GOVERNMENT EMPLOYMENT GUARANTEE, LABOR SUPPLY AND FIRMS' REACTION: EVIDENCE FROM THE LARGEST PUBLIC WORKFARE PROGRAM IN THE WORLD

Sumit Agarwal+, Shashwat Alok*, Yakshup Chopra* and Prasanna Tantri*

+ McDonough School of Business
* Indian School of Business

Background

- Governments regularly engage in activist fiscal interventions
  - Tax Cuts
  - Debt interventions
  - Unemployment Insurance
    - Public Workfare
- Public workfare programs increasingly popular around the world
  - Korea (1997-1999), Ethiopia (2004), Rwanda(2008), Sri Lanka (2010),…
  - Not just an emerging market phenomena
    - The great Depression – FDR's employment and wage policy
    - Recent Financial Crisis
      - Middle Class Tax Relief and Job Creation Act of 2012
      - Extended Unemployment Compensation
    - Other OECD countries

History of Public Workfare Programs

- Public workfare programs increasingly popular around the world
  - Ghana (1988-91), Bangladesh (1991-92), Korea (1997-99), Argentina (1997-00), Ethiopia (2004), Rwanda(2008), Kenya (2009), Sri Lanka (2010)…
  - Most of them being Cash-for-Work (Subbarao, 2010), with wages either equivalent or less than minimum wage.

  - Not just an emerging market phenomena
    - The great Depression – FDR's employment and wag
      - Construction of Hoover Dam (fig)
    - Recent Financial Crisis
      - Middle Class Tax Relief and Job Creation Act of 2012
      - Extended Unemployment Compensation
    - Other OECD countries

Labor in India

What do we do in this paper?

- Do (and how) such policies work in practice?
  - Study the labor and firm response to a largest public workfare program in the world (MNREGA)
  1. How do the labor markets respond to MNREGA?
     - Does it lead to labor shortage?
     - Movement of skilled labor to workfare
  2. If it does lead to labor shortage, how do firms respond?

- Use establishment level data to examine the impact on employment, Capex investments and profitability of firms.

Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA)

- Largest Public Workfare Program in the World
  - Guarantees 100 days of paid employment
    - No eligibility criteria other than being an adult!
  - Total of $51 billions spent so far
  - Serves 50 million households annually
    - Generating 2300 million person days of employment
- Rationale for the program
  - Social safety net
  - Rural infrastructure development
- Implemented in 3 phases
  - Phase 1: 2006 - 200 districts
  - Phase 2: 2007 – 130 districts
  - Phase 3: 2008 – Rest of India
  - Exploit the staggered implementation for identification
    - More on this later

Public Workfare Programs – Pros and Cons

- Rationale (In principle)
  - Safety net/insurance function for the poor
  - Consumption Smoothing
  - Spur growth through infrastructure development
    - Assist firm growth
  - Potentially useful in dealing with adverse macro-economic shocks – arrest consumption decline and poverty growth
  - Endogenous self-selection by unskilled, unemployed and poor (critical!)
  - Graduate from unskilled to skilled
    - Increase availability of skilled labor
- In practice
  - Political capture – intensity and location of targeting
  - May fail to achieve self-selection and targeting: Success contingent on only unskilled and poor being attracted by the program
  - Poor quality of infrastructure
  - Corruption and leakages
    - Deadweight cost

Raging Controversy: Two Opposing Views

- Anchored on three issues
  1. Wage gain and impact on poverty
     - Number of papers evaluating the impact on consumption, health, education and other socioeconomic outcomes
  2. Quality of work
  3. Did it attract only the unemployed?
     - No eligibility Criteria! Anyone can enroll under the scheme!
     - No accountability measures to check asset creation.
     - In case employment is not given within a 15 days of demand, unemployment allowance is given. 1st month 30% and for rest guaranteed days 50% of wage rate
     - Anecdotal evidence suggests that in some states 20%-30% employed were non-poor
     - Skilled workers engaged in MNREGA
     - Adverse impact on firms and future employment generation by private sector

For example, several anecdotes surrounding MNREGA

"*Admitting that NREGA had pushed Ludhiana's industry on the back foot, brand manager of Duke Gagan Jain said, "Acute labour shortage is a reality and we're trying to work things out... Not only unskilled, but even tasks requiring skilled workers have taken a beating, what with around 20% personnel taking off, Jain said... He claimed as it was getting tougher to find people with the required skill set, the future would see adoption of latest technology so that lesser people would have to be hired."*

- ***"Traders blame NREGA for worsening labour crisis", Times of India, Oct 21, 2009***

Raging Controversy: Two Opposing Views

- Anchored on three issues
  1. Wage gain and impact on poverty
     - Number of papers evaluating the impact on consumption, health, education and other socioeconomic outcomes
  2. Quality of work
  3. Did it attract only the poor & unemployed?
     - Anecdotal evidence suggests that in some states 20%-30% employed were non-poor
     - Skilled workers engaged in NREGA
     - Adverse impact on firms and future employment generation by private sector
       - Thus far arguments largely based on anecdotal evidence
       - This is where our paper comes in!

Our Goals in This Paper

- Extant literature examining the impact of workfare program has primarily focused on socioeconomic outcomes of the intended beneficiaries
- Program Evaluation:
  1. Can workfare programs create labor market distortions?
     - In particular, do permanent/skilled workers leave their jobs to move to workfare?
       - Our Answer: Yes
  2. Impact on factories-
     - How do factories respond?
       - Labor-capital substitution
     - Impact on revenues and profitability
- Inform on barriers to effectiveness of such polices
  - Exploit heterogeneity to program response across regions and firms/industries

Existing Work

- Impact evaluation of fiscal policies
  - Tax cuts/rebates - House and Shapiro (2006); Mertens and Ravn (2014)), Agarwal and Qian(2014)
  - Debt Interventions : Agarwal, Amromin, Ben-David, Chomsisengphet, Piskorski, and Seru (Forthcoming); Agarwal, Amromin, Chomsisengphet, Piskorski, Seru, and Yao (2015), Loan waivers (Subramanian et al)
- Impact of minimum wage and unemployment insurance on labor supply
  - Krueger and Meyer (2004), Chetty (2008), Aaronson et al (2010) among others
- Interaction between labor market and firms
  - Bena and Simintzi (2016), Ma, Ouimet and Simintzi (2016), Vig Volpin and Siminitzi (2015), Agarwal and Matsa (2013), Agarwal and Tambe (2016), Bergman, Benmelech and Seru (2015)

