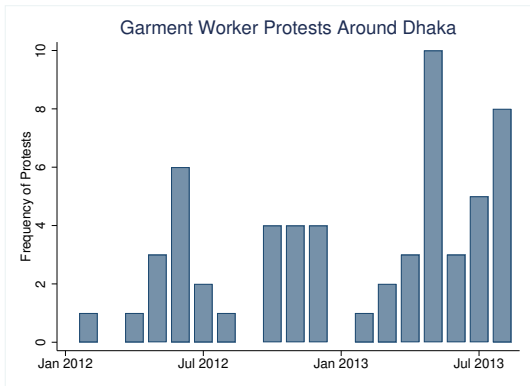


Unrest, Layoffs, and Productivity at a Bangladeshi Sweater Factory

Robert Akerlof (Warwick), Anik Ashraf (LMU Munich),
Rocco Macchiavello (LSE), Atonu Rabbani (DU)

- Conflicts between management and workers are common in organizations all around the world.
- Such conflicts can potentially have significant impacts on worker productivity at the organizations.
- Particularly acute in emerging industrial countries.
 - Poor pay, labor rights, and working conditions.

Motivation



Motivation



Mass layoffs could affect long-term worker productivity:

- **raise** productivity by removing troublemakers or by intimidating workers with fear of further firing.
- **lower** productivity by reducing workers' morale or inducing retaliation.

Mass layoffs could affect long-term worker productivity:

- **raise** productivity by removing troublemakers or by intimidating workers with fear of further firing.
- **lower** productivity by reducing workers' morale or inducing retaliation.

What is the impact of co-worker firing on productivity of retained workers?

Mass layoffs could affect long-term worker productivity:

- **raise** productivity by removing troublemakers or by intimidating workers with fear of further firing.
- **lower** productivity by reducing workers' morale or inducing retaliation.

What is the impact of co-worker firing on productivity of retained workers?

- Empirical evidence is scarce.
- Difficult to get data from organizations experiencing unrest.

What We Do

- We exploit an episode of labor unrest and subsequent firing of workers at a large sweater factory in Bangladesh.
 - Workers (violently) protested against "low" piece rates.
 - 25% of workers were fired.

What We Do

- We exploit an episode of labor unrest and subsequent firing of workers at a large sweater factory in Bangladesh.
 - Workers (violently) protested against "low" piece rates.
 - 25% of workers were fired.
- Empirical advantages:
 1. Individual production process → good measure of workers' *productivity*.
 2. Data and field work *before, during, and after* the unrest.
 3. Distinguish fired workers from voluntary quits.
 4. Across-worker variation in exposure to co-worker firing.

What We Find

Using a diff-in-diff approach with exposure to firing as a (continuous) treatment we find that:

- The layoff is associated with a significant and persistent reduction in productivity.
- The productivity drop is specifically associated with firing of peers with whom workers likely had social connections (friends).
- Each additional fired friend translates to a loss of 2-3 days' production per month.
- Suggestive evidence of deliberate shading of performance by workers, possibly to punish the factory.
- Suggestive evidence of factory trying to win the workers back.

Related Literature

- Conflict within firms
 - Krueger & Mas (2004); Krueger and Friebe (2019); Sandvik et al. (2021); Coviello et al. (2021); Drzensky and Heinz (2016); Gerhards and Heinz (2017); Heinz et al. (2020)
 - Mass Layoff in Management Literature: Brockner et al. (1987); Brockner et al. (1993); Brockner and Wiesenfeld (1993)
- Informal/Relational Contracts within Firms:
 - Levin (2002, 2003); Gibbons and Henderson (2012); Li and Matouschek (2013); Breu et al. (2014); Fahn and Zanarone (2021); Adhvaryu et al. (2020); Blader et al. (2020)
- Industrial Relations in Developing Countries
 - Atkin et al. (2017); Ashraf et al. (2015); Breza et al. (2019); Macchiavello et al. (2020); Adhvaryu et al. (2022)

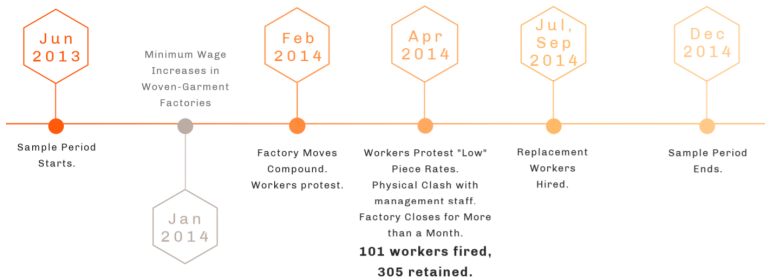
Background

- Manual Knitting Unit at a large sweater factory in Bangladesh.
- Workers knit sweater parts with a knitting machine.
 - Work on multiple styles in a given month.
 - Paid based on piece rates.
 - Work in **Blocks** of 25-30 workers.

