature. First, by discussing the labor market impact of land acquisition for SEZs in India, this research adds to the literature on the developmental impacts of place based policies like SEZs, road construction and other regional development programs which aim at improving labor productivity in a region. For instance, Wang (2013) finds that SEZs in China create agglomeration economies which generate wage increases for workers and Alder et al. (2016) shows that SEZ states witnessed higher rates of economic growth in China. Similarly, Greenstone et al. (2010) find that US counties successful in creating large manufacturing agglomerations increased total factor productivity which created positive spillover benefits for workers including higher wages. In contrast, by disaggregating our results into short-term and medium-run effects of land acquisition on rural labor markets we show that the rate of employment generation in the SEZ sector continues to remain sluggish even after two years of land acquisition. This experience of India’s SEZs is in contrast with other place based development strategies like the Tennessee Valley Authority (TVA) in the United States which created long-term benefits for workers in the non-agricultural sector (Kline and Moretti, 2013). Even within India, public infrastructure development programs like building rural roads have resulted in a sustained reduction in workers reliance on agriculture for subsistence (Asher and Novosad, 2016). Further, Chaurey (2017) finds that location based tax exemptions in India also contributed to increases in employment generated by firms.

Second, this chapter contributes to the relatively thin literature estimating the impact of SEZs on developmental outcomes in India. Hyun, Ravi, et al. (2018) measure the impact of ‘functioning’ SEZs on labor productivity and find evidence of spillover benefits in the form of greater formalization of the informal manufacturing sector. On the other hand, Alkon (2018) finds no evidence of socio-economic spillover benefits of SEZs in the form of increased provision of schools, roads and other public services.
However, this chapter differs from these studies in several ways. First, we estimate changes in rural labor markets following the acquisition of agricultural land for SEZs. Second, we study changes in agricultural land use pattern to discuss the distributional impact of long-term changes in the agrarian economy caused by SEZs. Finally, since farmers lose their land for SEZs, we study the impact of SEZs on rural incomes and its potential to bring about structural transformation in rural labor markets.

Finally, this chapter engages with the political economy literature which analyzes forceful alienation of farmers from agricultural land to capitalist accumulation in developing countries around the world.\textsuperscript{14} Involuntary acquisition of agricultural land for setting up SEZs can be characterized as instances of ‘accumulation by dispossession’ (Levien, 2015a).\textsuperscript{15} This chapter contributes to this literature by discussing the impact of SEZs on landownership patterns, distribution of incomes and vulnerability of small and marginal farmers (Levien (2012); Chakravorty (2013); Krieger and Leroch (2016)). Using a new data created through archival research on land acquisition for SEZs in India and data from the nationally representative National Sample Survey (NSS), we provide casual estimates of the adverse impact of SEZs on the rural economy. Our findings are consistent with field studies suggesting that not only are SEZs unable to absorb dispossessed farmers, they also generate a peculiar agrarian transformation through land speculation which drastically amplifies existing class and caste inequalities in India (Levien, 2011).\textsuperscript{16}

The rest of this chapter is organized as follows. Section 1.2 provides an overview of the Indian SEZ experience. Section 1.3 presents a theoretical model that outlines the


\textsuperscript{15}Accumulation by dispossession (ABD) refers to the dispossession of agricultural workers, forest dwellers and marginalized groups in order to make land and labor available for capital to acquire at extremely low costs (Harvey, 2007).

\textsuperscript{16}See Misra (2019a) for a review of political economy factors impacting land acquisition for SEZs in India.
impact of land acquisitions for SEZs on rural labor markets. Section 1.4 presents the data and section 1.5 discusses the empirical strategy used in this study. Section 1.6 presents the results, while Section 1.7 discusses the mechanisms driving changes in rural labor markets. Finally, section 1.8 concludes with policy recommendations.

1.2 Context

After economic liberalization in 1991, the share of manufactured exports in India’s GDP increased significantly from 75 percent in 1989 to 81 percent in 1999 (Aggarwal, 2002). Between 2000 - 2005, India’s exports more than doubled, from USD 42 billion in 2000 to USD 100 billion in 2005 (Nayyar, 2010). While several studies suggest that rising per-capita incomes contributed to rising exports (Chandra (2003); Dhawan and Biswal (1999)), Indian policy makers prioritized increasing exports as a means to achieving higher economic growth. In this backdrop, the Special Economic Zones (SEZ) Act of 2005 was passed by the Parliament of India. SEZs were envisioned as comprehensive industrial townships with social facilities like housing blocks, schools and hospitals (Hyun, Ravi, et al., 2018).17 To pursue these objectives, the SEZ Act allowed large corporations and state governments to acquire agricultural land for setting up SEZs.18

SEZs were expected to bring large flows of foreign direct investment and spur domestic investment, which would boost economic growth at the national level. In addition, they were expected to benefit the local economy by boosting infrastructure and generating employment, and stemming rural to urban migration (Aggarwal, 2007). This was expected to allow rural workers to diversify their incomes by reducing their re-

17The minimum size requirements for Indian SEZs were much lower than SEZs set up in China. Information Technology (IT) SEZs were allowed to be as small as 0.1 square kilometers, while multi-product SEZs needed to be at least 10 square kilometers of area.

18The policy for land acquisition for SEZs was based on the Land Acquisition Act of 1894. Under this law the state could allow for transfer of ownership of any privately owned land if considered necessary for ‘public purposes’. This provision is also known as the ‘eminent domain’ clause of the SEZ Act of 2005.
liance on the agricultural sector (Aggarwal, 2012). In light of these expected gains, the state provided several fiscal benefits like exemption from import and customs duty in procurement of input goods, full tax-exemption for the first five years, and a 50 percent exemption in the next five years. In addition, SEZs were exempted from paying the Minimum Alternate Tax (MAT), which is currently set at 18.5% of book profits in India. Further, SEZs benefited from preferential processing of applications requesting permissions to expand or diversify production, “single window clearances” and exemption from various credit constraints like restrictions on foreign borrowing faced by other firms (Shah et al., 2009).

1.2.1 Procedure for Setting up SEZs

In order to examine the causal effects of land acquisition for SEZs on rural labor markets, it is important to discuss the process of setting up an SEZ. Setting up an SEZ involved three steps: (1) approval, (2) notification, and (3) operationalization. Our empirical analysis hinges on the penultimate stage of setting up an SEZ i.e. notification. Since SEZ developers are required to provide evidence of land acquisition for a formal approval by the Board of Approvals (BoA), we can ascertain the status of land acquisition by tracing the process of SEZ approval and subsequent notification. We describe below the process of SEZ approval and notification.

In the first stage of setting up an SEZ i.e. approval, using evidence provided in the literature (Aggarwal (2007); Alkon (2018); Hyun, Ravi, et al. (2018)) and by examining various official notifications and orders of the government, we identify the three main steps in obtaining an approval. First, the applicant must make a formal application.

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19 The corporate tax rate in India is 35 percent (Aggarwal, 2007).

20 The MAT is a compulsory tax levied on companies that make substantial profits but have low, or even zero, tax liability due to the host of deductions and exemptions available under the income tax law.

21 Single window clearances implied that applications were reviewed jointly by both the Central and State governments through a single regulatory body, the Board of Approval (BoA), which was set up to facilitate a faster pace of clearances and resolution of bureaucratic red-tape (Hyun, Ravi, et al., 2018).
to the BoA under the Ministry of Commerce and Industry. Second, after reviewing applications, the state government submits a report recommending or raising objections to the proposal of setting up of each SEZ. Third, if the state government gives a favorable recommendation and the project fulfills the area requirements laid down in the SEZ Act (2005), the BoA makes its first decision. This decision could be one of the following: (a) formal approval, (b) in-principle approval, (c) deferring the decision to a later date, or (d) rejecting the proposal.

While the exact criteria for each decision is not available, a review of BoA meeting minutes reveals that the BoA grants formal approval on three conditions. First, the applicant must be in possession of the land. Second, the state government must recommend the SEZ and finally, land proposed for the establishment of the SEZ must be above the minimum threshold required by the SEZ Act.\(^{22}\) If the SEZ developer is not in possession of the land then the BoA would grant an ‘in-principle’ approval. In the second meeting of the Board, held in June 2006, it was decided that in such cases, the developer has to approach the Board for a ‘formal approval’ after acquiring the proposed land. Finally, apart from evidence of being in possession of the land, if other technical requirements (like environmental clearances or legal disputes pending on the firm) were not met, the Board decided to defer the decision on the proposal and if state governments object, the proposal is rejected.

In the next stage of setting up an SEZ i.e. notification, proposals that received formal approvals were invited to provide more details about land ownership, lease agreement and clearances from other government agencies within 30 days of the date

\(^{22}\)The minimum area requirement for SEZs was originally 100 hectares, but this kept changing and over time smaller sized SEZs were also approved (Hyun, Ravi, et al., 2018). Particularly in the handicrafts sector, SEZs of 10 hectares were also approved.
of approval.\textsuperscript{23,24} If the BoA is satisfied by the documents provided by the developers, then the SEZ would be notified. Once notification is announced, the SEZ can become functional. The Board emphasizes that developers should begin operations as soon as possible after the formal notification of the SEZ. It is important to note that according to the rules enacted by the BoA, SEZ developers must submit official documents like land registration, rental or buying agreements to prove that they are in possession of the land, within 30 days of getting a formal notification.\textsuperscript{25} The detailed procedure for approval and subsequent notification of an SEZ is summarized in Figure 1.1.

Based on the above framework of setting up of SEZs, land acquisition should have occurred before the BoA awards the \textit{formal approval} to the proposal. Based on newspaper reports and answers to questions in the Parliament, we can conclude that the primary cause for not granting approval is disputes related to land acquisitions. If land acquisition efforts by the developers do not succeed then the Board does not change the \textit{in-principle approval} of the SEZ. According to our archival research (described in detail in Section 1.4), during the period between 2006 - 2012, 221 SEZ projects in 88 districts were not awarded formal approval. In some cases approvals were denied due to legal reasons and stay orders passed by the courts. However, in most cases, projects which received \textit{in-principle approval} but failed to convert these to \textit{formal approval} can be linked to farmer agitations. As shown by Jenkins, Kennedy, Mukhopadhyay, and Pradhan (2015), several SEZ projects fail to get notified or become operational even after acquiring land from farmers at rates lower than the market value of the land. In these cases, land is often returned to farmers. For instance, in Maharashtra, over 24,000 acres of land was returned to farmers after

\textsuperscript{23}These include the Ministry of Environment and in some cases the Ministry of Defense and External Affairs. In additional cases, the Board also requests statement of finances for green shoot developers (i.e. new firms).

\textsuperscript{24}In practice, the time between formal approval and notification in many cases lasted more than 30 days and could be up to one year.

\textsuperscript{25}In some exceptional cases, the BoA allowed for more than 30 days for SEZ developers to provide information.
SEZs proposals were canceled due to farmer protests (PTI, 2015). In some cases, land is not returned even when projects were canceled and farmers had to approach the Supreme Court for their land (Rajagopalan, 2017).

Our main empirical analysis includes SEZs that pass the penultimate stage i.e. notification. Figure 1.2 shows the district where SEZs were notified till 2012. Further, Table 1.1 shows the break-up of notified SEZs in each state in each year between 2006 - 2012. As can be seen, more than 72 percent all notified SEZs are located in the western and southern states of Gujarat, Maharashtra, Andhra Pradesh (including present day Telengana), Karnataka, Tamil Nadu and Kerala.

1.2.2 Performance of SEZs

According to the SEZ web-portal of the Ministry of Commerce and Industry in India, by 2019, more that 400 SEZ projects were approved by the government. Of these, 232 became operational and started exports by 2019. The SEZs relate to information technology (IT) and electronic hardwares, pharmaceuticals and biotechnology. More than 50,000 hectares of land has been acquired for setting up of these SEZs which have created around 2 million jobs in the period between 2005 - 2017.

The BoA has claimed that SEZs have increased India’s exports by around 10 percent annually between 2007 - 2018. The growth of SEZ exports remained unaffected by the economic crisis of 2008 (New Delhi, 2009). However, newspaper reports suggest that SEZ developers have earned huge profits by evading government taxes by taking advantage of SEZ rules (Sarkar and Damor, 2013). Aggarwal (2009) reports that India’s chief auditor found that SEZ developers evaded INR 20 billion (USD 300 million) in

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26 We exclude union territories like Chandigarh and Pondicherry and small states like Goa and Nagaland from this analysis as information about farmer movements is scarce for these regions.

27 The statistics on the performance of SEZs have been taken from the SEZ portal which can be accessed at [http://sezindia.nic.in/upload/5cdd38b962661FACT%20SHEET%20ON%20SEZs%20as%20on%2015.5.2019.pdf](http://sezindia.nic.in/upload/5cdd38b962661FACT%20SHEET%20ON%20SEZs%20as%20on%2015.5.2019.pdf).
taxes by classifying domestic sales as foreign exports. Existing evidence suggests that SEZs have contributed to increased economic activity in the neighborhood where they are created and have contributed to increasing formalization of the local labor force (Hyun, Ravi, et al., 2018). However, SEZs have not had a significant spillover effect on the socio-economic development indicators like physical infrastructure including schools, tapped water supply and the provision of electricity (Alkon, 2018). Aggarwal (2012) argues that SEZs can promote new knowledge intensive industries to diversify production but evidence on this is scarce. Banerjee-Guha (2008) argues that over 62 percent SEZs produce IT-enabled services and only five percent SEZ produce manufactured outputs. Therefore, the ability of SEZs to generate low-skill employment opportunities at a large scale is limited and SEZs simply reorganize the space relations in capitalist production by creating ‘enclaves’ for capitalist accumulation.

The expectation that policy initiatives like SEZs would benefit the rural economy does not appreciate the role of agrarian institutions and asymmetries of economic and political power between large landlords and landless workers (Bardhan, 1989b). Therefore, surplus appropriation is not determined solely by the dictates of efficiency (Rao, 1994). The role of dominant classes in controlling institutions would determine the benefits of SEZs. Rao (1986) argues that wealth distribution and social relations of production determine the rate of accumulation and technological change in the rural economy. Factors like market imperfections, wage-setting power of employers and limited mobility of factors across sectors constrain the impact of efficiency enhancing technical changes in the agrarian sector (Rao, 1989).

28 Using the 2009 exchange rate of 1USD = 67 INR.

29 These asymmetries manifest in differential access to factors of production like capital and credit for different agrarian classes (Bardhan, 1989a). The rural economy is often characterized by imperfect and interlinked factor markets for credit and capital (Bardhan, 1980). Correspondingly, agricultural workers depend on large landlords for subsistence. Land acquisition for SEZs increases the reliance of small farmers on large landowners by dispossessing them of their land. Further, SEZs may allow large landowners to transition from agricultural to non-agricultural land use which would increase the rents associated with landownership. In the process, labor demand in agriculture would decline which would adversely impact agricultural workers.
SEZs pose serious concerns for the well-being of workers in the agricultural sector. While SEZ rules require that non-agricultural or infertile land should be used for SEZ development, Balagopal (2007) shows that several SEZs were approved by state governments even when they were proposed on fertile agricultural land. This may have serious implications for food security (Aggarwal, 2006). While evidence on the impact of SEZs on manufacturing output, economic growth and exports is limited, even fewer studies discuss changes in social relations of production at the local level. Levien (2011) argues that SEZs do not absorb the labor dispossessed by land acquisition, but result in the creation of a rentier class of rural elite which engage in land speculation with adverse impacts on agricultural production and food security of the region.30 This rentier class, comprising of the local elite become the major beneficiaries of SEZs which weakens the traditional norms around land sales in the countryside (Levien, 2015b).31 In addition, these changes reduce women’s independent rights to agricultural land and increase their burden of household reproductive work (Levien, 2017). Unsurprisingly, land acquisition attempts for setting up of SEZs have met with stiff resistance from farmers in most parts of the country. Appendix A.1 provides an overview of farmer resistances compiled used archival newspaper research.

1.3 Model

This section presents a simple model to explain how acquisition of agricultural land under the SEZ policy will impact rural labor markets in India. Diverting agricultural land for SEZs generates rents for the rural elite. Using a framework of rents appro-

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30 Levien (2011) shows how local elite including political leaders and large farmers buy land belonging to small farmers in the expectation that they will benefit from developing the land or selling it when prices appreciate after SEZs become functional.

31 Agricultural land is related to farmers prestige and land markets in rural India are thin. Farmers sell land to pay off debts or arrange finances for weddings and bereavements (Levien, 2011). Since land acquisition for SEZs increases the demand for non-agricultural land use, Ghatak and Ghosh (2011) advocate for auctions of land around SEZs to ensure that the interests of farmers are safeguarded against forceful land grabs.
prio­ration sim­i­lar to (Khan and Jomo, 2000) and Acemoglu and Robinson (2006), we first dis­cuss how labor sup­ply deci­sions depend on the orig­i­nal en­dow­ment of agri­cul­tural land with small and large farmers. Next, we an­alyze the po­ten­tial of land ac­qui­sition to cre­ate land rents for the rural elite by trans­fer­ring own­ership of land from agri­cul­tural to non-agri­cul­tural use. These rents cre­ate a di­vergence be­tween the class-in­ter­ests of the predom­i­nant agrarian classes - large land­own­ing elite and small farmers (and land­less work­ers). Final­ly, we dis­cuss the op­ti­miza­tion prob­lem faced by the elite and de­rive factor prices that would pre­vail after land ac­qui­sition for SEZs.

1.3.1 The Basic Setup: Rural Class Structure

Sup­pose there are \( p \) small farmers each own­ing a small plot of land, \( l_p \). Fur­ther, there are \( e \) large farmers or elites own­ing, \( l_e \) units of land.\(^{32,33}\) By de­fi­ni­tion, the size of land owned by large farmers is larger than that owned by small farmers, \( l_e > l_p \). Assum­ing that the to­tal pop­u­lation of the vil­lage is nor­mal­ized to unity, a frac­tion, \( \gamma \) of the pop­u­la­tion com­prises of large farmers. Cor­re­spond­ing­ly, \( 1 - \gamma \) is the pro­por­tion of small farmers and we as­sume that small farmers out­num­ber the large farmers, \( 1 - \gamma > 1/2 \).

Before land ac­qui­sition for set­ting up SEZs, agri­cul­ture is the pri­mary oc­ca­sion of the rural eco­nom­y.\(^{34}\) If \( \theta \) is the pro­por­tion of rural land belong­ing to large farmers,

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\(^{32}\)Family mem­bers of small farmers work on their own farms and they do not hire any labor (Sen, 1962). In ad­di­tion, at least one mem­ber of the house­hold works as a wage work­er em­ployed by large farmers. There­fore, small farmer house­holds are net sell­ers of labor in the eco­nom­y.

\(^{33}\)Large farmers can ei­ther cul­ti­vate their land them­selves or rent it out to ten­ant farmers. Their role as own­ers of land is im­por­tant in pro­tect­ing their class in­ter­ests as net buy­ers of labor power and en­gag­ing in pro­duc­tion. The elite seek to in­crease the rents accru­ing to them as land prices in­crease after land ac­qui­sition for SEZs.

\(^{34}\)Small farmers work on their own land and as wage work­ers on the lands of the elite. There­fore, the labor sup­ply for agri­cul­tural pro­duc­tion com­prises of the entire work­ing pop­u­la­tion of the eco­nom­y. This labor abun­dant fea­ture is re­fer­red to as ‘un­lim­ited sup­plies of labor’ in the tradi­tional agri­cul­tural sector by Lewis (1954) and Ranis and Fei (1981) among oth­ers. Fur­ther, the elite also en­gage in agri­cul­tural pro­duc­tion using labor and their in­it­i­al endow­ment of land. We arg­ue that after land ac­qui­sition, large farmers (elite) can tran­si­tion away from agri­cul­ture to non-agri­cul­tural pro­duc­tion.
average land size for small farmers and large farmers is given by the following.

\[ l^p = \frac{(1 - \theta) \bar{l}}{1 - \gamma} \quad \text{and} \quad l^e = \frac{\theta \bar{l}}{\gamma} \]  

(1.1)

where \( \bar{l} \) is the average agricultural landholding size in the village given by the following

\[ \bar{l} = \frac{1}{n} \sum_{i=1}^{n} l_i \quad \text{where} \quad n = p + e \]

Every individual \( i \) belongs to one of the two mutually exclusive sets, large farmers or elites, \( r \) or small farmers, \( s \). Using their initial endowments of land, both elites and small-farmers (\( \forall i \in (r, s) \)) engage in agricultural production. Additionally, small farmers also work as wage labor to supplement their farming incomes.\(^{35}\) Any changes in landownership of both groups changes their production or labor supply choices as discussed below.

1.3.1.1 Elites

In practice, land acquisition under SEZs would lead to a transfer of agricultural land from farmers to non-farmers (industrial capital). However, post-land acquisition, large farmers or the elite themselves diversify from agricultural production to real estate development and other non-agricultural activities Levien (2011).\(^{36}\) This change in land use by large farmers creates non-agricultural employment in the economy. Since we are primarily concerned with changes in the agricultural economy, we focus on changes in landownership within the different agrarian classes. We assume that

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\(^{35}\)Sen (1975) demonstrated that small farms are more productive than large farms in India, particularly at low levels of agricultural technology (Deolalikar, 1981). Correspondingly, several studies have discussed the role of small farms in helping smooth consumption (Barrett, 1996) and providing an income-safety net to small farmers (De Janvry and Sadoulet, 2011). However, Rudra and Sen (1980) clarify that the inverse-size relationship may be a consequence of greater labor input provided by family members on subsistence farms. Therefore, small peasants in India are in a "precarious position" since they lack non-labor inputs for agricultural production. Therefore, the output produced by small farms is not sufficient to sustain their families. In fact the size of small farms can be less than 1 hectare (Figure 1.4) which makes small farmers ‘effectively landless’ (Basole and Basu, 2011). Small farmers need to augment their incomes from self-cultivation or rely on alternative sources of income like public and private wage employment.

\(^{36}\)Throughout this chapter, we use ‘large farmers’ and ‘elite’ interchangeably.
the non-agricultural employment created by the SEZ sector is a consequence of the rural elite diverting a part of their land towards non-agricultural production in the SEZ sector.

Before land acquisition, each member of the class of large farmers, \( i \in r \) engages in agricultural production using their original endowment of land, \( l^e \) and labor as inputs with total-factor productivity, \( \psi \). After land is acquired for SEZs, large farmers may divert a part of their land away from agriculture to non-agricultural production. As SEZs get established, the demand for non-agricultural land use in real estate, housing complexes and other infrastructure projects increase (Levien (2012); Reddy and Reddy (2007); Baka (2013)). However, land acquisition reduces the size of large farmer’s landholding, so the land available for non-agricultural production is less than their original endowment of land, i.e. \( l < l^e \). Further, non-agricultural production is associated with higher total factor productivity, \( \phi \) which would increase their returns on the land, i.e. \( \phi > \psi \).

We assume that introduction of industrial activity through land acquisition for SEZs is the only prerequisite for large farmers to change their land use from agricultural to non-agricultural use without any costs.\(^{37}\) Therefore, the production function for large farmers, \( i \in r \) is given by the following.

\[
Y^r = \begin{cases} 
\psi F(l_{i \in r}, n_{a}^i), & \text{if } l_{i \in r} = l^e \\
\psi F((1 - \kappa)l_{i \in r}, n_{na}^i) + \phi F(\kappa l_{i \in r}, n_{na}^i), & \text{if } l_{i \in r} = (1 - q)l^e 
\end{cases}
\]  

(1.2)

where, \( l \) is the land owned and \( n_a \) is the labor employed by each large farmer before land acquisition. We assume that the elite lose a fraction \( q \) of their land and they use a fraction \( \kappa \) of their remaining land to engage in non-agricultural production. \( n_{na} \)

\(^{37}\)This assumption implies that physical infrastructure like link roads etc. exist and the elite have the technical expertise to transition from agriculture to non-agricultural production. However, the stock of physical infrastructure may vary between regions which may determine the labor market impacts of SEZs in a given region.
is the labor employed by the elite in non-agricultural production. Finally, the elite continue to engage in agricultural production using the remaining land \((1 - \kappa)\) and demand \(n_p a\) labor. Since large landlords are diverting a part of their land away from agricultural production, we can see that labor demand in agriculture will reduce after land acquisition \(n_a > n_p a\). We assume that both agricultural and non-agricultural production is characterized by constant returns to scale. From the production functions, we can see that labor productivity in both scenarios, depends solely on the total factor productivity in each case. Therefore, in principle, non-agricultural production should hire more workers than agricultural production \((n_{na} > n_a)\) since \((\phi > \psi)\). This condition would hold even when the actual land available to large farmers has declined due to land acquisition, since after land acquisition larger farmers will diversify to non-agricultural production. Therefore, the total demand for non-agricultural labor should exceed the labor demand generated by the traditional agricultural economy.\(^{38}\)

1.3.1.2 Small Farmers

Small farmers own \(l^p\) units of land and one unit of labor. They work on their own farms and as wage workers for large farmers. Their labor supply decisions depend on the productivity of their land and their ability to retain their initial endowment of \(l^p\) units of land after land acquisition attempts.\(^{39}\) More formally, the production function of small farmers is given by the following.

---

\(^{38}\)This increase in labor demand in the SEZ sector should result in moving ‘underemployed’ labor out of agriculture. However, we discuss in Proposition 3 that agricultural workers being displaced by land acquisition are not absorbed by the non-agricultural SEZ sector.

\(^{39}\)Land acquisition may not affect all small farmers in the village. However, once customary rules of land ownership are changed through land acquisition, there is greater uncertainty associated with agricultural production which adversely affects small farmers Levien (2012). Therefore, we assume that SEZ creation will eventually dispossess all small farmers and lead to the creation of landless workers who work as wage workers in the agricultural or non-agricultural sectors developed either for the local elite or SEZ developers.
\[ Y^* = \begin{cases} \tau n_c, & \text{if } l_{i\in s} = l^p \\ 0, & \text{if } l_{i\in s} = 0 \end{cases} \quad (1.3) \]

where \( \tau \) is the average and marginal productivity of labor on family farms and \( n_c \) is the number of hours spent by workers cultivating their family farms. We assume that the small farmers lose all of their land in land acquisition for SEZs. Given the production functions of large farmers and small farmers from Equations 1.2 and 1.3 respectively, the market clearing condition defined by the labor supply curve in each case can be written as follows.

\[ 1 \geq \begin{cases} \sum n_a + N_c, & \text{where } N_c = \sum n_c, \text{ if } l_{i\in r} = l^e \\ \sum n_{na} + \sum np_a, & \text{if } l_{i\in r} \leq l^e \end{cases} \quad (1.4) \]

where Equation 1.4 assumes that after land acquisition has taken place and SEZs are constructed, the elite will transition partially from agricultural to non-agricultural production and correspondingly labor demand in agriculture will decline from \( n_a \) to \( np_a \). We now turn to calculating the rents before and after land acquisition that the elite will appropriate. However, we first impose the following restrictions on the parameters in the model.

**Assumption 1**: The productivity of labor on self-cultivated small farms (\( \tau \)) is less than the productivity of labor in all other forms of employment. This is because the small size of land owned by small farmers may not allow them to use advanced technology or greater mechanization that large farmers can employ.\(^{40}\) This assumption also allows us to create a fall back position or wage floor for workers.

**Assumption 2**: \( w_{pre}^c > w^g + \tau \). For labor markets to clear, we assume that the sum of legal minimum wages (\( w^g \)) and average productivity of small farms (\( \tau \)) is lower than

\(^{40}\)Since the traditional agricultural sector is characterized by excess labor, crowding out labor from this sector would not reduce the productivity of self-farming (Lewis (1954); Sen (1962)).
the wages in private agricultural employment in competitive labor markets before land acquisition takes place \( u_{\text{pre}}^e \). If wages paid by employers are lower than workers earnings received by self-farming and public employment guarantee, workers would choose to not work in private labor markets.

### 1.3.2 Rents

Rural labor markets in India are highly monopsonistic i.e. they are characterized by high land inequality and surplus labor. For instance, Rawal (2008) shows that the Gini coefficient of land ownership in India was around 0.76 in 2003. States like Andhra Pradesh, Tamil Nadu, Maharashtra and Karnataka have the highest incidence of landlessness in India (Rawal, 2008). Large farmers enjoy considerable political domination in these regions and in the absence of any major land redistribution after independence, this class has managed to retain their wage setting power. Consequently, the model described above defines a monopsonistic labor market characterized by few employers and many employees, \((1 - \gamma) > 1/2\). In monopsonistic labor markets, many small farmers rely on a few large farmers who have short-side power in the labor market. Bowles (2009) argues that short-side power is vested in the economic agent who is on the short-side of a non-clearing market. In this case, since \( p \) is large and \( l_p \) is very small, workers would depend heavily on wage employment from a few large employers.

Before land acquisition takes place, the elite engage in agricultural production and after land acquisition for SEZs, they divert their land towards non-agricultural use in order to benefit from the increased land rents generated by the SEZs. Given the market clearing condition from Equation 1.4, we derive the factor prices for land and labor before and after land acquisition below.
1.3.2.1 Rents from Landownership

In order to determine the rents generated by the elite before and after land acquisition we compare factor prices that prevail in this imperfect labor market where few employers control labor demand to corresponding factor prices in a perfectly competitive economy. Rents are defined as excess earnings over the amount necessary to keep the factor in its present occupation (Pareto, 1964).\footnote{The rents defined above are Paretian rents which constitute returns to factors in excess of their marginal productivity or opportunity cost. Alternatively, in the classical tradition, rents are defined as the proportion of national income accruing to owners of non-reproducible resources (Basu, 2018). See Banaji (1990) for a discussion on rents accruing to landowners in the agrarian sector.}

In competitive labor markets, the factor prices for each factor (land and labor) are determined by the value of their marginal products. Therefore, the returns to wages equals the marginal product of labor. However, in imperfect labor markets employers can use their market power to depress wages below its marginal product and returns to ownership of the means of production (land) is the difference between the total output and the total wage bill (Acemoglu and Robinson, 2006). Therefore, the returns to land are higher in imperfect markets in comparison to perfectly competitive markets. This difference in the returns to land generates rents for large farmers.

The magnitude of this rent is determined by the ability of large farmers to depress wages. There are two reasons why rents accruing to large farmers would increase after land acquisition. First, the presence of subsistence farming creates a wage floor for the elite. If they reduce wages below the marginal product of self-farming $\tau$, the labor supply would fall to zero. This is because small farmers would not be willing to work for wages lower than what they earn through self-farming. However, after small farmers are dispossessed, the elite can lower wages further as workers no longer have land to undertake self-farming. Second, SEZs allow the elite to diversify their land use from agricultural to include non-agricultural production which is associated with higher factor productivity and consequently, higher profits.
More formally, rents accruing to large farmers, $\Delta R_{pre}$, before land acquisition takes place can be defined as follows.

$$\Delta R_{pre} \equiv R_{pre}^m - R_{pre}^c$$ (1.5)

where $R_{pre}^m$ is the returns to agricultural land in monopsonistic labor markets and $R_{pre}^c$ refers to the marginal product of land. The superscript $m$ refers to monopsonistic labor markets and $c$ refers to competitive labor markets. Likewise, the rents generated for large farmers after land acquisition $\Delta R_{post}$ are defined as follows.

$$\Delta R_{post} \equiv R_{post}^m - R_{post}^c$$ (1.6)

where $R_{post}^m$ refers to the rents appropriated by large farmers due to their market power after land acquisition and $R_{post}^c$ is the marginal product of land after land acquisition.

### 1.3.2.2 Differential Rents

Using the rents described above, we can calculate the differential rents that land acquisition would create for the elite. We know that wages in competitive markets are higher than those in repressive labor markets, $w_{pre}^c > w_{pre}^m$. Correspondingly, land rents in monopsonistic (repressive) labor markets are higher than competitive markets, $R_{pre}^m > R_{pre}^c$.\(^{42}\) Using the rents before and after land acquisition, we now define differential rents, $\bar{R}$ gained by the elite if they succeed in acquiring the land owned by small farmers as follows.

$$\bar{R} \equiv \Delta R_{post} - \Delta R_{pre}$$ (1.7)

\(^{42}\)See Appendix A.2.1 for a detailed derivation of rents before and after land acquisition.
where,

\[ \Delta R_{post} = R^m_{post} - R^c_{post} \]

and,

\[ \Delta R_{pre} = R^m_{pre} - R^c_{pre} \]

Since \( \phi > \psi \) and using Assumptions 1 and 2, we can see that \( \Delta R_{post} > \Delta R_{pre} \).

Equation 1.7 presents the gains accruing to the local elite after land has been acquired for SEZs and they have transitioned away from agricultural production. Both, changes in the composition of the rural labor force and higher productivity associated with non-agricultural production contribute to the rents appropriated by the elite through land acquisition.

1.3.3 Employment and Wages after Land Acquisition

We now evaluate the level of non-agricultural employment and wages that would prevail after land acquisition. We start by first examining the non-agricultural and agricultural labor demand decisions of the elite after land acquisition.

If labor markets have to clear, we can see that \( (w^g) \) is the wage rate that would prevail after land acquisition and from Assumption 1 that \( (w^g) \) is the lowest wage that employers would pay if small farmers have no alternative to self-farming on their farms. Therefore, the wage rate in the non-agricultural and agricultural labor markets would be equal to the wage floor set by the state. \( w^{npa} = w^{na} = w^g \). However, we assume that the elite have to spend a proportion of their differential rents in order to convert their agricultural land for non-agricultural use. This could imply political lobbying for changing the designation of land use or other investments in land to make it suitable for real estate or construction, among other uses. Specifically, the elite spend a fraction \( \alpha \in [0, 1] \) of their differential rents in land improvements and
The elite determine their non-agricultural labor demand, \( n_{na}^i \) after land acquisition using the following optimization problem.

\[
\pi(n_{na}, n_{pa}) = \max_{n_{na}, n_{pa}} \left\{ n_{pa} \psi f \left( \frac{1 - L}{n_{pa}} \right) + n_{na} \phi f \left( \frac{L}{n_{na}} \right) - \alpha \bar{R} - w^g(n_{na} + n_{pa}) \right\}
\]

subject to \((1 - \alpha) \bar{R} \geq \Delta R_{pre}\)

where \( L = \kappa q_l e \) is the proportion of land that the elite divert to non-agricultural production following land acquisition and \((1 - L)\) is the proportion of land remaining under cultivation. \( n_{na} \) is the labor demand in the non-agricultural sector and \( n_{pa} \) is the new labor demand in the agricultural sector. Therefore, after the elite have succeeded in dispossessing farmers of their land, their labor demand function \( n_{na}^* \) is the total non-agricultural employment generated by the elite.\(^{43}\) This completes the formalization of the model. We now discuss the following comparative statics.\(^{44}\)

**Proposition 1:** Non-agricultural labor demand after land acquisition increases when total factor productivity associated with SEZ production increases.

This proposition implies that \( \frac{\partial n_{na}^*}{\partial \phi} > 0 \). An increase in the productivity associated with non-agricultural production would allow the elite to hire more workers and consequently increase their profits. Since the elite can keep wages depressed \( w^{na} \approx w^g \), they would hire more workers in response to an increase in productivity associated with non-agricultural production to increase their profits. Therefore, land acquisition could lead to greater employment creation if the factors affecting the productivity of production like roads, ports and electricity, among others, improve. Consequently, SEZs may have greater employment opportunities and greater political acceptability in regions characterized by better provision of physical infrastructure. This suggests

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\(^{43}\) Appendix A.2.3 provides the first order conditions and shows the derivation for equilibrium values for \( n_{na}^i \).

\(^{44}\) We present the formal proof of the propositions in Appendix A.2.4.
Proposition 2: Agricultural labor demand and agricultural wages will decline as the elite transition from agricultural to non-agricultural land use.

This proposition implies that, \( \frac{\partial n_a}{\partial l_e} > 0 \) and \( \frac{\partial w_a}{\partial l_e} > 0 \). The intuition is as follows: Large farmers are primary employers of agricultural labor and land acquisition for the creation of SEZs increases the opportunity cost of using land for agriculture. Consequently, large farmers transition into real estate development and divert land away from agriculture. Correspondingly, labor demand in agriculture declines \( \frac{\partial n_a}{\partial l_e} > 0 \). This reduction in labor demand exerts a downward pressure on agricultural wages \( \frac{\partial w_a}{\partial n_a} > 0 \). Wage floors created by public employment guarantee provide the lower bound for agricultural wages.\(^{46}\) However, imperfect implementation of public employment programs may allow monopsonistic employers to reduce wages below the legal minimum and wages would fall even when minimum wages are rising.

Proposition 3: Labor demand in the SEZ (non-agricultural) sector falls short of labor supply which creates involuntary unemployment for dispossessed workers who are forced to work in the agricultural sector.

According to Equation 1.4, after land acquisition, small farmers would rely solely on employment in the private sector for their subsistence as they would be dispossessed of their land. Therefore, each worker would like to work solely in private employment. However, the SEZ sector would not be able to absorb the labor force dispossessed by land acquisition: therefore, \( n_{na}^* < 1 \). This means that, while labor demand in

\(^{45}\)Correspondingly, we use SEZs in the more developed southern and western states of India for empirically estimating the labor market impacts of land acquisition for SEZs. In Section 1.4 we discuss the criteria for inclusion of states in this study.

\(^{46}\) Several studies estimating the labor market impact of public employment show that rural wages rise due to employment programs like the National Rural Employment Guarantee Act (NREGA) of India (Imbert and Papp (2015); Misra (2019b)).
the non-agricultural sector increases (from Proposition 1), there will still be under-provision of private employment after land acquisition relative to labor supply. There are several reasons for the slow rate of labor absorption by the SEZ sector. First, labor demand by the elite would decrease as the proportion of rents necessary for setting up SEZs $\alpha$ increases. Therefore, if the rural elite have to invest a large proportion of their differential rents on non-productive lobbying, the labor demand generated by the SEZ sector would decline. Second, labor demand generated by the SEZ sector depends on the degree of labor market imperfection in the rural economy prior to land acquisition ($\Delta R_{pre}$). If land rents accruing to the agricultural elite are large, they may not fully transition into non-agricultural production which would further depress labor demand, $n^*_na$. This mechanism explains why productivity enhancing technical improvements in agriculture are retarded when large landlords can keep wages in agriculture depressed (Lewis, 1954).

Therefore, land acquisition would not only restrict the ability of workers to augment their earnings with self-farming, but will also lead to under-provision of private employment. This would create involuntary unemployment in the rural economy. Since non-agricultural employment is determined by the marginal product of labor, the excess labor supply will be absorbed by the non-capitalist agricultural sector in the economy. Correspondingly, labor supply in the agricultural economy would increase causing a downward pressure on rural wages.

Proposition 3 has two important distributional consequences for the local economy. First, small and marginal farmers are adversely affected by involuntary land transfer on two counts (a) direct effect of land dispossession, and (b) the decline in their fall-back position in the labor market which reduces workers’ ability to bargain for higher wages. Second, land acquisition converts small farmers into landless workers which increases labor supply in the rural economy. However, labor demand in agriculture
declines due to the reduction in agricultural land in the economy. These changes in the rural labor markets exert a downward pressure on, both rural wages and consequently the incomes of small farmers and landless workers. In contrast, the large landowning elite benefit from the creation of SEZs even when they lose a part of their agricultural landholding. This is because, even when a part of landholding is acquired for SEZs, their expected profits would increase as SEZs would increase the market value of the remaining land. Consequently, the elite can then profitably transition to higher productivity non-agricultural land use.

With the theoretical framework above in mind, we next describe how we estimate the causal impact of land acquisition for SEZs on rural labor markets and discuss the possible threats to our identification strategy. We start by first describing the data used for the empirical analysis in the next section.

1.4 Data

1.4.1 Data on SEZs

To determine the impact of SEZs on the agrarian economy, data on timing of land acquisition across different districts across the country is essential. Since this information is not available in the publicly available documents on the SEZ web-portal, we determine the timing of land acquisition, using the procedure of establishing an SEZ, outlined in Section 1.2. As detailed in Section 1.2, setting up an SEZ involved three steps: (1) approval; (2) notification; and (3) operationalization. In the first stage of SEZ approval, SEZs were approved once the SEZ developer was in possession of agricultural land and the project was recommended by the state government. In the second stage of SEZ notification, SEZs were officially notified when they produced evidence of being in possession of land such as land lease documents. Specifically, SEZ developers were required to submit evidence of land acquisition like land lease to get their project officially notified.
Since this chapter investigates the impact of agricultural land being diverted for non-agricultural use, our empirical strategy includes SEZs that pass the penultimate stage in the process of setting up i.e notification. Therefore, our identification relies on correctly assigning the date of land acquisition. In over 90 percent of cases, the difference between the date of approval and notification is only a few months as the SEZ BoA met to evaluate these proposals and track their progress every month between 2006 - 2015. Therefore, we can infer that land is acquired by all notified SEZs in the year preceding the year of notification of the SEZ.