Novel Contribution

- Impact evaluation of MNREGA on previously ignored firm-level outcomes
  - First paper to study the impact of workfare program on corporate sector
  - Spillovers via labor supply distortions
- Using workfare as a labor supply shock, we are able to examine the dynamics of labor-technology substitution by firms
  - Empirical setup allows us to separate labor supply from demand based explanations
  - Detailed data on permanent and contract workers allows us to examine the supply of particular types of workforce

Towards Literature

- Real implications of activist fiscal policy in general and workfare programs in particular
  - Fiscal spending may have unintended consequences and may crowd out employment in the private sector
- Optimality of the workfare program in comparison to welfare program
  - Lack of effective monitoring can attract skilled labor making them dependent on the program effectively transforming workfare into welfare (Besley and Coate (1992))
- Impact of MNREGA-a workfare program on industrial sector

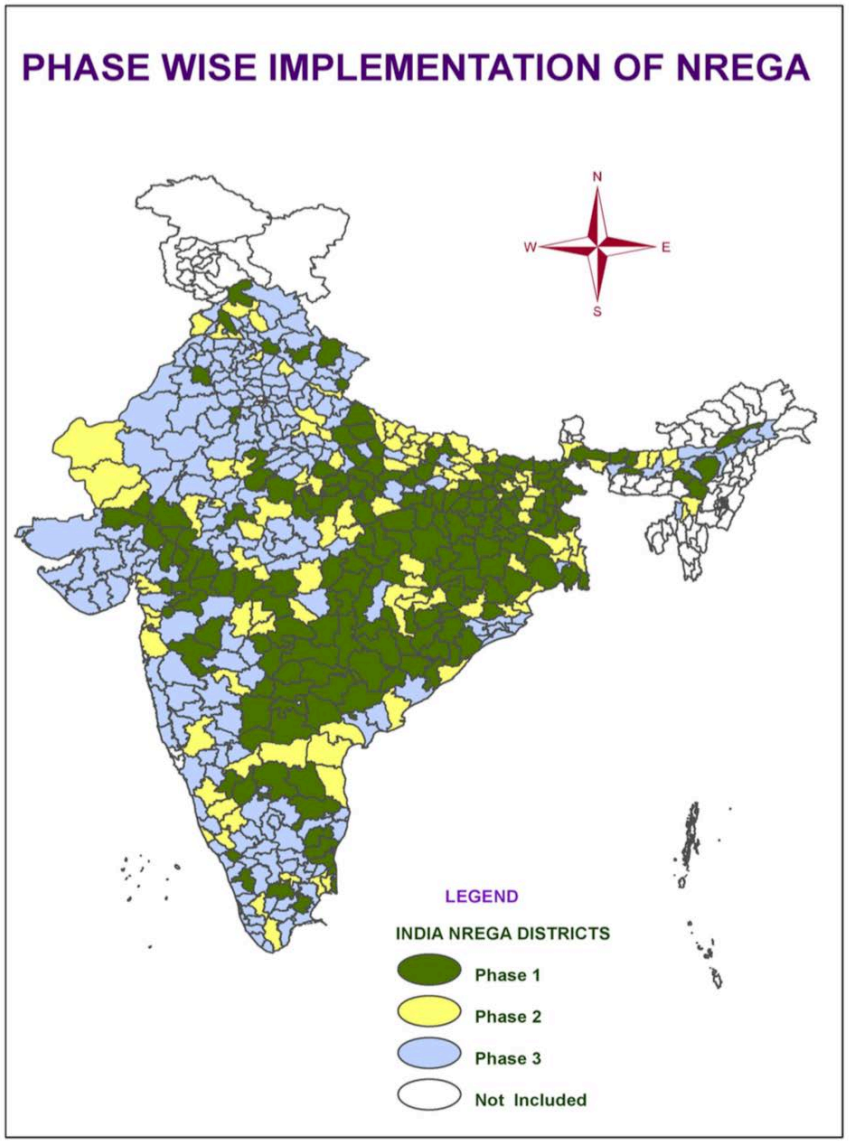
Data: Sources

- Establishment level panel Data from Annual Survey of Industries
- Period: 2002-2010
- Focus on factories sampled every year – 31,655 establishments/firms
- 1,26,586 firm-year observations
- Detailed annual data on number and types of workers – permanent, contract and managerial staff
- Data on financial outcomes – sales, cost of production, assets, earnings
  - Detailed data on annual additions to land, plant and machinery, computers etc

Data: Variable Definition

Permanent workers	count; workers on the factory payroll.
Wages per Perm--anent worker	in INR; yearly wage paid to a permanent worker.
Contract workers	count; workers hired through contractors
Wages per cont--ract worker	in INR; yearly wage paid to a contract worker.
Fixed Assets (Gross Additions)	in INR; Gross additions to the total fixed assets, this includes assets equipment, transport and land.
P&M (Gross Additions)	in INR; Gross additions to plant and machinery.
Invested capital	in INR; Fixed capital and physical capital.
Capital per worker	in INR; Invested capital / (permanent and contractual worker).
Total Output	in INR; Ex-factory value of quantity manufactured + income from services + variation in stocks of semi finished goods + value of electricity generated and sold + value of own construction + net balance of goods sold in the same condition as purchased.
Total Input	in INR; Fuel and material consumption + Operating and non-operating expense + Repairs and maintenance of fixed assets + Insurance charges + Expense on other works.
Profit	in INR; (Total output-total input) - depreciation - rent & interest paid - wages, benefits and bonus to employees.
Cash Ratio	Cash & Cash Equivalents by Total Assets.
Output per unit Input	Total output per total input.
Post-MNREGA	A dummy variable that takes the value one for factories located in phase 1 districts for fiscal years after 2006 , phase 2 districts for fiscal years after 2007, and phase 3 districts for fiscal years after 2008;and zero, otherwise.[28]