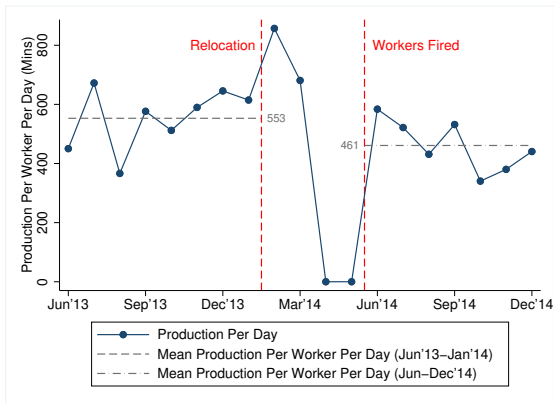


- In March, 2014: 406 workers; 15 Blocks

Background: Key Events



Production Per Worker-Day for Surviving Workers



We want to understand productivity changes among the 305 surviving workers after their peers were fired.

- Worker Productivity
 - Individual production process helps us to measure productivity at worker level.
 - On average, a worker knits four styles of sweaters per month.
 - Piece rates of sweaters vary by styles, but not consistently with style complexity or sweater size.
 - We construct estimates of Standard Minute Value (SMV) from sweater design charts. **Example**
 - Productivity of worker i in month t is the total time-value of his production:

$$MonthlyProduction_{it} = \sum_{s \in S} q_{ist} \times SMV_s,$$

q_{ist} = number of sweaters of style s produced by i in month t ;
 SMV_s = SMV of sweater style s .

- Exposure to Firing
 - In the spirit of Homans (1950), we gathered observational insights into the typical activities of workers on the production floor during the pre-firing period. [Examples](#)
 - Workers mostly interact with same-block peers, especially those located close to them.
 - Post-firing survey supports qualitative observations. [Graphs](#)
 - We also know the locations of fired workers.

Floormap - Locations of Fired Workers



Exposure to Firing

- We define exposure to firing as the number of (likely) friends fired.
- We combine information from floor map and socialization patterns to construct two measures of exposure:
 1. Number of fired peers from block.
 2. Spatially weighted exposure to firing (E) for worker i as:

$$E_i = \sum_{j=1}^n \frac{F_j}{D_{ij}}$$

$F_j = 1(\text{peer } j \text{ fired})$

D_{ij} = Euclidean distance between i and j Circles on Map

$$\text{MonthlyProduction}_{it} = \alpha + \beta(E_i * \text{Post}_t) + \theta_i + \text{Month}_t + \epsilon_{it}$$

- *MonthlyProduction* = Time value of worker *i*'s production in month *t*
- *E_i* = Worker *i*'s exposure to firing (standardized)
- *Post* = Indicator variable for post-firing months
- Pre-firing months = Jun'13 - Jan'14; drop turmoil months
- Post-firing months = Jun'14 - Dec'14
- *θ_i* = Worker FE; *Month_t* = Month FE
- Standard errors clustered at the worker *i* level
 - Alternative approaches to clustering yield similar results

Descriptive Statistics

All Workers	n	Mean	Std. Dev.	Min	Max
Number of Workers Per Block	15	27.07	5.3	9	30
Number of Workers Fired Per Block	15	6.73	3.56	2	14
Exposure to Firing: Same Block (Non-stand.)	304	2.57	1.56	0.41	7.02
Survivors	n	Mean	Std. Dev.		
Monthly Earnings in BDT (Jun'13-Mar'14)	2,922	10,097.67	3,822.68		
Time-Value of Monthly Production (Mins.)	2,919	13,198.06	8,885.01		
Monthly Attendance Days (Jun'13-Mar'14)	2,922	25.51	4.49		
Tenure (months) in Mar'14	305	63.3	19.16		

Who Got Fired?