The official SEZ website is the primary source of information on SEZs on the list of notified SEZs. However, these lists do not contain the exact year of notification of each SEZ. To obtain the actual year of notification of each SEZ we rely on three different data sources. First, we follow Hyun, Ravi, et al. (2018) and Alkon (2018) and rely on the minutes of the SEZ BoA meetings which discuss each SEZ proposal and determine whether the developer is in possession of the land required for their projects. Using these minutes, we can determine the month and year of SEZ notification. However, the notification status of SEZs kept changing in response to farmer agitations, legal disputes and other irregularities found in the project. Therefore, relying simply on the date of notification from the SEZ BoA meeting minutes may not be adequate.

In order to overcome this limitation, we use a second important data source - archival research. Specifically, we use newspaper reports on farmer agitations, and other SEZ related disputes to confirm that notified SEZs continue to be in possession of agricultural land and are not de-notified over time. In addition to the more infamous examples of canceled SEZ projects in Nandigram and Singur, Shailesh (2015) shows how farmer protests in Uttar Pradesh have led to the cancellation or stalling of SEZ projects in Uttar Pradesh. The BoA also de-notified various projects between 2007 - 2012. Since the inception of SEZs in 2006, the national and regional media has
reported extensively on disputes related to land acquisition and legal battles fought for SEZ land and compensation paid to displaced farmers. Since land acquisition attempts by the state often resorted to violent and illegal methods, even international organizations like the United Nations Human Rights Watch released press statements on land acquisition drives in India. These documents allow us to confirm that over 100 SEZ projects were de-notified during the period of 2006 - 2012.

Finally, we triangulate the information obtained from the minutes of SEZ BoA meetings and archival newspaper evidence with a third crucial data source - answers to parliamentary questions tabled by members of parliament.47 Since SEZs were a highly contentious issue and land acquisition attempts by various states involved violent displacement of farmers, several discussions on the subject occurred in the Indian parliament. This was true particularly in the Rajya Sabha (Upper House) of the parliament where opposition members frequently asked questions on land acquisition, compensation paid to farmers and government policy on rehabilitation. Some of these questions dealt with the status of SEZ notification and operations. This chapter uses the official government replies to these questions to confirm the notification status of SEZs over the period between 2006 – 2012. We collect information from over 30 detailed questions related to farmer agitations, compensation paid to farmers and detailed lists of notified SEZs.

The analysis in this chapter is confined to 2006 - 2012. There are two reasons why we confine our analysis to this period. First, data on rural labor markets used in this analysis is taken from the Employment and Unemployment Rounds of the National Sample Survey Data of India (described below). The government has not released this data after the 68th Round which corresponds to the period 2011 - 2012. Therefore, we cannot observe changes in labor markets after this period. Second, all SEZs that

47https://rajyasabha.nic.in/rsnew/Questions/DateSearch.aspx
were approved after 2010 were situated in the districts that already had at least one functioning SEZ. Since our data on rural labor markets, agricultural productivity, land ownership and land use is disaggregated at the district level, additional SEZs in the same districts do not add treatment districts to our study.

Using the data collection method described above, Table 1.1 shows that 286 SEZs were notified in 87 districts in 16 states and 3 Union territories of India from 2006 - 2012. In the same period 355 SEZs were approved but 69 of these approved SEZs could not provide documented evidence of land acquisition and were not notified. From Table 1.1, we see that 72 percent of all notified SEZs were concentrated in the southern and western states of united Andhra Pradesh (present day Andhra Pradesh and Telengana), Maharashtra, Tamil Nadu, Karnataka, Kerala and Gujarat. United Andhra Pradesh alone accounts for 62 (20 percent) of all notified SEZs. Among the other states, Haryana and Uttar Pradesh have the greatest number of notified SEZs (19 and 17, respectively).

This analysis is confined to the states of Andhra Pradesh, Tamil Nadu, Kerala, Karnataka, Gujarat, Maharashtra, and Telangana. Figure 1.3 presents the distribution of SEZs in the states used in the study. These main southern and western states account for over 72 percent of all notified SEZs.48 There are several reasons for excluding the northern states from this chapter. First, most SEZs in north India were notified in the predominantly urban districts of Gautam Buddh Nagar (Noida and Greater Noida) and Gurgaon in Uttar Pradesh and Haryana, respectively which border the National Capital Region of Delhi. Since this chapter discusses the impact of SEZs on the rural economy, these districts may not contribute significantly to our analysis. Second, information on SEZs in smaller states and Union territories including Goa,

48Hyun, Ravi, et al. (2018) also use similar states in their analysis of spillovers of SEZs in India. Specifically, they include Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Kerala, Tamil Nadu, and Uttar Pradesh.
Nagaland, Pondicherry and Manipur is relatively scarce in the national newspapers and therefore, the status of land acquisition in some of these cases is ambiguous. Finally, states like West Bengal, Uttar Pradesh, Odisha and Rajasthan have witnessed the most successful farmer agitations on land acquisition and in several cases, SEZ developers have had to return some parts of the land acquired for SEZs to the farmers. The exact amount of land returned cannot be ascertained in most cases. Therefore, we exclude these states from our analysis.

1.4.2 National Sample Survey Data

Data on individual measures of employment and wages for rural and agricultural markets is taken from the nationally representative Employment and Unemployment Rounds of the National Sample Survey (NSS) of India. The NSS is conducted periodically, sometimes with a large sample and sometimes with a smaller sample. To enhance precision, we use only the rounds with larger samples (called ‘thick’ rounds). Each ‘thick’ round of data has a sample size of about 120,000 households spread between urban and rural areas. In each round, the NSS includes data over four sub-rounds in a year from July to June. The first two sub-rounds covering the period from July to December correspond to the peak (rainy) season of agriculture and the last two sub-rounds between January to June correspond to the lean (dry) season of agriculture. The main specification of this chapter uses four ‘thick’ rounds corresponding to the period from 2004-05 to 2011-12. Data from the 61st Round from July 2004 to June 2005 corresponds to the period before the SEZ Act was passed in 2005 and forms the pre-program period. The first meeting of the SEZ BoA to grant approvals to projects under the SEZ Act was held in 2006. Therefore, data from the

49 Thick rounds are quinquennial rounds of NSS surveys with a sample size of round 120,000 households. Thin rounds conducted in the intervening period have a sample size of around 40 percent of the thick round.
64th Round (July 2007 to June 2008), 66th Round (July 2009 to June 2010) and the 68th Round (July 2011 to June 2012) form the post-program period.

The Employment and Unemployment Rounds of the NSS provide information on weekly time-use and earnings for each member of the household. This allows us to calculate the daily percentage of time spent in public and private employment in the rural sector and calculate daily earnings of workers in each category. Table 1.5 shows the baseline mean values of our main labor market outcomes for all districts in our sample. In districts where SEZs were notified, around 19 percent of labor time is spent in non-agricultural employment while agricultural employment, at 41 percent; is the predominant occupation. In non-SEZ districts from the seven southern and western states percentage of labor time spent in non-agricultural and agricultural employment are 14 percent and 54 percent respectively. Further, individuals spend more than 22 percent of their labor time in household activities. Real agricultural wages in 2004 were around 4 rupees in both SEZ and non-SEZ districts which was significantly higher than non-agricultural wages (1.64 rupees and 1.1 rupees in SEZ and non-SEZ districts respectively). Appendix A.4 provides an overview of other sources of data used in this chapter and the procedure used to create variables used in the empirical estimations.

1.5 Empirical Strategy

Existing literature on the impact of India’s SEZ policy is mostly anecdotal and focuses largely on exports or non-agricultural employment in the geographical neighborhood of SEZs. There are two studies which empirically estimate causal impacts of SEZs in India using different estimation techniques. Leveraging the temporal differences in the notification of SEZs, Hyun, Ravi, et al. (2018) examine the effect of SEZs on economic activity in the immediate vicinity of an SEZ using both, an event study framework and a spatial difference-in-differences approach. Similarly, Alkon (2018)
estimates spillover effects of SEZs on infrastructure creation at the village-level (such as roads, schools and hospitals) using a control group of villages matched on observable characteristics.

There are several causal empirical studies that estimate the impact of infrastructure development and industrial zones on local economic indicators in India and China. For instance, Shenoy (2018) studies the impact of a regional growth augmenting program in the state of Uttarakhand in India using a spatial discontinuity design. Similarly, Chaurey (2017) studies a location-based tax incentive scheme in India on employment, output and capital, using a difference-in-differences design. DÉMurger et al. (2002) analyzes the impact of Chinese SEZs on provincial convergence in growth rates using location dummies. Similarly, in a study examining the economic growth effects of SEZs in China, Alder et al. (2016) employ a difference-in-differences framework. Finally, Wang (2013) examines the impact of the Chinese SEZ policy on foreign direct investments using panel data regressions and matching.

Additionally, there is also a growing literature examining place-based development policies in other domains including in the infrastructure and education sectors in India using different estimation techniques. For instance, Jagnani and Khanna (2018) examine the introduction of elite public colleges in India on local markets for primary and secondary education using an event time framework as their main identification strategy. Aggarwal (2018) and Adukia et al. (2017) examine impacts of India’s rural road construction program using a difference-in-differences and instrumental variables strategy, respectively. Finally, Ghani et al. (2014) use a non-parametric approach to estimate impacts of India’s golden quadrilateral highway construction program.

These studies suggest that the impact of industrial development projects like SEZs can be estimated by comparing outcomes in treatment districts to comparable control districts in a difference-in-differences framework. Alternatively, we can employ the
event time framework which generalizes the difference-in-differences framework by accounting for the effects of time-varying variables and by allowing the effects of the program to vary over each time period following the event (Jacobson et al., 1993). We employ both these methods to estimate the impact of land acquisition on rural labor markets.

1.5.1 Difference-in-Differences Framework

In this section, to examine the impacts of land acquisition for SEZs on rural labor markets, we use a difference-in-differences estimator exploiting temporal and geographical variation in land acquisition across districts and years for the notification of SEZs. Our identification strategy depends on assigning the timing of land acquisition for the first SEZ in a district. Archival research discussed in Section 1.2 shows that the notification of SEZs is contingent on land acquisition. Correspondingly, we can infer that land acquisition occurs in the year preceding notification.

The conventional difference-in-differences estimator requires that the treatment be assigned randomly across the population (Heckman et al., 1997). This random assignment ensures that any unobservable characteristics that may affect outcomes are controlled for as these may be present in both groups. However, the location of SEZs may be correlated with state and district level characteristics such as growth rates, levels of urbanization and level of infrastructure development. For instance, over 72 percent of all SEZs in India are located in the more developed western and southern states. This implies, notification of SEZs was not exogenous. Districts where at least one SEZ was notified (treatment districts) may be systematically different from other districts (control districts).

We follow the approach in Alder et al. (2016) and mitigate this potential endogeneity concern in two ways. First, we confine the analysis to districts in the seven states where the majority of SEZs are concentrated. Specifically, we only include the states
of Tamil Nadu, Gujarat, Maharashtra, Karnataka, Kerala, Andhra Pradesh, and Telangana in the analysis. Second, our estimation controls for time-invariant district level factors like poverty, proportion of marginalized communities (Scheduled Castes and Scheduled Tribes), agricultural wage, labor market participation and literacy rates at the district level. All district level controls are mentioned in Table 1.2. The sample for the difference-in-differences specification includes all districts in the seven states in our sample. The identifying assumption in the difference-in-differences framework is that in the absence of treatment (land acquisition for SEZs), treatment and control districts would follow a similar trend in the post-program period. We estimate the following model:

\[ Y_{idt} = \beta T_{dt} + \lambda_1 Z_d \times 1_{\{t>2006\}} + \sigma H_i + \pi_t + \mu_d + \epsilon_{idt} \]  

(1.9)

where \( Y_{idt} \) is the outcome of interest (e.g. time spent in non-agricultural employment) for individual \( i \) in district \( d \) during year \( t \).\(^{50}\) \( T_{dt} \) takes the value 1 after the first SEZ is notified in district \( d \) and 0 otherwise.\(^{51}\) \( Z_d \) contains pre-program measures of fraction scheduled caste (SC), fraction scheduled tribe (ST), fraction of literate males, fraction of literate females, male labor force participation rate, female labor force participation rate, fraction of agricultural labor, fraction of cultivators, fraction of irrigated land, population density, and population below poverty line. These time invariant district controls are interacted with a post-treatment dummy to capture trends correlated with the controls. Table 1.2 provides the mean values of all district-level controls used in this chapter. \( H_i \) are individual controls for age, years of education, indicator for female, indicator for being married, indicator for belonging to SC, ST, and other

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\(^{50}\)Since the NSS data is not annual, for outcomes examined with the NSS data, \( t = 2004, 2008, 2010, 2012 \). For outcomes examined with annual ICRISAT data, \( t = 2000 – 2012 \).

\(^{51}\)Since the timing of notification of the first SEZ differs across districts, for each district \( post \) will take the value 1 in different years.
backward caste (OBC) categories, indicator being a muslim, and household size. Table 1.3 provides mean values for individual level controls used in this chapter. \( \pi_t \) capture survey year fixed effects and \( \mu_d \) are district fixed effects. District fixed effects absorb district specific time-invariant heterogeneity. All estimates are adjusted for correlation over time within districts by clustering at the district level.

1.5.2 Event Time Framework

The difference-in-differences framework described above compares districts where SEZs were notified to districts where SEZs were never notified. However, districts where SEZs were notified may vary significantly from other districts on several factors including the level of urbanization, poverty rates and agricultural labor force participation. Therefore, we use an additional estimation strategy - event time framework similar to Jacobson et al. (1993) and Bailey and Goodman-Bacon (2015), which requires fewer assumptions than a traditional difference-in-differences design. Further, the event time framework allows us to estimate the short-term and medium-run impacts of land acquisition separately, which are useful in analyzing the systemic changes in agricultural land and labor markets which land acquisition for SEZs may trigger.

We exploit the staggered notification of SEZs from 2006 - 2012 in an event time framework by using within district changes in local labor markets that correspond to the year of land acquisition in each district. The identifying assumption of the event time framework is that the timing of land acquisition is uncorrelated with other determinants of changes in rural labor markets. The sample for the event time framework includes only notified districts in the seven states in our sample. Specifically, we estimate the following model.

\[
Y_{idt} = \sum_{\tau = -n}^{-1} \beta_{\tau} 1(t - T_d^* = \tau) + \sum_{\tau = 0}^{m} \beta_{\tau} 1(t - T_d^* = \tau) + \mu_d + \pi_t + \epsilon_{idt} \quad (1.10)
\]
where $Y_{idt}$ is the outcome variable (e.g. time spent in non-agricultural employment) for individual $i$ in district $d$ in time $t$. Estimates for the effect of land acquisition on the agrarian economy are captured by the coefficients on the time dummies $1(t - T_d^* = \tau)$, which are equal to 1 when the observation is $\tau$ periods away from $T_d^*$, the year when the first SEZ was notified in district $d$ and ($\tau = -1$) is omitted.\(^{52}\)

The first set of coefficients with $\tau < 0$ capture the pre-treatment period and the second set of coefficients, with $\tau \geq 0$ capture the post-treatment period. These estimates are intent-to-treat effects of land acquisition relative to the time period before land acquisition took place in these districts. For instance, if a district $d$ got its first SEZ notified in 2009, then it must have completed land acquisition in 2008. Correspondingly, the period between 2006 - 2007 capture the pre-treatment period, $\tau < 0$ and 2009 - 2012 capture the post-treatment period, $\tau \geq 0$. $\mu_d$ indicate district-level fixed effects and $\pi_t$ capture survey year fixed effects. Finally, estimates are adjusted for correlation over time within districts by clustering at the district level, $\epsilon_{idt}$.

We restrict our sample to districts where at least one SEZ was notified in the seven states in our analysis in order to compare changes in agrarian labor markets in similar districts. Using district fixed effects, we control for time-invariant unobserved characteristics that affect local labor markets and may also be correlated with the presence of an SEZ. Year fixed effects control for year specific unobservable factors common across all districts. This allows us to identify the impact of land acquisition for SEZs on the agrarian economy by estimating within-district changes in labor market and agricultural productivity for each time period after land acquisition occurred for the first SEZ in that district. This event time framework relies on fewer assumptions than

\(^{52}\)Since land acquisition must be completed before SEZs are notified, we expect to observe effects of land acquisition on rural labor markets immediately after notification of the SEZ. This implies that the causal impact of land acquisition is identified by changes in rural labor market outcomes in the first observable round of data after notification ($\tau = 0$). Therefore, ($\tau = -1$) is the natural baseline to capture these effects.
a traditional difference-in-differences design and has two distinct advantages. First, we do not compare districts where SEZs were never notified to districts where SEZs were notified since these are likely to be very different from each other. Instead, the sample is restricted to only those districts where SEZs were notified. Second, unlike in traditional difference-in-differences models where treatment happens in a specific year, in this study, we exploit the staggered rollout of SEZs in different years. This allows us to study the impact of SEZs without conflating impacts with changes in any one particular treatment year. Thus, there is no longer just one particular year that impacts all treatment districts which may be correlated with other year-specific shocks.\(^{53}\)

With the inclusion of district and year specific fixed effects in the event time framework, there are two challenges that remain. The first concern to the identification strategy is that the location and timing of land acquisition for SEZs may be correlated with unobservable and observable characteristics of the district like higher growth rate, greater employment opportunities or better road connectivity, among other factors. That is, timing of SEZs could be correlated with pre-existing trends in the local labor market. For instance, it is possible that rapid industrialization is driving both, the location of SEZs and changes in agricultural markets. Alternatively, it is also possible that SEZs are introduced in areas where a larger fraction of the labor force is employed in non-agricultural work. To address this concern, we confine our sample to the major southern and western states of the country which are comparable in economic characteristics like GDP growth, population growth and the degree of industrialization. Further, we exclude major cities like Mumbai, Chennai and Bangalore from our analysis as these cities are predominantly urban and may not be comparable to other districts in the sample. Finally, if the location and timing

\(^{53}\)Year specific shocks like droughts may impact agricultural labor markets in a region during a given year.
of SEZs was correlated with district specific factors which were also driving changes in labor markets, we would expect these trends to appear in the form of pre-existing trends. For each outcome in our analysis in Section 1.6 below, we examine pre-existing trends.

1.6 Results

1.6.1 Pre-Period Trends in Rural Labor Market Outcomes

A concern with the difference-in-differences estimation strategies described in Section 1.5 is that SEZ districts may have been witnessing labor market changes in the rural economy even before land acquisition for SEZs took place. Further, SEZs may have developed in these districts precisely because these districts witnessed a decline in self-farming, which created a work force available for non-agricultural work. In order to address this concern, we investigate whether the trend in the main outcome variables in treated districts was different from control districts in the years shortly pre-dating the reform. Using two thick rounds, the 55th Round of the NSS corresponding to 1999 - 2000 and the 61st Round corresponding to 2004 - 2005, we check for pre-program trends in labor market outcomes in SEZ districts, before the program was implemented. Since SEZs were notified after 2006, this data reports labor market dynamics prior to treatment. We assign a program dummy which takes the value 1 for treatment districts and use data from 2004 - 2005 as the ‘post’ period for this placebo test. In these estimations all district and individual level controls are included along-with district and year fixed effects.

Table 1.6 shows the results of the difference-in-differences specification described in Equation 1.9 using data from the 55th and 61st Rounds of NSS data from the period before the SEZ policy was implemented. This placebo treatment tests for any pre-existing trends in the treatment districts. Column (1) presents the results for non-agricultural casual work. Column (2) reports the coefficient for non-agricultural earn-
ings and column (3) shows changes in self-farming. Column (4) corresponds to casual agricultural work and column (5) corresponds to agricultural daily casual wages. As expected, there is no effect of the placebo treatment for any of the outcome variables. These results show that even though district-level factors like the proportion of labor force engaged in agriculture or the percentage agricultural land irrigated may affect the location of an SEZ, we can control for these factors using district-level time-invariant controls interacted with the ‘post’ dummy.

1.6.2 Effect of Land Acquisition on Rural Labor Market Outcomes

In this section, we present our main findings on the causal impact of land acquisition for SEZs on rural labor market outcomes. We present impacts on: (1) non-agricultural casual labor; (2) real non-agricultural casual wages; (3) self-farming; (4) agricultural casual labor; and (5) agricultural earnings and wage rates.

1.6.2.1 Changes in Non-Agricultural Casual Labor

we turn to the difference-in-differences estimation for changes in time spent in non-agricultural employment using Equation 1.9 which are reported in Table 1.7. We report the results for three specifications in columns (1) - (3). All estimates include survey year and district fixed effects. In addition to survey year and district fixed effects, results in column (2) control for individual characteristics mentioned in Table 1.3 and results in column (3) include individual controls and district level characteristics interacted with a dummy for the post period. Column (3) is our preferred specification. From Table 1.7, we find that relative to control districts from the seven states of western and southern India, the time spent in non-agricultural employment in treatment districts increases by 0.5 percentage points. From Table 1.5, we see that at baseline, workers in SEZ districts spent around 4 percent of their labor time in non-agricultural employment which translates to 0.28 workdays per week (15 days in a year). An increase of 0.5 percentage points corresponds to an increase of 1.8
work days in a year. This suggests negligible employment opportunities are created for workers in the non-agricultural sector immediately following land acquisition as construction on SEZs begin. This result is robust to all specifications presented in Table 1.7.

Next, using Equation 1.10 we estimate the impact of land acquisition for SEZs on non-agricultural casual labor in the event time framework. Land acquisition for SEZs would generate greater construction activity which should provide greater employment opportunities for rural workers. As the construction of SEZs begin, the demand for casual labor required for the construction of large industrial complexes increases in the rural economy. Figure 1.6 presents the estimates for changes in the time spent in non-agricultural casual labor using the event time framework. We find that the coefficients for post-program rounds are positive and statistically significant. Land acquisition for setting up SEZs increased time spent in non-agricultural casual labor by around 0.13 percentage points in the short run ($\tau = 0$). In the medium-run, the time spent in non-agricultural casual employment rises to 0.3 percentage points ($\tau = 2$). These changes are significant at the 95 percent confidence interval.

The impact of land acquisition for setting up of SEZs is positive on creating non-agricultural employment at the intensive margin as shown by Proposition 1 of our theoretical framework presented in Section 1.3. This result is consistent with national level analysis of rural labor markets in India. For instance Mehrotra et al. (2014) find that an increase in non-farm employment in the construction sector more than doubled between 2004 and 2010. However, as suggested by Proposition 3, the increase in non-agricultural employment falls short of the labor supply dispossessed by land acquisition. The marginal impact of land acquisition on non-agricultural employment

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54The short run refers to a period of one year from the date of SEZ approval and the medium-run refers to the period of up to two years from the date of SEZ approval.
is consistent with the evidence from other infrastructure programs in rural India. For instance, Asher and Novosad (2016) finds that rural road building programs fail to create substantial non-farm employment growth at the village-level. Therefore, the marginal impact of land acquisition on non-farm employment in rural labor markets do not represent structural transformation in the Indian economy. In fact, Jatav and Sen (2013) show that education, gender and age remain barriers to workers’ participation in non-agricultural employment.

1.6.2.2 Non-Agricultural Earnings

We next turn to impacts of land acquisition on real non-agricultural casual wages. Table 1.8 reports the difference-in-differences estimates for real non-agricultural wages. We find that real non-agricultural wages increase by 0.41 rupees per day from the baseline value of 5.3 rupees per day. These results are significant at the 95 percent confidence level. Correspondingly, Figure 1.7 shows the results using the event time framework. We see that real non-agricultural wages increase by 1.4 rupees per day in the short-run and 1.5 rupees per day in the medium-run, respectively. The short-term and medium-run impact of land acquisition on non-agricultural wages are similar in magnitude which implies that SEZs do not create spillover demand for non-agricultural labor in the economy.

Changes in real non-agricultural casual wages reflect increased demand for non-agricultural employment created by SEZs. As agricultural land is diverted towards creating manufacturing and residential units, jobs are created primarily in the construction sector which increases time spent in non-agricultural labor and wages. However, these changes are primarily witnessed in the demand for casual labor and not permanent wage employment in the non-agricultural sector.\textsuperscript{55} Several studies have

\textsuperscript{55}Hyun, Ravi, et al. (2018) show that wage employment in the formal sector also increases after SEZs become operational.
discussed the trend towards increasing ‘informalization’ of non-farm employment in India. For instance, Sundaram (2008) finds that between 14 and 27 million workers in the non-farm sector lack social security, retirement benefits and job security.

Similarly, SEZs do not create long-term and high-paying employment opportunities for the local economy. Our findings are consistent with evidence on non-farm employment and wages in rural India. Lanjouw and Murgai (2009) show that non-agricultural employment in rural India predominantly consists of low-paying casual labor jobs which do not increase consumption levels of workers and have no impact on rural poverty. The impact of SEZs on non-agricultural earnings also suggest that wages in the sector do not increase the standard of living for workers in the rural economy.

Hyun, Ravi, et al. (2018) find that after SEZs get operational they create formal sector employment. However, in our study focusing on casual labor markets, we find that the employment generation potential of SEZs for unskilled workers is limited. This is not surprising as Banerjee-Guha (2008) argues that over 62 percent of SEZs produce IT-enabled services and only five percent of SEZs produce manufactured outputs. This implies that the ability of SEZs to generate low-skill employment opportunities at a large scale, is limited. Therefore, SEZs would simply reorganize the space-relations in capitalist production by creating ‘enclaves’ for capitalist accumulation. Several studies suggest that the unskilled poor labor force relies on short-term rural to urban migration (Coffey et al., 2011), low paying agricultural employment (Lanjouw and Murgai, 2009) or other coping mechanisms in response to the prevailing agrarian distress in India.

Correspondingly, the employment growth in the non-farm sector can be explained in terms of a ‘push’ out from agriculture, rather than the ‘pull’ of the SEZ sector. This is contrary to claims made by SEZ developers and the state governments. For instance,
in several cases, the state government acquired land from farmers on the condition that SEZs would create permanent employment opportunities for dispossessed families ((Kumar, 2006); (Jadhav, 2018)).

1.6.2.3 Self-Farming

We next turn to examining impacts on self-farming. The estimates for time-spent in self-farming using the difference-in-differences estimation are presented in Table 1.9. Using the preferred specification which controls for individual and district-level characteristics, column (3) shows that self-farming declines by 3 percentage points from the baseline mean of 23 percent after land acquisition for setting up of SEZs. This translates into a decline of around 11 days in a year.

Similar to the difference-in-differences specification, Figure 1.8 presents the estimates for proportion of labor time spent in self-farming after land acquisition for SEZs. Using the event time framework, we find that in the short-run, time spent in self-farming falls by 2 percentage points. This corresponds to the direct effect of land acquisition as farmers get dispossessed due to land acquisition for SEZs. Since SEZs require the transfer of agricultural land from farmers, the proportion of land holders in the rural economy would decline and consequently, there would be a decrease in labor time allocated to self-employment in agriculture. The impact of land acquisition for SEZs is not confined to the short run as we find that labor time allocated to self-farming continues to decline by 5 percentage points in the medium-run. This medium-run decline in time spent in self-farming suggests that the process of dispossession of farmers continues even after SEZs are created.

The legal framework created to support land acquisition changes the traditional rules governing the sale of agricultural land. While land acquisition for SEZs entail a one-time transfer of land from agricultural to non-agricultural use, it weakens customary practices and institutions around land markets in the Indian countryside. Once force-
ful acquisition of agricultural land is legitimized by state policy, small and marginal farmers become vulnerable to land grabs by large farmers, local politicians or other powerful social groups. This alters their perceptions about the security of their land and investments for two reasons.

First, by dispossessing small farmers, land acquisition increases the proportion of marginal and small farmers in the economy who do not own enough land to undertake subsistence agriculture and are net suppliers of labor in the economy. As can be seen from Figure 1.4, SEZs districts witness an increase in the proportion of rural land held by marginal and small farmers between 2005 and 2010. Marginal and small landholdings increase by 7 percentage points. The corresponding increase in the proportion of small and marginal land in non-SEZ districts from these states is 3 percentage points during the same time period. The increase in the proportion of marginal and small landholdings in SEZ notified districts would increase the supply of agricultural labor in the countryside as output on small farms is not enough to provide for the subsistence needs of farmers. This increased class of small and marginal farmers would rely on private wage employment in agriculture to augment their incomes.

Second, land acquisition also reduces landholdings of large and medium farmers who are primary employers of agricultural labor. The proportion of agricultural land held in medium and large farms declines by around 6 percentage points in SEZ districts (Figure 1.4). The corresponding decline in non-SEZ districts is around 3 percentage points. Further, SEZs create expectations for greater non-agricultural land use in setting up residential facilities and shopping centers (Levien, 2013). This provides large landowners with an opportunity to diversify agricultural land for non-agricultural use.

56Landholdings smaller than 1 hectare are classified as marginal landholding between 1 hectare and 2 hectares are classified as small. Landholdings between 2 hectares and 10 hectares are medium and landholdings greater than 10 hectares are classified as large.
as SEZs increase the opportunity of cost of using rural land for agricultural purposes. With industrial activity in the countryside, there are greater opportunities for non-agricultural land use. The net impact of both these changes is a reduction in labor demand. Therefore, land acquisition creates a situation of excess labor supply and shrinking labor demand in the agricultural economy. These changes can extend up to the medium-run and would impact agricultural earnings and well-being of agricultural workers even after the initial round of land acquisition for SEZs.

1.6.2.4 Changes in Casual Agricultural Labor

Table 1.10 estimates the results for the difference-in-differences specification. We find that in our preferred specification of column (3), labor time in agricultural employment increases by 2 percentage points from the baseline value of 18 percent which is statistically significant. This translates into an increase of 7.2 workdays in a year. Figure 1.9 shows the results for changes in casual agricultural labor in SEZ districts using the event time framework. We find that in the short-run land acquisition increases labor time spent in casual agricultural labor by around 4 percentage points and in the medium-run, labor time in casual agricultural employment increases to 6 percentage points.

An increase in the proportion of time devoted to casual agricultural labor after land acquisition for SEZs is counter-intuitive. Contrary to claims that SEZs would create non-agricultural employment which would crowd-out labor from agriculture, we find that agricultural labor force participation actually increases. This paradoxical result underscores the developmental challenge of ‘underemployment’ in agriculture. Lanjouw and Murgai (2009) argue that agricultural employment provides subsistence income for the uneducated, poor and low caste sections of the labor force. Similarly, Abraham (2009) and Jatav and Sen (2013) show that the crisis of stagnant productivity, price instability and low incomes is increasing the distress of agrarian families.
In this context, increasing labor time spent in agriculture is particularly alarming as the influx of workers into this sector would depress wages and incomes further.

There may be two causes for this paradoxical result. First, land acquisition leads to a decline in landholdings and labor time spent in self-farming as discussed above. As land acquisition dispossesses small and medium farmers there is an increase in the supply of casual landless workers in the rural economy. Second, creation of non-agricultural employment in the SEZ sector has not been robust, particularly for unskilled agricultural workers. The medium-run increase in time spent in casual agricultural labor suggests that the small and marginal farmers dispossessed by SEZs have not been absorbed by wage employment in the non-agricultural sector after the advent of SEZs.

Agricultural labor is the predominant occupation in the states used in this study. In states like Maharashtra, Andhra Pradesh, Gujarat and Karnataka the proportion of rural population engaged in agriculture is above 70 percent while the national average is 64 percent in 2011-2012. At 77 percent, Maharashtra has the highest proportion of rural labor force in agriculture (National Sample Survey Office, 2013). In this scenario, an increase in labor time spent in agriculture would have adverse impacts on agrarian incomes of workers in this sector. Therefore, SEZs may adversely impact the rural economy by increasing the labor supply in this sector. The agricultural sector provides workers with subsistence employment as it absorbs excess labor in the rural economy. Therefore, the influx of landless workers dispossessed by land acquisition and the sluggish rate of employment creation in the SEZ sector would exert a downward pressure on agricultural incomes.

1.6.2.5 Agricultural Earnings and Wage Rates

Next, we discuss the impact of land acquisition for SEZs on agricultural earnings and wage rates. From the difference-in-differences specification in Table 1.11 we
find no change in agricultural earnings in treatment districts after land acquisition. Similar to the increase in agricultural labor, this is an important result to explain the dynamics of agricultural labor markets in India. Similarly, Figure 1.10 shows the event time estimation results for real daily agricultural earnings in districts where land was acquired for SEZs. We find that there is no statistically significant change in real daily agricultural earnings. As suggested by Proposition 2 of Section 1.3, labor demand in agriculture and consequently, earnings in agricultural employment remain unchanged. As agricultural earnings remain constant, we examine district level agricultural wage rates below.

Figure 1.5 presents the trends in district-level real agricultural wages in SEZ and non-SEZ districts used in this study. We find that the wage rate of agricultural employment is increasing in both SEZ and non-SEZ districts between 2005 - 2010. The increase in agricultural wage rate can be attributed to the National Employment Guarantee Act of 2005 which imposes a wage floor on private employment. The increase in labor supply created by land acquisition explains why earnings may not be rising in SEZ districts.

However, this increase in the wage rate does not translate into actual earnings by agricultural labor as there is excess labor supply in these districts as seen by the Table 1.10. This involuntary employment allows employers to keep their total wage bill constant even when the agricultural wage rate is high. This is a paradoxical result as it suggests that earnings decline even when the exogenously fixed wage rate increases. The crisis in Indian agriculture is manifested by stagnant productivity, low rates of technological adoption and high price volatility faced by farmers (Abraham, 2009).

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57 The National Employment Guarantee Act (NREGA) of 2005 provides 100 days of employment to every rural household at the legal minimum wage. This provides a wage floor for private employers as workers would not be willing to work for wages lower than those paid by NREGA. This Act was implemented in a phased manner between 2006 - 2008 in all rural areas of the country including the districts in our sample. See Misra (2019b) for an overview of the impact of NREGA on rural wages.
In this context, land acquisition for SEZs and the slow rate of employment creation in the SEZ sector ‘push’ workers into agricultural employment which depresses incomes in this sector.

### 1.6.2.6 Robustness

We test the robustness of the difference-in-differences estimation strategy in three ways. First, we construct a district-level panel to re-estimate the difference-in-differences model since our identification rests on district-level variation in the timing of SEZ notification. The results are presented in Table A.1. Second, we estimate Equation 1.9 in a propensity score matching estimation framework in Appendix A.3.2. Finally, we re-estimate the difference-in-differences model by dropping one state at a time, since it is possible that a single outlier is driving the results. We present further details in Appendix A.3.3. We find that our main difference-in-differences results remain robust to all three alternative specifications.

We also test the robustness of our event time estimates. The main concern with the event time identification strategy is that the location and timing of land acquisitions for SEZs may be correlated with unobservable district level characteristics. However, for all outcomes examined in Section 1.6.2, we find no evidence of preexisting trends. For instance, if rapid industrialization in a district was driving land acquisition and changes in rural labor market outcomes, we would expect to see evidence of a positive pre-trend. In Figures 1.6 - 1.10, we find no existence of a positive pre-trend. In other robustness checks for the event time framework, we test the robustness of our estimates by including individual specific controls reported in Table 1.3 and district-specific linear time trends. The results are presented in Figure 1.11. Our results are robust to including these controls in all cases except time spent in non-agricultural casual labor and earnings in the non-agricultural sector. Since land acquisition for SEZs had a weak impact on non-agricultural employment generated in the rural...
economy (Table A.3), it is not surprising that after controlling for education, gender and caste we find that SEZs do not increase non-agricultural employment and earnings in the rural economy.

1.7 Mechanisms

Our results show that land acquisition for SEZs increases labor time spent in non-agricultural casual labor and reduces labor time spent in self-farming. Further, we find that agricultural wages do not increase in SEZ districts even as wage rates are rising since there is an increase in agricultural labor supply created by dispossession of small farmers. In this section, we discuss the possible mechanisms for these changes in rural labor markets.

1.7.1 Agricultural Productivity

One possible explanation for changes in labor time spent in agricultural employment is changes in agricultural productivity. If SEZs lead to an increase in agricultural productivity, we would expect an increase in labor demand in agriculture and correspondingly self-farming on small farms would decline. Land acquisition for SEZs can have a positive impact on agricultural productivity if relatively less fertile agricultural land is used for the setting up of manufacturing units and the land remaining under agriculture is relatively more fertile or well-irrigated.

To test if this mechanism explains labor market changes in districts where land was acquired for SEZs, we estimate impacts on agricultural productivity in Figure 1.12 using Equation 1.10. Table 1.4 shows the mean productivity of crops in SEZ districts before 2006. The average productivity of food and cash crops was 4.57 tonnes per hectare and 1.76 tonnes per hectare respectively.58 Figure 1.12a estimates changes in

58 Food crops comprise of rice, wheat, pulses and cereals and cash crops comprise of oil, cotton, sugarcane and soybean.
agricultural productivity for the major food crops of the region. We find that there is no statistically significant impact of SEZs on the productivity of food crops. Further, Figure 1.12b shows changes in agricultural productivity for the major cash crops of the region. We find that there is no impact of SEZs on the productivity of cash crops as well. Therefore, we conclude that labor market changes after SEZs cannot be attributed to changes in agricultural productivity.\(^{59}\)

### 1.7.2 Land Use

We next examine land use patterns. Land use patterns in the agrarian economy may change for two reasons. First, as SEZs are developed on agricultural land, large landlords or rentier classes may transition from being agriculture to a pre-capitalist class with diversified investments. For instance, many SEZ projects have led to large landlords using agricultural land under their control to build housing colonies near SEZ complexes (Levien, 2011). In some cases, large landlords would anticipate increases in future land rates and decide to sell their land in the future.

Second, as land markets develop after the state relaxes regulations surrounding land sales, small farmers become vulnerable to involuntary land grabs in the future either by the newly emerging class of rural capital or by SEZ developers. Agricultural landownership and sales are governed by traditional norms and customs (Levien, 2015a). Basu (2019) argues that land markets are thin and sale of agricultural land takes place only when farmers are in distress. However, land acquisition for SEZs weakens these traditional ties of farmers with agricultural land. Levien (2011) shows that land sales increase significantly after SEZs were established in India. In this scenario, farmers would be reluctant to invest in agricultural production as the uncertainty related to agriculture increases. Several case studies find evidence of land

\(^{59}\)In their study on agricultural wage formation for rice farmers in Bangladesh, Boyce, Ravallion, et al. (1991) find that nominal wages are sticky and do not respond to changes in productivity and output prices. Therefore we cannot expect wages to increase in the absence of any productivity improvements as shown by Figure 1.12.
grabs by SEZs developers. For instance, Sen (2019) show that the provisions of the SEZ Act allowed private developers to grab large tracts of land from farmers to set up ancillary facilities and residential complexes around SEZs.

Both these factors would result in a decline in the proportion of agricultural land under cultivation. Figure 1.13 shows changes in land use patterns estimated using the event time framework. As suggested by the discussion above, the proportion of agricultural land cultivated declines by around 5 percentage points in the medium-run (Figure 1.13a). Similarly, the proportion of agricultural land left fallow increases by around 4 percentage points in the medium-run (Figure 1.13b). Therefore, the impact of SEZs on agricultural labor markets is not confined to a one-time transfer of agricultural land from farmers for setting up of manufacturing units. In fact, land acquisition for SEZs leads to changes in the medium-run in land use patterns in the countryside. As farmers anticipate further changes in landownership due to changes in factor prices for land and labor, agricultural land use declines.

This medium-run decline in agricultural land use is important as it suggests that the indirect impact of SEZs on agricultural landownership is significant and adversely impacts the welfare of small farmers and workers in the agricultural sector. Therefore, changes in land use patterns may explain the reduction in time spent in self-farming and an increase in the supply of agricultural labor. A decline in the proportion of agricultural land under cultivation suggests that farmers may be reluctant to undertake productive investments on their land as SEZs may provide them with opportunities to diversify away from agriculture. This increases the labor time spent in both agricultural and non-agricultural sectors.

These findings corroborate evidence from field based studies that show the large scale conversion of agricultural land for non-agricultural purpose has accelerated after SEZs. Ghatak and Mookherjee (2014) show that land acquisition may lead to under
investment in agricultural land by tenant farmers under sharecropping arrangements when they fear that landlords may divert land away from agricultural production. With more land being allotted for SEZs, townships and industries, land under cultivation has reduced significantly (Goswami, 2008). Further, we also empirically test the findings from fieldwork based political economy literature which show that land markets created by SEZs lead to the creation of a rural rentier class who profits from buying agricultural land from farmers and developing real estate ((Levien, 2011); (Levien, 2015b)).