Empirical Design: Difference-in-differences



Empirical Design: Difference-in-differences

- Staggered Implementation
  - Phase 1 – 2006, 200 districts
  - Phase 2 – 2007, 130 districts
  - Phase 3 – 2008, 285 districts
  - Unique Setting:
    - Developed Country workfare - usually in response to adverse macroeconomic shocks
    - No contemporaneous change in other fiscal or monetary policy
    - No expiry date
    - Internal Validity for 1.3 billion people
  - Lends itself to a generalized DiD approach

$$Y_{idt} = \alpha + \nu_i + \delta_t + \gamma X_{it} + \beta Post\text{-}NREGA_{idt} + \epsilon_{idt}$$

  - i denotes firm, d denotes a district and t denotes a year
  - Post-NREGA is a dummy variable which takes value one if the factory-year (it), belongs to the post implementation period in district d.
  - The coefficient of interest is β
  - Control for firm and year fixed effects

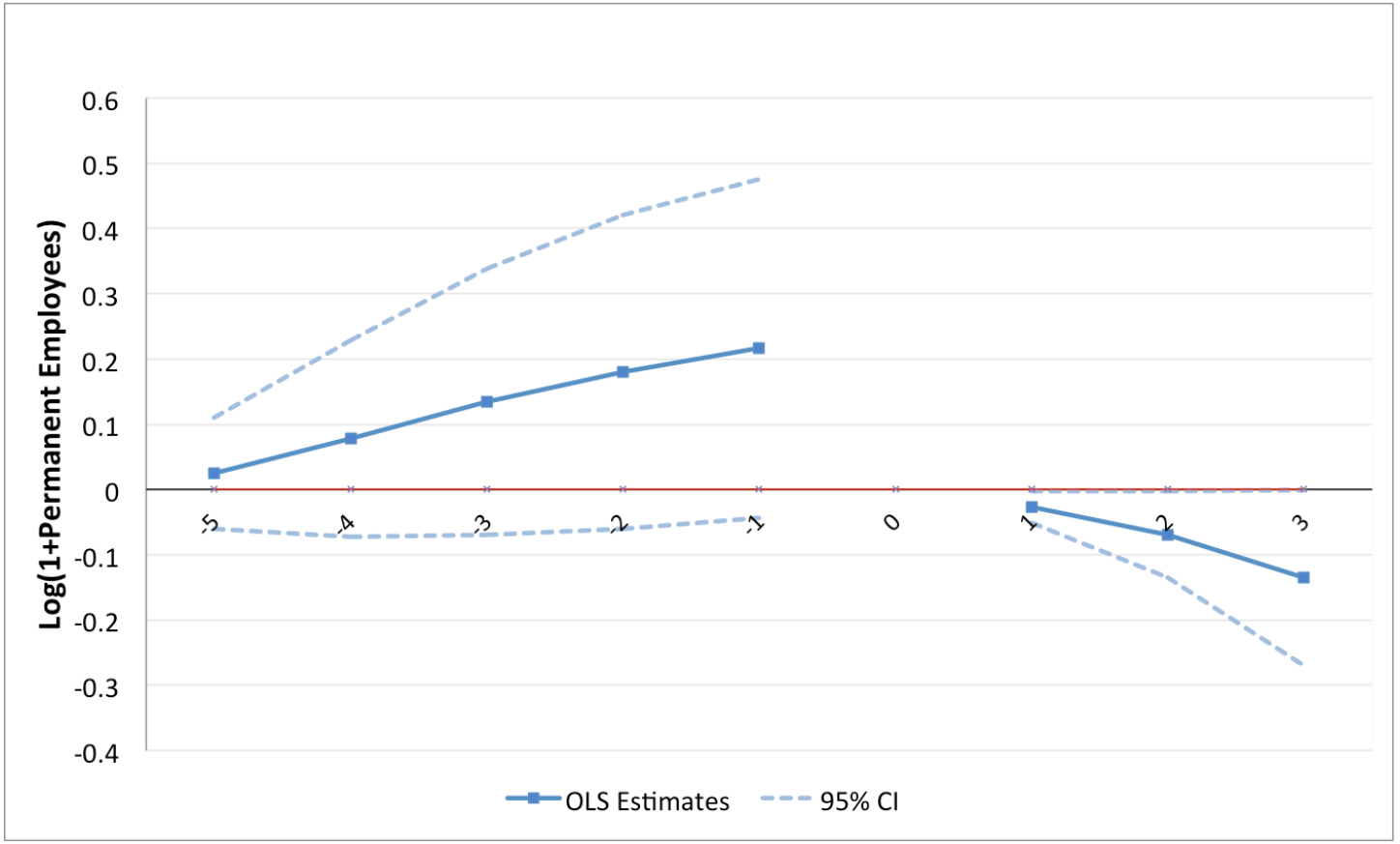
Impact of NREGA on Number of Workers

	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A			
VARIABLES	Permanent Workers		Contract Workers		Managerial Staff	
Post-MNREGA	-16.68**	-17.40**	-1.81	-1.92	-0.70	-0.86
	(-2.5275)	(-2.5470)	(-0.2474)	(-0.2569)	(-0.9112)	(-1.0849)
Firm Size		9.75***		3.01***		1.27***
		(7.3127)		(5.0580)		(9.7579)
Age		0.78**		0.03		0.10***
		(2.3762)		(0.4119)		(3.0306)
Observations	126,586	120,774	126,586	120,774	126,586	120,774
R-squared	0.8928	0.8938	0.9608	0.9613	0.7489	0.7484

Impact of NREGA on Number of Workers

Panel B						
VARIABLES	Log(1+Permanent Workers)		Log(1+Contract Workers)		Log(1+Managerial) Staff	
Post-MNREGA	-0.0267*	-0.0271**	0.0275	0.0253	-0.0022	-0.0034
	(-1.8876)	(-2.0353)	(0.8792)	(0.8136)	(-0.1701)	(-0.2750)
Firm Size		0.0500***		0.0419***		0.0469***
		(14.5783)		(8.4442)		(17.2981)
Age		0.0021***		-0.0005		0.0026***
		(3.8004)		(-0.3515)		(3.8986)
Observations	126,586	120,774	126,586	120,774	126,586	120,774
R-squared	0.9269	0.9300	0.8056	0.8081	0.9082	0.9113
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes	Yes	Yes