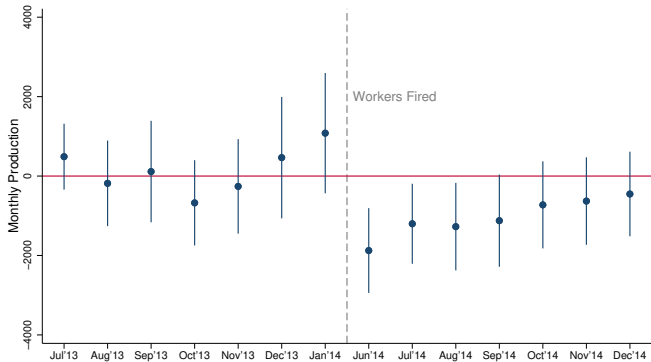
Effect of Exposure to Firing

	(1) Monthly Production	(2) Monthly Production	(3) Monthly Production	(4) Monthly Earnings	(5) Monthly Earnings
Post * (# Fired in Block)	-461.5*** (80.80)				
(Exposure: Same Block) * Post		-1,483*** (255.7)	-1,354*** (256.7)	-482.4*** (85.34)	-326.1*** (72.93)
Observations	4,134	4,119	4,119	4,123	4,123
Number of Workers	305	304	304	304	304
Worker FE	N	N	Y	N	Y
Year-Month FE	N	N	Y	N	Y

Note: All regressions include a constant, and control for individual components of the interaction terms.

Intensive vs Extensive

Test of Pre-Trend



Productivity Drop Consistent with Socialization Pattern

	(1)	(2)	(3)	(4)
		Monthly Production		
(Exposure: Same Block) * Post	-1,420*** (257.8)			-1,481*** (235.4)
(Exposure: Other Blocks) * Post	-616.7*** (228.3)			
(# Fired, 1 Worker Dist., Same Block) * Post		-922.5*** (281.5)		
(# Fired, 2 Worker Dist., Same Block) * Post		-424.7** (198.1)		
(# Fired, 3+ Worker Dist., Same Block) * Post		-252.8** (104.0)		
(# Fired, 1 Worker Dist. Front, Same Block) * Post			-1,319*** (421.3)	
(# Fired, 1 Worker Dist. Back, Same Block) * Post			-348.0 (442.1)	
(Exposure: SB) * Post * (Tenure Overlap)				-1,073*** (315.3)
Observations	4,119	4,104	2,908	4,119
Same Block = Other Blocks	[0.012]			
1 Worker Dist. = 2 Worker Dist.		[0.236]		
1 Worker Dist. = 3+ Worker Dist.		[0.026]		
Front = Back			[0.147]	

Note: All regressions include a constant, Worker FE, and Month FE.

Placebo Test: Fired vs Quitting Coworkers

	(1)	(2)	(3)	(4)
	Monthly Production			
	All Months	Post Months	All Months	All Months
# Quit, 1 Worker Dist., Same Block	-340.7 (923.3)	-122.4 (381.9)		120.4 (937.8)
(# Fired, 1 Worker Dist., Same Block) * Post			-1,099*** (250.7)	
(Exposure: Same Block) * Post				-1,361*** (257.2)
Observations	4,116	1,807	4,119	4,101

Note: All regressions include a constant, Worker FE, and Month FE.

Productivity drops only when co-workers were fired, not when they left voluntarily.

Productivity Drop Consistent with Socialization Pattern

Productivity drop higher if a fired co-worker:

- Was from the same block.
- Located closer inside the block.
- Located in the line-of-sight.
- Shared a longer tenure overlap and a lower age difference.

The results are not confounded by:

- Endogenous selection of workers into locations.
- Resentment from unrest period.

Not Confounded by Selection of Workers into Locations

	(1)	(2) Monthly Production Floor Simulated	(3) Floor Simulated
(# Fired, 1 Worker Dist., SB) * Post	-1,060*** (310.6)		
(# Fired, 2 Worker Dist., SB) * Post	-454.8** (195.2)		
(# Fired, 3+ Worker Dist., SB) * Post	-156.1 (126.5)		
(Recentered Exposure: SB) * Post		-1,136*** (246.5)	-1,604*** (288.5)
(Expected Exposure: SB) * Post			-897.6*** (332.1)
Observations	4,104	4,119	4,119
1 Worker Dist. = 3+ Worker Dist.	[0.013]		
# Worker in Circle * Post	Y	N	N
% Fired in Block * Post	N	N	N

Note: All regressions include a constant, Worker FE, and Month FE.