1.8 Conclusion
Special Economic Zones (SEZs) established on agricultural land have the potential to benefit the rural economy by creating non-agricultural employment and shifting labor away from agriculture. In India, where over 64 percent of the rural economy works in agriculture, crowding-out of labor away from agriculture has the potential to raise rural wages and living standards. Using nationally representative sample survey data on employment and a new data set compiled using archival research to determine the date of land acquisition for SEZs, this chapter provides the first empirical estimates of the impact of India’s SEZ policy on rural labor markets in districts where land is acquired.

This chapter finds that land acquisition for SEZs led to a significant decline in labor time devoted to self-farming and an increase in labor time spent as casual wage workers in the agricultural sector. Contrary to expectations of a structural transformation, the labor demand generated by the non-agricultural SEZ sector is marginal and not sufficient to pull workers out of the traditional agricultural sector characterized by low productivity and underemployment. Further, we argue that land acquisition for SEZs has an adverse impact on income distribution in the rural economy. On the one hand, real agricultural earnings remain stagnant, and on the other hand, in-
Structure development following the creation of SEZs in the region increases the opportunity cost of using land for agricultural production for the elite. This creates opportunities for large farmers to diversify land away from agricultural production. Consequently, wealth inequality in the countryside worsens after SEZs.

Therefore, our findings suggest that SEZs adversely impact rural labor markets and have detrimental effects on agricultural incomes. This is particularly surprising since wage rates for agricultural labor are increasing over the time period in our study, 2006 - 2012. Consequently, farmers dispossessed from their land do not benefit from increased employment creation and higher incomes generated by the SEZ sector. This explains farmer resistance to land acquisition for SEZs and their reluctance to part with their land which provided them with the means for subsistence production. Further, SEZs cannot be considered as a one-time transfer of agricultural land for non-agricultural use since we find that land acquisition continues to impact rural labor markets even in the medium-run. This is because land acquisition drives for SEZs and the expected increase in land values weaken traditional rules governing land sales in the agrarian economy. This leaves small farmers vulnerable to land grabs by the local elite in the future. Declining proportions of agricultural land used for cultivation and an increase in the proportion of agricultural land left uncultivated (fallow) suggest that land acquisition creates uncertainty over land ownership and security. Future research on rural labor markets can explore the impact of uncertainty created by land acquisition and its impact on distress sales of agricultural land, production decisions and labor demand.

Since programs like SEZs are not successful in reducing the labor force engaged in agriculture, development policy should focus on measures to improve agricultural productivity and incomes as suggested by Byerlee et al. (2009). The neglect of the agricultural sector has contributed to disproportionate concentration of poverty in
rural areas (75 percent) in India. Policies like employment guarantee for rural workers and, capital investment in agriculture should be prioritized at a time when economic disparities in the countryside are widening at an alarming rate. This research suggests that land acquisition for SEZs may aggravate the distress in the agrarian economy by dispossessing farmers without creating non-farm employment and diverting land away from agricultural production. Future research should focus on addressing the bottlenecks to structural transformation as a means to improving the standard of living for over 300 million small and marginal farmers in India.
Figure 1.1: Procedure for Setting up an SEZ

Note: This figure shows the procedure for setting up an SEZ based on the procedure laid down in the SEZ Act, 2005 and the minutes of the meetings conducted by the Board of Approval (BoA) of the Ministry of Commerce and Industry, Government of India.
Figure 1.2: Districts where SEZs were notified between 2006 - 2012

Note: This map shows the location of districts where SEZs were notified between 2006 - 2012 throughout India. This study uses SEZ districts from the states of Gujarat, Maharashtra, Andhra Pradesh, Karnataka, Kerala, Telangana and Tamil Nadu.
Figure 1.3: Number of SEZs Notified between 2006 - 2012 in States included in our Sample

Note: This figure shows the number of notified SEZs between 2006 - 2012. This study uses SEZ districts from the states of Gujarat, Maharashtra, Andhra Pradesh, Karnataka, Kerala, Telangana and Tamil Nadu.
Figure 1.4: Distribution of Landownership in SEZ Notified Districts vs. Non-SEZ Districts

Note: This figure shows changes in the proportion of agricultural land held by each of the four categories of landholdings - marginal (less than 1 hectares), small (between 1-2 hectares), medium (2-10 hectares) and large (above 10 hectares). Data from 2005 presents pre-SEZ land distribution and 2010 data corresponds to the post-SEZ land distribution. Data on land distribution is taken from ICRISAT.
Figure 1.5: Real Daily Agricultural Wage Rates

Note: This figure shows the trend in real daily agricultural wage rates using the ICRISAT data. Trends are shown separately for districts where at least one SEZ was notified and other districts.
Figure 1.6: Proportion of Time Spent in Non-Agricultural Casual Labor

Note: Sample includes a repeated cross-section of individuals between 18-60 years of age across 4 NSS survey rounds (2004, 2007, 2010 and 2012). The figure presents the effects of land acquisition for SEZs on proportion of time spent in non-agricultural employment. These estimates are intent-to-treat effects of land acquisition for SEZs relative to the round before land acquisition (\(\tau = -1\)). For instance, if land acquisition in a district occurred in 2009, the NSS surveys conducted in 2004, 2007, 2010, and 2012 are denoted as \(\tau = -2, \tau = -1, \tau = 0\) and \(\tau = 1\), respectively. Estimates include district and year (round) fixed effects. 95% confidence interval is presented, standard errors are clustered at the district level.
Figure 1.7: Real Daily Non-Agricultural Earnings

Note: Sample includes a repeated cross-section of individuals between 18-60 years of age across 4 NSS survey rounds (2004, 2007, 2010 and 2012). The figure presents the effects of land acquisition for SEZs on real daily non-agricultural earnings in rupees. These estimates are intent-to-treat effects of land acquisition for SEZs relative to the round before land acquisition ($\tau = -1$). For instance, if land acquisition in a district occurred in 2009, the NSS surveys conducted in 2004, 2007, 2010, and 2012 are denoted as $\tau = -2$, $\tau = -1$, $\tau = 0$ and $\tau = 1$, respectively. Estimates include district and year (round) fixed effects. 95% confidence interval is presented, standard errors are clustered at the district level.
Figure 1.8: Proportion of Time Spent in Self-Farming

Note: Sample includes a repeated cross-section of individuals between 18-60 years of age across 4 NSS survey rounds (2004, 2007, 2010 and 2012). The figure presents the effects of land acquisition for SEZs on proportion of time spent in self-farming. These estimates are intent-to-treat effects of land acquisition for SEZs relative to the round before land acquisition ($\tau = -1$). For instance, if land acquisition in a district occurred in 2009, the NSS surveys conducted in 2004, 2007, 2010, and 2012 are denoted as $\tau = -2$, $\tau = -1$, $\tau = 0$ and $\tau = 1$, respectively. Estimates include district and year (round) fixed effects. 95% confidence interval is presented, standard errors are clustered at the district level.
Figure 1.9: Proportion of Time Spent in Agricultural Casual Labor

Note: Sample includes a repeated cross-section of individuals between 18-60 years of age across 4 NSS survey rounds (2004, 2007, 2010 and 2012). The figure presents the effects of land acquisition for SEZs on proportion of time spent in agricultural employment. These estimates are intent-to-treat effects of land acquisition for SEZs relative to the round before land acquisition ($\tau = -1$). For instance, if land acquisition in a district occurred in 2009, the NSS surveys conducted in 2004, 2007, 2010, and 2012 are denoted as $\tau = -2$, $\tau = -1$, $\tau = 0$ and $\tau = 1$, respectively. Estimates include district and year (round) fixed effects. 95% confidence interval is presented, standard errors are clustered at the district level.
Figure 1.10: Real Daily Agricultural Earnings

Note: Sample includes a repeated cross-section of individuals between 18-60 years of age across 4 NSS survey rounds (2004, 2007, 2010 and 2012). The figure presents the effects of land acquisition for SEZs on real daily agricultural earnings in rupees. These estimates are intent-to-treat effects of land acquisition for SEZs relative to the round before land acquisition ($\tau = -1$). For instance, if land acquisition in a district occurred in 2009, the NSS surveys conducted in 2004, 2007, 2010, and 2012 are denoted as $\tau = -2$, $\tau = -1$, $\tau = 0$ and $\tau = 1$, respectively. Estimates include district and year fixed effects. 95% confidence interval is presented, standard errors are clustered at the district level.
Figure 1.11: Robustness Checks: Including District-Level Linear Trends and Individual Controls

- a: Non-Agricultural Employment
- b: Non-Agricultural Earnings
- c: Self-Farming
- d: Agricultural Employment
- e: Agricultural Earnings

Note: This figure presents the estimates for the event time specification using district-level linear time trends and individual controls like age and education mentioned in Table 1.3. Sample includes a repeated cross-section of individuals between 18-60 years across 4 NSS survey rounds (2004, 2007, 2010 and 2012). These estimates are intent-to-treat effects of land acquisition for SEZs relative to the round before land acquisition ($\tau = -1$). For instance, if land acquisition in a district occurred in 2009, the NSS surveys conducted in 2004, 2007, 2010, and 2012 are denoted as $\tau = -2, \tau = -1, \tau = 0$ and $\tau = 1$, respectively. Estimates include district and year fixed effects. 95% confidence interval is presented, standard errors are clustered at the district level.
Figure 1.12: Agricultural Productivity

Note: The figure presents the effects of land acquisition for SEZs on agricultural productivity using ICRISAT data. These estimates are intent-to-treat effects of land acquisition for SEZs relative to the round before land acquisition ($\tau = -1$). Food crops include - rice, wheat, cereals, and pulses. Cash crops include - sugarcane, oil, cotton, and soy. Estimates include district and year fixed effects. 95% confidence interval is presented, standard errors are clustered at the district level.
Figure 1.13: Agricultural Land Use

a: Proportion of Sown Land

b: Proportion of Fallow Land

Note: The figure presents the effects of land acquisition for SEZs on agricultural land use using ICRISAT data. These estimates are intent-to-treat effects of land acquisition for SEZs relative to the round before land acquisition ($\tau = -1$). Estimates include district and year (round) fixed effects. 95% confidence interval is presented, standard errors are clustered at the district level.
Table 1.1: Distribution of Notified SEZs by State and Year

<table>
<thead>
<tr>
<th>State/UT</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jharkhand</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Nagaland</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Punjab</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Goa</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Odisha</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>West Bengal</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>17</td>
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<tr>
<td>Haryana</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Karnataka*</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Kerala*</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Gujarat*</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Andhra Pradesh*</td>
<td>4</td>
<td>9</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Telangana*</td>
<td>8</td>
<td>22</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>39</td>
</tr>
<tr>
<td>Maharashtra*</td>
<td>4</td>
<td>14</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>Tamil Nadu*</td>
<td>9</td>
<td>14</td>
<td>12</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>53</td>
<td>90</td>
<td>55</td>
<td>49</td>
<td>20</td>
<td>14</td>
<td>5</td>
<td>286</td>
</tr>
</tbody>
</table>

Note: This table presents an overview of the number of SEZs notified in each year between 2006 - 2012 by state/union territory (UT). States marked with * are used in this study. These states account for 72 percent of all notified SEZs in the country.
Table 1.2: District Level Controls at Baseline (2004 - 2005)

<table>
<thead>
<tr>
<th>Variable</th>
<th>SEZ Districts (1)</th>
<th>Non-SEZ Districts (2)</th>
<th>p-value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fraction Scheduled Castes</td>
<td>0.15</td>
<td>0.14</td>
<td>0.674</td>
<td>Census 2001</td>
</tr>
<tr>
<td>Fraction Scheduled Tribes</td>
<td>0.08</td>
<td>0.11</td>
<td>0.232</td>
<td>Census 2001</td>
</tr>
<tr>
<td>Fraction Literate Male</td>
<td>0.58</td>
<td>0.60</td>
<td>0.023</td>
<td>Census 2001</td>
</tr>
<tr>
<td>Fraction Literate Female</td>
<td>0.42</td>
<td>0.40</td>
<td>0.023</td>
<td>Census 2001</td>
</tr>
<tr>
<td>Fraction Male Labor Force</td>
<td>0.62</td>
<td>0.59</td>
<td>0.003</td>
<td>Census 2001</td>
</tr>
<tr>
<td>Fraction Female Labor Force</td>
<td>0.38</td>
<td>0.41</td>
<td>0.003</td>
<td>Census 2001</td>
</tr>
<tr>
<td>Fraction Agricultural Labor</td>
<td>0.25</td>
<td>0.26</td>
<td>0.419</td>
<td>Census 2001</td>
</tr>
<tr>
<td>Population Density</td>
<td>360</td>
<td>263</td>
<td>0.007</td>
<td>Census 2001</td>
</tr>
<tr>
<td>Fraction Irrigated</td>
<td>0.36</td>
<td>0.30</td>
<td>0.086</td>
<td>Census 2001</td>
</tr>
<tr>
<td>Population below Poverty Line</td>
<td>0.16</td>
<td>0.23</td>
<td>0.005</td>
<td>NSS (CES) 2004</td>
</tr>
</tbody>
</table>

Note: This table shows the baseline means of district level controls used in all estimations. Columns (1) and (2) present the mean values of controls for districts where land SEZs were notified and control districts respectively. Column (3) presents the p-values of the student’s t-test of equality of means in columns (1) and (2). Column (4) gives the data source used in this chapter. The 2004 NSS Consumption Expenditure Survey (CES) is used for calculating the proportion of population below poverty line. All other controls are constructed using the Census 2001 Village Directories.

Table 1.3: Individual Level Controls

<table>
<thead>
<tr>
<th>Variable</th>
<th>SEZ Districts (1)</th>
<th>Non-SEZ Districts (2)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>36.08</td>
<td>36.05</td>
<td>0.988</td>
</tr>
<tr>
<td>Education (years)</td>
<td>5.56</td>
<td>5.41</td>
<td>0.853</td>
</tr>
<tr>
<td>Women</td>
<td>0.51</td>
<td>0.50</td>
<td>0.935</td>
</tr>
<tr>
<td>Married</td>
<td>0.76</td>
<td>0.77</td>
<td>0.979</td>
</tr>
<tr>
<td>Scheduled Tribes</td>
<td>0.08</td>
<td>0.10</td>
<td>0.596</td>
</tr>
<tr>
<td>Scheduled Castes</td>
<td>0.183</td>
<td>0.177</td>
<td>0.930</td>
</tr>
<tr>
<td>Other Backward Castes</td>
<td>0.51</td>
<td>0.48</td>
<td>0.77</td>
</tr>
<tr>
<td>Muslims</td>
<td>0.08</td>
<td>0.06</td>
<td>0.743</td>
</tr>
<tr>
<td>Household size</td>
<td>4.77</td>
<td>5.01</td>
<td>0.514</td>
</tr>
</tbody>
</table>

Note: This table shows the mean of individual level controls used in all estimations using the 61st, 64th, 66th and the 68th NSS Rounds. Columns (1) and (2) present the mean values of controls for districts where land SEZs were notified and control districts respectively. Column (3) presents the p-values of the student’s t-test of equality of means in columns (1) and (2). Individuals between 18 - 60 years are included in our sample.
Table 1.4: Summary Statistics: ICRISAT Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Agricultural Wage Rate</td>
<td>19.13</td>
<td>17.02</td>
</tr>
<tr>
<td>Productivity of Food Crops</td>
<td>4.57</td>
<td>3.80</td>
</tr>
<tr>
<td>Productivity of Cash Crops</td>
<td>1.76</td>
<td>5.65</td>
</tr>
<tr>
<td>Proportion of Net Sown Land</td>
<td>0.45</td>
<td>0.15</td>
</tr>
<tr>
<td>Proportion of Fallow Land</td>
<td>0.07</td>
<td>0.06</td>
</tr>
</tbody>
</table>

*Note:* This table shows the mean and standard deviation for real agricultural wages, agricultural productivity and land use using ICRISAT data. District-level wage rates are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. Agricultural productivity is calculated in (tonnes/hectares) and the proportion of net sown and fallow area is calculated using the total agricultural land at the district level.

Table 1.5: Outcome Variables at Baseline 2004-2005

<table>
<thead>
<tr>
<th>Variable</th>
<th>SEZ Districts (1)</th>
<th>Non-SEZ Districts (2)</th>
<th>p-value (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Agricultural Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casual Non-Agricultural Labor</td>
<td>4.10%</td>
<td>3.01%</td>
<td>0.699</td>
</tr>
<tr>
<td>Non-Agricultural Wage Employment</td>
<td>6.33%</td>
<td>4.84%</td>
<td>0.700</td>
</tr>
<tr>
<td>Non-Agricultural Self-Employment</td>
<td>8.79%</td>
<td>6.30</td>
<td>0.569</td>
</tr>
<tr>
<td>Agricultural Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Farming</td>
<td>23.67%</td>
<td>31.12%</td>
<td>0.287</td>
</tr>
<tr>
<td>Casual Labor in Agriculture</td>
<td>18.51%</td>
<td>22.41%</td>
<td>0.506</td>
</tr>
<tr>
<td>Domestic Work</td>
<td>22.20%</td>
<td>18.93%</td>
<td>0.610</td>
</tr>
<tr>
<td>Unemployed</td>
<td>8.87%</td>
<td>7.05%</td>
<td>0.623</td>
</tr>
<tr>
<td>Not in Labor Force</td>
<td>7.64%</td>
<td>6.43%</td>
<td>0.765</td>
</tr>
<tr>
<td>Non-Agricultural Daily earnings (real)</td>
<td>1.64%</td>
<td>1.10%</td>
<td>0.678</td>
</tr>
<tr>
<td>Agricultural Daily earnings (real)</td>
<td>4.16%</td>
<td>4.40%</td>
<td>0.882</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>27,622</td>
<td>31,715</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* This table shows the mean and standard deviation of labor market outcomes using the 61st Round (2004-05) of the NSS. Columns (1) and (2) present the mean values of controls for districts where SEZs were notified and control districts respectively. Column (3) presents the p-values of the student’s t-test of equality of means in columns (1) and (2). Employment variables show the proportion of time spent in each activity. The mean values are calculated using individuals between 18 - 60 years. Daily casual earnings are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau.
Table 1.6: Parallel Trends - Using Placebo Treatment

<table>
<thead>
<tr>
<th>Variable</th>
<th>Wage Employment (non-agriculture)</th>
<th>Real Wage (non-agriculture)</th>
<th>Self-Farming (agriculture)</th>
<th>Casual Work (agriculture)</th>
<th>Real Wage (agriculture)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>SEZ x post</td>
<td>0.230</td>
<td>2.282</td>
<td>-1.115</td>
<td>1.063</td>
<td>-0.0453</td>
</tr>
<tr>
<td></td>
<td>(0.416)</td>
<td>(2.398)</td>
<td>(1.636)</td>
<td>(0.899)</td>
<td>(1.607)</td>
</tr>
<tr>
<td>Observations</td>
<td>157,925</td>
<td>65,667</td>
<td>61,261</td>
<td>157,925</td>
<td>71,647</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.083</td>
<td>0.365</td>
<td>0.149</td>
<td>0.083</td>
<td>0.159</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
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</tr>
<tr>
<td>Individual Controls</td>
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<td>YES</td>
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</tr>
<tr>
<td>District Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Note: This table reports the results for the difference-in-differences specification using a placebo treatment. This specification uses the 55th Round as the hypothetical ‘pre-period’ and the 61st Round as the hypothetical ‘post-period’. Column (1) presents the results for non-agricultural casual work. Column (2) reports the coefficient for non-agricultural earnings and column (3) shows changes in self-farming. Column (4) corresponds to casual agricultural work and column (5) corresponds to daily agricultural casual wages. Casual wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. All district level time-invariant controls are interacted with a dummy for the post-period. Standard errors in parentheses are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1
Table 1.7: Difference-in-differences Estimates on Casual Non Agricultural Labor

<table>
<thead>
<tr>
<th>VARIABLES</th>
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</tr>
</thead>
<tbody>
<tr>
<td>SEZ x post</td>
<td>0.538*</td>
<td>0.552*</td>
<td>0.522*</td>
</tr>
<tr>
<td></td>
<td>(0.289)</td>
<td>(0.289)</td>
<td>(0.286)</td>
</tr>
<tr>
<td>Observations</td>
<td>201,695</td>
<td>201,285</td>
<td>201,285</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.066</td>
<td>0.128</td>
<td>0.128</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
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<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

Note: This table reports the results for the difference-in-differences specification for the proportion of time spent in casual non-agricultural labor. All specifications include district and year fixed effects. Column (2) also includes individual controls and column (3) includes individual and district level controls. All district level time-invariant controls are interacted with a dummy for the post-period. Standard errors in parentheses are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1

Table 1.8: Difference-in-differences Estimates on Real Daily Non-Agricultural Earnings

<table>
<thead>
<tr>
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<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEZ x post</td>
<td>0.482**</td>
<td>0.506**</td>
<td>0.408**</td>
</tr>
<tr>
<td></td>
<td>(0.234)</td>
<td>(0.235)</td>
<td>(0.202)</td>
</tr>
<tr>
<td>Observations</td>
<td>201,695</td>
<td>201,285</td>
<td>201,285</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.037</td>
<td>0.070</td>
<td>0.071</td>
</tr>
<tr>
<td>District FE</td>
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<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

Note: This table reports the results for difference-in-differences specification for real non-agricultural wages. All specifications include district and year fixed effects. Casual wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. Column (2) also includes individual controls and column (3) includes individual and district level controls. All district level time-invariant controls are interacted with a dummy for the post period. Standard errors in parentheses are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1
### Table 1.9: Difference-in-differences Estimates on Self-Employment in Agriculture

<table>
<thead>
<tr>
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<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEZ x post</td>
<td>-3.325**</td>
<td>-3.118**</td>
<td>-3.131**</td>
</tr>
<tr>
<td></td>
<td>(1.435)</td>
<td>(1.479)</td>
<td>(1.484)</td>
</tr>
<tr>
<td>Observations</td>
<td>94,799</td>
<td>94,725</td>
<td>94,725</td>
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<tr>
<td>R-squared</td>
<td>0.048</td>
<td>0.168</td>
<td>0.168</td>
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<tr>
<td>District FE</td>
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<td>YES</td>
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</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
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<td>YES</td>
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</tr>
<tr>
<td>District Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

*Note:* This table reports the results for difference-in-differences specification for time spent in self-employment in agriculture. All specifications include district and year fixed effects. Column (2) also includes individual controls and column (3) includes individual and district level controls. All district level time-invariant controls are interacted with a dummy for the post-period. Standard errors in parentheses are clustered at the district level. *** p < 0.01, ** p < 0.05, * p < 0.1

### Table 1.10: Difference-in-differences Estimates on Casual Agricultural Labor

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEZ x post</td>
<td>2.098***</td>
<td>2.034***</td>
<td>1.928***</td>
</tr>
<tr>
<td></td>
<td>(0.606)</td>
<td>(0.590)</td>
<td>(0.599)</td>
</tr>
<tr>
<td>Observations</td>
<td>201,695</td>
<td>201,285</td>
<td>201,285</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.032</td>
<td>0.107</td>
<td>0.108</td>
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<tr>
<td>District FE</td>
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</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
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</tr>
<tr>
<td>Individual Controls</td>
<td>NO</td>
<td>YES</td>
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</tr>
<tr>
<td>District Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

*Note:* This table reports the results for difference-in-differences specification for time spent in casual agricultural labor. All specifications include district and year fixed effects. Column (2) also includes individual controls and column (3) includes individual and district level controls. All district level time-invariant controls are interacted with a dummy for the post-period. Standard errors in parentheses are clustered at the district level. *** p < 0.01, ** p < 0.05, * p < 0.1
Table 1.11: Difference-in-differences Estimates on Real Daily Agricultural Earnings

<table>
<thead>
<tr>
<th>VARIABLES</th>
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<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEZ x post</td>
<td>0.193</td>
<td>0.202</td>
<td>0.221</td>
</tr>
<tr>
<td></td>
<td>(0.210)</td>
<td>(0.200)</td>
<td>(0.196)</td>
</tr>
<tr>
<td>Observations</td>
<td>201,695</td>
<td>201,285</td>
<td>201,285</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.008</td>
<td>0.051</td>
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<td>District FE</td>
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<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>NO</td>
<td>YES</td>
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</tr>
<tr>
<td>District Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

Note: This table reports the results for difference-in-differences specification for real casual agricultural wages. All specifications include district and year fixed effects. Casual wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. Column (2) also includes individual controls and column (3) includes individual and district level controls. All district level time-invariant controls are interacted with a dummy for the post-period. Standard errors in parentheses are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1
CHAPTER 2

DOES HISTORICAL LAND INEQUALITY ATTENUATE THE POSITIVE IMPACT OF INDIA’S EMPLOYMENT GUARANTEE PROGRAM?

2.1 Introduction

The colonial land revenue system in India led to severe economic inequality and concentration of political power in certain parts of the country and this power imbalance continues to be relevant today. Existing evidence suggests that social fragmentation and concentration of political and economic power arising out of this institution affects public goods provision (Banerjee, Iyer, and Somanathan, 2005) and agricultural productivity (Banerjee and Iyer, 2005). However, if a public policy has the potential to correct these historical imbalances, then it is important to study its impact not just in providing income security to the poor as argued by Drèze (2005), but also because such analyzes may hold valuable lessons for development policy design and implementation. The Mahatma Gandhi National Rural Employment Guarantee Act (henceforth NREGA) is a policy that can potentially erode the economic hegemony of large landowners as major employers in the Indian countryside. The guarantee of public employment under NREGA can reduce landless workers’ dependence on large landlords and increase their relative wage bargaining power.

The British categorized all cultivable land in India under landlord and non-landlord systems. In the former, the responsibility for tax collection was vested in large landlords and in the latter, individual farmers or village communities were directly respon-
sible for paying their taxes.\textsuperscript{1} In landlord districts, a class of large land-owners emerged who became de facto owners of all cultivable land under their control. Consequently, these landowning elites became influential in economic and political decision-making and their domination continued even after India’s independence in 1947 when the landlord-based revenue system was abolished (Banerjee and Iyer, 2005). This was in sharp contrast to non-landlord districts where land was more equitably distributed. The concentration of economic and political power in landlord regions adversely affected the provision of public goods (Banerjee, Iyer, and Somanathan, 2007) and agricultural investment (Banerjee and Iyer, 2005) in these districts.

The colonial land revenue institution, which created the large landlord class contributed to the under-development of these regions which continues to persist today. Table 2.1 presents a summary of district level characteristics including the proportion of marginalized communities and labor force participation for landlord and non-landlord districts.\textsuperscript{2} In 2004, 35 percent of the population in landlord districts was below the poverty line while the corresponding figure for non-landlord districts was 24 percent. Further, literacy rates in landlord districts was only 46 percent in contrast to 54 percent in non-landlord districts. The historical asymmetries of economic and political power created by the institution of landlord-based revenue system provides a unique opportunity to understand how political economy factors may obstruct the implementation of public programs aimed at increasing rural wages.\textsuperscript{3}

\textsuperscript{1}The British assigned land tax liability by categorizing all cultivable land under their direct rule in India under (a) landlord-based system (Zamindari), (b) non-landlord districts including individual cultivator-based system (Ryotwari), and village-based system (Mahalwari) which are discussed in Section 2.2.

\textsuperscript{2}Table 2.1 reports the mean of district-level characteristics for landlord and non-landlord districts. Districts that were not directly controlled by the British and were ruled by Indian kings and princes are excluded from this study. At India’s independence there were over five hundred small and large princely states. Prominent princely states included Jammu and Kashmir, Hyderabad, Junagarh, Mysore and Travancore. Section 2 provides an overview of the colonial land revenue system in India.

\textsuperscript{3}In the remainder of this chapter the terms landlord and zamindari will be used interchangeably.
In 2005, India legislated its flagship poverty-alleviation program, NREGA which entitles 100 days of work to every rural household at the legal minimum wage. It is the largest public employment program in the world which generated 2.35 billion workdays of employment in the financial year 2016-2017.\textsuperscript{4} NREGA impacts close to 50 million households in India and is thus a powerful tool for social and economic transformation. Through its joint emphasis on social protection and livelihood security, the program endeavors to empower the rural poor by instilling a new sense of identity and bargaining power thus making economic growth inclusive for all in rural India.

Existing studies on NREGA stress on factors like limited administrative capacities, low awareness of the program among beneficiaries (Ravallion et al., 2015), insufficient resource allocation (Banerjee and Saha, 2010), and corruption by bureaucrats (Adhikari and Bhatia, 2010) and private contractors (Aggarwal et al., 2012) to explain poor performance of the program in certain states. This chapter provides the first national level evidence to show that political economy factors like inequality in landownership and concentration of political decision-making with the elite attenuates the labor market impact of NREGA.

The creation of a landlord class by the colonial land revenue system and concentration of socio-economic power associated with it can attenuate the impact of NREGA by controlling its implementation at the local level. High inequality in landownership in landlord districts creates monopsonistic labor markets characterized by surplus labor which depress wages.\textsuperscript{5} Additionally, landlords also enjoy considerable political influence in these regions and have control over local political institutions like the

\textsuperscript{4}There is no official basis for providing 100 days of employment. During situations like drought, this limit can be increased. For instance, in 2014, the government increased the legal limit to 150 days in response to a drought. More details of the national level impact of NREGA can be found on the official NREGA website.

\textsuperscript{5}Monopsonistic labor markets are characterized by few employers and many employees. Since, labor demand is determined by few employers; both employment and wages at equilibrium are lower than those in competitive markets (Bowles, 2009).
Gram Panchayats (village assembles). Since the functioning of NREGA at the local level depends on these institutions, the landowning elite have considerable influence on its implementation. If the provision of NREGA is inadequate, it would not increase the bargaining position of workers and wages would remain unchanged. Thus, in order to protect their class interests, landlords thwart adequate NREGA provisioning using their political control over local village assemblies. However, in non-landlord districts, low levels of land inequality allow workers to demand greater provision of NREGA from the local elite which increases their bargaining position and exerts an upward pressure on wages.

There are three major contributions of this research. First, this chapter provides the first empirical estimates of the role of the historic land tenure system in conditioning the effect of NREGA on rural labor markets. Using temporal and geographical variation in NREGA implementation in difference-in-differences and triple difference frameworks, this chapter finds that real casual wages rose by 6 percent in non-landlord districts from a baseline mean of 390 rupees per month. This is equivalent to an increase of 26 Indian Rupees (0.40 USD) in real terms in non-landlord districts per month. This implies an 18 percent differential wage increase in non-landlord districts compared to landlord districts. This wage increase is caused by a one percentage point increase in labor-time spent by workers in public employment in non-landlord districts. Correspondingly, labor-time spent in private employment decreased by around 3 percentage points per day relative to the baseline mean. This corresponds to a reduction of 5.4 days in private employment in the six months of the lean season after the introduction of NREGA. However, the effect of NREGA on

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6Casual wage is defined as wages paid for unskilled manual labor. Table 2.3 shows that the baseline value for the natural log of daily casual wages in landlord and non-landlord districts is 2.5 and 2.6 respectively. This translates to 12 and 13 rupees per day in real terms.

7Using the 2009 exchange rate of 1USD = 66 INR.
rural wages and private employment in landlord districts is relatively muted due to the lower provision of public employment in these districts.

Second, this chapter disaggregates the impact of NREGA on private employment which consists of private wage employment, self-employment and domestic employment and examines how these are conditioned by the historic land revenue system. The decline in private employment witnessed in non-landlord districts is primarily driven by a 2.6 percentage point decline in time spent in unpaid domestic work. This translates into a reduction of 4.7 days in domestic employment over the entire lean season. This is important because women in India disproportionately shoulder responsibility for unpaid work and a decline in time allocated to domestic work implies that they benefit more from NREGA. Further, crowding-out of private employment because of public works as suggested by Imbert and Papp (2015) may actually be driven by a re-allocation of labor time from unpaid domestic work as opposed to from private wage labor.

Finally, to understand how the land revenue system affects changes in agricultural labor demand in response to NREGA, this chapter analyzes changes in agricultural wages and time allocated to self-employment and private wage employment in agriculture. Like Berg, Bhattacharyya, Rajasekhar, et al. (2018) we find no impact of NREGA on lean-season agricultural wages in landlord and non-landlord districts since labor demand is low during this time. Additionally, in landlord districts people reduce time spent in self-farming by 1.7 percentage points post-NREGA. This is because, self-farming on small plots of land is a subsistence mechanism adopted by households. When workers are provided employment under NREGA, they can substitute public employment for self-farming to augment their incomes. This substitution would not change the output produced by self-farming. This peculiar labor abundant feature
of agricultural labor markets in developing countries has been extensively studied by (Lewis, 1954) and (Sen, 1966) among others.

The rest of the chapter is structured as follows. Section 2.2 provides an overview of the colonial land revenue system in India and discusses its impact on the economic development of the country. Section 2.3 discusses existing research on the functioning of NREGA and section 2.4 discusses the data used in this chapter. Section 2.5 presents the empirical methodology and section 2.6 presents the main results of this chapter. Section 2.7 discusses changes in agricultural labor markets and section 2.8 concludes.

2.2 Colonial Land Revenue System in India

In their seminal paper, Acemoglu, Johnson, et al. (2001) show that colonial rule in non-settler colonies of Asia, Africa and Latin America led to the development of extractive institutions which continued to impact economic development in these countries even after independence.⁸ For instance, the institution of slavery resulted in extreme economic inequality which adversely impacted both long-term economic growth (Sokoloff and Engerman, 2000) and inclusive political participation like voting rights (Engerman and Sokoloff, 2005) in the Americas. Nunn (2008) finds that four centuries of trans-Atlantic slave trade continues to have a detrimental effect on post-colonial economic development of African countries. In Peru, the forced mining labor system (mita) continues to affect developmental outcomes like per-capita consumption and public goods provision (Dell, 2010).

In India, the British instituted different land tax revenue systems in different parts of the country. This assignment of land revenue system led to high inequality in

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⁸Acemoglu, Johnson, et al. (2001) argue that European colonization was contingent on the disease-environment of the region. In tropical regions where mortality rates for Europeans were higher, colonizers introduced extractive institutions which maximized their authoritarian political control necessary for resource extraction. In contrast, in regions where the prevalence of diseases was low, the colonizers decided to settle, and established Europe-like institutions including property-rights and checks against government power.
landownership under the landlord-based system known as the Zamindari or Malguzari system enacted in Bengal Presidency, Oudh and Central Province. In these regions, large landlords known as zamindars were responsible for tax collection from the entire village or several villages. Other systems of tax collection were the Ryotwari system and the Mahalwari system. In the former, individual cultivators owned land and were directly responsible for paying taxes and in the latter, village level bodies owned land and were jointly responsible for paying taxes (Banerjee and Iyer, 2005). These systems were introduced primarily in Madras and Bombay Presidencies; and Punjab and North Western Provinces respectively. The rest of India was under indirect British rule and was governed by local kings and princes. These regions were known as the Princely States. Iyer (2010) shows that these regions had a better provision of public goods in comparison to regions under direct British rule.

The classification of districts in each category was based on the date of conquest. Banerjee and Iyer (2005) find that territories conquered between 1820 and 1856 were accorded ‘non-landlord’ status and those acquired before or after this period were assigned as ‘landlord’ regions. This assignment was exogenous and not based on agricultural productivity or other labor market considerations. The distribution of land revenue system across British India can be seen in Figure 2.1.

This chapter classifies districts as landlord or non-landlord districts based on their historic land revenue assignment. Landlord districts comprise of the malguzari or malguzari regions and non-landlord districts consist of Mahalwari and Ryotwari districts. Iversen et al. (2013) have argued that the Malguzari system of the Central

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9Bengal Presidency comprised of present-day states of West Bengal, Bihar, Odisha and parts of Assam in India. Oudh was a part of present-day Uttar Pradesh and Central provinces comprised of districts from the present-day states of Madhya Pradesh, Maharashtra and Jharkhand.

10Madras Presidency comprised of territories from modern day Tamil Nadu, parts of Karnataka, and Andhra Pradesh (including Telangana). Bombay Presidency primarily comprised of Maharashtra and Gujarat. Additionally, Punjab province comprised of the states of Punjab, Haryana and parts of Himachal Pradesh. Finally, North West Province was made up of districts from western Uttar Pradesh.
Provinces should not be classified under landlord-based system as it consisted of a village ‘headman’ who did not have the same rights of evicting tenants at-will as the ‘zamindars’ of the Bengal Presidency. However, the defining feature of the colonial land revenue system was the creation of a ‘landlord class’ distinct from the cultivator who was recognized by the colonial government (Banerjee and Iyer, 2013). These landlords could levy any tax rate on the tenant farmers under their control and were free to keep the revenue that was left after paying the British (Banerjee and Iyer, 2005).

In malguzari regions, the village proprietor may be considered similar to large landlords in malguzari districts as they had control over taxation of large areas of land under their control (Baden-Powell, 1892). Further, according to the Statistical Abstract 1876 - 1885 published by the colonial government, 69 percent of the land area (corresponding to 72 percent of villages) in Central Provinces were under the zamindari system (Banerjee and Iyer, 2013). Therefore, by becoming de facto owners of land under their control, this landlord class increased its economic and political influence by appropriating all productivity gains witnessed by nineteenth century agriculture (Banerjee and Iyer, 2005).11

Extractive institutions concentrate political power in the hands of a few elites who extract resources from the rest of society (Acemoglu and Robinson, 2013). The zamindari system is an extractive colonial institution which gave landlords ‘absolute control’ over their tenant farmers as they could decide the tax rate and evict tenants if they failed to comply. Over time the power and influence of large landlords continued unabated.

11 Appendix B.3 re-estimates the main results of this chapter after dropping the districts of Central Provinces using the Iversen et al. (2013) classification. The main results of this chapter that the wage impact of NREGA is dampened in landlord districts does not change. However, we find that landlord districts have increased provision of NREGA if we drop the 31 districts in Madhya Pradesh, Maharashtra and Chhattisgarh classified as malguzari. However, the increase is not strong enough to positively impact wages in landlord districts. It is not surprising that the results should somewhat change after dropping around 10% of the sample and this change suggests the need for further investigation on the subject.
and wealth-inequality soared. This inequality contributed to the economic stagnation of the regions as class-based antagonism between large landlords and agricultural workers prevented collective bargaining for public investment in zamindari districts particularly between 1965-1980 (Banerjee and Iyer, 2005). Consequently, landlord districts fell behind the others in the provision of public infrastructure and human capital formation (Banerjee, Iyer, and Somanathan, 2005).

After India’s independence in 1947, several legislations aiming to correct the balance of power between landlords and workers were enacted. In the early 1950s, the system of zamindari was formally abolished and laws imposing a ceiling on land holdings were legislated (Bardhan, 1984). These efforts did witness some success at the national level. For instance, Basole and Basu (2011) show that average landholding size declined from 22 acres to 18 acres for large capitalist farmers between 1960 to 2003. However, during the same period the proportion of ‘effectively landless’ workers increased by 14 percentage points.\textsuperscript{12}

The marginal decline in the average size of land holding did not dampen the political and social influence of large capitalist farmers in the countryside for two reasons. First, political efforts to curtail the power of large landlords; by imposing a ceiling on land holding size or tenancy reform in zamindari districts were largely unsuccessful as state legislatures were predominantly controlled by land-owning classes (Besley and Burgess, 2000).\textsuperscript{13} As a consequence, most Indian states never saw any large scale land reform.\textsuperscript{14} In some cases, the abolition of zamindari led to the devolution of land control and rural power from the old landlords (many of whom had already

\textsuperscript{12}Basole and Basu (2011) classify all households as ‘effectively landless’ if they own less than 1 acre of land.

\textsuperscript{13}Tenancy reforms aim to strengthen the position of tenant farmers by providing them with legal registration for the land they cultivate to protect them against unlawful eviction by the landlord. In addition, these reforms formally define how output would be shared between the cultivator and the landlord (Besley and Burgess, 2000).

\textsuperscript{14}Notable exceptions being Kerala, and West Bengal. For a discussion on land reforms in India and its impact on agricultural productivity see Ghatak and Roy (2007) and (Besley and Burgess, 2000).
transitioned into predominantly urban lifestyles in urban centers) to a rising class of rich peasants known as *jotedars*. Boyce (1987) shows that in West Bengal, the *jotedars* became the principal obstacle to more far-reaching land reforms.\(^\text{15}\)

Second, public sector contribution in the gross capital formation in agriculture (GCFA) had started declining and private investment rose sharply from the 1980s (Gulati and Bathla, 2001).\(^\text{16}\) As the state reduced its productivity enhancing investment in agriculture, the socio-economic domination of large landlords increased and increased their influence and control the local decision-making. It was in this context that the government enacted NREGA to increase rural incomes and agricultural productivity in the countryside.