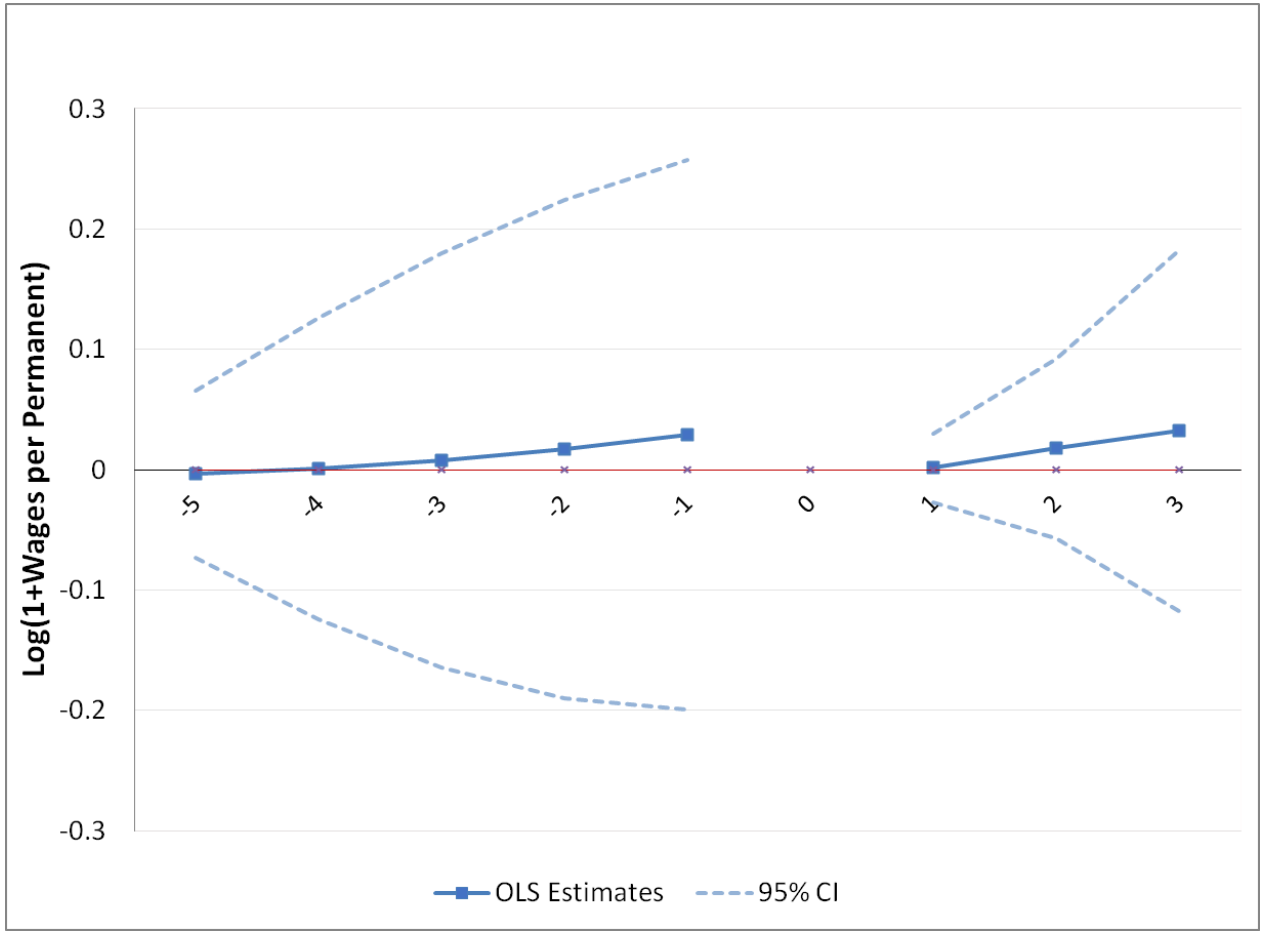
Estimated Response Dynamics of the Impact of NREGA Permanent Employees



Impact of NREGA and Wages per Worker

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A					
VARIABLES	Permanent Workers		Contract Workers		Managerial Staff	
Post-MNREGA	273.07	168.38	220.76	177.26	-6,356.35	-6,508.77
	(0.2781)	(0.1849)	(0.5463)	(0.4510)	(-1.1435)	(-1.2390)
Firm Size		1,225.40***		702.11***		8,196.99***
		(15.0748)		(10.4869)		(11.5943)
Age		69.80***		-19.7		355.68
		(2.7516)		(-1.1848)		(1.5665)
Observations	126,586	120,774	126,586	120,774	126,586	120,774
R-squared	0.8466	0.8493	0.6752	0.6774	0.5473	0.5639