- Results similar if we simulate holding constant the number of workers fired in each block. Block Simulated

Resentment from Unrest

	(1) Monthly Production	(2) N. of Coworkers Fired from Circle 1	(3) N. of Coworkers Fired from Circle 1	(4) Monthly Production Early	(5) Monthly Production Months Dropped	(6) Monthly Production
(Exposure: Same Block) * Post	-1,456*** (508.9)			-1,496*** (303.5)	-1,278*** (322.4)	-942.3*** (310.1)
Pre-Unrest Style Rent		0.0827 (0.0751)	0.0649 (0.0701)			
1(Unrest Period Production >Median)			0.186 (0.112)			
1 (Tenure in Mar'14 >Median)			0.0810 (0.0993)			
(Style Rent in Early Months) * Post					961.6*** (360.9)	892.7*** (328.5)
(Own Unrest Period Prod. Drop) * Post						-891.9** (401.2)
(Tenure in Mar'14) * Post						-1,490*** (364.3)
Observations	4,119	304	304	3,210	3,210	3,210
Worker FE; Year-Month FE	Y	N	N	Y	Y	Y
Block*Post	Y	N	N	N	N	N
Block FE	N	Y	Y	N	N	N

Who Got Fired?

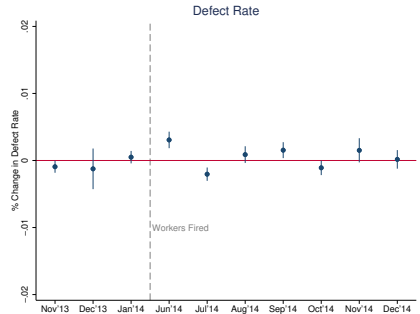
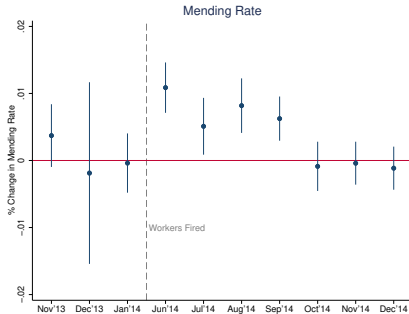
Alternative Explanations

We rule out alternative explanations:

- Lost learning and help [Results](#)
 - Exploit worker absenteeism.
- Old workers help new workers [Results](#)
 - Exploit phased-in hiring of new workers.
- Survivors look for new jobs [Results](#)
 - Stayers vs Leavers.
- Robust to changes in machine locations [Results](#)
 - Worker in the front.

- Two potential explanations for the effect of fired friends:
 - Demoralization
 - Desire to punish management
- Data on quality flaws helps distinguish (i) and (ii).
- Two kinds of quality faults in sweaters:
 - Mending faults: Faults that the workers do not need to fix themselves, but pass on to a separate set of *mending* workers who are paid by the factory.
 - Defects: Faults that the workers need to fix themselves before they are deemed acceptable to management.

Mechanism



- Mending Flaws increase while Defect Flaws do not.
- Evidence consistent with workers deliberately imposing a cost on the factory.

Response from Firm - Repairing Relations

	(1) Monthly Mending Rate	(2) Monthly Defect Rate	(3) Monthly Style Rent
Exposure: Same Block	-0.0005 (0.0018)	-0.0002 (0.0004)	-0.0254*** (0.0038)
(Exposure: Same Block) * 1(Jun'14)	0.0088*** (0.0019)	0.0033*** (0.0008)	0.0543*** (0.0074)
(Exposure: Same Block) * 1(Jul'14)	0.0036 (0.0024)	-0.0019*** (0.0006)	0.0606*** (0.0108)
(Exposure: Same Block) * 1(Aug'14)	0.0081*** (0.0023)	0.0009 (0.0007)	0.0789*** (0.0155)
(Exposure: Same Block) * 1(Sep'14)	0.0055*** (0.0020)	0.0016** (0.0006)	0.0520*** (0.0060)
(Exposure: Same Block) * 1(Oct'14)	-0.0014 (0.0018)	-0.0008 (0.0007)	0.0194*** (0.0058)
(Exposure: Same Block) * 1(Nov'14)	-0.0017 (0.0021)	0.0011 (0.0009)	0.0179*** (0.0060)
(Exposure: Same Block) * 1(Dec'14)	0.0018 (0.0019)	-0.0005 (0.0009)	0.0227*** (0.0052)
Observations	27,076	27,076	2,655