### 2.3 National Rural Employment Guarantee Act

#### 2.3.1 Program Features

According to the National Employment Guarantee Act of 2005, the state would provide 100 days of employment to every rural household in India at the legal minimum wage.\(^\text{17}\) If the state cannot provide employment within two weeks of people demanding public employment, workers would be entitled for payment without work.\(^\text{18}\)

Existing research has shown that NREGA has contributed to (a) increased agricultural and rural wages (Berg, Bhattacharyya, Durgam, et al. (2012); Imbert and Papp

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\(^\text{15}\) Private households account for over 95 percent of private capital investment in agriculture and close to 75 percent of private investment is aimed at increasing mechanization and irrigation of the land (Gulati and Bathla, 2001). These investments are primarily undertaken by large landowners as are aimed at increasing the productivity of large-scale capital-intensive agriculture.

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\(^\text{17}\) The minimum wages are determined at the state level and vary considerably by state, industry and skill level. For instance, in 2018, the minimum wage for unskilled workers ranged from 268 rupees per day in Bihar to 538 rupees per day in Delhi.

\(^\text{18}\) For a full discussion of the provisions and rights of citizens under the NREGA Act see Drève et al. (2006).
(2015)) and household savings (Ravi and Engler, 2015); (b) reduced distress migration from traditionally migration-intensive areas; (c) increased use of barren areas for cultivation (Mann and Pande, 2012); and (d) increased nutritional intake by participants (Jha et al., 2011). Public works under NREGA also improve land quality which contributes to productivity induced wage increases in addition to program-related transfers (Deininger and Liu, 2019). For instance, leveling of agricultural land, and creation of wells; and irrigation channels under NREGA enhance the agricultural productivity of helps small and marginal farmers (Ranaware et al., 2015).

NREGA is a demand driven scheme which allows the poorest families to self-select into the program (Dutta et al., 2012). Klonner and Oldiges (2014) find that NREGA not only helped the most vulnerable sections (Schedule Castes and Scheduled Tribes) by increasing their household consumption but also provided an income safety-net during the lean season of agriculture. In 2008, around two-thirds of the workers surveyed from six north Indian states were able to avoid hunger due to NREGA and around 75 percent respondents credited NREGA for helping them sustain their livelihoods in the dry season of agriculture (Khera and Nayak, 2009). Overall, NREGA has allowed rural households to increase consumption expenditure between 6.5 and 10 percent with around a 12 percent increase for marginalized caste groups (Bose, 2017).

According to the NREGA Act of 2005, 33 percent of public employment created under the scheme is reserved for women. Several studies have found that NREGA has had a positive impact on female labor force participation (Azam, 2011), wages (Zimmermann, 2012) and political engagement in local decision-making (Girard, 2014). Tsaneva and Balakrishnan (2018) find that in the first year of the program, women living in districts where NREGA was implemented were less likely to experience depression symptoms as the program provided them economic security and independence. Afridi, Mukhopadhyay, et al. (2016) show that mother’s participation in
NREGA increases time spent by children in school and leads to an improvement in their grades. NREGA has also been shown to have a strong impact on children’s grade progression, reading and comprehension; and math test-scores (Mani et al., 2014).

Even though NREGA has contributed to improving economic and social indicators across the country, NREGA implementation suffers from several problems like reduced budgetary allocation, corruption, violation of people’s entitlements and insufficient employment generation (Aggarwal, 2016). These shortcomings limit the ability of NREGA to achieve its transformative potential. Indeed, problems of delayed wage payments are effectively diluting the welfare effects of NREGA (Basu and Sen, 2015).

Further, the implementation of NREGA remains uneven across states and districts. It is generally agreed that the states of Kerala, Tamil Nadu, Rajasthan, Himachal Pradesh and Andhra Pradesh are the top performers in terms of employment creation and enforcement of the entitlement (Dreze and Khera (2009); Dreze and Oldiges (2007)). It is important to note that most districts in these states had the non-landlord system of land revenue. However, evidence suggests that the poorer states of Jharkhand and Bihar have not benefited significantly from NREGA (Dutta et al. (2012); Bhatia and Dreze (2006)). Most districts in these states were placed under the landlord-based system of land revenue. This disparity in the provision of NREGA between districts in these states also translates into differences in NREGA’s labor market impact.

Figure 2.2 presents the mean of rural casual (real) wages in landlord and non-landlord districts where NREGA was introduced in the first two phases between 2006 and

19Large parts of states like Rajasthan, Andhra Pradesh, Karnataka and Gujarat were ruled by Indian kings and were indirectly controlled by the British. These Princely States are excluded from this study.
2007.\textsuperscript{20} In 2004, before NREGA was introduced we can see that wages in landlord districts were much lower than those in non-landlord districts. This is expected as landlord districts lag behind non-landlord districts on several developmental indicators as shown in Table 2.1. After the introduction of NREGA, there is a wage increase in both districts but the increase in non-landlord districts is higher than the corresponding increase in landlord districts. This is important since non-landlord districts had higher wages even before NREGA. Therefore, it is important to investigate whether the labor market impact of NREGA is weaker in landlord districts which are poorer and in greater need of public employment? The next section discusses the mechanisms by which the colonial land-revenue system may weaken the labor market impacts of NREGA.

\subsection*{2.3.2 Theoretical Framework}

In standard monopsonistic labor markets, both employment and wages at equilibrium are lower than those in competitive markets. Since these labor markets are characterized by few employers, labor demand falls short of supply and involuntary unemployment is created. Therefore, contrary to competitive labor markets, monopsonistic labor markets are characterized by rationed workers at equilibrium i.e. people who would like to work at the prevailing wage but cannot find employment (Bowles, 2009). This mechanism forms the basis of wage suppression in monopsonistic labor markets.

Rural labor markets in India are highly monopsonistic - characterized by high land inequality and surplus labor. For instance, Rawal (2008) shows that the Gini coefficient of land ownership in India was around 0.76 in 2003. Additionally, over 40 percent of households in northern states like Uttar Pradesh, Bihar and Jharkhand are

\textsuperscript{20}For both landlord and non-landlord groups, districts that got NREGA in Phase I (2006) and II (2007) are included in this figure. These districts are considered ‘early’ or ‘treatment’ districts and phase III districts where NREGA became operational in April 2008 are ‘late’ or ‘control’ districts.
landless (Rawal, 2006). These states were primarily under landlord-based land revenue system. Large landlords enjoy considerable political domination in these regions and in the absence of any major land redistribution post-independence, this class has managed to retain their wage setting power. Therefore, the classification of districts by historical land revenue system not only provides us with an exogenous distribution of land ownership but also helps us understand the role of the landowning elite in local decision-making. This class has retained its control over local decision-making and can influence the implementation of public programs like NREGA in order to protect their class interests by keeping wages depressed.

The concentration of landownership in landlord districts creates a large class of small and marginal farmers who rely on large landlords for subsistence. Small farmers lack the resources and access to formal credit to undertake lumpy investment in agriculture (Bardhan et al., 2000). Therefore, they rely on support from landowning elite for informal credit (Pal, 2002) and cost sharing of purchased inputs (Bardhan, 1980). Therefore, before the advent of NREGA, large landlords kept wages depressed using a) monopsonistic labor markets and b) their control over political decision-making to protect their class-interests.

In this context, NREGA was enacted to raise rural wages which were depressed for decades. By recognizing public employment as a legal right, it provides an alternative source of employment for rural workers. There are three reasons why it should exert an upward pressure on rural wages. First, since NREGA employment pays the legal minimum wage, it creates a wage-floor for private employers. Second, the guarantee of public employment could increase the wage bargaining position of workers and erode the wage setting power of the landowning elites. Finally, NREGA can raise wages by creating durable public assets which can potentially increase the productivity of agriculture. If NREGA is successful in raising wages by providing alternative
employment, it can challenge the hegemony of large landlords and correct the historical imbalance created by the institution of zamindari. Not only would higher wages reduce profits, but the income-safety net provided to workers by NREGA could dilute the socio-economic dominance of the landlord class.

However, the success of NREGA depends on how well it is implemented at the local level. The implementation depends on the Gram Panchayats (village assemblies) which receive applications for NREGA work by citizens and decide on which public works should be created under NREGA (Drèze et al., 2006). If citizens were empowered, they would be able to collectively demand employment under NREGA and ensure that their entitlements under the program - hundred days of employment and payment of the legal minimum wages - take place on time. However, if workers cannot effectively demand the provision of NREGA from the landowning elite; who control local institutions, the latter can preserve their interests by reducing the provision of public employment, resulting in insufficient NREGA provision. This insufficient provision of NREGA would not result in providing workers with alternative employment to impact their wage bargaining power significantly.

In this case workers would continue to depend on large landlords for their subsistence. In landlord dominated districts where land is concentrated with few large landowners, labor markets are characterized by excess labor supply and wages would be determined by the subsistence needs of workers (Lewis, 1954). Therefore, landlords may be able to keep wages depressed even after NREGA as a part of workers’ subsistence expenditure is now met by wages received under public employment.

Since large landlords can use their market power to reduce the wage rate, there will be no significant change in the time spent in private wage employment at equilibrium as insufficient provision of NREGA does not alleviate workers’ dependence on large landlords for subsistence. Further, inadequate provision of NREGA in these districts...
does not allow productivity enhancing durable infrastructure to be created and as a result, there is no indirect impact of NREGA on wages through an increase in agricultural productivity.

Low levels of awareness about the provisions of the Act and opaqueness in its functioning may allow the local elite, usually the Pradhans (head of the village assembly) to control the implementation of the program and restrict the supply of public employment (Misra, 2019b). Existing research shows that the provision of NREGA in states like Bihar, Jharkhand and Odisha is insufficient and workers are rationed out of public employment (Dutta et al. (2012); Louis (2006)). For instance, in Bihar, over 78 percent of workers wanted to work under NREGA but could not get work. In Chhattisgarh and Odisha, the village assembly and local officials refused to acknowledge the demand for NREGA (Ambasta et al., 2008). Misra (2019c) finds that in 2009-10, 53 percent of rural households in landlord districts wanted to work under NREGA of which only 28 percent reported participating in the program. Therefore, over 25 percent households were rationed out of NREGA employment. Contrary to this, only 17 percent households were rationed in non-landlord districts.

In non-landlord districts, agricultural land is more equitably distributed and there is no concentration of political power with the elite. Consequently, citizens would be empowered to ensure better implementation of NREGA through social audits and other accountability enhancing mechanisms. This enables rural workers to improve their bargaining position with private employers as NREGA creates a wage floor. Further, the involvement of workers in NREGA implementation at the local level ensures that productivity enhancing infrastructure is created under NREGA which impacts agricultural productivity and wages. For instance, in Maharashtra; Ranaware et al. (2015) find that around 75 percent of NREGA works on private land belonged to small (53 percent) and marginal farmers (22 percent). Therefore, the ability of work-
ers to ensure better provision of public employment under NREGA in non-landlord districts would result in a stronger labor market impact of the program in these districts, particularly in comparison to landlord districts.

2.4 Data and Outcome Variables

2.4.1 Data

The main source of data used in this chapter comes from the Employment and Unemployment Rounds of the National Sample Survey Organization (NSSO) of India. Each ‘thick’ round of data has a sample size of about 120,000 households spread between urban and rural areas.\(^{21}\) In each round, the NSSO collects data over four sub-rounds in a year from July to June. The first two sub-rounds covering the period from July to December correspond to the peak (rainy) season of agriculture and the last two sub-rounds between January to June correspond to the lean or (dry) season of agriculture. The main specification of this chapter uses two ‘thick’ rounds covering the period from 2004-05 to 2007-08. Data from the 61st Round from July 2004 to June 2005 forms the pre-program period and data from the 64th Round of NSSO spanning July 2007 to June 2008 forms the post-program period. Data used in this chapter consist of observations from rural areas during the dry season of agriculture since public employment under NREGA is predominantly undertaken during this time of the year.

The main identification strategy of this chapter relies on changes at the district level. The main assumption of the identification strategy of this chapter is that before the introduction of NREGA trends in labor market outcomes were similar across treatment (phase I and II districts) and control districts (phase III districts). In order to discuss pre-program trends in rural wages (figure 2.3), public employment

\(^{21}\) Thick rounds are quinquennial rounds of surveys with a sample size of round 120,000 households. Thin rounds conducted in the intervening period have a sample size of around 40 percent of the thick round.
In addition to the NSS data, district level controls are constructed using several sources of data. Demographic characteristics including caste composition, literacy rates and workforce participation at the district level are created using the Primary Census Abstract and the Village Directories of Census of 2001. District level poverty head-count ratios have been constructed using the 2004 Consumption Expenditure Round of NSSO. We also control for the date of British conquest of a region as Banerjee and Iyer (2005) show that regions that fell under British rule before 1820 were highly fertile and witnessed greater exploitation and plunder.

Information on time-varying factors like the timing of local or state level elections is compiled using data from the Election Commission of India. Information about other concurrently running programs like the Pradhan Mantri Gram Sadak Yojna (PMGSY) is compiled from the program website and, data on districts affected by left-wing movements is taken from the Planing Commission of India (2005). Finally, information about phase-wise implementation of NREGA is taken from the web-portal of NREGA. The mean values of district-level controls at baseline and their sources are listed in Table 2.1.22

2.4.2 Assigning Colonial Revenue System to Districts

In addition to the NSS and the Census data, this chapter creates a new dataset by matching district boundaries of British India (before 1947) to those in 2004 when

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22 Appendix B.2 discusses the construction of control variables in detail.
NREGA was introduced. Banerjee and Iyer (2005) provide information about the land revenue system for 169 districts in British India.\(^{23}\) However, geographical boundaries of districts under colonial rule are significantly different from those today as districts have been divided, renamed, or merged with other districts. Kumar and Somanathan (2009) document changes in district boundaries from 1961 to 2001. By tracking changes in district names and boundaries over time, we were able to map 169 districts of British India to 289 present-day districts according to the Census boundaries of 2001.\(^{24}\) Of these, 130 districts had zamindari system and 159 districts had other forms of land revenue systems.

Table 2.2 provides the break-up of these districts by state, land revenue system and the phase of NREGA implementation. Our sample includes 20 out of 29 Indian states. However, we only include districts which were directly under the British land revenue system. Consequently, several districts from states like Rajasthan Andhra Pradesh, Madhya Pradesh and Gujarat are not included in our sample. All districts in states like Bihar, Jharkhand and West Bengal were placed under the landlord system.\(^{25}\) Districts in southern and western states like Maharashtra, Tamil Nadu and Karnataka were placed under non landlord-based revenue system. Several large states like Assam and Uttar Pradesh had districts with both revenue systems. Since the implementation of NREGA depends upon state and local level governments, the fact that several states in our sample have both landlord and non-landlord districts shows that state-level factors like differences in administrative capacity or state-level policies do not impact our results.

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\(^{23}\)This excludes the Princely States and districts from present day Pakistan, Bangladesh and Myanmar.

\(^{24}\)NREGA was not operational in completely urban districts like Mumbai and Chennai which are excluded from this analysis.

\(^{25}\)In Appendix B.1 we exclude states like Bihar, Jharkhand and West Bengal and re-estimate the main results of the model to confirm that the regression results for non-landlord districts are not affected by these states. Our results hold even after excluding these states which show that factors like state-level administrative capacity does not impact our triple-difference estimators.
2.4.3 Employment and Wage Variables

The Employment and Unemployment Rounds of the NSSO provides information on weekly time-use and earnings for each member of the household. This allows us to calculate the percentage of time spent in public and private employment in the rural sector. Further, private employment can be further decomposed into self-employment, domestic work and private wage employment. Additionally, in order to discuss changes in the agricultural sector, we construct variables for time spent in self-employment and private wage employment in agriculture. For all employment types, we calculate the daily wage rate by dividing the weekly earnings by the number of days worked in that employment. Further, these wages are deflated using the monthly consumer price index for rural labor from the Indian Labor Bureau.

Table 2.3 shows the baseline mean values of our main labor market outcomes like wages and employment. The causal daily wages earned by workers in landlord and non-landlord districts were 2.55 and 2.60 natural log points respectively. This shows that wages were similar before the introduction of NREGA.26 Further, before the introduction of NREGA, people allocated close to 0.02 percent of their labor time per-week in public employment in non-landlord districts. The corresponding proportion was 0.2 percent for landlord districts. This shows that earlier targeted public employment programs like Jawahar Rozgar Yojana (JRY) worked in these districts because these districts had a higher proportion of their population below the poverty-line.27 However, these programs did not generate substantial public employment since workers allocated less than one percent of their time per-week working under these programs. Correspondingly, private work was the major source of employment for

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26 As NREGA requires beneficiaries to undertake casual manual labor and pays the minimum wage so individuals with salaries or formal employment are not included in this chapter.

27 Jawahar Rozgar Yojana (JRY) was launched in April 1989 with the objective of providing employment for the unemployed and under-employed persons in rural areas. See Neelakantan (1994) for a discussion on JRY.
people in which they spent more than 80 percent of their time per week in both districts.

2.5 Empirical Strategy
The assignment of NREGA was based on a poverty criterion. In the first phase the 200 poorest districts of the country received the program by February 2006. In the second phase, another 130 districts got the program by April 2007. Finally, in the third phase all districts of India were covered by April 2008. For this analysis, districts that got NREGA in the first two phases would be considered ‘early’ or ‘treatment’ districts while phase three districts are considered ‘late’ or ‘control’ districts.

The ‘pre-period’ comes from the 61st Round of NSS (July 2004 - June 2005) before NREGA was implemented. The 64th Round of NSS (July 2007 - June 2008) provides the ‘post-period’ data where phase I and phase II districts were under the ambit of NREGA (treatment or ‘early’) districts and phase III (control or ‘late’) districts were not. Even though the last sub-round of data collection takes place between April and June 2008, we can assume that due to administrative and bureaucratic delays, phase III districts would not have been fully under NREGA in the first few months of its roll-out. Imbert and Papp (2015) find that even in the second quarter of 2008, there was a significant differential rise in public works in early districts which implies that public works did not start in late districts immediately after April 2008.

2.5.1 Difference-in-Differences Framework
Recent studies have estimated the labor market impacts of NREGA using different estimation techniques.\textsuperscript{28} Azam (2011), Imbert and Papp (2015) and Berg, Bhat-

\textsuperscript{28}Some papers like Bell and Mukhopadhyay (2015) have used the election of a female sarpanch (elected head of the village assembly) to instrument for endogeneity in NREGA participation. This is based on the finding that NREGA implementation suffered initially from greater leakages and delays in villages with a woman sarpanch (Afri, Iversen, et al., 2013). These studies aim to correct for unobservable differences between households that participate in
tacharyya, Durgam, et al. (2012) have used the spatial and temporal variation in the implementation of NREGA in a difference-in-differences framework as their identification strategy. However, Zimmermann (2012) notes that NREGA roll-out was not random and was based on an index of backwardness calculated by the Planning Commission of India (PCI). This index was based on the poverty head-count ratio, proportion of marginalized communities (Scheduled Castes and Scheduled Tribes), agricultural wages and output per-worker using data from the mid-1990s. Consequently, Klonner and Oldiges (2014) and Zimmermann (2012) use the fuzzy-regression discontinuity design (RDD) using state-specific ranks based on the poverty index.

There are two reasons why RDD based estimates may not be applicable in the context of this chapter. First, allocation of districts under NREGA was based on state-level ranks from the backwardness index. There is evidence that political factors played a role in determining district level allocation of NREGA (Gupta, 2006). Second, a fuzzy-RDD would estimate the local average treatment effect by comparing changes ‘near’ the cut-off point (between phase II and phase III districts) which reduces the sample size and hence the power to detect any meaningful effects. Since our sample consists of only 289 districts which were directly under British colonial rule, the fuzzy-RDD would reduce our sample further.

While the fuzzy-RDD may not be applicable in our estimation, the conventional difference-in-differences estimator requires that the treatment be assigned randomly across the population (Heckman et al., 1997). This random assignment ensures that any unobservable characteristics that affect the outcome are controlled for as these may be present in both groups. However, the poverty criteria in district selection violates this assumption. In order to correct for this differential trend in ‘treatment’

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NREGA and correspondingly use a village-level instrument. However, this chapter discusses the role of district level land revenue institution and consequently, we need to control for district level factors that may bias our results.
and ‘control’ districts, our estimation controls for time-invariant district level factors like poverty, proportion of SC/ST, agricultural wage and productivity per-worker. Additionally, Zimmermann (2012) finds that districts affected by left-wing insurgency movements were included in the first phase of NREGA. We also control for 55 districts affected by left-movements. All district level controls are mentioned in Table 2.1.

The impact of NREGA on labor market outcomes in landlord and non-landlord districts can be estimated separately using the difference-in-differences estimation described by equation 2.1.

\[ Y_{idt} = \beta_1 \text{NREGA}_d \times \text{post}_t + \lambda_1 \text{Z}_d \times \text{post}_t + \lambda_2 X_{dt} + \sigma H_i + \eta_t + \mu_d + \epsilon_{idt} \]  

(2.1)

where \( Y_{idt} \) is the variable of interest (say ln deflated (real) wages) for an individual \( i \) in district \( d \) and during year-quarter \( t \). \( \text{NREGA}_d \) is a dummy equal to 1 if the district got NREGA in the first two (early) phases and post is a dummy equal to one if the observation is after 2006. \( Z_d \) contains time invariant controls which are interacted with a post-treatment dummy to capture trends correlated with the controls. Time-invariant controls include proportion of marginalized communities, poverty head-count ratio, and a dummy for whether the district was affected by left-wing movements among others. \( X_{dt} \) are time varying district controls like normalized deviation from mean rainfall and the length of road constructed in a year. All district controls are listed in Table 2.1. \( H_i \) are individual controls listed in Table 2.4, \( \eta_t \) is year-quarter fixed effects, \( \mu_d \) are district fixed effects and all estimates are adjusted for correlation \( \epsilon_{idt} \) over time within districts by clustering at the district level. Using this regression framework, this chapter estimates the labor market impact of NREGA in landlord and non-landlord districts separately.

\(^{29}\)As a robustness check of the estimates, we formally incorporate criteria used to rank districts by poverty to conduct propensity score matching and use the matched data to re-estimate the model in Appendix B.1.
The NSSO provides sampling weights which are used to calculate summary statistics. However, since both, NREGA and the institution of zamindari are district level phenomena, our estimates should not be biased by smaller districts which may have a fewer number of observations. Therefore, this chapter re-weights the data to ensure that sum of all weights within a district-quarter is constant over time for each district and proportional to the rural population (Imbert and Papp, 2015).  

### 2.5.2 Triple Difference Framework

In order to calculate the net or differential impact of NREGA between landlord and non-landlord districts after the implementation of NREGA we construct a triple-difference estimator. By using a dummy variable NL which takes a value of 1 if the district did not have the zamindari system, we create a triple interaction term of NREGA, post and NL for the triple-difference estimation. The estimated model is given in equation 2.2 below.

\[
Y_{idt} = \beta_1 NL \times NREGA_d \times post_t + \gamma_1 NL_d \times post_t \\
+ \gamma_2 NREGA_d \times post_t + \lambda_1 Z_d \times post_t \\
+ \lambda_2 X_{dt} + \sigma H_i + \eta_t + \mu_d + \epsilon_{idt}
\]

where \(Y_{idt}\) is the variable of interest (say wages) for individual \(i\) in district \(d\) having a historical land settlement pattern \(NL\) and during year-quarter \(t\). The coefficient of interest is \(\beta_1\) can be interpreted as the difference in the changes in an outcome (say wages) after NREGA in non-landlord districts in comparison to the corresponding changes in landlord districts. Therefore, landlord districts serve as a control group for non-landlord districts in this estimation. In order to control for differences in district level factors that may bias our estimates, we continue to include time-invariant district

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30The results do not change significantly even with the original sampling weights provided by NSSO.
controls interacted with a dummy for the post period. Coefficients $\gamma_1$ and $\gamma_2$ capture the interaction terms.\textsuperscript{31} All other terms are explained above in equation 2.1.

2.6 Results: Changes in Rural Labor Market Outcomes

2.6.1 Trends in Labor Market Outcomes

Using NSSO data for the dry season (January to June) from 1999 to 2010, figure 2.3 shows the trends in the natural log of real wages in landlord and non-landlord districts before and after NREGA was implemented. In landlord districts, wages were almost identical between early and late districts. However, in non-landlord districts, early districts had lower wages in comparison to the late districts (this is expected as early districts were poorer). While wages had an upward trend in both districts, in non-landlord districts the gap between early and late districts narrowed sharply after NREGA. This is primarily because, wages in non-landlord districts under NREGA rose more significantly in comparison to early districts which had the landlord-based land revenue system.

Figure 2.4 shows trends in public employment. In the pre-program period (before 2007), the provision of public employment remained constant from 2000 to 2005 in both landlord and non-landlord districts. However, there is a sharp discontinuity in this trend post-NREGA as can be expected since NREGA provides guaranteed public employment. After NREGA was implemented, there is a steep rise in public employment for both landlord and non-landlord districts. The sharp increase in public employment of ‘late districts’ witnessed by landlord districts in 2010 points to the fact that by this time, NREGA was operational in all districts and the late districts no longer provide a control for early districts. This figure underscores the importance of including district level controls in my estimation.

\textsuperscript{31}We do not include the third interaction term $NREGA_d \times NL_d$ as this is time-invariant and will drop out of the regression.
Finally, figure 2.5 shows trends in private employment between 1999-2010. In non-landlord districts, private employment falls significantly in early districts as workers substitute NREGA for private employment. This explains crowding-out of private employment in these districts. However, there is no impact on time spent in private employment in landlord districts that received the program early (i.e. districts that received the program by 2007). The gap between early and late landlord districts is much smaller than that for non-landlord districts. This indicates that the effect of the program on private employment was muted in landlord districts. Since the provision of NREGA exerts an upward pressure on wages in non-landlord districts, it is not surprising to find that labor demand would reduce and correspondingly, time spent in private employment would also decline. However, by 2010, time spent in private employment increases in both landlord and non-landlord districts. This may signal that private labor demand increases over time in both landlord and non-landlord districts. This could be because of enhanced agricultural productivity or reduced public employment generated under NREGA as governments reduced budgetary allocation over time. Next, we turn to empirically estimating the labor market impacts of NREGA in landlord and non-landlord districts.

2.6.2 Regression Results: Changes in Rural Wages

Table 2.5 presents the estimation of equation 2.1 and equation 2.2 for the natural log of real casual wages during the dry season. Each regression equation includes district and year-quarter fixed effects. Columns (1) - (3) report the estimates of the impact of NREGA on ln real casual wages in landlord districts and columns (4) - (6) report the corresponding estimates for non-landlord districts. Finally, columns (7) - (9) show the results of the triple-difference estimation. Each column presents a different specification. Columns (3), (6) and (9) report the preferred specification.
including all district and individual level controls for the difference-in-differences and triple-difference estimations.\textsuperscript{32}

There is no effect of NREGA on real casual wages in landlord districts when year-quarter fixed-effects and district and individual-level controls are included (columns (1) - (3)). This is counter-intuitive as public employment under NREGA should increase casual wages which includes both public and private wages. However, in landlord districts collective bargaining power of workers is low which allows landlords to keep wages depressed even after NREGA is introduced in these districts. The situation in non-landlord districts is quite different. Casual wages increased by around 6.4 percent in these districts (columns (3) - (6)) which shows that NREGA has been far more successful in these districts. These estimates are comparable to the wage impact of NREGA in ‘best performing’ states like Andhra Pradesh, Himachal Pradesh, Rajasthan and Tamil Nadu which saw a wage increase of around 9 percent (Imbert and Papp, 2015). Azam (2011) finds that casual wages in NREGA districts increased by 5 percent in comparison to non-NREGA districts. Finally, the triple difference estimation (columns (6) - (9)), show that in comparison to wage change in landlord districts, there has been an 18 percent increase in non-landlord districts. This result is robust to all the specifications presented in Table 2.5.

These results lend credence to the main hypothesis of this chapter that in landlord districts, NREGA has not been successful in improving wages for casual workers. Section 2.3 discussed the mechanisms by which the wage effect of NREGA may be muted in landlord districts. If the provision of public employment under NREGA is not sufficient, it may not be successful in raising the bargaining position of workers. We now turn to examining changes in time spent in public employment to see whether

\textsuperscript{32}This chapter estimates how colonial land revenue system attenuates the impact of NREGA. Therefore, in this section we do not discuss the direct effects of NREGA on rural labor markets. Both difference-in-differences and triple difference estimators use time-quarter and district fixed-effects. For direct effects of the program see Azam (2011); Imbert and Papp (2015).
this divergence in the wage impact of NREGA can be explained by differences in the provision of public works in these districts. Next, we turn to examining the employment dynamics in these districts post-NREGA.

2.6.3 Regression Results: Changes in Public Employment

Table 2.6 presents the estimation of equation 2.1 and equation 2.2 for percentage of time spent per day in public employment during the dry season. In all the specifications, there is a positive but insignificant impact on public employment in the landlord districts. This is an important result as these districts were poorer than non-landlord districts and NREGA was intended to provide livelihood to landless workers and marginal farmers in poor districts. Further, since agricultural labor demand during the dry season is weak (Basu, 2013), this sluggish increase in time allocated to public employment in landlord districts shows that provision of public employment in these districts would fall short of the demand.

Lower provision of NREGA employment in these districts could be because of the political decision-making power of the landlord class or due to differences in administrative capacity (Dutta et al., 2012). However, NREGA implementation is determined by state governments and several states like Uttar Pradesh, Andhra Pradesh, Assam and Maharashtra had both landlord and non-landlord systems with similar administrative capacities and resources to implement NREGA. Therefore, administrative capacity may not satisfactorily explain the insufficient provision of NREGA. Correspondingly, the ability of local elite to control the implementation of NREGA to protect their class-interests explain why it has not been able to emerge as a viable alternative for private employment.

In contrast, there is a positive and statistically significant increase in public employment in the non-landlord districts. In these districts, time spent by workers in public employment rose by around one percentage point in 2007-2008 from 0.02 percent in
2004-2005. The difference in time spent under public employment between landlord and non-landlord districts is insignificant but positive as shown by the coefficients on the triple difference estimation. In order to look at corresponding changes in labor demand, the next section tests the impact of NREGA in creating private employment.

2.6.4 Regression Results: Changes in Private Employment

We now turn to private employment in Table 2.7. The coefficient of private employment is insignificant for landlord districts. As discussed in Section 3b, this suggests that workers in landlord districts continue to depend on large landowners for subsistence as the provision of NREGA is insufficient to provide workers with a credible alternative to private wage employment. The landowning elite in these districts exercise significant political domination and can control the implementation of NREGA to protect their class-interests by keeping wages depressed even after NREGA. Thus, there is no meaningful impact of NREGA on private wage employment in these districts.

In contrast, in non-landlord districts time spent in private employment decreased by around 3 percentage points from its baseline value of 81 percent in 2004-2005. This implies that in 2007-2008, workers were spending only around 78 percent of their time in private employment in non-landlord districts and this change is significant at the 1 percent level. This result is similar to that shown by Imbert and Papp (2015) for their ‘best performing’ states. This shows that NREGA impacts rural labor markets by providing workers with an alternative to private employment. In non-landlord districts, where time spent in public employment increased, rural wages rose and correspondingly employers reduced labor demand.

Finally, on comparing the change in private employment in these districts, relative to landlord district in the triple-difference specification, the results show a 3.5 percentage point decline in private employment, but this is not statistically significant.
To better understand the source of ‘crowding-out’ of private labor demand we disaggregate private labor into its components - self-employment, domestic work and private wage employment. From Panel A of Table 2.8, we see that in both landlord and non-landlord districts, there is an increase in time spent in self-employment (including agricultural and non-agricultural self-employment) with the former being larger (4.5 percentage points) than the latter (1.8 percentage points). However, this change is statistically insignificant. In rural India, almost all households are involved in some form of self-employment to augment their incomes. The large increase in self-employment in landlord districts can be attributed to a fall in domestic and private wage employment.

Further, Panel B of Table 2.8 shows that domestic employment also falls in both labor markets. This result indicates that after NREGA, women may be substituting public employment for unpaid work since they disproportionately shoulder the responsibility of domestic work. This is consistent with Khera and Nayak (2009), Azam (2011) and Zimmermann (2012) who show that women benefit more from NREGA. The decline in unpaid domestic work is statistically significant in non-landlord districts indicating that women may be participating more in these districts in comparison to their counterparts in landlord districts. This shows that while private employment may have fallen in non-landlord districts, the most significant share of this decline can be attributed to changes in labor time for unpaid domestic work.

Finally, we see from Panel C of Table 2.8 that there is a negative, but statistically insignificant effect on private wage employment in both landlord and non-landlord districts. Therefore, we can conclude that the ‘crowding-out’ of private employment is primarily because of women substituting unpaid work with public employment. This increases their incomes and bargaining positions both within and outside the household.
2.7 Agricultural Labor Markets

The results derived above describe rural labor market dynamics post-NREGA. This included both agricultural and non-agricultural labor in the rural areas where NREGA employment is undertaken. However, agriculture forms a major component of rural livelihoods, so it is important to estimate the impact of NREGA in agricultural markets. In particular, the changes in deflated casual wages described in Table 2.5 correspond to casual wages earned in public or private employment. However, it may be the case that the increase in casual wages is driven solely by NREGA wages. In order to address these concerns, Table 2.9 re-estimates the difference-in-differences and triple-difference estimates for the agricultural labor market.

2.7.1 Private Agricultural Wages

Panel A of Table 2.9 shows that NREGA does not have any statistically significant effect on agricultural wages in landlord and non-landlord districts separately. However, the differential wage increases in non-landlord districts in comparison to landlord districts is around 20 percent which is statistically significant. This implies that in comparison to landlord districts, non-landlord districts witness an increase in agricultural wages after NREGA. These findings are consistent with existing research which finds that NREGA has contributed to increasing wages for unskilled agricultural labor (Berg, Bhattacharyya, Rajasekhar, et al., 2018).

The fall in agricultural wages in landlord districts is a surprising result as NREGA is expected to improve wages for casual workers. Two factors may explain this result. First, workers employed as private agricultural labor during this period are those

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33This chapter does not explicitly deal with changes in the non-agricultural labor market for three reasons. First, this chapter looks at the rural economy and agriculture is the predominant occupation of the rural sector as most families engage in some farming. Second, public employment under NREGA is used to create public works aimed at increasing the productivity of agriculture. Existing research has stressed on this ‘non-transfer’ benefit of NREGA. Consequently, we study whether colonial land revenue institutions dampen this effect. Finally, since NREGA employment is concentrated in the lean season of agriculture, its impact on the non-farm sector may not be direct. Therefore, a full treatment of changes in these markets is beyond the scope of this chapter and future research may shed more light on the subject. See Binswanger-Mkhize (2013) for changes in the non-farm sector.
engaged in permanent contracts with their employers. Basu (2013) shows that workers in permanent contracts are paid less during the lean season as this reduction in payment is compensated by job security over the year.

Evidence suggests that tied-labor contracts and involuntary unemployment still exist in rural India. While states like Bihar, Jharkhand, Uttar Pradesh and Uttarakhand historically had some of the highest incidences of attached or tied-labor arrangements (Bardhan, 1983), more recently evidence of tied-labor has also been found in Andhra Pradesh, Madhya Pradesh, Rajasthan and Punjab (Basu, 2002). In Andhra Pradesh attached laborers are mainly males between the ages of 10-70 and are on yearly contracts (Deshingkar and Farrington, 2006). Attached labor contracts are also observed among the lower caste landless households in Rajasthan (Bhasin, 2004). In Punjab, although the ratio of attached labor to casual labor is less than one, this ratio increases with the size of land holdings (Singh, Singh, et al., 2007) which signals that large farms are more prone to using tied-labor. Finally, village level studies in the Telangana region of South India Motiram (2007) and Rawal (2006) in rural Haryana also point to the existence of tied and attached laborers.

Second, since these results are derived for the dry season of agriculture when labor demand is low, large employers can depress wages further as labor supply exceeds demand (Basu, 2013). Since NREGA provides some income support to workers, large land-owners may use their wage-setting power to reduce private wages as a part of workers’ subsistence is met by public works. As landlord districts are poorer than non-landlord districts, workers may have fewer outside options and rely mostly on agricultural employment for their survival. This is similar to the impact of NREGA on rural wages discussed above in section 2.6. This result shows that the success of NREGA in raising agricultural wages is limited in landlord districts. In non-landlord
districts, workers may resist wage cuts as greater provision of NREGA enables them to bargain with private employers for higher wages.

2.7.2 Self-Employment in Agriculture

We turn next to self-employment reported in Panel B of Table 2.9. In non-landlord districts, workers increase time spent in self-farming, but this change is not statistically significant. On the other hand, in landlord districts, workers reduce time spent in self-farming by around 1.7 percentage points and this result is significant at the 5 percent level. Since landlord districts are characterized by high land inequality, small and marginal farmers are ‘effectively landless’ and they may actively substitute labor away from self-farming to either NREGA employment or other private employment. Since farming on very small plots of land does not allow farmers to sustain their livelihoods, as Basole and Basu (2011) show, most people own less than one acre and are effectively landless. However, since alternative employment is lacking, people continue to work in self-farming. NREGA employment allows workers to substitute self-farming with public employment without affecting agricultural productivity. On the other hand, in non-landlord districts, NREGA has no impact on time spent in self-farming. This is because NREGA improves the productivity of self-farming in these regions. These regions have lower inequality in landownership and public works increase the productivity of self-farming.

2.7.3 Private Wage Employment in Agriculture

Finally, panel C of Table 2.9 looks at the private labor market. I find that there is a sharp decline in the percentage of time spent in private agricultural employment during the lean season. In non-landlord districts people reduce the time spent in private agricultural employment by around 5 percentage points. This is consistent with results presented above in Table 2.7 which show that private employment in non-landlord districts reduces due to rising wages after NREGA. Studies have shown that
employers have adopted labor-saving agricultural technologies in response to rising wages after NREGA (Bhargava, 2014). There is no statistically significant change in time allocated to private agricultural employment in landlord districts. This further shows that NREGA has not emerged as a credible alternative to private agricultural employment in these districts.

2.8 Conclusion

Employment guarantee programs have the potential to dent both transient and persistent poverty by providing income support to workers. This can improve rural wages for more than 260 million marginal farmers and landless workers engaged in Indian agriculture. While the overall impact of NREGA is positive and encouraging, considerable regional heterogeneity exists in performance between regions and across social groups. In a marked departure from existing research, this chapter presents evidence for the role of political economy factors in explaining the regional heterogeneity of NREGA. The ability of NREGA to raise rural wages by providing public employment is stymied in the districts where the historical colonial land revenue system led to the creation of a large landlord class. In contrast, in non-landlord districts, NREGA has had a positive impact on casual wages.

Further, in comparison to the landlord districts, there is a decline (crowding-out) of private employment in non-landlord districts. However, this change is primarily driven by a reduction in time allocated to unpaid domestic labor which is performed primarily by women. In terms of agricultural labor markets, this chapter finds that time spent in self-employment declines in landlord districts as workers substitute work on subsistence farms with public employment. Therefore, this chapter shows that historic inequalities that NREGA had the potential to redress, are attenuating its impact in districts that need it the most. In comparison to their counterparts in non-landlord districts, workers in landlord districts may be at a twin disadvantage.
First, these districts have monopsonistic labor markets characterized by the presence of a powerful landlord class. As a result, rural wages do not improve even after NREGA as the landlord class can depress wages using their market power.

Second, these districts have worse development indicators (like poverty headcount ratio) but the actual time spent by workers in NREGA employment is lower than in non-landlord districts. This suggests that in these districts the provision of NREGA may be insufficient to augment the incomes of small and marginal farmers. This is consistent with several studies that find evidence of considerable rationing of NREGA employment in Bihar, Jharkhand Odisha (Mukherjee and Sinha, 2013). These states were almost exclusively characterized by the landlord system of land revenue.

As India completes more than a decade of this historic legislation, it is distressing to see that the political commitment to this scheme stands diluted. Some commentators like Bhagwati and Panagariya (2014) have supported the present government’s proposal of confining NREGA to the poorest 200 districts of the country citing fiscal constraints and leakages due to ‘poor targeting’ because of the demand-driven nature of the scheme. However, Besley and Coate (1992) show that public ‘workfare’ programs will succeed if the demand for employment under the program exceeds private employment opportunities available to workers. Since, NREGA employment is primarily provided in the lean season of agriculture when private labor demand is low, workers who self-select to work in public employment do not have alternative employment available to them. Further, several studies using national and field level data have concluded that the scheme is mostly availed by the poor and participation by people from the top consumption quintile is merely 10 percent (Sabhikhi, 2012). This shows that the scheme is not poorly targeted. Further, as Abreu et al. (2014) have argued, productivity enhancing public works under NREGA add to the non-transfer benefits of the program which augment the welfare effects of the pro-
gram. Therefore, efforts must be made to improve the implementation of NREGA, particularly in landlord districts.