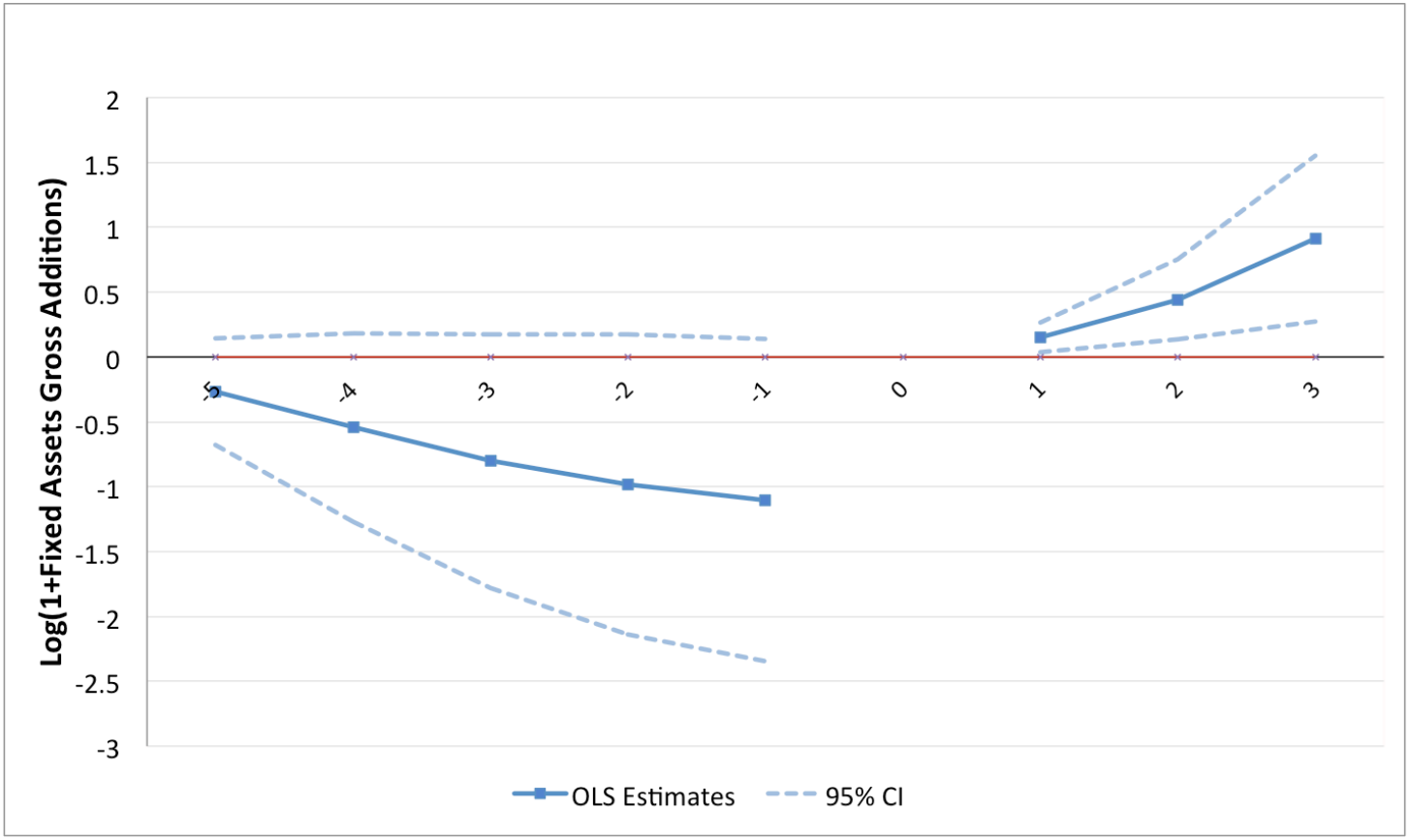
Estimated Response Dynamics of the Impact of NREGA Wages per Permanent Worker



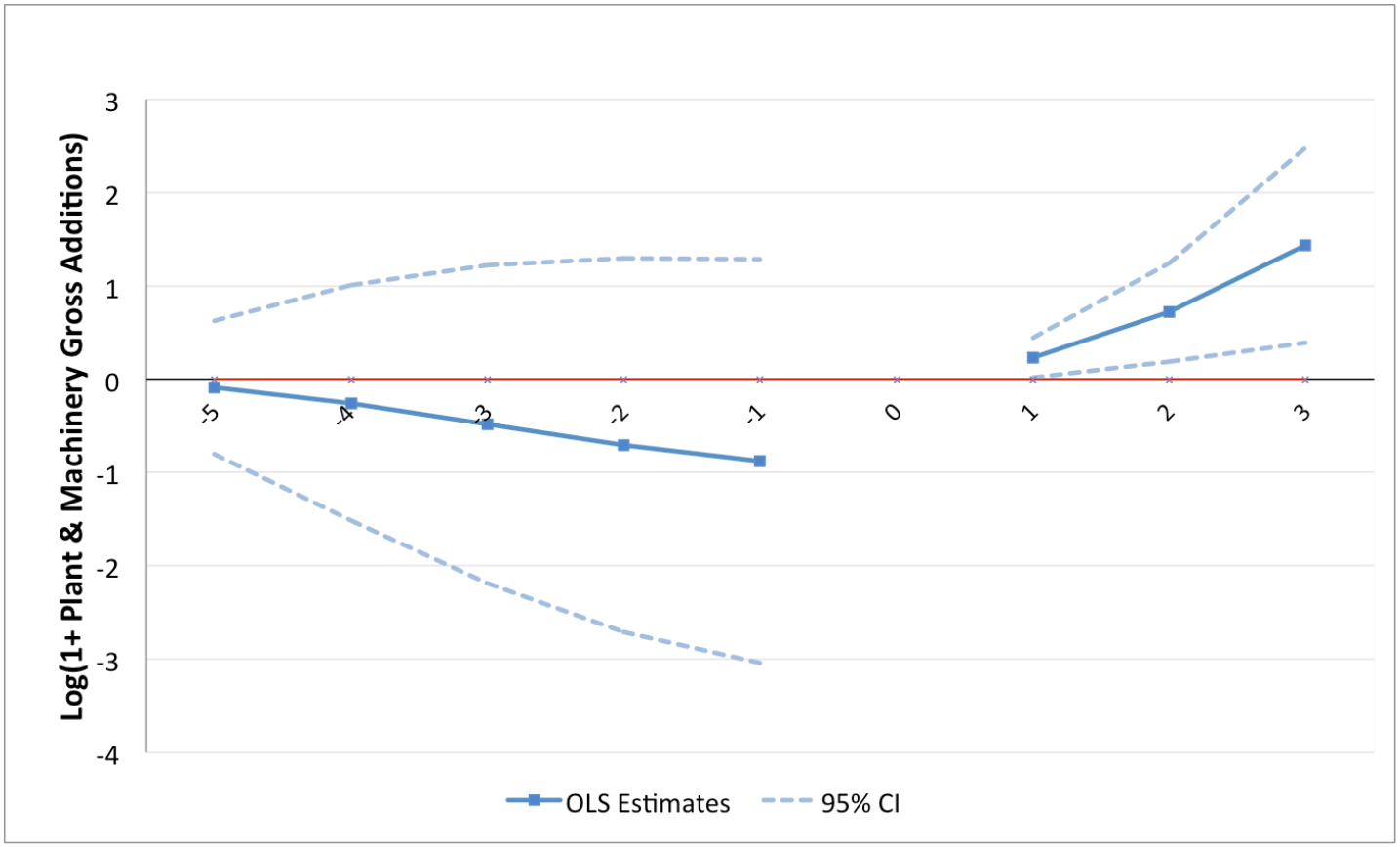
Impact of NREGA on Capitalization by Firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Log(1+Fixed Assets (Gross Additions))		Log(1+P&M (Gross Additions))		Log(1+Capital per worker)		Log(1+ Rent for P&M)	
Post-MNREGA	0.1135***	0.1182***	0.2363***	0.2323***	0.0411**	0.0230*	0.2201*	0.2487**
	(2.9276)	(3.1249)	(2.7793)	(2.7213)	(2.4773)	(1.8831)	(1.8633)	(2.0647)
Firm Size		-0.0971***		-0.1475***		0.0813***		0.0505***
		(-8.4035)		(-7.6571)		(8.5810)		(3.6610)
Age		0.0032		-0.0024		0.0005		0.0084**
		(1.3210)		(-0.4836)		(0.5287)		(1.9663)
Observations	124,975	120,774	122,847	118,778	126,569	120,757	126,558	120,752
R-squared	0.7987	0.8063	0.7116	0.7188	0.9072	0.9270	0.5782	0.5790
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Estimated Response Dynamics of the Impact of NREGA Fixed Assets (Gross Additions)