The first step towards strengthening NREGA would include increasing the administrative capacity at the grassroots level including among village assemblies and block level officials. Second, steps should be taken to ensure greater democratization of local decision-making to ensure that the participatory nature of the scheme is not diluted. Finally, NREGA should actually be implemented as a right of workers and elected representatives must be held accountable for its inadequate provision and timely compensation must be paid if work cannot be provided under the program. Uncovering specific challenges faced by workers in landlord districts in accessing NREGA employment are fruitful avenues for future research.
Figure 2.1: Distribution of Land Revenue System

Source: Adapted from Banerjee and Iyer (2005)
Figure 2.2: Change in Real Casual Wages 2004 - 2008 (in INR)

Note: This figure shows the mean of rural wages for both landlord and non-landlord groups before (2005) and after (2008) the first two phases of NREGA. For both time periods this figure is constructed for districts that got NREGA in Phase I (2006) and II (2007). Real wages are constructed by deflating the nominal wages using the monthly state-level consumer price index (CPI) for rural labor. Nominal wages are constructed using the National Sample Survey (NSS) 2004 - 2008 and state-level price index for rural laborers from the Indian Labor Bureau.
Figure 2.3: Trends in Ln Deflated Wage

Source: National Sample Survey (NSS) 1999 - 2010
Figure 2.4: Trends in Public Employment

Source: National Sample Survey (NSS) 1999 - 2010
Figure 2.5: Trends in Private Employment

Source: National Sample Survey (NSS) 1999 - 2010
Table 2.1: District Level Controls

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-Landlord (1)</th>
<th>Landlord (2)</th>
<th>p-value (3)</th>
<th>Source (4)</th>
<th>Time-Varying (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fraction Scheduled Castes (SC)</td>
<td>0.17</td>
<td>0.20</td>
<td>0.00</td>
<td>Census 2001</td>
<td>No</td>
</tr>
<tr>
<td>Fraction Scheduled Tribes (ST)</td>
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<td>0.10</td>
<td>0.39</td>
<td>Census 2001</td>
<td>No</td>
</tr>
<tr>
<td>Fraction Literate</td>
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<td>0.46</td>
<td>0.00</td>
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<td>No</td>
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<tr>
<td>Fraction Male Labor Force</td>
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<td>0.70</td>
<td>0.00</td>
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<tr>
<td>Fraction Female Labor Force</td>
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<td>Fraction Agricultural Labor</td>
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<td>0.51</td>
<td>0.68</td>
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<td>Population Density</td>
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<td>643</td>
<td>0.00</td>
<td>Census 2001</td>
<td>No</td>
</tr>
<tr>
<td>Fraction Irrigated</td>
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<td>0.48</td>
<td>0.42</td>
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</tr>
<tr>
<td>Fraction Unirrigated</td>
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<td>0.52</td>
<td>0.42</td>
<td>Census 2001</td>
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<tr>
<td>Log Agricultural Wage</td>
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<td>3.59</td>
<td>0.77</td>
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<td>No</td>
</tr>
<tr>
<td>Fraction Casual Agriculture</td>
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<td>0.20</td>
<td>0.17</td>
<td>NSSO (EUS) 2004</td>
<td>No</td>
</tr>
<tr>
<td>Fraction Casual Non-Agriculture</td>
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<td>0.01</td>
<td>NSSO (EUS) 2004</td>
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<td>Fraction Cultivators</td>
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<td>0.67</td>
<td>NSSO (EUS) 2007</td>
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<td>Fraction Non-Agricultural Business</td>
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<td>0.11</td>
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<td>0.00</td>
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<tr>
<td>Proportion below Poverty Line</td>
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<td>0.35</td>
<td>0.00</td>
<td>NSSO (CES) 2004</td>
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</tr>
<tr>
<td>Agricultural Productivity per Worker (normalized)</td>
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<td>-0.02</td>
<td>0.55</td>
<td>Ministry of Agriculture</td>
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<td>Left-wing Dist (2004)</td>
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<td>0.23</td>
<td>0.00</td>
<td>Planning Commission</td>
<td>Yes</td>
</tr>
<tr>
<td>Deviation rainfall (normalized)</td>
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<td>0.19</td>
<td>0.39</td>
<td>Univ. of Delaware</td>
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<tr>
<td>Road Construction</td>
<td>32.62</td>
<td>31.06</td>
<td>0.74</td>
<td>PMGSY website</td>
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</tr>
<tr>
<td>Election Year</td>
<td>0.43</td>
<td>0.54</td>
<td>0.06</td>
<td>Election Commission</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Number of Districts: 159, 130

Note: This Table shows the mean values of district level controls used in all estimations. Column 1 and 2 present the mean values of controls for non-landlord and landlord districts respectively. Column (3) presents the p-values of the student’s t-test of equality of means in columns 1 and 2. Column (4) gives the data source used and column (5) states whether the controls are time varying or not. The 61st Round of NSSO data is used to calculate baseline means reported in this Table. The Employment and Unemployment Survey is used for calculating labor force participation variables and the Consumption Expenditure Survey is used for calculating the proportion of population below poverty line. Proportion of population comes from Census 2001 and information on irrigated land is taken from Village Directory, Census 2001. Productivity per worker (normalized) is calculated using data on output and prices from the Ministry of Agriculture and number of agricultural workers from NSSO. Data on the proportion of districts affected by left-wing insurgency comes from Planning Commission report, 2005 and estimates of deviation of rainfall (normalized) from the mean of quarterly rainfall from 1970 - 2010 is constructed using data from the University of Delaware Earth System Research Library. Finally, data on annual road construction is taken from the website of the Pradhan Mantri Gram Sadak Yojna (PMGSY) and dummies for years preceding state or village body (panchayat) election is taken from the Election Commission of India website.
Table 2.2: Distribution of Districts by Land Tenure System and NREGA Phase

<table>
<thead>
<tr>
<th>State</th>
<th>District</th>
<th>Non-Landlord</th>
<th>Landlord</th>
<th>Non-Landlord</th>
<th>Landlord</th>
<th>Non-Landlord</th>
<th>Landlord</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
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<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
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<td>1</td>
<td>6</td>
<td>0</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Bihar</td>
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</tr>
<tr>
<td>Chhattisgarh</td>
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<td>4</td>
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<td>Haryana</td>
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<td>Jharkhand</td>
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<td>1</td>
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<td>2</td>
<td>0</td>
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<td>Uttar Pradesh</td>
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<td>22</td>
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<td>Uttarakhand</td>
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<td>West Bengal</td>
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<td>7</td>
<td>0</td>
<td>5</td>
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<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>289</td>
<td>40</td>
<td>73</td>
<td>37</td>
<td>37</td>
<td>82</td>
<td>20</td>
</tr>
</tbody>
</table>

*Note:* This Table shows districts in each state used in this chapter. Districts are classified according to their land revenue system and the phase when NREGA was implemented in it. Data on phases is taken from the NREGA website and information about land settlement system by district is taken from Banerjee and Iyer (2005). Districts of British India are matched to boundaries given in Census 2001 using Kumar and Somanathan (2015). Districts for which data on boundaries was not available and those under rule by Indian kings and princes (Princely States) during colonial rule are excluded from this chapter.
Table 2.3: Labor Market Outcomes at Baseline

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-Landlord (1)</th>
<th>Landlord (2)</th>
<th>p-value (3)</th>
</tr>
</thead>
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<td>Ln Deflated Wage</td>
<td>2.6</td>
<td>2.5</td>
<td>0.30</td>
</tr>
<tr>
<td>Public Work</td>
<td>0.02%</td>
<td>0.19%</td>
<td>0.64</td>
</tr>
<tr>
<td>Private Sector Work</td>
<td>81%</td>
<td>83%</td>
<td>0.71</td>
</tr>
<tr>
<td>Self Employment</td>
<td>33%</td>
<td>31%</td>
<td>0.55</td>
</tr>
<tr>
<td>Domestic Work</td>
<td>26%</td>
<td>35%</td>
<td>0.08</td>
</tr>
<tr>
<td>Private Wage Work</td>
<td>22%</td>
<td>18%</td>
<td>0.29</td>
</tr>
<tr>
<td>Unemployed</td>
<td>6%</td>
<td>5%</td>
<td>0.64</td>
</tr>
<tr>
<td>Not in Labor Force</td>
<td>12%</td>
<td>11%</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Observations 57,989 67,553

Note: This Table shows the mean values for labor market outcomes at the baseline level. All values are restricted to persons aged 15 to 60. Natural log of daily wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. Percentage of time spent in private, self and public employment is calculated using the Employment and Unemployment Round of NSSO data 2004. Column (1) and (2) present the mean values of labor market outcomes for between non-landlord and landlord districts respectively. Column (3) presents the p-values of the student’s t-test of equality of means between landlord and non-landlord districts.

Table 2.4: Individual Level Controls

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non Landlord (1)</th>
<th>Landlord (2)</th>
<th>p-value (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>33.29</td>
<td>33.07</td>
<td>0.88</td>
</tr>
<tr>
<td>Education (years)</td>
<td>4.76</td>
<td>3.76</td>
<td>0.06</td>
</tr>
<tr>
<td>Women</td>
<td>0.50</td>
<td>0.50</td>
<td>0.97</td>
</tr>
<tr>
<td>Married</td>
<td>0.70</td>
<td>0.74</td>
<td>0.42</td>
</tr>
<tr>
<td>Scheduled Tribes</td>
<td>0.09</td>
<td>0.10</td>
<td>0.67</td>
</tr>
<tr>
<td>Scheduled Castes</td>
<td>0.20</td>
<td>0.23</td>
<td>0.59</td>
</tr>
<tr>
<td>Other Backward Castes</td>
<td>0.46</td>
<td>0.39</td>
<td>0.24</td>
</tr>
<tr>
<td>Muslims</td>
<td>0.12</td>
<td>0.14</td>
<td>0.68</td>
</tr>
<tr>
<td>Household size</td>
<td>5.63</td>
<td>5.87</td>
<td>0.48</td>
</tr>
<tr>
<td>Self-employed (agriculture)</td>
<td>0.37</td>
<td>0.39</td>
<td>0.84</td>
</tr>
<tr>
<td>Proportion Agricultural Labor</td>
<td>0.24</td>
<td>0.27</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Individual Observations 67,553 57,989

Note: This Table shows the mean values of individual level controls used in all estimations. Column (1) and (2) present the mean values of controls for non-landlord and landlord districts respectively. Column (3) presents the p-values of the student’s t-test of equality of means between non-landlord and landlord districts. The 61st Round of the Employment and Unemployment Survey of NSSO is used to calculate baseline means reported in this Table.
Table 2.5: Changes in Ln Deflated Wages Between Landlord and Non Landlord Districts in the Dry Season

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>DD: NREGA by Landlord Districts</th>
<th>DD: NREGA by Non-Landlord Districts</th>
<th>DDD: By NREGA and Non Landlord</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td>0.198*** (0.0615)</td>
<td>0.180*** (0.0630)</td>
<td>0.177*** (0.0638)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>-0.137*** (0.0509)</td>
<td>-0.136** (0.0560)</td>
<td>-0.162*** (0.0565)</td>
</tr>
<tr>
<td>NREGxpost</td>
<td>-0.0860* (0.0496)</td>
<td>0.112*** (0.0568)</td>
<td>0.0629** (0.0306)</td>
</tr>
<tr>
<td></td>
<td>-0.0608 (0.0597)</td>
<td>0.0636** (0.0293)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>9,437</td>
<td>9,437</td>
<td>9,433</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.327</td>
<td>0.336</td>
<td>0.395</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls x post</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: This Table shows results for three panels. Columns (1) - (3) show results of a difference-in-differences for landlord districts and columns (4) - (6) for non-landlord districts and column (7) - (9) show results of a triple difference. Each column presents results from a separate specification. Natural log of daily wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. Data on on employment is calculated using the 61st Round (pre-period) and the 64th Round (post-period) of NSSO data. We use weights proportional to the district population and all district level time-invariant controls are interacted with a dummy for the post period. Standard errors in parentheses are clustered at the district level.
Table 2.6: Changes in Public Employment Between Landlord and Non Landlord Districts in the Dry Season

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>DD: NREGA by Landlord Districts</th>
<th>DD: NREGA by Non-Landlord Districts</th>
<th>DDD: By NREGA and Non Landlord</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td>0.743</td>
<td>0.413</td>
<td>0.472</td>
</tr>
<tr>
<td></td>
<td>(0.750)</td>
<td>(0.791)</td>
<td>(0.793)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>-0.243*</td>
<td>-0.896***</td>
<td>-0.932***</td>
</tr>
<tr>
<td></td>
<td>(0.136)</td>
<td>(0.298)</td>
<td>(0.309)</td>
</tr>
<tr>
<td>NREGxpost</td>
<td>0.475*</td>
<td>0.868</td>
<td>0.825</td>
</tr>
<tr>
<td></td>
<td>(0.274)</td>
<td>(0.554)</td>
<td>(0.555)</td>
</tr>
<tr>
<td></td>
<td>1.219*</td>
<td>0.936**</td>
<td>0.936**</td>
</tr>
<tr>
<td></td>
<td>(0.700)</td>
<td>(0.396)</td>
<td>(0.396)</td>
</tr>
<tr>
<td>Observations</td>
<td>59,743</td>
<td>59,743</td>
<td>59,582</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.054</td>
<td>0.061</td>
<td>0.066</td>
</tr>
<tr>
<td></td>
<td>(0.061)</td>
<td>(0.066)</td>
<td>(0.066)</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls x post</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

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

Note: This Table shows results for three panels. Columns (1) - (3) show results of a difference-in-differences for landlord districts and columns (4) - (6) for non-landlord districts and columns (7) - (9) show results of the triple difference estimation. Each column presents results from a separate specification. Public employment is a percentage of time spent by individuals in working on public employment. Data on employment is calculated using the 61st Round (pre-period) and the 64th Round (post-period) of NSSO data. We use weights proportional to the district population and all district level time-invariant controls are interacted with a dummy for the post period. Standard errors in parentheses are clustered at the district level.
Table 2.7: Changes in Private Employment Between Landlord and Non Landlord Districts in the Dry Season

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>DD: NREGA by Landlord Districts</th>
<th>DD: NREGA by Non-Landlord Districts</th>
<th>DDD: By NREGA and Non Landlord</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td>-4.670* (2.403)</td>
<td>-4.097 (2.549)</td>
<td>-3.502 (2.265)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>2.964 (2.064)</td>
<td>3.631* (2.195)</td>
<td>3.432* (1.855)</td>
</tr>
<tr>
<td>NREGxpost</td>
<td>1.688 (2.070)</td>
<td>1.213 (2.606)</td>
<td>1.272 (2.264)</td>
</tr>
<tr>
<td>Observations</td>
<td>59,743</td>
<td>59,743</td>
<td>59,582</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.027</td>
<td>0.275</td>
<td>0.032</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls x post</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: This Table shows results for three panels. Columns (1) - (3) show results of a difference-in-differences for landlord districts, columns (4) - (6) for non-landlord districts and columns (7) - (9) show results of a triple difference estimation. Each column presents results from a separate specification. Public employment is a percentage of time spent by individuals in working on public employment. Data on employment is calculated using the 61st Round (pre-period) and the 64th Round (post-period) of NSSO data. We use weights proportional to the district population and all district level time-invariant controls are interacted with a dummy for the post period. Standard errors in parentheses are clustered at the district level.
Table 2.8: Decomposing the Effect of NREGA on Private Employment

<table>
<thead>
<tr>
<th>Panel</th>
<th>Self Employment</th>
<th>Domestic Work</th>
<th>Private Wage Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Landlord DD</th>
<th>Non Landlord DD</th>
<th>Triple Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>NREGxNLxpost</td>
<td>-3.590</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.058)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NLxpost</td>
<td>1.274</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.522)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxpost</td>
<td>4.526</td>
<td>1.754</td>
<td>3.955</td>
</tr>
<tr>
<td></td>
<td>(2.924)</td>
<td>(1.975)</td>
<td>(2.646)</td>
</tr>
<tr>
<td>Observations</td>
<td>59,582</td>
<td>59,232</td>
<td>118,814</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.235</td>
<td>0.185</td>
<td>0.205</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Landlord DD</th>
<th>Non Landlord DD</th>
<th>Triple Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>NREGxNLxpost</td>
<td>1.717</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.247)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NLxpost</td>
<td>2.210</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.720)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxpost</td>
<td>-2.204</td>
<td>-2.615**</td>
<td>-2.541</td>
</tr>
<tr>
<td></td>
<td>(1.829)</td>
<td>(1.285)</td>
<td>(1.867)</td>
</tr>
<tr>
<td>Observations</td>
<td>59,582</td>
<td>59,458</td>
<td>118,814</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.580</td>
<td>0.048</td>
<td>0.522</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Landlord DD</th>
<th>Non Landlord DD</th>
<th>Triple Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>NREGxNLxpost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NLxpost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxpost</td>
<td>-1.050</td>
<td>-2.200</td>
<td>-0.152</td>
</tr>
<tr>
<td></td>
<td>(2.669)</td>
<td>(1.647)</td>
<td>(2.416)</td>
</tr>
<tr>
<td>Observations</td>
<td>59,582</td>
<td>59,232</td>
<td>118,814</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.173</td>
<td>0.172</td>
<td>0.173</td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1

Note: Panel A, Panel B and Panel C report the regression results for Self Employment, Domestic Employment and Private Wage Employment respectively. Each column presents results from a separate specification. Column (1) and (2) report the results of a double difference estimation for landlord and non-landlord districts respectively. Column (3) reports the results of the triple-difference estimation. All regressions include district and individual level controls defined in Table 1 and Table 4 respectively. All employment variables are calculated using the 61st and 64th round of NSSO. We use weights proportional to the district population and standard errors in parentheses are clustered at the district level.
Table 2.9: Effect of NREGA on Agricultural Labor Markets in the lean season

<table>
<thead>
<tr>
<th>Panel A. Ln Agricultural Wage</th>
<th>Landlord DD (1)</th>
<th>Non Landlord DD (2)</th>
<th>Triple Difference (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NREGxNLxpost</td>
<td>0.197***</td>
<td>(0.0742)</td>
<td></td>
</tr>
<tr>
<td>NREGxpost</td>
<td>-0.109</td>
<td>0.0557</td>
<td>-0.122*</td>
</tr>
<tr>
<td></td>
<td>(0.0696)</td>
<td>(0.0374)</td>
<td>(0.0628)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>-0.211***</td>
<td>(0.0654)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>5,414</td>
<td>5,733</td>
<td>11,147</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.466</td>
<td>0.661</td>
<td>0.564</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B. Self Employment in Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>NREGxNLxpost</td>
</tr>
<tr>
<td>NLxpost</td>
</tr>
<tr>
<td>NREGxpost</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>R-squared</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel C. Private Agricultural Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>NREGxNLxpost</td>
</tr>
<tr>
<td>NLxpost</td>
</tr>
<tr>
<td>NREGxpost</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>R-squared</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
</tr>
<tr>
<td>District Controls x post</td>
</tr>
<tr>
<td>Individual Controls</td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1

Note: This Table shows the impact of NREGA on agricultural labor markets. Panel A, Panel B and Panel C report the regression results for log of agricultural wage (deflated), self-employment and private wage casual employment agriculture. Each column presents results from a separate specification. All rates are calculated using the 61st and 64th Round of NSSO data which is spread over four sub-rounds in a year. All regressions are estimated for the dry season. All regressions include district controls mentioned in Table 1 and Table 4 respectively. In addition, each specification includes year quarter and district fixed effects. Reweighted sampling weights are used in these regressions and robust standard errors in parentheses are clustered at the district level.
CHAPTER 3

NO EMPLOYMENT WITHOUT PARTICIPATION: AN EVALUATION OF INDIA’S EMPLOYMENT PROGRAM IN EASTERN UTTAR PRADESH

3.1 Introduction

The Mahatma Gandhi National Rural Employment Guarantee Act (NREGA) is the largest rural welfare program in the world. Enacted in 2005, this scheme guarantees 100 days of employment in a year to every rural household at the legal minimum wage. The Act was operational in the 200 poorest districts by February 2006, another 130 districts got the scheme in the second phase in April 2007 and finally by 2008, the entire country was under this ambit. This legal work entitlement impacts close to 50 million households in India and is thus a powerful tool for social and economic transformation. Through its joint emphasis on social protection and livelihood security, in principle, the scheme endeavors to empower the rural poor by instilling a new sense of identity and bargaining power and make economic growth inclusive for all in rural India. However, lack of transparency in its implementation and awareness of legal entitlements of workers has diluted the demand-driven nature of the program. This chapter presents an analysis of the awareness of legal entitlements and responsibilities of various stakeholders in the implementation of NREGA in one of the poorest regions of the country. Further, we discuss the impact of NREGA on agricultural productivity and wage bargaining by landless workers who are the intended beneficiaries of NREGA.
Public workfare programs have enjoyed a long and distinguished presence in the experience of economic development around the world and their potential benefits depend on their ability to create income safety-nets for the poor.1 This program improves upon earlier employment schemes in two ways. First, it employs workers directly and prohibits the hiring of private contractors as here is a long history of private contractors exploiting workers by underpaying them and harassing workers (Ambasta et al., 2008). Second, public works under NREGA do not use labor displacing technology in order to maximize employment generation under NREGA.

NREGA is a demand driven program based on the principle of self-selection (Dutta et al., 2012). It treats employment as a legal right and if the state is unable to provide employment for participants then it is obliged to pay workers without work. Public employment generated through NREGA is meant to generate productive assets that increase agricultural productivity and provides livelihood security. These include works aimed at natural resource management like irrigation works and afforestation. Moreover, public works can also be aimed to specifically improve the productivity of agricultural land owned by the scheduled castes, scheduled tribes and other disadvantaged sections of society. Finally, labor can also be employed to build rural infrastructure like toilets, roads and food grain storage structures (Drèze et al., 2006).

In 2018, NREGA completed a decade of being in operation throughout the country. Several academic studies and newspaper editorials were written to analyze each aspect of this historic legislation. Evidence suggests that public works leading to capital formation in agriculture have three potential effects on welfare (i) The direct effect of job creation for those employed (Klonner and Oldiges, 2014), (ii) Increase in

1 India has a long history with these programs since the 1960s. Schemes like Jawahar Rozgar Yojana, Employment Assurance Scheme, Food for Work Program, Jawahar Gram Samridhi Yojana and Sampoorna Grameen Rozgar Yojana were forerunners to NREGA. Subbarao (1997) provides an overview of India’s public employment programs.
labor demand in the lean season of agriculture which raise wages (Azam, 2011); and (iii) creation of public goods which increase agricultural productivity (Berg, Bhattacharyya, Durgam, et al., 2012). NREGA has exerted an upward pressure on wages causing around 20 percentage point shift away from labor-intensive technologies by small farmers and low-powered technologies (Bhargava, 2014). In addition, Imbert and Papp (2015) show that increase in wages for households in the poorest 30 percent of the population accounts for around 31 percent of the total welfare gains from the program. Correspondingly, others have argued that public works under NREGA contributed to increasing the productivity of agriculture which contributed to the non-transfer benefits of the program (Deininger and Liu (2013); Abreu et al. (2014)).

In practice, NREGA suffers from several problems like reduced budgetary allocation, corruption, violation of people’s entitlements and insufficient employment generation (Aggarwal, 2016). Further, the implementation and performance of NREGA varies considerably across states and districts. While states like Andhra Pradesh, Chattisgarh, Himachal Pradesh, Madhya Pradesh, Rajasthan and Tamil Nadu have successfully created more than 100 days of employment under the program (Imbert and Papp, 2015), but other states like Jharkhand and Bihar have lagged behind in the provision of NREGA employment under the program (Dutta et al. (2012); Bhatia and Dreze (2006)). Existing studies have identified limited administrative capacities, low awareness of the program among beneficiaries (Ravallion et al., 2015), insufficient financial allocation for NREGA (Banerjee and Saha, 2010), and corruption by bureaucrats (Adhikari and Bhatia, 2010) and private contractors (Bhagat, 2012) to explain poor performance of the program in certain states.

While the provision of NREGA in these regions in UP has has been inadequate. Dutta et al. (2012) shows that in 2009-10 over 54 percent of the households in UP that demanded work under NREGA but have not been provided public employment
guaranteed under the Act. Paradoxically, the same study found that the demand for NREGA work in UP is also low. Only around 35 percent of rural households officially demanded employment under NREGA when the national average was around 45 percent. This is surprising since UP has a highest proportion of the population below the poverty line in comparison to any state of the country. This lack of demand for NREGA suggests that workers may not be fully aware of their rights to demand public employment which is NREGA’s unique feature. This chapter aims study how awareness among beneficiaries and public officials determines the functioning of NREGA in one of the poorest regions of the country where NREGA has been operational since its inception. Prompted by high incidence of poverty, prevalence of bonded labor in agriculture and high Maoist insurgency, we conducted in-depth household level surveys with NREGA beneficiaries and semi-structured interviews with government officials in 12 Gram Panchayats of Halia block in Mirzapur district of eastern Uttar Pradesh (UP).

This study contributes to the existing literature on the functioning of NREGA in three ways. First, in addition to collecting formation from NREGA participants, we also conducted informal interviews with bureaucrats at the state, district and block level to understand various processes associated with the program. These include information about the flow of finances, data entry process and the role of block and district level development officers in supporting the endeavours of the Gram Panchayats. Second, we record people’s perceptions about NREGA implementation and the role of various stakeholders to assess their awareness of various provisions of the Act. Third this study verifies information on the number of work days and wage payments mentioned on NREGA website with the information provided by the beneficiaries. We find that official statistics are not consistent with people’s own claims about their participation. This discrepancy in NREGA records prevails because workers are not aware or able to access these records from the NREGA website.
Our findings suggest that even though NREGA has been India’s flagship poverty alleviation program for more than a decade, government functionaries at the state and local level have little awareness of their responsibilities and administrative capacity to ensure smooth functioning of NREGA at the grass-roots level. While it does provide people with some income support, but its provision is inadequate to provide an income-safety net to beneficiaries. A primary reason for this is that implementation of the program on the ground diverges considerably from the provisions of the NREGA Act of 2005. The creation of public employment under NREGA rests on the principle of recognizing employment as a right which workers can demand from the state. In order to safeguard the interest of workers, several decentralization measures were introduced in its functioning. However, in the surveyed villages all decision-making authority was concentrated with the elected head of the village assembly (Pradhan). This concentration of power creates patron-client relationships of exchange between the Pradhan and workers which generates rents for the former and safeguards his class interests.

The rest of this chapter is organized as follows. Section 3.2 presents an overview of the survey region and discusses the sampling process and methodology of data collection used in this study. Section 3.3 presents the findings of our interviews with government officials and shows how processes necessary to increase workers’ participation in NREGA functioning are not followed. Section 3.4 analyzes the findings of our household surveys of NREGA beneficiaries and section 3.5 reports the findings from our focus-group discussions on how NREGA is impacting agricultural productivity and labor demand. Section 3.6 argues that lack of awareness among NREGA beneficiaries serves the vital purpose of protecting the interests of the local elite and finally section 3.7 concludes with some policy implications of this study.
3.2 Choice of District and Data Collection

The aim of this study is two folds. First, we document the functioning of district and block level administrative framework which is responsible to implement NREGA. Second, we discuss the challenges faced by people in participating public employment under NREGA in one of the poorest districts of Uttar Pradesh. In order to address these concerns we conducted informal discussions with several state and district level officials and undertook household level surveys of NREGA participants between November 2016 and March 2017. This section presents an overview of the survey district and presents our sampling and data collection strategy.

3.2.1 Mirzapur

This study was conducted in the Halia block of Mirzapur district of eastern Uttar Pradesh. There are two reasons why it is important to document the functioning of NREGA in this region. First, this region is characterized by the presence of the kol community which is one of the most-backward communities of the country and is forced to work in tied-labor arrangements in agriculture. Second, this region is affected by Maoist movement and the developmental impact of NREGA has been instrumental in improving the relationship of tribal communities and the Indian state. Therefore, it is important to remove the bottlenecks in NREGA functioning to ensure that the promises made to citizens of the region are fulfilled and their trust in the state is restored. Lack of proper implementation and embezzlement of NREGA funds in the region has attracted considerable media attention and has been the subject of a high-level official inquiry (PTI, 2014).

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2Blocks or tehsils are administrative sub-division of a district created for rural development. Halia is one of the 12 administrative blocks of Mirzapur.

3For instance, Singh (2009) records instances of corruption and other problems with NREGA implementation in the region.
Mirzapur located in the eastern part of Uttar Pradesh (UP), is one of the poorest 200 districts of the country and among the fifteen poorest districts of UP (Haq, 2017). This district was covered under NREGA in the first phase in 2006. It is a predominantly rural district with 86 percent of its total population of around 2.5 million residing in rural areas. Over 65 percent of the total labor force is employed in agriculture.

Selected demographic indicators are given below in table 3.1. The proportion of marginalized communities, particularly the Scheduled Castes is 28 percent in Mirzapur while the state-level average is 23 percent. Socially backward communities like SCs and STs are over-represented in NREGA participation as the incidence of poverty is higher for these groups. For instance, in 2011, 45 percent of the Scheduled Tribes living in rural India were below the poverty line in comparison to only 15 percent of those belonging to the upper castes. Correspondingly we find that 5 percent of our sample of NREGA beneficiaries comprises of STs, when their share in district-level population is only 0.7 percent. Further, literacy rates among these groups (56 percent for SCs and 57 percent for STs) is also lower than the state average of (60 percent for SCs and 64 percent for STs).

3.2.1.1 Kols

Following the pioneering work of Srinivas and Marriot (1955), a number of researchers have analyzed the role of caste identity in determining people’s access to public goods, their ability to engage profitably in trade and to raise capital through collateral (Banerjee and Somanathan, 2007; Anderson, 2011; Verma, 1991; Dreze, Sen, et al., 1999). Rural wages and the incidence of poverty differ along gender, caste and reli-

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4In the 2003 ranking of districts by poverty, Mirzapur was ranked 180 out of the 447 backward districts of the country (Commission et al., 2005).

5This includes the percentage of cultivators and agricultural wage laborers.
gious lines. For instance, in 2004; daily wages for women were lower than the legal minimum wage in most states in comparison to men (Basu, 2013). Social stratification along caste and gender lines may also reduce certain groups’ access to NREGA, who may continue to remain impoverished in regions where these inequalities are more pronounced.

In addition to widespread poverty and higher incidence of marginalized communities, the district is also home to the kol community. The kols are a tribal community of Central India who live primarily in the states of Uttar Pradesh, Bihar, Jharkhand, Madhya Pradesh, Maharashtra and Tripura. This community is classified as Scheduled Tribes (ST) in all states except UP where they are classified as Scheduled Castes (SC). According to the Census of India, (2011) the total population of the community is estimated at 1.7 million, of which around 300 thousand kols live in eastern UP. The kols like most tribal adivasi groups of the country, have traditionally depended on forest produce for subsistence. The kols of Central India have been among the most disadvantaged groups in the country and their development indicators have lagged behind other tribal communities. For instance, in a study of body-mass index (BMI) of adult males in Central India, Adak et al. (2006) find that over 51 percent of the kols in the region suffered from severe to mild chronic energy deficiency.

In the three decades following India’s independence in 1947, these groups have been dispossessed of their lands and denied access to forests under various developmental paradigms. These groups have been dis and have been displaced and rendered homeless for the construction of large dams and industrial townships (Guha, 2007). This process of dispossession of adivasis accelerated under the neoliberal policies followed by the Indian state since the 1990s. Verma (2016) shows that till 1990s, 40 percent of all displaced social groups were adivasis and policies of involuntary land transfer for

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6Madhya Pradesh has around 900 thousand kol population which is the highest in the country.
setting-up of Special Economic Zones (SEZs) increased the dispossession of this group significantly. Further, this group has suffered violent atrocities and human rights violations by the police and other agencies as they organize resistance movements against land grab attempts by the state (Baviskar, 2003).

The kols of southern UP work primarily as wage workers in agriculture and quarry mining industries. Most kol households either do not own agricultural land or own uneven, rocky or less-productive land. They dwell in stone or katcha houses without basic amenities like electricity, clean water or access to health care (Rashid, 2013). Srivastava et al. (2005) finds that the kol of Halia block in Mirzapur are among the few communities where bonded labor in agriculture has continued unabated. These tied-labor arrangements among kols represent inter-linked factor markets characterized by debt-bondage where workers are forced to work for large agricultural landlords (often over generations) in order to service a short debt or loan taken from their employers.

In a detailed study of bonded workers in Halia block of Mirzapur Shankar (1996) find that workers traditionally take a small loan in order to meet the expenses of a marriage or funeral (shradh) and has to pledge their labor to the landlord who does not charge interest on the loan. Further, workers are paid using food-grains.

In addition, this labor-tying arrangement also involves a component of share-cropping. The kol workers were given a small plot of land (0.06 ha) for subsistence farming and the landlord claimed a share of the produce based on the credit and inputs like seeds and fertilizers supplied by them in the production process.

7 A full account of struggles for kol landownership can be found here.
8 The wages in kind are mostly given in kodo which is an inferior rain-fed crop (Shankar, 1996).
3.2.1.2 Maoist Movements in the region

The presence of bonded labor in the Halia block of Mirzapur provides a unique opportunity to study the impact and functioning of NREGA in one of the most backward regions of the country. Further, this region is affected by armed left-wing Maoist movements by virtue of being situated at the border of Madhya Pradesh and Uttar Pradesh. Socio-economic exclusion and high incidence of poverty has contributed to these struggles in the region. Borooah (2008) finds that the probability of a district being affected by extremist movements increases with rise in poverty and decreases with increase in literacy.

While 41 percent of UP’s population is below the poverty-line, Mirzapur has a higher concentration of poverty. Using the 2004, National Sample Survey (Consumption Expenditure Survey) we find that the poverty rate in Mirzapur is around 53 percent. High levels of poverty coupled with Maoist insurgencies has contributed to the listing of the district among 170 extremely backward districts and among the 55 extremist affected districts of the country (Commission et al., 2005). There is some evidence of NREGA has succeeded in creating an income safety-net for people and improved their participation in anti-Maoist operations (Khanna and Zimmermann, 2017). However, insufficient fund allocation and other implementation challenges are dampening the impact of NREGA (Banerjee and Saha, 2010).

3.2.2 Sampling and Data Collection

This chapter presents the findings of a field study conducted in the Halia block of Mirzapur district. There are two components of the study. First, we document the district and block-level administrative processes involved in the provision of NREGA and second, we discuss the impact of NREGA and gaps in implementation and the

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9See Kumar, Rana, et al. (2015) for details of the Maoist movement in eastern Uttar Pradesh
awareness of the rights of workers under the program. Correspondingly, we collect data from government officials and NREGA beneficiaries. In this section we present the data collection strategy of this chapter.

3.2.2.1 Administrative Data Collection

This chapter is the first to document the experiences and information provided by officials involved in the provision of NREGA. Between August - November of 2017, we conducted several rounds of semi-structured interviews with the officials involved in NREGA implementation at the state, district and block levels. First, we discussed the role of the state government in the implementation of NREGA with the officials of the Ministry of Rural Development in the state capital of Lucknow. Second, we contacted the office of the Chief Development officer (CDO) of Mirzapur to document the procedure of data entry, funds transfer and recording un-met demand for NREGA work at the district level. Finally, we contacted the office of the Block Development Officer (BDO) to assess the administrative capacity at the grass-roots level involved in the provision and supervision of NREGA works in the Halia block of Mirzapur.

3.2.2.2 Household-level Survey Data

In order to understand the impediments to NREGA participation and timely wage payment in one of the most backward regions of the country we conducted household level surveys of NREGA beneficiaries in 12 Gram Panchayats of Halia block between November 2017 - February 2018. The NREGA web-portal provides detailed information about NREGA workers at the village level including the number of days and the name of projects in which NREGA beneficiaries have worked. Using the work records for 2017 from the NREGA web-portal, we randomly selected around 1100
households for our study. Of these, we were able to trace around 973 households who were surveyed for this study.\textsuperscript{10}

Our surveys included both quantitative and qualitative questions about household characteristics and assets, indebtedness profiles of household members and their sources of income including agricultural and non-agricultural earnings. Further, we asked beneficiaries about their participation in and awareness of the provisions of NREGA. These included detailed questions about the number of days they worked under NREGA, wages paid and conditions of work. In addition, we recorded people’s perceptions and experiences with negotiating with the Pradhans or BDO for their entitlements under NREGA. Table 3.2 provides the break-up of sample households by their caste and Gram Panchayat (GP). Fuliyari and Gaurava are the largest GPs in the sample and they collectively contribute to around 40 percent of the sample. While, all GPs in the sample are affected by Maoist activity, the villages of Fuliyari, Parshiakala, Deohyat, Khutha and Gaurava are right at the border of Madhya Pradesh are more prone to insurgent activities. The village of Halia was less than 5 kms from the district headquarters and had banks, ATM machines within the largest agricultural market of the region.

These household level surveys were conducted in respondents homes so they feel comfortable in answering questions about NREGA wages received and their perceptions about the role of their elected representatives and government officials. In addition, we also conducted two focus group discussions asking people about the impact of NREGA on agricultural productivity, incomes and employment opportunities. These focus group discussions were held in the villages of Halia and Fuliyari where around 10-

\textsuperscript{10}Most villages had a population less than 2,000 people and settlements were organized along caste lines. Therefore, it was fairly easy to identify and survey individuals from these households. In many cases we were informed that some individuals on our list had migrated out of the village a few years ago or were deceased. The inability of our team to locate around 120 households may indicate the presence of fudging of muster-rolls similar to existing studies like Adhikari and Bhatia (2010). However, we are unable to ascertain whether these were indeed instances of ‘ghost-workers’ and suggest the need for future research on this issue.
15 cultivators and agricultural wage workers were asked to discuss whether NREGA was having any spillover impact in agriculture. In several villages we were invited by the Pradhan for a meeting to discuss the functioning of NREGA and the problems faced by them. However, this would have interfered with our findings so we decided not to meet with the Pradhans.\textsuperscript{11}

The summary statistics is given below in Table 3.3. We see most NREGA beneficiaries were below the poverty line and lived in \textit{katcha} houses without access to clean drinking water and toilets. The respondents of all social-groups, relied primarily on public-distribution of food at subsidized rates for rations. Most households had solar energy panels installed on their roofs which generally powered one LCD lamp and a mobile charging plug point for around ten hours in a day. These solar panels were installed under government programs where beneficiaries had to pay only 10 percent of the total cost. Further, most households had few durable assets other than bicycle and mobile phones. In most cases, the mobile phones were used primarily by men and women did not report owning mobiles.

### 3.3 State and Local Administrative Set-up

Existing research on the implementation of NREGA has focussed primarily on improving the transparency of the village assemblies (\textit{Gram Panchayats}) through social audits (Kumar and Sah, 2015) and capacity building and greater monitoring (Aiyar and Samji, 2006). Other studies have discussed the role of caste and gender affiliations of elected representatives (Johnson, 2009) and funds utilization and state-level capacity for proper implementation of NREGA (Chakraborty, 2007). However, few studies have focussed on the bureaucratic capacity and opaque information flow within the administrative set-up created to oversee the provision of NREGA, particularly in the

\textsuperscript{11}In some cases, the Pradhans offered to arrange for surveys to be conducted in his house but we rejected these offers.
poorer states.\textsuperscript{12} This study aims to fill this lacuna in the existing literature, particularly since research on the role of the state and local governments in the functioning of NREGA in Uttar Pradesh is scarce.

The implementation of NREGA rests on the coordinated and timely functioning of the state, district and local governments. Himanshu (2013) outlines the responsibilities of each of these institutions in the planning, provision of public employment and wage payments under the program. This scheme is largely financed by the Central government but under Section 32 of the NREGA Act, the responsibility of implementing it is vested with state and local government or the \textit{Gram Panchayats} (Mookherjee, 2014). The ability of workers to participate in local governance institutions like the \textit{Gram Panchayat} the \textit{Gram Sabha} is pivotal in ensuring that NREGA is successfully implemented at the village level.\textsuperscript{13} For instance, in states like Chhattisgarh, demands for social audits of NREGA have often resulted in confrontation between citizens’ groups and local elites. Such confrontations result in a high degree of opaqueness in the functioning of the program in these states (Shah, 2008).

3.3.1 Role of the State Government

However, the actual implementation of NREGA suffers from considerable challenges both at the state and local level. At the state-level the major constraint faced by officials in the state NREGA secretariat is the lack of adequate number of officials to implement the various administrative duties. Most employees are contractual data-

\textsuperscript{12}Notable exceptions include Raabe et al. (2010) who conduct an analysis of NREGA implementation using case studies in Bihar and Aiyar and Samji (2009) who study the role the state government of Andhra Pradesh in the implementation of NREGA.