Estimated Response Dynamics of the Impact of NREGA Plant and Machinery (Gross Additions)



Impact of NREGA on Firm Performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Log(1+Total Input)		Log(1+Total Output)		Log(1+Profit)		Cash Ratio		Output per unit Input	
Post-MNREGA	0.0763***	0.0752***	0.0176	0.0163	-0.0048**	-0.0048**	-0.0033***	-0.0026**	-1.0166***	-1.0593***
	(3.3755)	(3.3680)	(1.1388)	(1.2897)	(-2.5245)	(-2.4552)	(-2.6156)	(-2.4705)	(-3.2824)	(-3.2646)
Firm Size		0.1013***		0.1053***		0.0050***		-0.0029***		0.0184
		(20.2568)		(22.8744)		(12.0877)		(-7.5685)		(0.7192)
Age		0.0037***		0.0028***		0.0001		0.0002***		-0.0090**
		(4.0244)		(3.3502)		(0.8787)		(3.3002)		(-2.1375)
Observations	126,586	120,774	126,586	120,774	126,583	120,771	124,701	119,248	126,586	120,774
R-squared	0.9234	0.9276	0.9420	0.9477	0.7468	0.7513	0.9925	0.9948	0.3648	0.3650
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Impact of NREGA on Working Capital Cycle

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Inventory Cycle		Debtor cycle		Working Capital Cycle	
Post-NREGA	-25.09***	-25.24***	-2.09**	-2.26***	-26.61***	-26.92***
	(-4.1690)	(-4.1278)	(-2.4544)	(-2.7158)	(-4.4034)	(-4.3648)
Firm Size		1.34**		0.58***		2.24***
		(2.3936)		(3.4316)		(3.6285)
Age		0.09		0.02		0.13
		(0.8583)		(0.3626)		(1.0416)
Observations	126,586	120,774	115,519	110,389	126,586	120,774
R-squared	0.6561	0.6588	0.7715	0.7745	0.6672	0.6692
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes	Yes	Yes

Cross-Sectional Tests

- Sub-sample tests
  - Explains the channel of influence and heterogeneity in impact
  - Further strengthens Causal Interpretation

1. Low Wages vs High Wages
2. Low Labor Productivity vs High Labor Productivity
3. High Volatility vs Low Volatility
4. Pro Employer Laws vs Others
5. Interaction with Labor Laws
   1. Low Wages in Regions with Pro-Employer LawsA
   2. Low Labor Productivity in Regions with Pro-Employer Laws
   3. High Volatility in Regions with Pro-Employer Laws

Low Wage per Worker versus Others

Panel A : Factories with below median Permanent Wage per worker				
	(1)	(2)	(3)	(4)
	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))
Post-MNREGA	-0.0267*	0.0579***	0.1045*	0.1946*
	(-1.9102)	(4.8250)	(1.9606)	(1.7656)
Observations	62,653	62,653	62,653	61,452
R-squared	0.9293	0.7971	0.7953	0.7113
Panel B : Factories with above median Permanent Wage per worker				
Post-MNREGA	-0.0161	-0.0535***	0.0853	0.2196*
	(-0.8537)	(-4.6099)	(1.5296)	(1.8865)
Observations	55,666	55,666	55,666	54,900
R-squared	0.9212	0.8219	0.7971	0.7028
Year FE	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes

Low Labor Productivity versus Others

Panel A : Factories with low labor productivity				
	(1)	(2)	(3)	(4)
	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))
Post-MNREGA	-0.0385*	0.0358***	0.1686***	0.2600*
	(-1.7286)	(2.7540)	(3.0938)	(1.9410)
Observations	56,614	56,614	56,614	55,329
R-squared	0.9321	0.8162	0.7674	0.6886
Panel B : Factories with high labor productivity				
Post-MNREGA	-0.0048	-0.0156	0.0306	0.1586
	(-0.3582)	(-1.3421)	(0.5774)	(1.5486)
Observations	61,701	61,701	61,701	61,020
R-squared	0.9254	0.7946	0.7648	0.6658
Year FE	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes

Industries with High Output Volatility versus Others

Panel A : Factories with high output volatility				
	(1)	(2)	(3)	(4)
	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))
Post-MNREGA	-0.0320**	0.0004	0.1422***	0.2965***
	(-2.1885)	(0.0383)	(3.3380)	(3.1506)
Observations	86,953	86,953	86,953	85,193
R-squared	0.9237	0.8414	0.8072	0.7195
Panel B : Factories with low output volatility				
Post-MNREGA	-0.0113	0.0045	0.0425	0.0579
	(-0.4757)	(0.2762)	(0.6244)	(0.3524)
Observations	33,282	33,282	33,282	33,060
R-squared	0.9433	0.7806	0.8016	0.7144
Year FE	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes

States with Pro-Employee Labor Regulations versus Others

Panel A : Factories in States with Pro-Employer/Neutral Labor Regulations				
	(1)	(3)	(5)	(6)
	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))
Post-MNREGA	-0.0304*	-0.0051	0.1558***	0.2565**
	(-1.8226)	(-0.4108)	(3.2882)	(2.3036)
Observations	77,024	77,024	77,024	75,535
R-squared	0.9279	0.8106	0.8082	0.7246
Panel B : Factories in States with Pro-Employee Labor Regulations				
Post-MNREGA	-0.0222	0.0129	-0.0538	-0.0239
	(-0.7665)	(0.9083)	(-0.7268)	(-0.1646)
Observations	29,995	29,995	29,995	29,576
R-squared	0.9272	0.8720	0.8055	0.7059
Year FE	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes

Labor Productivity and Labor Regulations

	Panel A : Low Labor productivity and Pro-Employer/Neutral Regulations				Panel B : Low Labor Productivity and Pro-Employee Regulations			
	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Post-MNREGA	-0.0541**	0.0339**	0.2302***	0.3169*	-0.0279	0.0396*	0.0301	0.0545
	(-2.3136)	(2.1147)	(3.3341)	(1.8264)	(-0.4149)	(1.8071)	(0.3769)	(0.2554)
Observations	39,362	39,362	39,362	38,353	12,083	12,083	12,083	11,867
R-squared	0.9291	0.8101	0.7641	0.6842	0.9302	0.8268	0.7784	0.6953
	Panel C : High Labor productivity and Pro-Employer/Neutral Regulations				Panel D : High Labor Productivity and Pro-Employee Regulations			
	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))
Post-MNREGA	0.0036	-0.0276*	0.0050	0.1011	-0.0092	0.0059	-0.1219	-0.0789
	(0.2170)	(-1.7617)	(0.0771)	(0.7759)	(-0.4293)	(0.3604)	(-1.2413)	(-0.5006)
Observations	36,037	36,037	36,037	35,576	17,212	17,212	17,212	17,019
R-squared	0.9235	0.7592	0.7657	0.6693	0.9210	0.8726	0.7637	0.6554
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Wages per Worker and Labor Regulations

	Panel A : Low Wage and Pro-Employer/Neutral Regulations				Panel B : Low Wage and Pro-Employee Regulations			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Log(1+Perma-nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))	Log(1+Perma-nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))
Post-MNREGA	-0.0380**	0.0530***	0.1551**	0.2061	-0.0091	0.0689***	-0.0545	0.0117
	(-2.0723)	(3.4916)	(2.3823)	(1.4908)	(-0.3527)	(3.2637)	(-0.5486)	(0.0583)
Observations	40,347	40,347	40,347	39,466	15,237	15,237	15,237	14,976
R-squared	0.9282	0.7982	0.7964	0.7165	0.9238	0.8126	0.8012	0.7070
	Panel C : High Wage and Pro-Employer/Neutral Regulations				Panel D : High Wage and Pro-Employee Regulations			
	Log(1+Perma-nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))	Log(1+Perma-nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))
Post-MNREGA	-0.0131	-0.0588***	0.0797	0.2167	-0.0242	-0.0430***	-0.0620	-0.0651
	(-0.5635)	(-3.6718)	(1.1737)	(1.3953)	(-0.5871)	(-2.9650)	(-0.6044)	(-0.3611)
Observations	35,052	35,052	35,052	34,463	14,060	14,060	14,060	13,911
R-squared	0.9169	0.7890	0.8032	0.7129	0.9181	0.8889	0.7769	0.6663
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Output Volatility and Labor Regulations

	Panel A : High output volatility and Pro-Employer/Neutral Regulations				Panel B : High output volatility and Pro-Employee Regulations			
	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Post-MNREGA	-0.0440**	-0.0056	0.3189***	0.1675***	-0.0042	0.0131	-0.0392	-0.0137
	(-2.1932)	(-0.3944)	(2.5938)	(3.1604)	(-0.1962)	(0.7949)	(-0.4557)	(-0.0906)
Observations	56,037	56,037	54,707	56,037	21,016	21,016	21,016	20,652
R-squared	0.9197	0.8237	0.7235	0.8077	0.9234	0.8715	0.8110	0.7129
	Panel C : Low output volatility and Pro-Employer/Neutral Regulations				Panel D : Low output volatility and Pro-Employee Regulations			
	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))	Log(1+Perma--nent Workers)	Log(1+Wages per Permanent)	Log(1+Fixed Assets (Gross Additions))	Log(1+P&M (Gross Additions))
Post-MNREGA	0.0064	0.0005	0.0948	0.0612	-0.0581	0.0107	-0.1019	-0.0739
	(0.3022)	(0.0237)	(1.1215)	(0.2931)	(-0.8550)	(0.6198)	(-0.7701)	(-0.2522)
Observations	20,611	20,611	20,611	20,464	8,884	8,884	8,884	8,830
R-squared	0.9464	0.7583	0.8062	0.7242	0.9333	0.8727	0.7908	0.6873
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Additional Robustness Tests

- Access to Finance Regression Discontinutiy
- Alternate Identification Strategy (IV)
  - Centre-State Government Political Alignment
- Pre-Trends (Placebo)

Access to Finance and Response to MNREGA: An RD design

- Priority Sector Lending (PSL) Limit revised in October 2006 from INR 10 Mill to INR 50 Mill in Total Assets for non-public companies.
- We exploit this to design an RD test – Examine Heterogeneous response to MNREGA based on access to finance
  - Key idea is to compare firms just below 50 Mill to those just Above
  - Further divide plants in to those located in more/less financially developed areas
  - Run the tests on sample of plants in areas where MNREGA was already imposed (Phase 1 districts)
  - **Placebo:** Run the tests for plants not yet hit by MNREGA (located in phase 3 districts)
- Variables;
  - Y-variable : Log(1+Plant and Machinery (Gross additions)) and Change in Worker Wages in 2007.
  - Cut-off: INR 50 million on Plant and Machinery (Gross) in 2006.

- Factories below INR 50 mn in financially less developed districts covered in phase 1, show higher growth in mechanization in comparison to the factories above INR 50 mn.
- No differential affect on wages
- As a placebo, we look at the districts covered under phase 3. We do not find any such variation in those factories.