\textsuperscript{13}The \textit{Gram Panchayat} is the village council with elected leader(s) and the \textit{Gram Sabha} is the village assembly comprising of all adult members of the village. Finally, an official of the rank of Block Development Officer serves as the Program Officer of NREGA who is responsible for the smooth running of the program in her block. Citizens are supposed to apply for work to the \textit{Gram Panchayat} which is also responsible to maintain job cards and implement the works sanctioned by the block level officials. The \textit{Gram Sabha} is required to monitor the execution of works under NREGA (Dreze et al., 2006). Therefore, the program relies heavily on the ability of people to demand and monitor its implementation.
entry staff with high turnaround rates. The administration was also unaware of its role in appointing district level officials like the Employment Guarantee Assistant (Gram Rozgar Sahayak) and the Program Officer (PO). We were told that these officials were determined at the district level and the state authority does not interfere with local decisions.

Next, state level NREGA operations in UP do not have any programs to increase awareness of NREGA provisions among the beneficiaries and increasing transparency in its functioning. Not only is this in violation of the responsibilities of the state government, but also contributes to the lack of information about participant rights and entitlements that we find in our field study. Further, state government should engage of professional agencies for technical support and improving the quality of data collected under the program. This aspect of the scheme is also neglected. In fact officials were aware of local research institutes working on these issues but reported having no official collaboration with them. This disjoint between the ‘perceived’ and ‘practised’ responsibility of the state government was also witnessed in the case of social audits. NREGA Act requires state governments to establish competent agencies to conduct social audits of NREGA functioning and asset creation. However, state-level officials contested this claim and stated that financial audits are conducted by the Central government and local bodies like the Panchayats decide to inspect public works completed under NREGA.

Finally, on the question of finances the officials were reluctant to answer any questions. Most officials maintained that there was no delay in releasing funds from the State Employment Fund (SEF) to districts or the submission of district-wise utilization certificates to the Central government. In fact any instance of insufficient or delayed fund transfer was blamed on delays in data entry. While there was general acknowledgment of the fact that funds were inadequate to pay workers on time, but
officials were not willing to explain these deficiencies. Therefore, the state level administrative set-up in UP does not adequately fulfill its obligations under the NREGA Act and this reflects in poor implementation of the program at the local level.

3.3.2 Role of the District Level officials

The Chief Development Officer (CDO) is the main district level officer responsible for smooth functioning of NREGA. Through our meetings with the CDO and his staff, we found the CDO conducted bi-weekly meetings with all BDOs to tackle the bottlenecks associated with NREGA. Further, the CDO had a large staff dedicated to data entry and maintaining records. However, we found of records of lists of projects sent by Gram Sabhas for ratification and information about works completed were incomplete. Further, according to the records maintained by the CDO, all workers under NREGA were paid full wages on time. However, on meeting with workers in the village we found that this was not the case in reality. This points to the fact that records of public employment created and wages paid on the NREGA portal does not match with the actual experience of workers. The data entry staff at the CDO’s office showed us that his records match those supplied by the block level officials. Contrary to the provisions of the Act the CDO does not inspect or monitor the public works completed under NREGA which are under the supervision of the Block Development Officer (BDO).

3.3.3 Role of the Block Level officials

Successful implementation of NREGA depends critically on block level officers discharging their duties in a transparent manner. However, it was at this level that we found that procedures were most opaque and diverged from the rules considerably. For instance, there was no Program Officer (PO) to oversee the implementation of

\[^{14}\text{Public officials may be wary of pointing to the role of the state government in delaying or mismanagement of NREGA finances. However, our study could not ascertain these issues in detail.}\]
NREGA. The PO is the main authority to accept applications for NREGA work, scrutinizing proposals and creating NREGA employment. In the absence of the PO, NREGA provision and transparency mechanisms within the Act are diluted. For instance, there are no direct employment requests made to block level officials and monitoring of NREGA works is seldom undertaken. When asked about social-audits, we were told that there was never a request for these audits from the Gram Panchayats. Further, NREGA muster rolls were created by contractual data entry staff and suffered from delays due to electricity shortage and computer malfunctions. The BDO himself primarily works out of another district and seldom visits the block. Therefore, information about NREGA responsibilities was limited in the Halia block administration office. We were told that the office simply compiles the lists of number of work days generated under NREGA based on the information provided by the Pradhans.

However, the officials at the BDO’s office denied any corruption and leakages in NREGA funds transfer claiming that all payments were directly made by the state-government into the bank or post-office accounts of NREGA workers. Further, as evidence of the disjoint between the provisions of NREGA Act and its implementation at the local level, we were told citizens have never approached the BDO for any NREGA related issue. All NREGA related matters are discussed in periodic meetings that the BDO holds with the Pradhans. Correspondingly, the officials at the BDO’s office believed that NREGA was working well in their block in comparison to the neighbouring block but they knew that no new durable assets were being created under NREGA in the block. Given this lack of administrative and technical capacity, information and demands for accountability, it is not surprising that the provision of NREGA in the block is well below the national average and suffers from wage delays and other shortcomings which are discussed in the next section.
3.4 Assessing the Functioning of NREGA

The goal of this chapter to understand the impediments to NREGA employment and commensurate wage payment to workers. This section breaks down NREGA participation into its stages to discuss potential challenges to its successful implementation. These include application for public employment under NREGA, the timely provision of public employment and wage payment, supporting facilities at work sites and finally the presence of an efficient grievance redressal mechanism.

3.4.1 Applying for NREGA works

In order to ensure that the demand driven nature of the program is maintained the procedure of application for NREGA employment involves two steps. First, households who anticipate working under NREGA must register with the Gram Panchayat (GP) which issues a job-card to all applicants which is valid for five years Drèze et al. (2006). Second, any household with a valid job-card can request NREGA employment by submitting an oral or written application to either the Gram Panchayat or the NREGA program officer.

Our survey revealed that close to 90 percent of the respondents had NREGA job cards issued by the GP. Most respondents (close to 95 percent) claimed that the Pradhan helped them in getting a job-card. Panel A of Table 3.4 shows that there is little inter-caste variation in the proportion of households with a valid job card. However, this percentage is significantly lower for Muslim households (76 percent). While the small sample of Muslim households in this study restricts our ability to explain this divergence, but most respondents claimed that they were not sure if the Pradhan made their job card or not. However, they regularly participated in NREGA works in their villages.

While most households had a valid job card, but none of the job cards had any entry of the work done in the last six-months. In addition, in four villages (around 30 percent)
of the sample, the job cards for the entire village were kept with the Pradhans and not the individual households. When we asked the respondents to show us the job-cards, in most cases they could retrieve them from the Pradhan’s house. In these cases, the respondents stated that job cards were always kept with the Pradhan and they had never questioned this practice.

The condition of registering with the GP and having a valid job card was met by most households, around 70 percent households had ever placed a formal request (oral or written) for NREGA employment either to the BDO or the Pradhan. Some people had informally asked the Pradhan for NREGA work but received no acknowledgement for this request. Most respondents were unaware of their role in *demanding* employment under NREGA. It was believed that NREGA works would begin only when the Pradhan ‘desires’. In fact, over 50 percent of the respondents believed that NREGA works are undertaken in the village because the Pradhan wanted to help them during the lean season of agriculture. This shows that in practice, the promise of demand driven employment guarantee is diluted as workers are unaware of the legal provisions of the Act. This also explains why official records of NREGA works in the region do not show any unfulfilled work demand during any time.\(^\text{15}\) Since people do not request the provision of public employment, there is no mechanism to record how much work people actually want under NREGA. When we asked our respondents how many days in a year would they like to work under NREGA, the majority answered that they would like to work under NREGA for as much as possible and 60 percent of the respondents were unaware of their legal entitlement of 100 days of NREGA employment per household.

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\(^\text{15}\)According to the data processing staff at the office of the Central Development Officer (CDO) there is no unfulfilled demand for NREGA in the district. According to the NREGA website, there are a few cases of unfulfilled work demand from the previous years. We were told that this is actually a data entry problem and does not signify any unmet-work demand under NREGA.
3.4.2 Provision of NREGA employment

In the absence of any formal work application and entry in job cards showing a record of public employment created under NREGA, the actual provision of NREGA in the region does not correspond to demand. In 2016, workers reported working under NREGA for an average of 29 days. The number of days worked were roughly equal for men and women (29 and 28 respectively). Panel B of Table 3.4 shows that marginalized communities (SCs, STs OBCs and kols) reported working for more than 31 days in a year while upper castes and Muslims worked for around 25 days. This suggests that the participation of poorer sections of society is more in NREGA. Several studies using national and field level data have concluded that the scheme is mostly availed by the poor and participation by people from the top consumption quintile is merely 10 percent which means that the scheme is ‘not poorly targeted’ (Sabhikhi, 2012).16 Field data from Andhra Pradesh, Karnataka, Rajasthan and Maharashtra collected in 2010, show that small and marginal farmers mainly benefited from NREGA except in distress prone districts of Anantpur and Yavatmal where larger farmers also participated and gained from NREGA (Kareemulla et al., 2010).

Female participation in NREGA at 18 percent in UP is among the worst in the country as the national average in 2012 was around 47 percent (Mann and Pande, 2012). Our study shows at only 12 percent of the women worked under NREGA. This is particularly alarming since 33 percent of public employment created under the scheme is reserved for women. Several studies have found that NREGA has had a positive impact on female labor force participation nationally (Azam, 2011) and political engagement in local decision-making (Girard, 2014). Tsaneva and Balakrishnan (2018) find that in the first year of the program, women living in districts where NREGA

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16 This is important as concerns are raised about leakage to the non-poor Bhagwati and Panagariya (2014).
was implemented were less likely to experience depression symptoms as the program
provided them economic security and independence.

Even when the actual provision of NREGA remained low, we found no evidence
of any discrimination in people’s participation based on gender, religion or caste of
the household. This is contrary to evidence from Rajasthan where low provision of
NREGA compared to its demand, led to rationing of work based on the caste and of
the village head Sarpanch (Mukhopadhyay, Sharan, et al., 2015). In addition, none
of the respondents reported having paid any bribes to help secure NREGA work or
wages. In 76 percent households public employment was primarily performed by men
while in others, both men and women participated in NREGA.

The number of work days reported by respondents differed significantly from the
official records on the NREGA website. For instance, the average number of workdays
according to the records was only 25. Our findings suggest that there is significant
discrepancy in official records of NREGA employment. Panel B of Table 3.4 shows
considerable inter-caste variation in the difference between the official record and
the actual number of days that people claimed to have worked. For instance, the
Scheduled Castes and OBC households reported having worked for an average of 28
and 32 days respectively. However, according to the official records they worked only
for 21 and 24 days respectively. This implies that work-days were under-reported for
marginalized groups. This means that some of the labor performed by these groups
was not recorded in the official statistics and correspondingly they were not paid for
this labor.

The trend was different for upper caste households who reported having worked for 25
days but official records indicate that they worked for 37 days. Therefore, there was
significant over-reporting of work days in this case. This implies that these groups
got paid more than what they worked for. The experience highlights corruption
as an important factor in the provision of NREGA similar to existing literature. Corruption in the form of fudging of muster rolls, flawed work measurement, non-payment of minimum wages and delays in wage payments is widespread across the country (Adhikari and Bhatia, 2010).

Further, we found no evidence of year-long agricultural labor contracts or tied-labor arrangements which would hinder worker’s ability to participate in NREGA. For over 81 percent of households engaged in self-farming or wage employment, NREGA employment augmented their income time without causing any significant substitution of private or self-employment by NREGA. This is contrary to Imbert and Papp (2015), who find significant crowding-out of private wage employment post-NREGA. The insufficient and unpredictable nature of NREGA provision does not allow farmers to change their labor supply decisions in response to public employment. Further, since NREGA employment occurs in the lean season of agriculture, labor demand in agricultural markets and in self-farming is low.\(^\text{17}\) Further, most employers are flexible and adjust their own labor demand to allow workers to participate in NREGA.\(^\text{18}\)

When we tried to ascertain people’s perceptions about NREGA supply, an overwhelming majority agreed that the provision of employment under NREGA is insufficient. However, there was little awareness about its causes. Around 60 percent of the respondents claimed that the Pradhan “tries his best” to create NREGA employment but has no budget to do so. Most people said that the provision of NREGA has remained consistently low ever since its inception.

\(^\text{17}\)The majority of respondents claimed that they would prefer NREGA to remain operational throughout the year including the peak season of agriculture. This shows that labor demand in the rural economy (agricultural and non-agricultural) is insufficient to provide employment to workers at any point during the year.

\(^\text{18}\)In most cases, private employers (agricultural and non-agricultural) adjusted the timing of their labor demand by a few days to accommodate NREGA employment.
Therefore, our findings suggest that NREGA has not altered the social relations of production within the rural economy. This is primarily because the actual provision of NREGA does not vary by demand but is fixed exogenously by the Pradhan. The number of work days created under NREGA is not sufficient to meet the consumption requirements of poor households in the region.

Most states have not been able provide 100 days of employment in a year and consequently many people in rural India who want NREGA work have not been able to get it (Mukhopadhyay, Sharan, et al., 2015). However, the average of 29 days of NREGA in this region is lower than other regions including the worst performing states. For instance, during the period between 2013 and 2016, NREGA has been able to generate 45 days of work in a year for each participating household in rural India. Mukhopadhyay, Sharan, et al. (2015) find that the number of work days supplied was much less than what was demanded in Bihar, Jharkhand, Odisha and Rajasthan.19

3.4.3 Payment of Wages

Similar to the provision of NREGA employment, the nature of wage payment after the work also diverged considerably from the norm. Our study found that there is no set schedule for NREGA payment in the survey villages. Payment for NREGA works must be made weekly or fortnightly (Drèze et al., 2006). The primary purpose of employment guarantee is to raise people’s incomes during the lean season of agriculture. Therefore, delays in payment effectively dilute the welfare effects of NREGA (Basu and Sen, 2015). Around 84 percent of the respondents claimed that NREGA payments were delayed by over two-weeks and NREGA payments are directly credited in the workers’ bank accounts.20 While this is a violation of the provisions of NREGA,

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19 The provision of NREGA remained low in Jharkhand even during acute agricultural crisis when it was most needed.

20 This is different from the experience in Jharkhand, Chhattisgarh, and Odisha where work is allocated to groups of workers and wages are paid to the group leader so individual workers receive less than their official wage (Banerjee and
studies from the neighbouring state of Bihar found even longer delays. For instance, in Bihar, 38 percent of payments are delayed by more than 60 days (Ravallion et al., 2015).

Over 92 percent of the respondents claimed to have bank or post-office accounts and produced bank passbooks to show NREGA payments. In the remaining cases, the money would be paid in cash by the Pradhan. In some cases, respondents had given signed blank bank-withdrawal slips linked to their accounts to the Pradhan who would withdraw the money and pay cash to workers. In around 39 percent of cases no wages were paid to workers even when they participated in NREGA.

Panel C of Table 3.4 shows that based on the number of days respondents claimed to have actually worked, the average daily wage rate paid for NREGA employment was 65 INR (0.9 USD). The actual wage rate differed considerably between social groups. For instance, on the one hand the upper castes and Muslim households received an actual wage rate of 86 and 73 INR respectively. On the other hand, the actual wage rate for SCs (including kols) and OBCs was only 63 and 69 INR respectively. The lowest wage rate was recorded for the STs who earned less than 60 INR a day under NREGA. However, if we compare daily wage rates based on the number of days officially reported on the NREGA website, we find that the average wage rate was 78 INR and there was relatively little variation between wage rates between social groups.

Saha, 2010). Further, several instances of collusion between local elected body and bank officials to reduce payments received by workers have been recorded by Adhikari and Bhatia (2010).

21 In principle bank-withdrawal slips can be used only by the account holder to withdraw money but according to the respondents, the Pradhan can operate their bank accounts without them being present.

22 Using 2017 exchange rate 1 USD = 69 INR.

23 Some respondents claimed that the Pradhan assured them that they will get another payment related to NREGA in the coming weeks. However, the CDO’s office confirmed that all NREGA wages for the year were paid.
We were not able to discern any difference in wages paid to men and women workers. This is particularly important since prior to NREGA, daily wages received by women were lower than the legal minimum wage in most states in comparison to men (Basu, 2013). Using nationally representative data (Zimmermann, 2012) has shown that female wages have risen considerably after NREGA. Moreover, Desai et al. (2015) finds that around 45 percent of women working under NREGA during 20011 - 2012 were either not working earlier or were working exclusively on family farms in 2004-2005. Therefore, NREGA gave several women their first opportunity to earn a cash wage and consequently their material living and household bargaining position have significantly improved.

Surprisingly, more than 88 percent of the households were aware that the minimum wage in the district was around 100 INR per day but were not aware that the minimum wage laws applied to NREGA employment. Further, most respondents felt they were paid a fair amount since their neighbours and friends received similar wages. While most respondents remembered the dates and amounts of NREGA earnings, they could not calculate their wage rates and compare whether their earnings were commensurate with the number of days worked. Lack of awareness coupled with lack of education may explain people’s inability to determine whether they are paid fair wages. For instance, the household head in 69 percent of the households was uneducated. This number was much lower for upper castes (39 percent).

Existing research identifies delays in payments as a major impediment to the successful implementation of NREGA. Problems of delayed wage payments are effectively diluting the welfare effects of NREGA (Basu and Sen, 2015). Payment delays have increased since 2008 with the movement from cash payments to payments through bank and post office accounts and the complex procedures needed to approve payments for NREGA workers (Ravallion et al., 2015). However, evidence on the role
of technology is mixed as (Banerjee, Duflo, et al., 2014) find that an e-governance reform led to a 25 percent decline in program expenditure with no adverse impact on employment. Other improvements at the local level include the use of technology in administering the program and wage payments. Payments based on Aadhar numbers result in people getting wages on time in Jharkhand (Bhatti, 2012).\textsuperscript{24}

3.4.4 Supporting Facilities at work site

According to Drèze et al. (2006) NREGA work-sites are required to be located within 5 kilometres of the village and should have provision for safe drinking water, shade for children and periods of rest, first-aid box with adequate material for emergency treatment for minor injuries and other health hazards connected with the work [Schedule II, Para 23]. All respondents agreed that NREGA works were undertaken very close to the village (in most cases less than on kilometre). However, most respondents agreed that apart from the provision of drinking water, no other facility was provided at the work-site. Workers reported that in the past, minor incidents had occurred at the NREGA work-site. In addition, most respondents reported that they had never demanded any additional facilities at the work-sites as they were unaware of the provisions of the Act.

Panel D of Table 3.4 shows that most workers agreed that in their experience no health or child care facilities are provided at NREGA work sites. In some cases women workers suggested that they had to delegate child-care to other family members and would benefit if there was any form of child-care support while they worked. However, they had never made a formal or informal request for this as they did not think it was mandatory under the Act. Further, most women agreed that their primary concern was lack of adequate work and timely payment under NREGA and consequently,

\textsuperscript{24}Aadhar is the unique identity number given to every resident of India.
they would refrain from demanding work-site child-care facilities as that might upset the Pradhan. This creates impediments to women’s participation in NREGA as they disproportionately bear child care responsibilities within the household.

### 3.4.5 Grievance Redressal

Over 90 percent of the respondents claimed that they had problems with the inadequate provision of NREGA and delayed wage payments. However, in most cases they would only discuss this with the Pradhan who would blame lack of budgetary allocation for the poor provision of NREGA. None of the respondents claimed to have approached the BDO, NREGA PO, or any bureaucrat to discuss problems related to NREGA implementation.

Additionally, none of the respondents ever approached any elected representative except the Pradhan to discuss their grievances about NREGA. This is consistent across social groups as seen from Panel E of Table 3.4. In fact, nobody claimed raising this issue in the Gram Sabha or the village assembly. This shows that people’s perception of NREGA differs considerably from its actual provisions. People have not realized that NREGA is a demand driven program and they are entitled to 100 days of employment at the minimum wage. Most people claimed that they had no knowledge about the provisions of NREGA and relied on the Pradhan’s interpretation of the rules and procedures to help them with their problems.

### 3.4.6 Assets Created under NREGA

In eight out of twelve villages the respondents claimed to have worked under two NREGA works. The construction of a water reservoir (talaab) and a mud katchcha road. Both of these were existed and were verified by our team. In the remaining four villages workers only worked on a water reservoir which could not be completed as works had been halted owning to insufficient funds. Over 70 percent respondents
claimed that the water reservoirs helped with agricultural production but claimed that they have been working on the same reservoir for several seasons as it needs frequent repairs. More than 80 percent of the respondents had no knowledge of any list of prospective works maintained by the Gram Panchayat. Finally, most workers did not know that NREGA works were meant to improve the productivity of their agriculture. It was believed that the government chose which public assets were to be created under NREGA and local participants had no say in the process.

While productive assets created under NREGA can create non-transfer welfare gains for the local economy as they increase the productivity of agriculture (Abreu et al., 2014). However, the experience of this region shows that this element of the program is not implemented seriously. Creation of durable assets is also a significant source of corruption in NREGA. For instance, public employment to create wells was undertaken in Jharkhand and corruption and bribery were rampant during the construction process (Bhagat, 2012). Lack of accountability through social audits and public disclosure of payment rolls hinders the ability of workers to examine fund utilization certificates prepared by the officials Ambasta et al. (2008). However, better implementation of the program can help in minimizing corruption and increasing transparency in NREGA. For instance, creating correct incentives for officials reduces theft by around 64 percent (Niehaus and Sukhtankar, 2013). Better implementation of NREGA can increase private market wages by around 6 percent and decrease days without work by 7 percent (Muralidharan et al., 2016).

3.5 Impact on Agriculture

It is important to investigate whether the creation of productivity enhancing assets under NREGA has had an impact on agriculture in this region for three reasons. First, as mentioned above, this region is traditionally characterized by the incidence
of tied-labor and among the most backward districts of the country. Correspondingly, it is important to study whether NREGA has been successful in helping prevent indebtedness by raising the productivity and incomes in agriculture. NREGA employment enables peasants to withstand adverse weather shocks and the agricultural lean season when private labor demand is low (Bardhan, 1980). For instance, in 2008, around two-thirds of NREGA workers in North India avoided hunger and around 75 percent respondents credited NREGA for helping them sustain their livelihoods in the dry season of agriculture (Khera and Nayak, 2009). This, in turn may reduce their reliance on informal credit to meet their consumption or investment needs and reduces migration to urban areas. Empirical estimates on the impact of NREGA shows that NREGA increased the consumption expenditure of the most vulnerable sections (Schedule Castes and Scheduled Tribes) during the lean season of agriculture (Klonner and Oldiges, 2014).

Second, raising agricultural productivity through public works is an important non-transfer benefit of NREGA which augments the direct income-transfer under the program (Deininger and Liu, 2013). However, creation of productivity enhancing assets under NREGA requires coordinated push from the farmers and Gram Sabhas and the block level officials. As mentioned above, we found no evidence of any planning or proposals for possible works under the program and there was no mechanism for involving local farmers in deciding the nature of public assets created. Finally, most NREGA beneficiaries in our sample were wage workers for most months in a year. Existing research shows that the guarantee of alternative employment would increase the bargaining position of workers and exert an upward pressure on rural wages (Im-

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25 The Backwardness Index comprises of agricultural productivity per worker, agricultural wages, and the proportion of SCs and STs in the population (Commission et al., 2014).

26 In 2002, informal loans from moneylenders or employers accounted for around 42 percent of total rural credit in India (Pradhan, 2013).
Studies using national level data show that NREGA has allowed rural households to increase consumption expenditure between 6.5 and 10 percent with around 12 percent increase for marginalized caste groups (Bose, 2017). In addition, the scheme has had a positive impact in reducing child labor by around 10 percent (Mani et al., 2014).

3.5.1 Agricultural Profile of the Region

Table 3.5 provides an overview of the proportion of agricultural cultivators and wage workers by social group. Around 74 percent of our respondents engaged in some form of agricultural production and rice, wheat and mustard are the major crops of the region. Among these, 46 percent own the land they cultivate and the remaining 54 percent work as share-croppers on the land of large landlords. While we did not find any incidence of bonded labor in over 390 kol households that we surveyed, but around 65 percent kol households engaged in share-cropping adhiya where the landlord claimed about half the total produce. The incidence of share-cropping among the kols was the highest among all social groups. As already noted, share-cropping on land owned by the landlord (who also provides credit and inputs for production) is an important component of tied-labor arrangements in this region. However, none of our respondents reported that they were forced to work for their landlords exclusively.

Further, members from most households that engage in self-farming also work as agricultural wage workers as incomes from agriculture are not sufficient to meet their subsistence needs. Most households cultivate small plots of land (less than 0.5 acre) and over 97 percent of the respondents produced solely to meet their subsistence needs.

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27 The landlord occasionally asks share-croppers to work in his house during weddings and other ceremonies without any monetary payment. In the focus group discussions, we found that this practice was not practices across castes and was not confined to the kols. People in the region distinctly remember that kols were forced to work on the landlord’s farms for 1kg rice and a bottle of local liquor, but reported that this practice does not exist any more. While we did not any incidence of debt-bondage in our sample, future research is needed to determine whether the practice is actually extinct from the region.
needs. They relied predominantly on household labor and over 90 percent never hired any additional workers. The remaining 26 percent of the respondents work as landless labor in agriculture and non-agricultural wage employment. Even among cultivators, household members engage in wage labor for six to nine months in a year. The agricultural produce for these households lasts between three to six months depending on the farm and family size. While 67 percent of all cultivators (and 60 percent of kol cultivators) reported taking a loan from the landlords or local money lenders, none of them reported any work conditionality attached to the loan repayment schedule. Interest rates charged were between 15 - 25 percent per month and none of the respondents had ever approached a bank or any formal lending institution for credit. None of the respondents felt that banks would lend them any money even when all of them had bank accounts and even ATM debit cards. Most loans were taken to buy inputs for agriculture (67 percent), financing household consumption and medical expenses came next (15 percent).

3.5.2 Role of NREGA on agricultural productivity and wages

Several studies have shown that NREGA positively impacts agricultural productivity (Berg, Bhattacharyya, Durgam, et al., 2012) and raises agricultural wages (Berg, Bhattacharyya, Rajasekhar, et al., 2018). However, our findings suggest that NREGA had little impact on the intensity of inputs like fertilizer, machinery and labor demand. This is not surprising since we we found little evidence of durable assets being created under NREGA. Further, contrary to evidence from other states; none of the NREGA works in the region were conducted in the fields belonging to marginalized communities. This is particularly important as kol farmers were granted landownership of rocky and semi-barren land on the outskirts of several villages under the
Uttar Pradesh Land Ceiling Act of 1972. Under Category II of the permissible works under NREGA, public employment can be used to undertake individual works to improve the land belonging to “scheduled castes, scheduled tribes, de-notified tribes and other families below the poverty line (Drèze et al., 2006). In contrast, Ranaware et al. (2015) finds that in Maharashtra around 75 percent of NREGA works on private land belonged to small (53 percent) and marginal farmers (22 percent) However, our study found that no such works were ever undertaken in the rocky fields belonging to the kol farmers who could have benefited immensely from such productivity enhancing work on their land.

Second, we investigate the impact of NREGA on agricultural wages. Our respondents claimed that NREGA had no impact on their wage bargaining position vis-a-vis private agricultural employers. On a few instances when workers had demanded higher wages, the landlords simply refused and in the absence of other alternative employment workers had no choice but to accept the wages offered by the landlords. This was also true during the lean season of the year when NREGA employment was primarily undertaken. Since the provision of NREGA was erratic and unpredictable, it did not emerge as a credible alternative to private employment. Further, owning to stagnant agricultural productivity there was no increase in labor demand during the harvest season and consequently there was no upward pressure on agricultural wages. On several instances, workers reported having worked at wages below the legal minimum.

Therefore, contrary to the experience of better performing states like Andhra Pradesh, Rajasthan and Tamil Nadu where NREGA has a positive impact on rural wages

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28under the Land Ceiling Act of 1972, the maximum land size for agricultural holding was fixed at 12.5 acres. Any landholding above this size was confiscated by the state and redistributed among the landless workers, primarily belonging to the marginalized social groups. However, there has been limited real redistribution under the scheme and most land transferred is barren or non-agricultural land. See Singh and Mehrotra (2014) for a full discussion on land reforms in UP.
and crowded-out private employment ((Dreze and Khera, 2009), (Imbert and Papp, 2015)), in the most backward regions of the country, the full potential of NREGA is not realized. In fact its implementation does not allow cultivators to increase the productivity of their agriculture or workers to improve their wage bargaining potential. It simply serves as an erratic and unpredictable source of income for a few days in the year. Almost all respondents claimed that NREGA earnings were spent in household consumption and was not sufficient to increase their savings or provide for agricultural investment. Next, we discuss how lack of transparency and citizen’s participation in the provision of NREGA is leading to elite capture and corruption in its implementation.

3.6 Lack of Awareness and the Local Political Economy

All respondents agreed that NREGA provides indispensable income support which helps increase consumption during the lean months of agriculture. However, as the preceding discussion showed, there was surprisingly little awareness about its provisions and workers entitlements among our respondents. In this section, we discuss that lack of awareness of workers’ rights and the duties of elected representatives and government functionaries under NREGA contributes to the formation of client-patron exchanges between workers and the local elite and and corruption in the provision of NREGA.

3.6.1 Role of the Pradhan

The previous discussion shows that Pradhan plays a pivotal role in NREGA provision, wage payment the record collection in every gram panchayat. In most cases, people approach the Pradhan with most of their NREGA related queries. However, when we questioned people on whether the Pradhans discharge their duties as mandated by the NREGA Act, we found that the Pradhan did not keep any records of existing works,
number of days of employment created and wages paid in a transparent manner. Further, NREGA job-cards were never updated with particulars of the number of days worked and wages paid. In several cases the Pradhan kept the job cards so people had no idea of the wages they were actually paid and the number of days of work that got registered in the official records. This increases the opaqueness in the functioning of NREGA.

Paradoxically, almost all respondents had a positive view of the role played by the Pradhan in helping them with NREGA related difficulties. Table 3.6 shows that most respondents thought that inadequate provision of NREGA and delays in wage payments were minimized because of the efforts of the Pradhan. It was believed that the Pradhan even pays the panchayat mitra a monthly salary of 5000 INR for maintaining NREGA records for the entire village. In addition, our respondents never met or interacted with any of the government functionaries like the Program Officer or saw the BDO inspect any work site. Even in Halia village which is located within a few kilometres from the Block headquarters, 80 percent of the respondents agreed that they had never heard of the Program Officer and less than 6 percent of the respondents said they ever spoke to any one from the BDO’s office.

Our study shows that in this region, the village Pradhan ot just controls all facets linked to NREGA implementation in his Gram Panchayat, but has also emerged as the link between citizens and government officials. This central position of the Pradhan is primarily because of a total lack of awareness of the provisions of NREGA among the beneficiaries. And in the absence of any transparency measures like social audits, this concentration of political and social power with the Pradhan leads to the client-patron exchanges and corruption in the functioning of NREGA. Table 3.6 shows that around 90 percent or more respondents of all social groups believed that the provision of NREGA depends solely on the Pradhan who has consolidated his
position considerably in the local economy. Respondents explained that if they have to approach the Pradhan with their NREGA related complaints, they could not afford to antagonize him in any way. They also explained that NREGA had been a major issue in the previous local body elections in the region.

Experiences from Jharkhand where local body elections have not been held since 1978 also show that local institutions like the Gram Sabha lacks the administrative capacity to implement NREGA (Bhatia and Dreze, 2006). The absence of village assemblies seriously dilutes the legal entitlement of NREGA as these assemblies are pivotal in ensuring that NREGA is implemented when people demand employment from the state. In most cases, this lack of administrative capacity is also reflected in the delay in appointment of officials at the village and block level.29 In fact, these deficiencies in public personnel and institutional capacity allows public officials to restrict the number of job cards and regulate the supply of NREGA workdays Bhatia and Dreze (2006).

3.6.2 Patron-Client Exchanges NREGA Implementation

According to Scott (1972) patron-client relationship consists of exchanges between “an individual of higher socio-economic status (patron) uses his own influence and resources to provide protection or benefits, or both, for a person of lower status (client) who, for his part, reciprocates by offering general support and assistance, including personal services, to the patron”. Such repeated exchanges between between a identifiable agents within a community is form of rent seeking in developing countries. The patron spends a part of the rents created in one period to provide protection and access to scarce resources to clients in their networks to maintain their influence and authority which allows further rounds of rent-seeking (Khan and Jomo, 2000). The

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29Officials at the local level include panchayat sevaks or panchayat mitras and gram rozgar sevaks and block level officials include supervisors, engineers etc.
pivotal role played by the Pradhan in the functioning of NREGA in his Gram Panchayat establishes him as the principle patron in the repeated provision of NREGA which creates rents for the local elite.

Dutta et al. (2012) attribute the low demand and participation rates in NREGA in Bihar, Jharkhand and Odisha to low information and awareness. As workers are unaware of their rights under NREGA, they rely on the Pradhan for the provision of NREGA. The Pradhan in turn, benefits from lack of transparency in the functioning of NREGA to control its supply to suit the interests of local landholding elite and appropriate NREGA funds. At the same time, the Pradhan spends some resources to ensure that workers continue to trust and rely on him to address their concerns and grievances related to the functioning of NREGA. By excluding the role of community participation and decision-making through the Gram Sabhas, the Pradhans not only dilute the demand driven provisions of NREGA, but also create opaqueness in the implementation of NREGA. This arrangement suits government functionaries as workers do not approach the PO or BDO with requests for NREGA and the official records can show that there is no unfulfilled demand for NREGA in their regions. Such complicity between lower-level government officials and local elite has been studied extensively in the Indian context. For instance, Bardhan (1998) argues that professionals, large landlords and capitalist form dominant coalitions in India which exclude the poor from political participation and economic prosperity. The professional class comprises of educated elites including government officials, urban elite and petty-bourgeoisie.

NREGA empowers workers to demand for employment and wages which not only improves their incomes in the short-run but can also weaken their reliance on the local elite. This would weaken the ability of large landlords to keep wages depressed and demand accountability from the officials. Therefore, collusion between these
groups can effectively dampen the provisions of the Act and generate rents for both groups.

3.6.3 Corruption in NREGA Implementation

If NREGA employment is provided for 100 days in a year and wages are paid on time, the wage bill of large landlords would rise. In most cases the Pradhan or his extended family members are major employers of agricultural labor. Therefore, it is in their interest to curtail the supply of NREGA. Further, ignorance of official procedures creates avenues for corruption and fund embezzlement.

Our surveys revealed that the number of days worked by individuals recorded on the NREGA website differed significantly from the number of days workers claimed to have worked. As we were conducting our study shortly after NREGA works ended for the year and since most workers worked on similar projects, it was easy to calculate the number of days that each member of the household worked under NREGA. On average, around 42 percent of our respondents reported working more days under NREGA than what was officially recorded and the remaining workers had worked fewer number of days. This discrepancy also existed in their wages paid, as payments are released based on the official number of days worked by people. Therefore, workers whose work days were under-reported in the official statistics, were paid less and others were paid more for the same number of days worked. However, workers themselves were unable to calculate whether they were paid according to the number of days they worked or not.

Finally, The Pradhan maintained control of payment schedules and in some cases, he was also in possession of bank account details and withdrawal slips linked to workers accounts. Individual NREGA beneficiaries had no idea how much money was deposited in the account by the state, but only knew the cash payment received by the Pradhan. This discrepancy in NREGA records andopaqueness in wage payment
is maintained by the Pradhan as he controls data entry for NREGA works at the village level. Further, several respondents believed that the Pradhan submits several requests to the BDO to ensure the release of NREGA funds. This is important to ensure that corruption rent-seeking continue through the patron-client engagements devised by the Pradhan.

3.7 Policy Implications

By documenting the functioning of NREGA in one of the poorest regions of UP, this chapter aims to explain why NREGA may not be performing well in eastern Uttar Pradesh. Using semi-structured interviews with government functionaries and NREGA beneficiaries we find that lack of awareness of workers’ entitlements, poor administrative capacity, corruption and collusion between the bureaucracy and local level elected officials contribute to poor and opaque implementation of NREGA at the local-level. Consequently, the program has not emerged as a credible alternative source of employment for workers who are among the poorest in the country.

This chapter contributes to the existing literature by arguing that lack of awareness about the provisions of NREGA not only limits the participation in public works but also serves as a basis for patron-client relationships to emerge between the local elites, primarily the Pradhans and NREGA beneficiaries. By centralizing all decision-making and NREGA record keeping practices, the Pradhans are able to engage in rent seeking through corruption and also protect their class interests by keeping rural wages depressed. This arrangement also suits local administrators as it insulates them from day to day monitoring and implementation of NREGA. However, this collusion between the local elite and government officials effectively dilute the demand driven nature of NREGA.
Periodic social audits and people’s participation in its implementation acts as checks and balances on elected representatives and government officials at the local level. However, our study shows that these measures have not been introduced in eastern UP. Similarly, no few durable assets have been created to augment agricultural productivity in the region. As consequence the spill-over benefits of NREGA have not been realized and there is no change in agricultural productivity or labor demand.

The aim of this study is not to argue for a reduction in the provision of NREGA as suggested by Bhagwati and Panagariya (2014). But to identify the bottlenecks in proper functioning of NREGA. First, there is an urgent need to increase awareness and administrative capacity at the state and district level. These offices were severely understaffed and ill-equipped to handle the administrative work load of NREGA. This under-staffing leads to sub-contracting of important data entry and verification work to part-time employees at the state level and to people affiliated to the Pradhans at the village level. Not only does it dilute the transparency provisions of the Act, but also creates avenues for corruption.

Second, information about the provisions of NREGA is shockingly absent even after 10 years of its existence. In the absence of awareness of entitlements, the demand driven nature of the program is diluted. Therefore, public information campaigns and local self-help groups must be strengthened to ensure that the guarantee of public employment is maintained and NREGA emerges as a credible alternative to low wage and seasonal agricultural employment. Finally, there is a growing gap between the performance and impact of NREGA between states and regions. Therefore, there is a need to understand the role of local political economy factors that condition and complicate the functioning of NREGA. The role of local elite and their collusion with government officials effectively exclude NREGA beneficiaries from participating in the planning process employment generation under the program.
Figure 3.1: Mirzpur, Uttar Pradesh

Table 3.1: Socio-Economic Characteristics of the Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample (1)</th>
<th>Mirzapur (2)</th>
<th>Uttar Pradesh (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Scheduled Castes</td>
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<td>28</td>
<td>23</td>
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<tr>
<td>Percent Scheduled Tribes</td>
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<td>0.9</td>
<td>0.7</td>
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<td>65</td>
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<td>Scheduled Castes Literacy Rate</td>
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<td>60</td>
</tr>
<tr>
<td>Scheduled Tribes Literacy Rate</td>
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<td>57</td>
<td>54</td>
</tr>
<tr>
<td>Percent Cultivators</td>
<td>31</td>
<td>23</td>
<td>36</td>
</tr>
<tr>
<td>Percent Agricultural Labor</td>
<td>46</td>
<td>42</td>
<td>36</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>973</td>
<td>2 million</td>
<td>155 million</td>
</tr>
</tbody>
</table>

Note: This table shows population percentages of socio-economic indicators of our sample, the district of Mirzapur and the state of Uttar Pradesh in columns (1), (2) and (3) respectively. The values for the sample characteristics are calculated using survey data which comprises of a random sample of NREGA workers in 2016. The district and state-level measures are taken from the Census of India, 2011. All state and district level statistics are reported for rural sectors of the economy including the total population estimates.
Table 3.2: Distribution of social groups by Gram Panchayats in the sample

<table>
<thead>
<tr>
<th>Name of the Village</th>
<th>Scheduled Castes</th>
<th>Scheduled Tribes</th>
<th>Other Backward Tribes</th>
<th>Muslims</th>
<th>Kols</th>
<th>Upper Caste Hindus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Babura Bhairodayal</td>
<td>21</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>14</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Babura Kala</td>
<td>5</td>
<td>2</td>
<td>10</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>28</td>
</tr>
<tr>
<td>Babura Raghunath</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>11</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Badanaha</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>24</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>Banasa</td>
<td>81</td>
<td>0</td>
<td>17</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>101</td>
</tr>
<tr>
<td>Deohut</td>
<td>13</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>40</td>
<td>0</td>
<td>61</td>
</tr>
<tr>
<td>Fuliyari</td>
<td>60</td>
<td>20</td>
<td>38</td>
<td>0</td>
<td>126</td>
<td>13</td>
<td>257</td>
</tr>
<tr>
<td>Gaurva</td>
<td>8</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>105</td>
<td>2</td>
<td>124</td>
</tr>
<tr>
<td>Halia</td>
<td>45</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>25</td>
<td>0</td>
<td>78</td>
</tr>
<tr>
<td>Khintha</td>
<td>48</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>62</td>
</tr>
<tr>
<td>Maheshpur</td>
<td>63</td>
<td>3</td>
<td>25</td>
<td>16</td>
<td>0</td>
<td>1</td>
<td>108</td>
</tr>
<tr>
<td>Pareshiyakala</td>
<td>10</td>
<td>0</td>
<td>8</td>
<td>3</td>
<td>32</td>
<td>0</td>
<td>53</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>371</strong></td>
<td><strong>49</strong></td>
<td><strong>108</strong></td>
<td><strong>34</strong></td>
<td><strong>393</strong></td>
<td><strong>18</strong></td>
<td><strong>973</strong></td>
</tr>
</tbody>
</table>

**Note:** This table shows the distribution of our sample across the twelve Gram Panchayats of Halia block of Mirzapur.

Table 3.3: Descriptive Statistics: Household Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Scheduled Castes (1)</th>
<th>Scheduled Tribes (2)</th>
<th>Other Backward Tribes (3)</th>
<th>Muslims (4)</th>
<th>Kols (5)</th>
<th>Upper Caste Hindus (6)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Household Size</td>
<td>5.40</td>
<td>6.04</td>
<td>5.62</td>
<td>5.94</td>
<td>5.65</td>
<td>5.67</td>
<td></td>
</tr>
<tr>
<td>Average Age</td>
<td>44.75</td>
<td>44.94</td>
<td>44.45</td>
<td>45.06</td>
<td>41.61</td>
<td>40.05</td>
<td></td>
</tr>
<tr>
<td>Women-headed Households</td>
<td>0.33</td>
<td>0.26</td>
<td>0.35</td>
<td>0.18</td>
<td>0.41</td>
<td>0.44</td>
<td></td>
</tr>
<tr>
<td>Literate Households</td>
<td>0.65</td>
<td>0.62</td>
<td>0.73</td>
<td>0.74</td>
<td>0.73</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td>Below Poverty Line</td>
<td>0.64</td>
<td>0.59</td>
<td>0.66</td>
<td>0.50</td>
<td>0.57</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>Ration Card</td>
<td>0.94</td>
<td>0.92</td>
<td>0.85</td>
<td>0.94</td>
<td>0.90</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Katcha Floor</td>
<td>0.98</td>
<td>0.99</td>
<td>0.98</td>
<td>1.00</td>
<td>0.99</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Solar Energy</td>
<td>0.80</td>
<td>0.86</td>
<td>0.81</td>
<td>0.91</td>
<td>0.88</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Water from open wells</td>
<td>0.89</td>
<td>0.93</td>
<td>0.93</td>
<td>0.97</td>
<td>0.92</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Toilet</td>
<td>0.15</td>
<td>0.06</td>
<td>0.07</td>
<td>0.18</td>
<td>0.07</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>Bicycles</td>
<td>0.82</td>
<td>0.69</td>
<td>0.81</td>
<td>0.88</td>
<td>0.77</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Mobile Phone</td>
<td>0.47</td>
<td>0.39</td>
<td>0.41</td>
<td>0.35</td>
<td>0.48</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>Farm animals (mostly goats)</td>
<td>2.05</td>
<td>2.00</td>
<td>2.16</td>
<td>2.38</td>
<td>2.00</td>
<td>2.44</td>
<td></td>
</tr>
<tr>
<td>Migration</td>
<td>0.33</td>
<td>0.45</td>
<td>0.50</td>
<td>0.62</td>
<td>0.31</td>
<td>0.55</td>
<td></td>
</tr>
<tr>
<td><strong>Number of Households</strong></td>
<td>371</td>
<td>49</td>
<td>108</td>
<td>34</td>
<td>393</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** This table presents socio-economic characteristics of surveyed households by social group. Average household size refers to the number of individuals living in a separate dwelling and average age refers to the age of the household head. Literacy status is reported for the head of the household. For all other indicators, the table reports the proportion of households headed by women or own a certain asset like bicycle or mobile phone. Farm animals reports the average number of animals owned by the household and migration refers to the proportion of households from which at least one member lives and works outside the village for more than six months in a year.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Scheduled Castes</th>
<th>Scheduled Tribes</th>
<th>Other Backward Tribes</th>
<th>Muslims</th>
<th>Isla</th>
<th>Upper Caste Hindus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Panel A. Applying for NREGA works</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGA Job-Cards present</td>
<td>0.91</td>
<td>0.92</td>
<td>0.94</td>
<td>0.76</td>
<td>0.90</td>
<td>0.94</td>
</tr>
<tr>
<td>Households never requested NREGA employment</td>
<td>0.80</td>
<td>0.88</td>
<td>0.79</td>
<td>0.56</td>
<td>0.83</td>
<td>0.94</td>
</tr>
<tr>
<td>Households involved in NREGA planning</td>
<td>0.22</td>
<td>0.12</td>
<td>0.23</td>
<td>0.29</td>
<td>0.24</td>
<td>0.22</td>
</tr>
<tr>
<td>Panel B. Provision of NREGA employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation by Women</td>
<td>0.12</td>
<td>0.16</td>
<td>0.15</td>
<td>0.15</td>
<td>0.12</td>
<td>0.06</td>
</tr>
<tr>
<td>No of NREGA workdays (Respondents)</td>
<td>27.81</td>
<td>31.00</td>
<td>31.81</td>
<td>25.18</td>
<td>30.66</td>
<td>25.00</td>
</tr>
<tr>
<td>No of NREGA workdays (Official)</td>
<td>20.62</td>
<td>20.67</td>
<td>24.18</td>
<td>18.35</td>
<td>29.65</td>
<td>36.39</td>
</tr>
<tr>
<td>— Provision of 100 days of NREGA</td>
<td>0.07</td>
<td>0.10</td>
<td>0.10</td>
<td>0.06</td>
<td>0.10</td>
<td>0.17</td>
</tr>
<tr>
<td>Payment without Work</td>
<td>0.03</td>
<td>0.10</td>
<td>0.02</td>
<td>0.00</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Panel C. Payment of Wages</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank or Post Office Account</td>
<td>0.92</td>
<td>0.92</td>
<td>0.94</td>
<td>0.91</td>
<td>0.92</td>
<td>0.89</td>
</tr>
<tr>
<td>Reported Legal Minimum Wage</td>
<td>97.22</td>
<td>99.86</td>
<td>104.08</td>
<td>110.62</td>
<td>95.26</td>
<td>102.33</td>
</tr>
<tr>
<td>Average daily wage received under NREGA</td>
<td>63.06</td>
<td>59.37</td>
<td>68.93</td>
<td>63.45</td>
<td>70.89</td>
<td>86.08</td>
</tr>
<tr>
<td>Delay of two weeks or more</td>
<td>0.72</td>
<td>0.80</td>
<td>0.63</td>
<td>0.50</td>
<td>0.72</td>
<td>0.89</td>
</tr>
<tr>
<td>Panel D. Supporting Facilities at work site</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absence of Health-care facilities</td>
<td>0.97</td>
<td>1.00</td>
<td>0.99</td>
<td>1.00</td>
<td>0.98</td>
<td>1.00</td>
</tr>
<tr>
<td>Absence of Childcare Facilities</td>
<td>0.93</td>
<td>0.98</td>
<td>0.96</td>
<td>0.97</td>
<td>0.94</td>
<td>1.00</td>
</tr>
<tr>
<td>Panel E. Grievance Redressal and Impact of NREGA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approached solely Pradhan with problems</td>
<td>0.93</td>
<td>1.00</td>
<td>0.95</td>
<td>0.88</td>
<td>0.94</td>
<td>0.89</td>
</tr>
<tr>
<td>No impact of NREGA on overall welfare</td>
<td>0.95</td>
<td>0.96</td>
<td>0.95</td>
<td>1.00</td>
<td>0.95</td>
<td>0.94</td>
</tr>
<tr>
<td>No impact of NREGA on savings</td>
<td>0.10</td>
<td>0.18</td>
<td>0.07</td>
<td>0.06</td>
<td>0.15</td>
<td>0.17</td>
</tr>
<tr>
<td>Should NREGA continue</td>
<td>0.99</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.99</td>
<td>1.00</td>
</tr>
<tr>
<td>Number of Households</td>
<td>371</td>
<td>49</td>
<td>108</td>
<td>34</td>
<td>393</td>
<td>18</td>
</tr>
</tbody>
</table>

Note: This table summarizes the different aspects of NREGA participation by the respondents. The responses are based on participant’s awareness, perceptions and experience in working with NREGA. Average number of work days and average daily wages (in nominal terms) are based on actual work done and payments received by our respondents. All other variables are proportions of households who report not having applied for NREGA employment or receiving payment without work etc. These replies are based on workers’ past experiences with NREGA planning and implementation.
### Table 3.5: Agricultural Profile of Survey Respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Scheduled Castes</th>
<th>Scheduled Tribes</th>
<th>Other Backward Tribes</th>
<th>Muslims</th>
<th>Kols</th>
<th>Upper Caste Hindus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Self-Farming</td>
<td>0.71</td>
<td>0.65</td>
<td>0.83</td>
<td>0.56</td>
<td>0.76</td>
<td>0.83</td>
</tr>
<tr>
<td>Share-cropping</td>
<td>0.33</td>
<td>0.37</td>
<td>0.40</td>
<td>0.15</td>
<td>0.65</td>
<td>0.10</td>
</tr>
<tr>
<td>Agricultural Labor</td>
<td>0.46</td>
<td>0.53</td>
<td>0.56</td>
<td>0.53</td>
<td>0.43</td>
<td>0.29</td>
</tr>
<tr>
<td>Non-Agricultural Labor</td>
<td>0.09</td>
<td>0.04</td>
<td>0.07</td>
<td>0.15</td>
<td>0.07</td>
<td>0.17</td>
</tr>
<tr>
<td>Small landholding size</td>
<td>0.61</td>
<td>0.55</td>
<td>0.67</td>
<td>0.94</td>
<td>0.47</td>
<td>0.33</td>
</tr>
<tr>
<td>Medium landholding size</td>
<td>0.34</td>
<td>0.33</td>
<td>0.27</td>
<td>0.06</td>
<td>0.48</td>
<td>0.61</td>
</tr>
<tr>
<td>Large landholding size</td>
<td>0.05</td>
<td>0.12</td>
<td>0.06</td>
<td>0.00</td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>Farming for sale</td>
<td>0.03</td>
<td>0.02</td>
<td>0.06</td>
<td>0.00</td>
<td>0.015</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>Number of Households</strong></td>
<td>371</td>
<td>49</td>
<td>108</td>
<td>34</td>
<td>393</td>
<td>18</td>
</tr>
</tbody>
</table>

*Note:* This table shows the agricultural profile of the surveyed households by social group. Self-farming, share-cropping, agricultural and non-agricultural labor are measured as proportions of survey respondents with household members engaging in these occupations. Small landholding refers to a farm-size of less than one acre, medium landholding size is greater than one acre but less than four acres and a landholding is characterized as large if it is greater than four acres. The values in the table report the proportion of households owning small, medium or large landholding by social category and whether they produce for the sale in markets.

### Table 3.6: Role of the *Pradhan* in NREGA Implementation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Scheduled Castes</th>
<th>Scheduled Tribes</th>
<th>Other Backward Tribes</th>
<th>Muslims</th>
<th>Kols</th>
<th>Upper Caste Hindus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>NREGA ever discussed in <em>Gram Panchayat</em></td>
<td>0.11</td>
<td>0.22</td>
<td>0.02</td>
<td>0.00</td>
<td>0.15</td>
<td>0.11</td>
</tr>
<tr>
<td>Ever Approached BDO</td>
<td>0.22</td>
<td>0.35</td>
<td>0.13</td>
<td>0.09</td>
<td>0.24</td>
<td>0.39</td>
</tr>
<tr>
<td>Ever Approached PO</td>
<td>0.11</td>
<td>0.22</td>
<td>0.02</td>
<td>0.00</td>
<td>0.13</td>
<td>0.11</td>
</tr>
<tr>
<td><em>Pradhan</em> solves NREGA issues</td>
<td>0.93</td>
<td>1.00</td>
<td>0.95</td>
<td>0.88</td>
<td>0.94</td>
<td>0.89</td>
</tr>
<tr>
<td><em>Pradhan</em> solely responsible for NREGA</td>
<td>0.89</td>
<td>0.96</td>
<td>0.89</td>
<td>0.79</td>
<td>0.92</td>
<td>0.94</td>
</tr>
<tr>
<td>NREGA has consolidated the position of <em>Pradhan</em></td>
<td>0.92</td>
<td>0.88</td>
<td>0.94</td>
<td>0.97</td>
<td>0.89</td>
<td>0.83</td>
</tr>
<tr>
<td><strong>Number of Households</strong></td>
<td>371</td>
<td>49</td>
<td>108</td>
<td>34</td>
<td>393</td>
<td>18</td>
</tr>
</tbody>
</table>

*Note:* This table shows the experience of NREGA beneficiaries in our survey and presents their perceptions about the role of the *Pradhan* in the functioning of NREGA. The values in the table are the proportions of households who have approached the village assembly (*Gram Sabha*), Block Development Officer or Program Officer with any NREGA related issue. The last two rows of the table report the proportion of our respondents who agree with the claim that the *Pradhan* is solely responsible for implementing NREGA and that the socio-economic position of the *Pradhan* has improved because of the central role played by them in its provision.
A.1 Land Acquisition and Farmer Resistance

Since 1950s, India has acquired around 50 million acres of agricultural land for various infrastructural, developmental and mining purposes. This has led to a displacement of close to 60 million people (Ren, 2017). Instances of ‘land grabs’ for developmental purposes like publicly owned infrastructure projects, dams and privately owned SEZs are ubiquitous in India (Sud, 2014). The SEZ Act of 2005, presents another example of development induced population displacement in India. Land for setting up SEZs is acquired by the firms directly by negotiating a ‘fair’ price from farmers and cultivators. The rules for acquiring land for SEZs were based on the Land Acquisition Act of 1894. Under this law the state could allow for transfer of ownership of any privately owned land if it is considered necessary for ‘public purposes’. The compensation to the original owners of land was based on the official value of the land. This official value is significantly lower than the market value. However, this law has no provision for seeking consent by all those who stand to lose their land. In theory, the Land Acquisition Act can only be applied to cases where acquiring land would serve some public purpose by the government as authorized by the law. However, land acquisition attempts have been criticized for diverting fertile agricultural land away from agriculture by acquiring it at cheap rates for real estate development without rehabilitating the farmers who lose their land (Wadhwa, 2010). Further, there is no provision for the rehabilitation of land owners and tenant farmers who
lose their livelihoods because of SEZs. In fact state governments often try to reduce compensation paid to farmers using fraudulent and violent means (Ren, 2017).

Farmer agitations in the eastern states of Odisha and West Bengal have garnered the most media attention. In a project involving the South Korean Steel giant POSCO, in Odisha the state government manipulated records to reduce compensation paid to farmers and suppressed farmer agitations violently. This prompted international outrage and organizations like the Amnesty International issued statements against human rights violations involved in land acquisition attempts by the state (Amnesty, 2013). In the case of POSCO, villagers organized a resistance movement by erecting barriers, forming human chains, and drawing enough media attention to make violent removal politically difficult till 2011 (Levien, 2012). In West Bengal, in 2007, in Nandigram, police fired upon local farmers protesting against land acquisition initiated by the state government to attract an Indonesian firm to build a chemical plant which killed 12 villagers (Ren, 2017).

There are also instances of farmer agitations in Northern India. In 2010, thousands of farmers marched into the national capital from the neighboring state of Uttar Pradesh to oppose the “forcible” acquisition of their land by the state government for setting up SEZs. Cornered over sustained land acquisition protests, the state government decided that it would no longer be involved in acquiring land directly for private sector projects. Pai (2010) documents that farmers in Greater Nodia in Uttar Pradesh were allowed to independently negotiate land prices with SEZ developers and sign agreements which both parties respected. In other cases, state governments of Punjab and Haryana were forced to revisit their land acquisition policies and offer generous compensation to farmers facing dispossession. This included skill development and promise of employment, additional plots of land and 33 year annuity payments (Kaur, 2010). In Chandigarh, farmers themselves demanded the rights for setting up IT
enabled SEZs and controversial land acquisition plans by the government were stalled and investigated for corruption (Express News Service, 2009). Similarly, in 2010 farmers in Nindar village of Jaipur in Rajasthan dug holes in the earth which farmers (both men and women) occupied day and night (Khaled, 2007).\footnote{A synopsis of farmer struggle against land acquisition can be found here.} SEZs in the northern and eastern part of India have failed to become operational and only 28 percent of all functional SEZs are situated in this region. Major SEZs in Bengal and Odisha were scrapped even before they became notified as land related agitations by farmer organizations deterred land acquisition attempts by the state.

Farmer agitations have also been seen in the states included in this study. In a detailed study of land acquisition in Andhra Pradesh, Rawat et al. (2011) find that land acquisition was not based on consent and in several cases, land distributed to marginalized communities under previous government programs was forcefully acquired for SEZs. Further, in Chittor district of Andhra Pradesh, compensation between INR 250,000 (USD 3,571) to INR 300,000 (USD 4,285) per acre was paid to large landowners and small farmers were not paid any compensation but were promised employment opportunities in the SEZs (Balagopal, 2007). In 2009, around 4,000 farmers staged a rally against acquisition of 5,000 acres of land for industrial purpose in villages near Sanand by Gujarat Industrial Development Corporation (PTI, 2013). In Maharashtra several SEZ projects were canceled owing to difficulties in land acquisition and protests by farmers (Sebastian, 2012). Major capitalists also expressed frustration at the reluctance of state governments in helping them acquire land for setting up SEZs as farmer agitations make elected representatives highly unpopular with their constituents (Layak et al., 2012). Farmer protests against land acquisition are also documented in Nandagudi in Karnataka, Baikampady in Mangalore and Raigad in Maharashtra. These protests were often against forced eviction of farmers from fer-
tile agricultural land. For instance, in Kakinada in Andhra Pradesh, an oil based SEZ project was approved on over 9,000 acres of land which was used by farmers for double cropping of paddy in a year (Balagopal, 2007).

Forceful eviction of farmers from their land and insufficient and unjust compensation paid to farmers is the primary reason for farmer agitation against SEZs throughout the country. However, there is considerable state level variation in the politics and protests across India since every state can formulate its own policies regarding land acquisition. Bedi and Tillin (2015) examined the multifaceted stances of state governments toward land acquisition and identified a set of different responses to rural protests. For instance, they find that governments resorted to violent crackdown in Odisha and West Bengal but offered incentives to defuse opposition in Rajasthan. Further, states also manipulated legal and procedural processes to facilitate land deals in Gujarat and Maharashtra while co-opting resistance in West Bengal and Goa, and non-response such as in Karnataka. Further, Vijayabaskar (2010) shows that land acquisition for SEZs in Tamil Nadu was completed without significant farmer resistance. They argue that the state level variations need to be understood within local political and economic contexts.

A.2 Theoretical Framework: Derivations

In this section we first derive the factor prices in competitive and monopsonistic labor markets and then calculate the differential rents that would be generated by land acquisition. We then proceed to deriving the equilibrium values of labor demand after land acquisition.

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2See Jenkins, Kennedy, and Mukhopadhyay (2014) for details of various protest movements against land acquisition for setting up of SEZs in India.
A.2.1 Factor Prices before Land Acquisition

Differences in factor prices of land and labor in competitive and monopsonistic labor markets generate rents for landowners. From Equation 1.2 we can see that each elite will employ, \( n^i_a = n_a/e \), where \( n_a = 1 - N_c \). Consequently, the production function for the elite before land acquisition can be written in per-capita terms as follows:

\[
y^r = \psi f(l_i/n_a)
\]  
(A.1)

Factor prices of land and labor before land acquisition under competitive labor markets are as follows:\(^3\)

\[
\frac{\partial Y^r}{\partial n_a} = w_{pre}^c = \psi [f(l_i/n_a) - \frac{1}{n_a} f'(l_i/n_a)]
\]  
(A.2)

\[
\frac{\partial Y^r}{\partial l_e} = R_{pre}^c = \psi f'(l_i/n_a)
\]  
(A.3)

where the superscript, \( c \) refers to competitive labor markets. Next, we turn to monopsonistic or repressive labor markets represented by the superscript, \( m \). If small farms are not sufficient to sustain the families of small farmers, we can assume that \( n_a = 1 \).\(^4\)

In this case, the employers, \( e \) will be able to exercise market power to depress wages below the competitive wage. We assume that wages now have a lower bound defined

---

\(^3\)In a perfectly competitive market, employers will hire workers up to the point where wages equal their marginal product and since the production function is linearly homogeneous, the marginal products can be expressed in terms of a single factor (land per unit of labor).

\[
Y^r = \psi F(l_{i<r}, n_a^i)
\]

\[
Y^r = n_a \psi f(l_i/n_a)
\]

\[
MP_{n_a} = \frac{\partial Y^r}{\partial n_a} \quad \text{and} \quad MP_{l_e} = \frac{\partial Y^r}{\partial l_e}
\]

\(^4\)This implies that the main worker in the household spends all of her time working as a wage worker. Other members of the household may be engaged in self-cultivation on small family owned farms.
by the legal minimum wage $w^g$ and the marginal productivity of small farms $\tau$.\(^5\)

Therefore, the fallback position of a small peasant comprises of wage earned in public employment and the returns from cultivating their land, $l_p$.

For instance, let us assume that employers are willing to pay a small increment $\epsilon$ over and above the fallback position of workers. Since some workers are always rationed out of monopsonistic labor markets, they would be willing to accept a lower wage in order to get employed. This would exert a downward pressure on wages and labor markets would clear only when workers are indifferent between working for the elite or their fallback position. More formally,

\[
\begin{align*}
    w_{pre}^m &= \tau + w^g \\
    R_{pre}^m &= \frac{\psi f(l_e) - (\tau + w^g)}{l_e}
\end{align*}
\] (A.4)

Correspondingly, the rate of return on land is given by the following.

where $w_{pre}^m$ is the wage rate that would prevail under repressive labor market conditions and $R_{pre}^m$ is the return on per-unit of land ($l_e$) owned by the elite. Next we derive factor prices after land acquisition. However, in order to ensure that private labor markets clear, we add an assumption on the behavior of wages.

**Assumption 2**: $w_{pre}^e > \tau + w^g$. For labor markets to clear, we assume that the sum of legal minimum wages and average productivity of small farms is lower than the wages in private agricultural employment.

---

\(^5\)This could be the wage earned through participation in public employment programs like the National Rural Employment Guarantee Act (NREGA).
A.2.2 Factor Prices after Land Acquisition

We now derive factor prices that would prevail under competitive and repressive labor markets after land acquisition has taken place. The returns to labor and land in the competitive scenario will be defined for agricultural land and non-agricultural land as follows

\[ w_{1c}^{\text{post}} = \psi \left[ f\left( \frac{1 - L}{np_a} \right) - \frac{1}{np_a} f'\left( \frac{1 - L}{np_a} \right) \right] \] (A.6)

\[ R_{1c}^{\text{post}} = \psi f'\left( \frac{1 - L}{np_a} \right) \] (A.7)

\[ w_{2c}^{\text{post}} = \phi \left[ f\left( \frac{L}{n_a} \right) - \frac{1}{n_a} f'\left( \frac{L}{n_a} \right) \right] \] (A.8)

\[ R_{2c}^{\text{post}} = \phi f'\left( \frac{L}{n_a} \right) \] (A.9)

where, \( w_{1c}^{\text{post}} \) is the wage rate that would prevail in agricultural markets under competitive labor market conditions and \( w_{2c}^{\text{post}} \) is the wage rate in non-agricultural production under competitive labor markets. Correspondingly, \( R_{1c}^{\text{post}} \), \( R_{2c}^{\text{post}} \) are the return on per unit of new land holding of an elite \( L \) after land acquisition for agricultural and non-agricultural land respectively.

After land acquisition we assume that all small farmers have been dispossessed of their land. Therefore, \( l^p \to 0 \) and small-farmers are converted to wage workers. Further, the elite have diversified their production to include both agricultural and non-agricultural production. Since workers no longer engage in any cultivation, \( Y^p = 0 \), we assume that their wages now have a lower bound defined only by the legal
minimum wage, $w^g$. Therefore, the wages in both agricultural and non-agricultural labor markets would be set by the legal minimum wage.

\[ w^m_{\text{post}} = w^m_{\text{pre}} = w^g \]  
\[ R^m_{\text{post}} = \psi f((1 - L)/np_a) - w^g \]  
\[ R^m_{\text{post}} = \phi f(L/n_{na}) - w^g \]

where $w^m_{\text{post}}$ is the wage rate that would prevail under repressive labor market conditions, $R^m_{\text{post}}$ is the return on per-unit of land under agricultural production and $R^m_{\text{post}}$ is the return on per-unit of land under non-agricultural production. $(L)$ is the proportion of land devoted to non-agricultural production by the elite and $w^g$ is the legal minimum wage that the elite have to pay the workers in both agricultural and non-agricultural labor markets.

The above exposition shows that both before and after land acquisition, the elite appropriate rents using their economic power by virtue of inequality in landownership. However, the rents in the latter case are greater as non-agricultural production is associated with higher total factor productivity. Correspondingly, the rent after land acquisition can be written as follows.

\[ \Delta R_{\text{post}} = (R^m_{\text{post}} - R^c_{\text{post}}) + (R^m_{\text{post}} - R^c_{\text{post}}) \]

We now define rents from labor repression before land acquisition using Equation 1.5.

\[ \Delta R_{\text{pre}} = \frac{\psi f(l_e) - (w^g + \tau)}{l_e} - \psi f'(l_e) > 0 \]
After land acquisition, small farmers lose their land and $\tau = 0$, therefore we can write the rents post-land acquisition using Equation 1.6.

$$
\Delta R_{\text{post}} = \frac{\psi f((1 - L)/np_a) - w^g}{(1 - L)/np_a} - \psi f'((1 - L)/np_a) + \frac{\phi f(L/n_{na}) - w^g}{L/n_{na}} - \phi f'(L/n_{na})
$$

(A.15)

where $(1 - L)$ is the proportion of elite land used for agriculture after SEZs and $L$ is the proportion of land diverted away from agriculture. Equation A.14 and Equation A.15, state that the returns to per unit of land under monopsonistic labor markets are greater than the marginal productivity of land in competitive labor markets both before and after land acquisition.

### A.2.3 Optimization Problem faced by the Elite

The equation below presents the optimization problem faced by large landowners.

$$
\pi(n_{na}, np_a) = \max_{n_{na}, np_a} \{ np_a\psi f((1 - L)/np_a) + n_{na}\phi f(L/n_{na}) - \alpha \bar{R} - w^g(n_{na} + np_a) \}
$$

subject to $$(1 - \alpha) \bar{R} \geq \Delta R_{\text{pre}}$$

(A.16)

where the prices for non-agricultural output have been normalized to unity and the constraint is an implicit function of $n_{na}$.  

---

6The constraint can expanded using Equation 1.7. The constraint simply states that the elite will convert their agricultural lands for non-agricultural use if the residual rents after making the necessary changes would be greater than the rents they were appropriating before SEZs. That is, 

\[
(1 - \alpha) \bar{R} \geq \Delta R_{\text{pre}} \quad \text{where} \quad \bar{R} = \Delta R_{\text{post}} - \Delta R_{\text{pre}} \quad \Rightarrow \quad \Delta R_{\text{post}} = \left( \frac{2 - \alpha}{1 - \alpha} \right) \Delta R_{\text{pre}} \\
\]

Since $n_{na} \neq 1$, Equation A.15 can be written as follows

\[
\Delta R_{\text{post}} = \frac{\psi f((1 - L)/np_a) - w^g}{(1 - L)/np_a} - \psi f'((1 - L)/np_a) + \frac{\phi f(L/n_{na}) - w^g}{L/n_{na}} - \phi f'(L/n_{na})
\]
Assuming the above constraint is satisfied with an equality and using the Lagrangian \( \lambda \), the first-order conditions associated with Equation A.16, \( \frac{\partial \pi}{\partial n_{na}} = 0 \), \( \frac{\partial \pi}{\partial n_{pa}} = 0 \) and \( \frac{\partial \pi}{\partial \lambda} = 0 \) can be written as follows.

\[
\frac{\partial \pi}{\partial n_{na}} = \phi f(L/n_{na}) - \frac{\phi}{n_{na}} f'(L/n_{na}) - \alpha \frac{\partial \bar{R}}{\partial n_{na}} - w^g = 0 \quad (A.17)
\]

\[
\frac{\partial \pi}{\partial n_{pa}} = \psi f((1 - L)/n_{pa}) - \frac{\psi}{n_{pa}} f'((1 - L)/n_{pa}) - \alpha \frac{\partial \bar{R}}{\partial n_{pa}} - w^g = 0 \quad (A.18)
\]

\[
\frac{\psi f((1 - L)/n_{pa}) - w^g}{(1 - L)/n_{pa}} - \psi f'((1 - L)/n_{pa}) + \frac{\phi f(L/n_{na}) - w^g}{L/n_{na}} - \phi f'(L/n_{na}) = \left( \frac{2 - \alpha^*}{1 - \alpha^*} \right) \Delta R_{pre} \quad (A.19)
\]

where the left-hand side of Equation A.19 is the expression for \( \Delta R_{post} \) from Equation A.14 and the right-hand side is expanding \( \bar{R} \) using Equation 1.7. We can now solve for the equilibrium value of \( n_{na}^* \) and \( n_{pa}^* \) using the condition that the total labor demand in agricultural and non-agricultural employment should equal total labor supply (normalized to unity). Therefore, \( e n_{na} + e n_{pa} = 1 \).

### A.2.4 Proofs of Propositions

#### A.2.4.1 Proof of Proposition 1

**Proposition 1:** Non-agricultural labor demand after land acquisition increases when total factor productivity associated with SEZ production increases.

Proposition 1 implies that \( \frac{\partial n_{na}^*}{\partial \phi} > 0 \). We use the Implicit Function Theorem and re-arranging the first-order conditions defined in Equation A.17.

\[
F^1 = \frac{\partial \pi}{\partial n_{na}} = \phi f(L/n_{na}) - \frac{\phi}{n_{na}} f'(L/n_{na}) - \alpha \frac{\partial \bar{R}}{\partial n_{na}} - w^g = 0 \quad (A.20)
\]
\[
\frac{dn_{na}^*}{d\phi} = -\frac{F_\phi^1}{F_\phi^1_{n_{na}}}
\]

Therefore,
\[
F_\phi^1 = f\left(\frac{L}{n_{na}}\right) - \frac{f'(L/n_{na})}{n_{na}} - \alpha \frac{\partial^2 \bar{R}}{\partial n_{na} \partial \phi}
\]

where
\[
\frac{\partial^2 \bar{R}}{\partial n_{na} \partial \phi} = \frac{f(L/n_{na})}{L} - \frac{f'(L/n_{na})}{n_{na}} \left( \frac{1}{n_{na}} - \frac{1}{L} \right) - f''(L/n_{na}) > 0
\]

Since \( f'' < 0 \). Correspondingly, we can see that \( F_\phi^1 > 0 \). Similarly, we have
\[
F_{n_{na}}^1 = -\frac{f'(L/n_{na})}{n_{na}^2}(\phi - 1) + \frac{\phi}{n_{na}^2}(f''(L/n_{na})) - \alpha \frac{\partial^2 \bar{R}}{\partial n_{na}^2} < 0
\]

Since \( \frac{\partial^2 \bar{R}}{\partial n_{na}^2} < 0 \) and \( f'' < 0 \). Therefore, we can see that \( \frac{\partial n_{na}^*}{\partial \phi} > 0 \).

A.2.4.2 Proof of Proposition 2

**Proposition 2:** Agricultural labor demand and agricultural income will decline as the elite divert more land from agricultural to non-agricultural land use.

This proposition implies that, \( (\frac{\partial n_{pa}}{\partial L} < 0) \) and \( (\frac{\partial w_a}{\partial x_e} > 0) \). We use the Implicit Function Theorem and the first-order conditions defined in equation A.19 and to prove the first part of Proposition 2. The first-order conditions can be re-arranged as follows.

\[
\frac{\partial \pi}{\partial \lambda} = F^2 = \frac{\psi f((1 - L)/n_{pa}) - w^g}{(1 - L)/n_{pa}} - \psi f'(1 - L)/n_{pa})
\]

\[
+ \frac{\phi f(L/n_{na}) - w^g}{L/n_{na}} - \phi f'(L/n_{na}) = \left( \frac{2 - \alpha^*}{1 - \alpha^*} \right) \Delta R_{pre}
\]
From the Implicit Function Theorem, we know that

\[
\frac{dnp_a}{dL} = -\frac{F^2_L}{F^2_{np_a}} \tag{A.21}
\]

where

\[
F^2_{np_a} = \frac{\psi}{1-L} (f - f'/np_a) + \frac{1}{np_a} f''((1-L)/np_a) > 0
\]

and

\[
F^2_L = \left( \frac{D - \frac{\psi}{np_a} f'}{D^2} \right) + \frac{\psi}{np_a} f'' + \left( \frac{L \phi' - n_{na} (\phi f - w^g)}{L^2} \right) - \frac{\phi}{n_{na}} f'' > 0
\]

where \( D = np_a (\psi f((1-L)/np_a) - w^g) \) and \( f'' < 0 \). Therefore, \( \frac{dnp_a}{dL} = -\frac{F^2_L}{F^2_{np_a}} < 0 \).

We now turn to incomes in agricultural employment. We know that wages paid in agriculture are determined by the legal minimum \( w^g \). Further we showed above that labor demand in agriculture would decline after landlords divert a part of their land away from agriculture. Correspondingly, total earnings in agricultural employment would also fall.

\section*{A.2.4.3 Proof of Proposition 3}

\textbf{Proposition 3}: Labor demand in the SEZ (non-agricultural) sector falls short of labor supply which creates involuntary unemployment for dispossessed workers who are forced to work in the agricultural sector.

Using the first-order conditions derived in Equations A.17 - A.19 we can derive the non-agricultural labor demanded by landlords as an implicit-function of \( \alpha, np_a \) and \( w^g \). However, this proposition argues that labor demand generated by the SEZ sector would fall short of labor supply dispossessed from self-farming. Since all small farmers engaged in agricultural production, and since the SEZ sector is associated with higher productivity, we assume that labor supply available to work in the SEZ sector = 1.
Therefore, all workers would be willing to work in non-agricultural employment and only those who are not absorbed by the SEZ sector would continue working in the agricultural sector. We can now substitute the value of $\phi f'(L/n_{na})$ from Equation A.17 in Equation A.19 to solve for $n_{na}$.

$$n_{na}^* = \frac{L(1-L)}{B(1-L)^2 - AL^2} \left[ \frac{2 - \alpha^*}{1 - \alpha^*} \Delta R_{pre} - \frac{A}{e} \left( \frac{L}{1 - L} \right) \right]$$ \hspace{1cm} (A.22)

where $A = (\psi f(1 - L)/n_{pa} - w^g)$ and $B = (\phi f(L/n_a) - w^g)$. We can see from Equation A.22 that $n_{na}^* < 1$ if $\alpha \leq 1$.

To prove that $n_{na}^* < 1$, let us assume that $n_{na}^* = 1$. In this case, the value of $\alpha$ would be given by the following.

$$\alpha = 1 + \frac{\Delta R_{pre}eL(1 - L)}{\Delta R_{pre}eL(1 - L) - (eB(1 - L)^2 + AL^2(1 - e))} > 1$$

Since $\alpha$ is a proportion of rents invested by landlords, it cannot be greater than 1. Therefore, labor demand generated by the SEZ sector cannot be equal to 1.

### A.3 Robustness Checks

The primary concern for any causal inference is that changes that are observed after land acquisition for SEZs could be caused by other changes happening in the economy over time. This section addresses these concerns by reporting three robustness checks to assess the validity of the results shown in Section 1.6. First, we use a district-level panel to estimate the impact of land acquisition on rural labor markets. Second, we use propensity scores to match the treatment and control districts and re-run our main difference-in-differences specification on the restricted sample of matched districts. Third, we re-estimate Equation 1.9 by dropping one state at a time.
A.3.1 District Level Panel

The main specification of the chapter uses individual level observations from the southern and western states of India. However, since our identification strategy relies on the temporal and geographic variation in land acquisition between districts, we re-estimate the difference-in-differences model presented in Section 1.5 by aggregating data at the district level from the seven states included in the study. More specifically, we estimate the following specification.

\[
Y_{dt} = \beta T_{dt} + \lambda_1 Z_d \times 1_{\{t>2006\}} + \sigma H_i + \pi_t + \mu_d + \epsilon_{dt}
\]  

(A.23)

where \(Y_{dt}\) is the outcome variable say time spent in self-farming in district \(d\) in time \(t\). \(Z_d\) is a set of time-invariant district level controls mentioned in Table 1.2. \(\pi_t\) capture survey year fixed effects and \(\mu_d\) are district fixed effects. All estimates are adjusted for correlation over time within districts by clustering at the district level.

Table A.1 presents the estimates for Equation A.23. Columns (1) - (2) estimate the impact of land acquisition for SEZs on non-agricultural casual employment and earnings. Using district-level data we find that land acquisition has no impact on non-agricultural labor demand and earnings. This is not surprising as the main results of this chapter showed that land acquisition had a marginal impact on non-agricultural labor demand and earnings (Table 1.7 and Table 1.8).

Columns (3) - (5) present the results for self-farming, time spent in casual agricultural employment and agricultural earnings respectively. We find that similar to the main specification of this chapter, presented in Tables 1.9 - Table 1.11, land acquisition reduces time spent in self-cultivation by 3.5 percentage points and increases time spent in casual labor by 4 percentage points. These results are significant at the 95 percent level. Finally, we find that land acquisition does not impact agricultural earnings at the district-level. Thus, the results indicate that the results in the main
specification of this chapter are robust to using a district-level panel which reduces the sample size of the study considerably.

A.3.2 Propensity Score Matching

In this section, we employ propensity score matching to test the main results presented in this chapter. This method is used when selecting a subset of comparison units similar to the treatment units is difficult because units must be compared across several pre-treatment characteristics. Matching is based on the concept of contrasting the outcomes of program participants with the outcomes of ‘comparable’ non-participants (Dehejia and Wahba, 2002). To estimate a treatment effect for each treated person, the outcome (like wage or private employment) is compared to an average of the outcomes for matched persons in the untreated sample. Matching on the propensity score is essentially a weighting scheme, which assigns a higher weight to similar comparison units when computing the estimated treatment effect to ensure unbiased estimates of the treatment (Dehejia and Wahba, 2002). Matching can be used to create a comparable control group if treatment is not random (Rosenbaum and Rubin, 1985). Propensity scores are particularly useful when matching can take place on a number of covariates and when the control population is much larger than the treatment population (Stuart, 2010).

Since we are interested in the labor market impacts of SEZs, we use determinants of rural labor supply like the proportion of marginalized caste (Scheduled Castes and Scheduled Tribes who are predominantly landless groups), literacy rates, labor force engaged in agriculture and the proportion of the population below poverty line to create a matched sample of control districts from the seven states included in our study. Marginalized communities are predominantly landless and the incidence of
poverty is disproportionately high for these groups (Gang et al., 2008). Figure A.1 shows the distribution of propensity scores between treatment and control units. We find that the first two bins of treated districts have no comparison units and there are fewer controls that are matched to treatment districts in bins 0.6 to 1. The matching estimation will therefore, drop the treatment districts that do not have comparable control districts. Table A.2 provides the summary statistics for the district level controls after matching. Using 130 non-SEZ districts in the southern and western states, we match 87 districts to 62 districts where SEZs were notified. Matching control districts on district level covariates reduces the median bias from 18.2 in the unmatched sample to 4.8 in the matched sample.

Table A.3 presents the difference-in-differences estimation results using matched districts. Columns (1) - (5) resent the results for non-agricultural casual employment, non-agricultural real earnings, self-farming, casual agricultural employment and agricultural earnings respectively. All regressions include district controls and individual controls. In addition, district and year fixed effects have been applied to all specifications. We find that our difference-in-differences results are robust to the construction of a control group using propensity score matching on district-level time invariant characteristics. We find that in comparison to a matched control group, in districts where SEZs were notified, the proportion of labor time spent in non-agricultural employment increased by 0.6 percent while self-farming declined by around 5 percent. Correspondingly, proportion of time spent in agricultural labor increased by around 2 percent.