Factories under Financial Constraint versus Others

	Phase 1 Districts				Phase 3 Districts			
	Low Financial Development		High Financial Development		Low Financial Development		High Financial Development	
	P&M	Wages	P&M	Wages	P&M	Wages	P&M	Wages
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bias-Corrected	-6.5734***	0.1309	0.05246	-0.6173	-2.0995*	0.1918	-0.35145	0.0763
	(-3.4459)	(0.7379)	(0.0745)	(-1.7987)	(-1.6935)	(0.9015)	(0.8536)	(0.5904)
Robust	-6.5734*	0.1309	0.05246	-0.6173	-2.0995	0.1918	-0.35145	0.0763
	(-1.7524)	(0.5743)	(0.0269)	(-1.4473)	(-1.2329)	(0.6243)	(1.044)	(0.4237)
Observations	836	842	52	52	2420	2438	3714	3506
Year	2007				2007			

Alternate Identification: IV Approach

- Governments in emerging economies re-sort to politically targeted fiscal measures to win voter support (Cole (2008); Alok and Ayyagari (2015))
- MNREGA funded by Central and implemented by State government
- **Key idea:** State governments aligned with ruling party at center are likely to get higher funding
- **Our Instrument:** Dummy variable as our instrument that takes the value of one if the ruling party in a state S during a year t is same as the ruling party at the center.
- The identifying assumption (exclusion restriction) is that the victory of a party in these states is unlikely to, directly, have an adverse effect of employment in factories other than through its effect on the intensity of MNREGA implementation.
- Estimates using the instrumental variable approach are identified through randomized variation in the intensity of treatment, whereas our identification for DID estimates were based on staggered roll out of MNREGA.
  - Use three proxies for MNREGA Intensity: : Labor Expenditure is the total wage expense related to MNREGA workforce, Number of Works is total number of public infrastructure projects undertaken through MNREGA, and total employment demanded is the number of workers registered with MNREGA that demanded work.
  - our instrument is positively correlated with all three measures and the correlation is statistically significant at the 1% level.
  - Using our instrument, we then examine if outflow of workers is greater in areas with higher intensity of implementation.

Alternate Identification: First stage IV Regression

	(1)	(2)	(3)
VARIABLES	Labor Expenditure	Number of Works	Total Employment Demanded
State Election Dummy	0.0022***	0.0103***	0.0339***
	(2.6102)	(2.5713)	(2.7611)
Observations	49,715	49,715	49,715
P(SW Chi-sq)	0.0091	0.0100	0.0058
SW F	6.7900	6.6100	7.6100
Prob > F	0.0263	0.065	0.0321
Year FE	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes

Alternate Identification: Second stage IV Regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Log(1 + Permanent Workers)			Log(1 + Contract Workers)			Log(1 + Managerial Staff)		
Labor Expenditure	-10.1409*			5.3189			6.7811		
	(-1.7140)			(0.5116)			(1.0610)		
Number of Works		-2.1684*			1.1374			1.4500	
		(-1.8639)			(0.4784)			(1.2399)	
Total Employment Demanded			-0.6560*			0.3441			0.4387
			(-1.7750)			(0.5064)			(1.1049)
Firm Size	0.0381***	0.0383***	0.0382***	0.0450***	0.0449***	0.0450***	0.0318***	0.0317***	0.0318***
	(10.3170)	(10.3246)	(10.3798)	(5.6400)	(5.6150)	(5.6441)	(8.7509)	(8.6268)	(8.7202)
Age	0.0030**	0.0028*	0.0030**	-0.0020	-0.0019	-0.0020	0.0020	0.0022	0.0020
	(2.2684)	(1.9642)	(2.2705)	(-0.8077)	(-0.7538)	(-0.8037)	(1.3485)	(1.4666)	(1.3535)
Observations	49,715	49,715	49,715	49,715	49,715	49,715	49,715	49,715	49,715
R-squared	0.9680	0.9664	0.9679	0.9060	0.9058	0.9060	0.9551	0.9543	0.9550
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Existence of Pre-Existing Trend

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(1+Permanent Workers)	Permanent Workers	Log(1+Contract Workers)	Contract Workers	Log(1+Managerial) Staff)	Managerial Staff
			Panel A : Years 2003-2005			
Post-NREGA	0.0016	14.59*	-0.0194	-2.52	0.0096	-0.23
	(0.1347)	(1.9223)	(-0.5793)	(-0.2994)	(0.7935)	(-0.3470)
Firm Size	0.0500***	9.76***	0.0419***	3.01***	0.0469***	1.27***
	(14.5782)	(7.3069)	(8.4387)	(5.0585)	(17.2938)	(9.7501)
Age	0.0021***	0.79**	-0.0005	0.04	0.0026***	0.10***
	(3.8106)	(2.3819)	(-0.3542)	(0.4211)	(3.8995)	(3.0383)
Observations	120,774	120,774	120,774	120,774	120,774	120,774
R-squared	0.9300	0.8938	0.8081	0.9613	0.9113	0.7484
			Panel B : Years 2004-2006			
Post-NREGA	-0.0091	0.25	0.0189	-1.56	0.0084	0.09
	(-0.9240)	(0.0702)	(0.7488)	(-0.4149)	(0.8728)	(0.1436)
Firm Size	0.0500***	9.76***	0.0419***	3.05***	0.0469***	1.27***
	(14.5834)	(7.3013)	(8.4379)	(5.0604)	(17.2866)	(9.7496)
Age	0.0022***	0.79**	-0.0005	0.04	0.0026***	0.10***
	(3.8172)	(2.3837)	(-0.3592)	(0.4238)	(3.9000)	(3.0383)
Observations	120,774	120,774	120,774	120,774	120,774	120,774
R-squared	0.9300	0.8938	0.8081	0.9613	0.9113	0.7484
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Factory FE	Yes	Yes	Yes	Yes	Yes	Yes

Concluding Remarks

- Using establishment level employment and operating data, we examine the impact of Indian government's employment guarantee program on private sector.
- Using a DiD framework, we report three main findings:
  - MNREGA caused a labor supply shock for firms
  - Firms respond by technology adoption
  - This results in increase costs of production
- Overall, our study informs the policy debate on the impact of public workfare programs and highlights that such schemes may have unintended spill over effects on private establishments.