However, when we confine our control group to a matched sample, we find that there is no statistically significant impact on both agricultural and non-agricultural

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7Deaton (2003) shows that in 1990 - 2000, close to 30 percent of rural India lived below the poverty line. While the SCs and STs together represent 24 percent of the population, 47 percent of rural poverty is concentrated in this group (Gang et al., 2008).
real earnings. In our standard difference-in-differences estimator, non-agricultural real earnings were increasing. These results support our main hypothesis that SEZs create excess supply of rural labor which depresses wages in both agricultural and non-agricultural sectors. This is important as both agricultural and non-agricultural employment increase significantly. Therefore, wages are sticky and do not respond to increased demand in non-agricultural employment. This can be explained by the large agricultural labor force, created by land acquisition which exerts a downward pressure on wages in the countryside.

A.3.3 Difference-in-Differences Estimation: Excluding One State at a Time

Our sample is confined to SEZ districts in the southern and western states of India which account for 72 percent of all notified SEZs. In order to ensure that our results are not driven by SEZ districts in any one state, we re-estimate Equation 1.9 by dropping observations from one state at a time. The results are shown in Table A.4.

We find that the increase in non-agricultural employment is primarily driven by Maharashtra and Andhra Pradesh. If we exclude these states from our sample, we find that land acquisition for SEZs have no impact on time spent in non-agricultural labor. Therefore, SEZs in other states do not contribute significantly to employment creation in the non-agricultural casual labor. This is particularly true for Tamil Nadu and Karnataka. This is not surprising since the aggregate impact of SEZs on non-agricultural labor was small in magnitude.

Table 1.8 shows that incomes in the non-agricultural sector increased by around 5 percentage points. This result is robust to the exclusion of all states except Kerala. One reason for no impact of SEZs on non-agricultural wages in Kerala is the fact that Kerala has the lowest proportion of rural force engaged in agriculture (31 percent). Correspondingly, employment in the non-agricultural sector is significantly higher.
than other states. This would keep non-agricultural wages depressed in Kerala even after land acquisition SEZs.

Next we turn to self-farming. We find that the results are consistent to the exclusion of all states except Gujarat. The fact that Gujarat witnessed a significant decline to drive an overall reduction in self-farming by 3 percentage points (Table 1.9) suggests the need for future research exploring landholding patterns in SEZ districts in Gujarat. With respect to changes in casual agricultural labor, Table A.4 shows that the main results of the chapter reported in Table 1.10 are consistent with the exclusion of each of the seven states used in the sample.

Finally, we turn to changes in agricultural incomes. The main results of this chapter reported in Table 1.11 show that land acquisition has no impact on agricultural earnings. This result is also consistent with the results in Table A.4. We find that the exclusion of any one state does not alter this result.

A.4 Data and Variable Creation

A.4.1 International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

Data on agricultural productivity is calculated using data from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) India.\(^8\) The ‘Meso’ dataset of ICRISAT contains information on annual crop area and production, irrigated area, monthly rainfall, livestock, agricultural implements and operational holdings for all districts in 19 major states in India.\(^9\) This allows us to construct a district level panel to compute changes in agricultural production area under cultivation over

\(^{8}\)ICRISAT

\(^{9}\)The states included in the ICRISAT data are Andhra Pradesh (including Telangana), Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Bihar, West Bengal, Odisha, Assam, Himachal Pradesh, Kerala, Chhattisgarh, Jharkhand and Uttarakhand.
time. ICRISAT collects data on cereals, pulses, oilseeds and selected cash crops from 1966 - 2010. As our sample corresponds to the major southern and western states, using the ICRISAT data we calculate total annual yield of major food crops and cash crops for the states in our sample.\textsuperscript{10}

In addition to data on agricultural productivity, ICRISAT also provides district level means of agricultural wages for both men and women using information from the Ministry of Agriculture. We use district level agricultural wages from the ICRISAT data to determine changes in wage rates in the agricultural economy due to land acquisition for SEZs. While the NSS provides us with the earnings received at the individual level by workers in each employment category, the wage rate data from ICRISAT allows us to study trends in wage rates in agriculture. Table 1.4 presents the summary statistics for variables constructed using the ICRISAT data for the districts where SEZs were notified.

\section*{A.4.2 Census of India}

In addition to the NSS data, district level controls for the proportion of marginalized communities (SC/ST), literacy rates and the proportion of population below poverty are constructed using the 2001 Census of India. Demographic characteristics including caste composition, literacy rates and workforce participation at the district level are created using the Primary Census Abstract and the Village Directories from Census, 2001. Table 1.4 provides the descriptive statistics for all district level controls used in the chapter.

\footnote{Food crops comprise of rice, wheat, pulses and cereals and cash crops comprise of oil, cotton, sugarcane and soybean.}
A.4.3 Employment and Wage Variables

The Employment and Unemployment Rounds of the NSS provide information on weekly time use and earnings for each member of the household. This allows us to calculate the percentage of time spent per day in public and private employment in the rural sector. Further, private employment can be further decomposed into self-employment, domestic work and private wage employment. Additionally, in order to discuss changes in the agricultural sector, we construct variables for time spent in self-employment and private wage employment in agriculture. For all employment types, we calculate the daily wage rate by dividing the weekly earnings by the number of days worked in that employment. Further, these wages are deflated using the monthly consumer price index for rural labor from the Indian Labor Bureau.

A.4.4 Poverty Rates

Data on poverty headcount-ratio comes from the Consumption Expenditure Survey of the 61st Round of NSS data (2004 - 2005). We use state level poverty lines using the monthly per capita expenditure (MPCE) reported in the data. We construct estimates of the proportion of people living below the state level poverty line for every district using the Uniform Recall Period (URP). All district level controls are presented in Table 1.2.

A.4.5 Land Use

The Directorate of Economics and Statistics at the Ministry of Agriculture publishes annual data on rural land use for all states in India. We use land use data for states included in this study between 2000 - 2012. Rural agricultural land is classified as - area under cultivation (net sown area), fallow land (area under cultivation which has not been used for agricultural production for at least one year, but not more than five years) and cultivable waste land (area under cultivation but not used for agricultural production for over five years). We use this classification of rural land
to create the proportion of land under cultivation and fallow land by dividing land under each category by the total agricultural land in a district. Table 1.4 presents the summary statistics for the proportion of fallow land and land under cultivation for districts where at least one SEZ was notified.
Figure A.1: Distribution of Propensity Scores across SEZ Districts
Table A.1: Difference in Differences Estimates using a District Level Panel

<table>
<thead>
<tr>
<th>Variable</th>
<th>Wage Employment (non-agriculture)</th>
<th>Real Wage (non-agriculture)</th>
<th>Self-Farming (agriculture)</th>
<th>Casual Work (agriculture)</th>
<th>Real Wage (agriculture)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>SEZ x post</td>
<td>0.395 (0.391)</td>
<td>0.356 (0.247)</td>
<td>-3.482** (1.649)</td>
<td>4.166** (1.667)</td>
<td>1.132* (0.634)</td>
</tr>
<tr>
<td>Observations</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.726</td>
<td>0.813</td>
<td>0.671</td>
<td>0.581</td>
<td>0.807</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls x post</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Note: This table reports the results for the difference-in-differences specification using a district-level panel. Column (1) presents the results for non-agricultural casual work. Column (2) reports the coefficient for non-agricultural earnings and column (3) shows changes in self-farming. Column (4) corresponds to casual agricultural work and column (5) corresponds to daily agricultural casual wages. Casual wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. All district level time-invariant controls are interacted with a dummy for the post-period. Standard errors in parentheses are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1
Table A.2: Matched District Level Controls

<table>
<thead>
<tr>
<th>Variable</th>
<th>SEZ Districts (1)</th>
<th>Matched Non-SEZ Districts (2)</th>
<th>p-value (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fraction SC</td>
<td>0.16</td>
<td>0.16</td>
<td>0.992</td>
</tr>
<tr>
<td>Fraction ST</td>
<td>0.087</td>
<td>0.101</td>
<td>0.648</td>
</tr>
<tr>
<td>Fraction Literate Male</td>
<td>0.589</td>
<td>0.588</td>
<td>0.827</td>
</tr>
<tr>
<td>Fraction Literate Female</td>
<td>0.41</td>
<td>0.412</td>
<td>0.827</td>
</tr>
<tr>
<td>Fraction Male Labor Force</td>
<td>0.601</td>
<td>0.604</td>
<td>0.793</td>
</tr>
<tr>
<td>Fraction Agricultural Labor</td>
<td>0.533</td>
<td>0.524</td>
<td>0.763</td>
</tr>
<tr>
<td>Fraction below Poverty Line</td>
<td>0.32</td>
<td>0.30</td>
<td>0.45</td>
</tr>
<tr>
<td>Number of Districts</td>
<td>62</td>
<td>87</td>
<td></td>
</tr>
</tbody>
</table>

Note: This table shows the mean values of matched district level controls. Columns (1) and (2) present the mean values for districts where SEZs were notified and matched-control districts respectively. Column (3) presents the p-values of the student’s t-test of equality of means in columns (1) and (2).
Table A.3: Difference-in-differences using Matched Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Wage Employment (non-agriculture)</th>
<th>Real Wage (non-agriculture)</th>
<th>Self Employment (agriculture)</th>
<th>Casual Work (agriculture)</th>
<th>Real Wage (agriculture)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>SEZ x post</td>
<td>0.639* (0.354)</td>
<td>0.157 (0.198)</td>
<td>-4.695*** (1.497)</td>
<td>2.423*** (0.678)</td>
<td>0.224 (0.196)</td>
</tr>
<tr>
<td>Observations</td>
<td>173,077</td>
<td>173,077</td>
<td>85,072</td>
<td>173,077</td>
<td>173,077</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.056</td>
<td>0.058</td>
<td>0.160</td>
<td>0.104</td>
<td>0.051</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Note: This table reports the results for difference-in-differences specification using the matched sample where districts were matched using propensity scores based on district-level characteristics. Column (1) presents the results for non agricultural casual work. Column (2) reports the coefficient for non-agricultural earnings and column (3) shows changes in self-farming. Column (4) corresponds to casual agricultural work and column (5) corresponds to daily agricultural casual earnings. Casual wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. All district level time-invariant controls are interacted with a dummy for the post-period. Standard errors in parentheses are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1
Table A.4: Difference-in-Differences Estimation Excluding One State at a Time

<table>
<thead>
<tr>
<th>Variable</th>
<th>Excluding Gujarat</th>
<th>Excluding Maharashtra</th>
<th>Excluding Kerala</th>
<th>Excluding Tamil Nadu</th>
<th>Excluding Andhra Pradesh &amp; Telangana</th>
<th>Excluding Karnataka</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Non Agricultural Employment</td>
<td>0.542*</td>
<td>0.268</td>
<td>0.549*</td>
<td>0.711***</td>
<td>0.203</td>
<td>0.713**</td>
</tr>
<tr>
<td></td>
<td>(0.303)</td>
<td>(0.338)</td>
<td>(0.312)</td>
<td>(0.271)</td>
<td>(0.337)</td>
<td>(0.316)</td>
</tr>
<tr>
<td>Non-Agricultural Earnings</td>
<td>0.485**</td>
<td>0.369*</td>
<td>0.214</td>
<td>0.574**</td>
<td>0.443*</td>
<td>0.471**</td>
</tr>
<tr>
<td></td>
<td>(0.220)</td>
<td>(0.216)</td>
<td>(0.145)</td>
<td>(0.226)</td>
<td>(0.260)</td>
<td>(0.230)</td>
</tr>
<tr>
<td></td>
<td>(1.617)</td>
<td>(1.767)</td>
<td>(1.576)</td>
<td>(1.638)</td>
<td>(1.542)</td>
<td>(1.568)</td>
</tr>
<tr>
<td>Casual Agricultural Labor</td>
<td>1.757***</td>
<td>1.903***</td>
<td>2.069***</td>
<td>1.735**</td>
<td>1.257**</td>
<td>1.596**</td>
</tr>
<tr>
<td></td>
<td>(0.636)</td>
<td>(0.677)</td>
<td>(0.650)</td>
<td>(0.665)</td>
<td>(0.620)</td>
<td>(0.623)</td>
</tr>
<tr>
<td>Agricultural Earnings</td>
<td>0.128</td>
<td>0.275</td>
<td>0.205</td>
<td>0.176</td>
<td>0.0618</td>
<td>0.150</td>
</tr>
<tr>
<td></td>
<td>(0.207)</td>
<td>(0.221)</td>
<td>(0.181)</td>
<td>(0.212)</td>
<td>(0.220)</td>
<td>(0.205)</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Note: This table reports the results for differences-in-difference specification by excluding each state at a time. Each row corresponds to a different labor market outcome mentioned in column (1). All district level time-invariant controls are interacted with a dummy for the post period. Standard errors in parentheses are clustered at the district level. Standard errors in parentheses are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1
APPENDIX B

APPENDIX OF CHAPTER 2

B.1 Robustness Checks

The primary concern for any causal inference is that changes that are observed post the intervention are not caused by the program but instead are due to other changes happening in the economy over time. In the context of this study, changes in labor market that we observe in landlord and non-landlord districts may not be because of NREGA but due to other unobservable factors. This section addresses these concerns by conducting two robustness checks to assess the validity of the results shown in section 2.6. First, we re-estimate equation 2.2 using data from the pre-program period 1999-2005 for a falsification test and second, we use propensity scores to match the treatment and control districts and re-run the estimates on the restricted sample of matched-districts. The results are described below.

B.1.1 Placebo Treatment

Table B.1 shows the results of re-estimating equation 2.2 using data from two thick rounds of NSSO data from the period before NREGA was implemented. We use the 55th and the 61th rounds of NSSO which correspond to the period of 1999-2000 and 2004-2005 respectively. Since the first phase of NREGA was implemented in 2006, this data reports labor market dynamics prior to treatment. We assign a program dummy for early districts and use data from 2004-2005 as the ‘post’ period for this placebo test. In these estimations all district and individual level controls are included along-with district and year quarter fixed effects. The results for the natural log of
real casual wage, public and private employment are reported in columns (1), (2) and (3) respectively. As expected, there is no effect of the placebo treatment for any of the specifications. The increasing trend in ln real wages that was shown in Figure 2.3 does not hold when district and individual level controls are included. These results show that even though district level factors like poverty head-count ratios may have affected the selection of districts in the program, we can control for these factors using district level time-invariant controls.

B.1.2 Propensity Score Matching

Next, we employ propensity score matching to test the main results presented in this chapter. This method is used when selecting a subset of comparison units similar to the treatment units is difficult because units must be compared across several pre-treatment characteristics. Matching is based on the concept of contrasting the outcomes of program participants with the outcomes of ‘comparable’ non-participants (Dehejia and Wahba, 2002). To estimate a treatment effect for each treated person, the outcome (like wage or private employment) is compared to an average of the outcomes for matched persons in the untreated sample. Matching on the propensity score is essentially a weighting scheme, which assigns a higher weight to similar comparison units when computing the estimated treatment effect to ensure unbiased estimates of the treatment (Dehejia and Wahba, 2002).

This method is particularly attractive in cases like NREGA as it allows us to match observations across multiple dimensions. We know that the program was implemented in the early districts based on the poverty criteria. Zimmermann (2012) notes that the criteria for selecting the first 200 poorest districts and the subsequent 130 districts was based on a backwardness index created by the Planning Commission of India in 2003. This included agricultural wage, fraction of Scheduled Castes and Scheduled Tribes in the population of a district, the fraction of agricultural workers, the poverty head-
count ratio and agricultural productivity per worker. I use these district level criteria to match treatment districts with control districts using non-replacement matching with the nearest neighbor and keep only matched districts.

Correspondingly, the number of districts with a common support reduces from 289 in the original estimation to 267 in the matched estimation. Further, the median bias reduces from 32 percent (in the unmatched sample) to 6 percent (in the matched sample).

Figure B.1 shows the histogram for the estimated propensity score for the treatment and control districts. I find that the first bin of treated districts has no comparison units and there are fewer controls that are matched to treatment districts in bins 0.7 to 1. The matching estimation will therefore, drop the treatment districts that do not have comparable control districts. Table B.2 provides the summary statistics for the controls after matching and Table B.3 provides the changes in the number of individual observations before and after matching.

Table B.4 presents the regression results for equation 2.1 and equation 2.2 for real wages, public and private employment. All regressions include district and individual controls. In addition, district and year-quarter fixed effects have been applied to all specifications. The triple difference coefficient for real wages continues to remain positive and significant at the 5 percent level. This is similar to results in table 2.5. Further, on comparing the double difference coefficients, we find that wages increased by around 5 percent in non-landlord districts and fell by around 3 percent in landlord districts. However, these results are not statistically significant. This shows that wages in non-landlord districts rose differentially in comparison to landlord districts.

However, contrary to earlier results, there is an increase in public employment in landlord districts which is significant at the 5 percent level. The corresponding increase for non-landlord districts is also statistically significant but the magnitude of increase is
(0.8 percentage points) is less than that in landlord districts (1.2 percentage points). This shows that if we restrict the study to 267 districts which are matched on poverty indicators, we find that there is an increase in time spent in public employment in landlord districts. However, this increase in public employment is not sufficient to increase the bargaining position of workers as we do not see any wage increase in landlord districts. Therefore, our central conclusion that landlords can keep wages depressed using their market power as the provision of NREGA may not be sufficient to provide workers with a credible alternative, continues to hold.

Finally, private employment has fallen by around 2.5 percentage points in non-landlord districts (significant at the 1 percent level) while it has increased by around one percentage point in landlord districts which is not statistically significant. This is similar to results in table 2.7. These results show that even when we control for all baseline factors that may have contributed to a district’s inclusion in the treatment group, the differences between the impact of NREGA in landlord and non-landlord districts remains significant. The institution of zamindari continues to play a major role in determining the success of NREGA. Districts that did not have this exploitative system continued to show greater improvement in rural wages under NREGA in comparison to landlord districts.

B.1.3 Excluding states based on Land Revenue System and Land Reforms

In this section we re-estimate equation 2.1 and equation 2.2 for rural wages, public and private employment by excluding states which had exclusively landlord-based system and those that had some successful land reform attempts.

States in north and eastern India like Bihar, Jharkhand and West Bengal were characterized exclusively by landlord-based revenue system. Excluding these states should not alter the results for non-landlord districts in the difference-in-differences estima-
tion. Further, removing these states would also check whether our triple difference estimators are driven by few northern states without any non-landlord districts. This would ensure that state-level factors like differences in the administrative capacity and political commitment of states to NREGA are not responsible for the differential impact of NREGA in non-landlord districts. We will first re-estimate our main regressions with the exclusion of Bihar and Rajasthan from the sample.

Our original regressions included 45 districts from Bihar and Jharkhand which contributed to over 30 percent of our sample for landlord districts. Table B.5 reports the results for the full specifications (all controls and fixed effects) for our regressions for rural wages, public and private employment. As expected, the results for the impact of NREGA on non-landlord districts remains unchanged. Further, the results for landlord districts also show the same pattern as before. The provision of NREGA continues to be weak in landlord districts which attenuates its wage and private employment impact. Finally, the differential impact of NREGA on the wages of non-landlord districts also show an increase of 6 percent. Since Bihar and Jharkhand created the least NREGA employment, this reduction in our regression coefficient by 2 percentage points (in comparison to the complete sample in Table 2.5) shows that the provision of public employment under NREGA drives its labor market impact in rural wages and private employment. Therefore, our mechanism for the impact of NREGA being attenuated in landlord districts due to lower provision of NREGA employment is further validated by these results.

Next, we turn to the eastern state of West Bengal which was also placed under the landlord-based revenue system. However, post-independence this state together with the southern state of Kerala witnessed some land reform attempts by the state governments. As a consequence of these land reform attempts, land ceiling was enacted, and land was distributed to landless workers. This could potentially reduce the effect
of historical inequalities on the functioning of NREGA. In this section, we exclude these states from our sample and re-estimate the model in Section 2.5.

As can be seen from table B.6, the exclusion of states like West Bengal and Kerala which witnessed partial land reforms after independence also does not alter the main results of this chapter. We report the results for the difference-in-differences and triple difference estimators using the complete specifications including district and individual controls and fixed effects. As can be seen from Panel A of the table, NREGA has a positive and statistically significant impact on rural wages in non-landlord districts. Since there is no impact of NREGA in landlord districts, the differential impact of NREGA in non-landlord districts measured by the triple difference estimator is round 8 percent which is similar to the results in section 2.5.

Panel B of Table B.6 discusses changes in public employment in this sample. We see that both landlord and non-landlord districts witness an increase in time spent in NREGA employment. However, this increase is landlord districts is not enough to cause an increase in rural wages and crowding-out of private employment which is seen in non-landlord districts (Panel C).

Therefore, our results are robust to different specifications and continue to hold even when states which were exclusively landlord based and those which witnessed some land reform post-independence are excluded from the sample.

B.2 Creation of Variables
B.2.1 District Boundaries and Date of Conquest

In their data appendix, Banerjee and Iyer (2005) provide detailed information on the date of conquest by the British and historical land revenue system instituted in these districts. However, over time these district boundaries were changed significantly. The geographical boundaries of districts under colonial rule are significantly different from
those today as districts have been divided, renamed, or merged with other districts. Kumar and Somanathan (2009) document the changes in district boundaries from 1961 to 2001. Using these changes in district boundaries over time, we create a panel of 289 rural districts with data on land revenue system. Districts for which data was ambiguous or unclear were verified using sources like government websites and if the ambiguity could not be resolved, then those districts were dropped from the sample. Further, data on the date of conquest by the British is an important control as Banerjee and Iyer (2005) show that regions that fell under British rule before 1820 were highly fertile and witnessed greater exploitation and plunder. We also include the date of British colonial conquest as a control in our estimations.

B.2.2 Productivity of workers and rainfall

Data on productivity per worker is constructed using data on output for nine major crops and their prices published by the Ministry of Agriculture, Government of India. These crops include bajra, gram, jowar, maize, ragi, rice, wheat, arhar and barley for 2004-2005. In addition, the prices are taken from the website of the annual tables on district-level prices compiled by the Ministry of Agriculture. If data on price for any crop is missing for any particular district, we use the state level average as the price for crops in that district. Data on annual rainfall comes from the rainfall data set, Terrestrial Air Temperature and Precipitation: Monthly and Annual Time Series (1970-2010) prepared by the Center for Climatic Research at the University of Delaware. We create long term means using quarterly data from 1970 - 2010 and calculate the normalized quarterly deviation from this long term mean.

B.2.3 Poverty Headcount Ratio

Data on poverty headcount-ratio comes from the Consumption Expenditure Survey of the 61st Round of NSSO data (2004 - 2005). We use state level poverty lines using the monthly per capita expenditure (MPCE) reported in the data. We construct
estimates of the proportion of people living below the state level poverty line for every district using the Uniform Recall Period (URP).

B.3 Dropping of Central Province as Non-landlord Districts

In this section we test whether the results would hold after dropping the districts as suggested by Iversen et al. (2013). The 18 districts of the Central Provinces today account for around 31 districts according to the 2001 Census which accounts for over 10 percent of the sample. Since there are conceptual reasons why the Iversen et al. (2013) objection may not hold, we do not re-classify the districts. However, our results should not be driven by observations from these districts, therefore we drop them from our sample in the estimation below. The results below show that the primary result of this chapter that the wage effect of NREGA is attenuated in landlord districts holds. However, dropping the districts does change the coefficient for time spent in public employment in landlord districts. The results for rural wages, public and private employment are shown below.

From table B.7 we can see that even after dropping districts in Central Provinces (CP), wages in landlord districts remain depressed and in non-landlord districts they increase. This is similar to the main results of the chapter in table 2.5 Turning next to public employment in table B.8, we see that our results for landlord districts change in comparison to the results of table 2.6. After we drop the 31 districts in Maharashtra, Madhya Pradesh and Chhattisgarh, we find that public employment in landlord districts increases significantly by around 1.2 percentage points which is statistically significant. While the increase in public employment in landlord districts is not sufficient to increase wages, which is the major argument of this chapter, the changes in public employment shown in table B.8 suggest the need for future investigation on the subject.
Finally, we discuss private employment in table B.9. We find that on comparison with the results of table 2.7, private employment does not change after incorporating the changes suggested by Iversen et al. (2013). Therefore, there is no crowding-out of private employment in landlord districts which is consistent with results in table B.8 which show that wages in landlord districts do not rise post-NREGA. Therefore, large landlords do not reduce their labor demand as they can keep wages depressed. Alternatively, in non-landlord districts we see that there is crowding-out of private employment as wages rise. These results show that the main argument of this chapter, that the labor market impact of NREGA is attenuated in landlord districts, continues to hold.
Figure B.1: Distribution of Propensity Scores across NREGA Districts

Table B.1: Placebo Treatment Between Landlord and Non Landlord Districts in the Dry Season

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Ln Deflated Wage (1)</th>
<th>Public Employment (2)</th>
<th>Private Employment (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NREGxNLxpost</td>
<td>-0.0122 (0.0690)</td>
<td>-0.374 (0.287)</td>
<td>-0.849 (2.071)</td>
</tr>
<tr>
<td>NREGxpost</td>
<td>0.0346 (0.0531)</td>
<td>0.229 (0.275)</td>
<td>-2.415 (1.587)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>-0.0570 (0.0539)</td>
<td>0.188 (0.192)</td>
<td>2.836* (1.645)</td>
</tr>
<tr>
<td>Observations</td>
<td>16,030</td>
<td>116,521</td>
<td>116,521</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.522</td>
<td>0.031</td>
<td>0.185</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls x post</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1

Note: Each column reports the results for a separate triple difference regression. Column (1) reports the results for log of deflated casual wages when the dummy for post equals 1 for 2004-2005 and similarly, column (2) and column (3) report the results for public employment and private employment respectively. The natural log of daily wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. Data on employment is calculated using the 55th Round (pre-period) and the 61th Round (post-period) of NSSO data. The NSSO collects data over four sub-rounds in a year and the last two sub-rounds (January to June) comprises of the dry season and the other two quarters are the rainy season. We use weights proportional to the district population and all district level time-invariant controls are interacted with a dummy for the post period. Standard errors in parentheses are clustered at the district level.
Table B.2: Matched District Level Controls

<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment (1)</th>
<th>Control (2)</th>
<th>p-value (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln Agricultural Wage</td>
<td>3.41</td>
<td>3.39</td>
<td>0.92</td>
</tr>
<tr>
<td>Fraction SC</td>
<td>0.17</td>
<td>0.18</td>
<td>0.61</td>
</tr>
<tr>
<td>Fraction ST</td>
<td>0.15</td>
<td>0.14</td>
<td>0.92</td>
</tr>
<tr>
<td>Fraction Agricultural Labor</td>
<td>0.52</td>
<td>0.54</td>
<td>0.15</td>
</tr>
<tr>
<td>Fraction Below Poverty</td>
<td>0.32</td>
<td>0.30</td>
<td>0.45</td>
</tr>
</tbody>
</table>

District Observations 95 174
Individual Observations 55672 27916

Note: This Table shows the mean values of matched district level controls used in all estimations. Column 1 and 2 present the mean values of controls for non-landlord and landlord districts respectively. Column (3) presents the p-values of the student’s t-test of equality of means in columns 1 and 2. The Employment and Unemployment Survey is used for calculating labor force participation variables and the Consumption Expenditure Survey is used for calculating the proportion of population below poverty line. Proportion of population comes from Census 2001 and productivity per worker (normalized) is calculated using data on output and prices from the Ministry of Agriculture and number of agricultural workers from NSSO.

Table B.3: Individual Observations before and after Matching

Panel A. Before Matching

<table>
<thead>
<tr>
<th>Land Revenue System</th>
<th>Control</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landlord</td>
<td>16,983</td>
<td>1,04,478</td>
</tr>
<tr>
<td>Non landlord</td>
<td>65,008</td>
<td>61,680</td>
</tr>
<tr>
<td>Total</td>
<td>81,991</td>
<td>1,66,158</td>
</tr>
</tbody>
</table>

Panel B. After Matching

<table>
<thead>
<tr>
<th>Land Revenue System</th>
<th>Control</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landlord</td>
<td>16,983</td>
<td>98,702</td>
</tr>
<tr>
<td>Non-landlord</td>
<td>57,828</td>
<td>59,200</td>
</tr>
<tr>
<td>Total</td>
<td>74,811</td>
<td>1,57,902</td>
</tr>
</tbody>
</table>
Table B.4: Propensity Score Matching: Effect of NREGA on Rural Labor Markets in the dry season

<table>
<thead>
<tr>
<th></th>
<th>Landlord DD</th>
<th>Non Landlord DD</th>
<th>Triple Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A. Ln Casual Wage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td>0.148**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0614)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxpost</td>
<td>-0.0344</td>
<td>0.0357</td>
<td>-0.0711</td>
</tr>
<tr>
<td></td>
<td>(0.0560)</td>
<td>(0.0286)</td>
<td>(0.0529)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>-0.160***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0486)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>10,015</td>
<td>10,939</td>
<td>20,954</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.402</td>
<td>0.597</td>
<td>0.509</td>
</tr>
<tr>
<td>Panel B. Public Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td>-0.308</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.649)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxpost</td>
<td>1.240**</td>
<td>0.797**</td>
<td>0.947**</td>
</tr>
<tr>
<td></td>
<td>(0.528)</td>
<td>(0.360)</td>
<td>(0.476)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>-0.912***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.335)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>57,276</td>
<td>55,286</td>
<td>112,344</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.057</td>
<td>0.078</td>
<td>0.062</td>
</tr>
<tr>
<td>Panel C. Private Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td>-2.264</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.903)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxpost</td>
<td>0.810</td>
<td>-2.492***</td>
<td>0.263</td>
</tr>
<tr>
<td></td>
<td>(1.868)</td>
<td>(0.934)</td>
<td>(1.708)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>2.044</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.584)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>57,276</td>
<td>55,068</td>
<td>112,344</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.292</td>
<td>0.292</td>
<td>0.291</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls x post</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Note: This table shows the impact of NREGA on rural labor markets using propensity score matching. Panel A, Panel B and Panel C report the regression results for log of agricultural wage (deflated), public employment and private employment respectively. Each column presents results from a separate specification and includes only districts matched on five criteria of backwardness identified by the Planning Commission in 2003. All rates are calculated using the 61st and 64th Round of NSSO data which is spread over four sub-rounds in a year. All regressions are estimated for the dry season. All regressions include district controls mentioned in Table (1) and individual controls mentioned in Table (4). In addition, each specification includes year quarter and district fixed effects. Re-weighted sampling weights provided by NSSO are used in these regressions and robust standard errors in parentheses are clustered at the district level.
Table B.5: Labor Market Effects of NREGA excluding Bihar and Jharkhand

<table>
<thead>
<tr>
<th></th>
<th>Landlord DD</th>
<th>Non Landlord DD</th>
<th>Triple Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td><strong>Panel A. Ln Casual Wage</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREG\times NL \times post</td>
<td>0.143**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0634)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREG \times post</td>
<td>-0.0361</td>
<td>0.0636**</td>
<td>-0.0487</td>
</tr>
<tr>
<td></td>
<td>(0.0554)</td>
<td>(0.0293)</td>
<td>(0.0568)</td>
</tr>
<tr>
<td>NL \times post</td>
<td>-0.143**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0553)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>6,816</td>
<td>10,490</td>
<td>17,306</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.417</td>
<td>0.592</td>
<td>0.528</td>
</tr>
<tr>
<td><strong>Panel B. Public Employment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREG \times NL \times post</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.285</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.790)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREG \times post</td>
<td>1.116</td>
<td>0.936**</td>
<td>0.694</td>
</tr>
<tr>
<td></td>
<td>(0.766)</td>
<td>(0.396)</td>
<td>(0.538)</td>
</tr>
<tr>
<td>NL \times post</td>
<td>-0.825**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.349)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>41,545</td>
<td>59,458</td>
<td>100,777</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.073</td>
<td>0.107</td>
<td>0.083</td>
</tr>
<tr>
<td><strong>Panel C. Private Employment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREG \times NL \times post</td>
<td>-3.184</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.311)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREG \times post</td>
<td>0.902</td>
<td>-2.927**</td>
<td>0.634</td>
</tr>
<tr>
<td></td>
<td>(2.509)</td>
<td>(1.146)</td>
<td>(2.168)</td>
</tr>
<tr>
<td>NL \times post</td>
<td>3.384*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.855)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>41,545</td>
<td>59,232</td>
<td>100,777</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.256</td>
<td>0.281</td>
<td>0.269</td>
</tr>
</tbody>
</table>

Year-Quarter FE: YES
District Controls x post: YES
Individual Controls: YES

*** p<0.01, ** p<0.05, * p<0.1

Note: This table shows the impact of NREGA on rural labor markets excluding the states of Bihar and Jharkhand. Panel A, Panel B and Panel C report the regression results for ln of rural casual wage (deflated), public employment and private employment respectively. Each column presents results from a separate specification and includes only districts matched on five criteria of backwardness identified by the Planning Commission in 2003. All rates are calculated using the 61st and 64th Round of NSSO data which is spread over four sub-rounds in a year. All regressions are estimated for the dry season. All regressions include district controls mentioned in Table (1) and individual controls mentioned in Table (4). In addition, each specification includes year quarter and district fixed effects. Re-weighted sampling weights provided by NSSO are used in these regressions and robust standard errors in parentheses are clustered at the district level.
Table B.6: Labor Market Effects of NREGA excluding West Bengal and Kerala

<table>
<thead>
<tr>
<th></th>
<th>Landlord DD</th>
<th>Non Landlord DD</th>
<th>Triple Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td><strong>Panel A. Ln Casual Wage</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td></td>
<td></td>
<td>0.190***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.0700)</td>
</tr>
<tr>
<td>NREGxpost</td>
<td>-0.0334</td>
<td>0.0590*</td>
<td>-0.0989</td>
</tr>
<tr>
<td></td>
<td>(0.0656)</td>
<td>(0.0310)</td>
<td>(0.0651)</td>
</tr>
<tr>
<td>NLxpost</td>
<td></td>
<td></td>
<td>-0.166***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.0588)</td>
</tr>
<tr>
<td>Observations</td>
<td>7,053</td>
<td>9,910</td>
<td>16,963</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.426</td>
<td>0.552</td>
<td>0.499</td>
</tr>
<tr>
<td><strong>Panel B. Public Employment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td></td>
<td></td>
<td>0.303</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1.002)</td>
</tr>
<tr>
<td>NREGxpost</td>
<td>1.409*</td>
<td>0.860**</td>
<td>0.729</td>
</tr>
<tr>
<td></td>
<td>(0.839)</td>
<td>(0.355)</td>
<td>(0.679)</td>
</tr>
<tr>
<td>NLxpost</td>
<td></td>
<td></td>
<td>-0.920***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.353)</td>
</tr>
<tr>
<td>Observations</td>
<td>46,322</td>
<td>55,862</td>
<td>101,972</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.074</td>
<td>0.110</td>
<td>0.083</td>
</tr>
<tr>
<td><strong>Panel C. Private Employment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td></td>
<td></td>
<td>-2.771</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2.557)</td>
</tr>
<tr>
<td>NREGxpost</td>
<td>-0.0926</td>
<td>-3.114**</td>
<td>0.319</td>
</tr>
<tr>
<td></td>
<td>(2.493)</td>
<td>(1.180)</td>
<td>(2.360)</td>
</tr>
<tr>
<td>NLxpost</td>
<td></td>
<td></td>
<td>3.118</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1.927)</td>
</tr>
<tr>
<td>Observations</td>
<td>46,322</td>
<td>55,650</td>
<td>101,972</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.277</td>
<td>0.274</td>
<td>0.274</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls x post</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1

Note: This table shows the impact of NREGA on rural labor markets excluding the states of West Bengal and Kerala. Panel A, Panel B and Panel C report the regression results for ln of rural casual wage (deflated), public employment and private employment respectively. Each column presents results from a separate specification and includes only districts matched on five criteria of backwardness identified by the Planning Commission in 2003. All rates are calculated using the 61st and 64th Round of NSSO data which is spread over four sub-rounds in a year. All regressions are estimated for the dry season. All regressions include district controls mentioned in Table (9) and individual controls mentioned in Table (3). In addition, each specification includes year quarter and district fixed effects. Re-weighted sampling weights provided by NSSO are used in these regressions and robust standard errors in parentheses are clustered at the district level.
Table B.7: Changes in Ln Deflated Wages Between Landlord and Non Landlord Districts using Iversen et al. (2013) classification

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>DD: NREGA by Landlord Districts</th>
<th>DD: NREGA by Non Landlord Districts</th>
<th>DDD: By NREGA and Non Landlord</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td>-0.0669 (0.0499)</td>
<td>-0.0285 (0.0611)</td>
<td>-0.0205 (0.0683)</td>
</tr>
<tr>
<td>NREGxpost</td>
<td>0.112*** (0.0368)</td>
<td>0.0629** (0.0306)</td>
<td>0.0636** (0.0293)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>-0.117** (0.0503)</td>
<td>-0.0851 (0.0583)</td>
<td>-0.113* (0.0648)</td>
</tr>
<tr>
<td>Observations</td>
<td>7,679</td>
<td>7,679</td>
<td>10,490</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.283</td>
<td>0.293</td>
<td>0.353</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

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

Note: This Table shows results for three panels. Columns (1) - (3) show results of a difference-in-differences for landlord districts, columns (4) - (6) for non-landlord districts and columns (7) - (9) show results of a triple difference. Each column presents results from a separate specification. Ln Daily wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. Data on employment is calculated using the 61st Round (pre-period) and the 64th Round (post-period) of NSSO data. I use weights proportional to the district population and all district level time-invariant controls are interacted with a dummy for the post period. Standard errors in parentheses are clustered at the district level.
Table B.8: Changes in Public Employment Between Landlord and Non Landlord Districts using Iversen et al. (2013) classification

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>DD: NREGA by Landlord Districts</th>
<th>DD: NREGA by Non Landlord Districts</th>
<th>DDD: By NREGA and Non Landlord</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td>1.033</td>
<td>0.884</td>
<td>0.900</td>
</tr>
<tr>
<td></td>
<td>(0.725)</td>
<td>(0.764)</td>
<td>(0.775)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>-0.168</td>
<td>-0.433</td>
<td>-0.415</td>
</tr>
<tr>
<td></td>
<td>(0.137)</td>
<td>(0.271)</td>
<td>(0.276)</td>
</tr>
<tr>
<td>NREGxpost</td>
<td>0.186</td>
<td>1.246***</td>
<td>1.245***</td>
</tr>
<tr>
<td></td>
<td>(0.191)</td>
<td>(0.453)</td>
<td>(0.464)</td>
</tr>
<tr>
<td>Observations</td>
<td>52,134</td>
<td>52,134</td>
<td>52,002</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.024</td>
<td>0.029</td>
<td>0.032</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Coup</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

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

Note: This Table shows results for three panels. Columns (1) - (3) show results of a difference-in-differences for landlord districts, columns (4) - (6) for non-landlord districts and columns (7) - (9) show results of a triple difference. Each column presents results from a separate specification. Log Daily wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. Data on on employment is calculated using the 61st Round (pre-period) and the 64th Round (post-period) of NSSO data. I use weights proportional to the district population and all district level time-invariant controls are interacted with a dummy for the post period. Standard errors in parentheses are clustered at the district level.
Table B.9: Changes in Private Employment Between Landlord and Non Landlord Districts using Iversen et al. (2013) classification

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>DD: NREGA by Landlord Districts</th>
<th>DD: NREGA by Non Landlord Districts</th>
<th>DDD: By NREGA and Non Landlord</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>NREGxNLxpost</td>
<td>-2.774</td>
<td>-2.243</td>
<td>-2.198</td>
</tr>
<tr>
<td></td>
<td>(2.282)</td>
<td>(2.575)</td>
<td>(2.286)</td>
</tr>
<tr>
<td>NLxpost</td>
<td>0.980</td>
<td>1.180</td>
<td>1.637</td>
</tr>
<tr>
<td></td>
<td>(1.902)</td>
<td>(2.092)</td>
<td>(1.776)</td>
</tr>
<tr>
<td>NREGxpost</td>
<td>-0.211</td>
<td>-0.898</td>
<td>-0.543</td>
</tr>
<tr>
<td></td>
<td>(1.928)</td>
<td>(2.843)</td>
<td>(2.423)</td>
</tr>
<tr>
<td>Observations</td>
<td>52,134</td>
<td>52,134</td>
<td>52,002</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.022</td>
<td>0.024</td>
<td>0.284</td>
</tr>
<tr>
<td>District FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>District Controls</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

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

Note: This Table shows results for three panels. Columns (1) - (3) show results of a difference-in-differences for landlord districts, columns (4) - (6) for non-landlord districts and columns (7) - (9) show results of a triple difference. Each column presents results from a separate specification. Log Daily wages are deflated using the monthly, state-level price index for rural laborers from the Indian Labor Bureau. Data on employment is calculated using the 61st Round (pre-period) and the 64th Round (post-period) of NSSO data. I use weights proportional to the district population and all district level time-invariant controls are interacted with a dummy for the post period. Standard errors in parentheses are clustered at the district level.


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