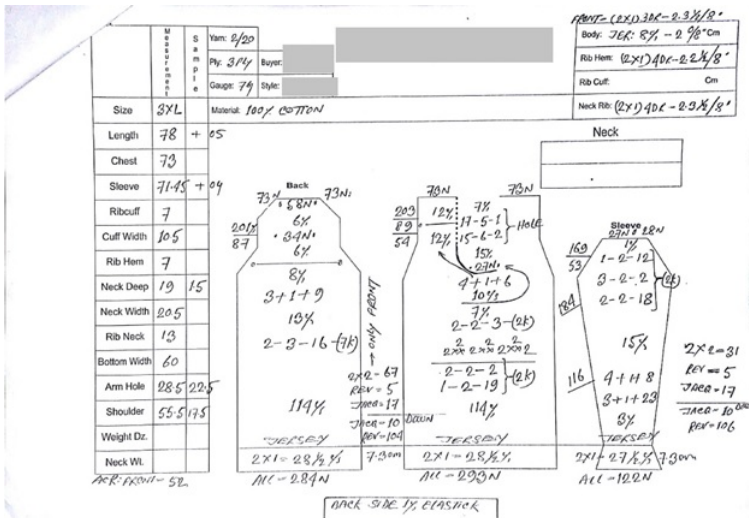
Note: All regressions include a constant.

Conclusion

- We examine an episode of mass layoff at a large factory with poor industrial relations.
- We find that the productivity of surviving workers drops when friends are fired.
- Evidence suggests that workers shade performance to punish management.
- Management tries to win the angry workers back.
- Suggestive evidence of multilateral contracts between firms and workers.
- Implications for HR practices in LDCs.

APPENDIX

A Sweater Design Chart



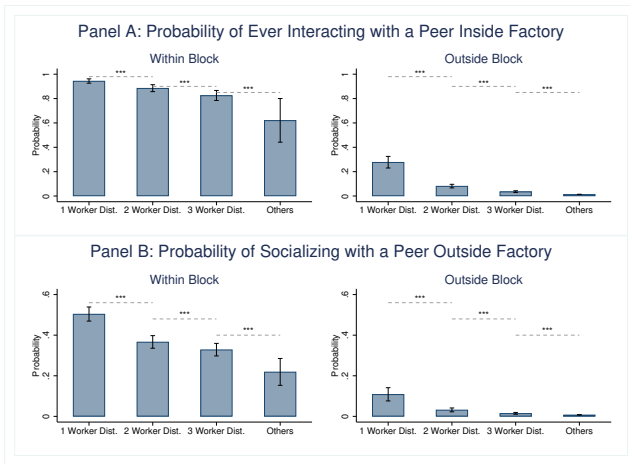
Qualitative Observation - 1

Time	Description of Activity
5:09 PM	Subject not in his station
5:30-5:56 PM	Subject arrives at his station and starts setting up his machine for a new style. A lot of non-work related chatting going on with the operator facing him.
6:00 PM	Operator another machine comes to the subject's station and borrows his operation breakdown.
6:12 PM	The operator to the subject's left comes to his station and helps him setup the machine. He gives hands on instruction for approximately 45 seconds.
6:16 PM	More small talk with the operators to his left and front . Subject is still setting up his machine.
6:17 PM	Subject finds that he forgot to change a part in the machine while setting it up for the new style that requires a different gauge. He tells that to the operator in front of him and starts changing it.
6:20- 6:27 PM	Subject fetches the supervisor to his machine. They talk about the technical stuff while the supervisor tries to tune the machine.
6:54 PM	Conversation with an operator to his front . Talks about the trouble he's having with his machine.
6:58 PM	Adjustments done and working with the machine starts.
7:00-7:01 PM	Takes a small sample of cloth he made to the supervisors, comes back in 30 seconds and compares his work with that of the operator to his left who is also doing a neck part.
7:07 PM	Cleans up and leaves the floor for the day.

Qualitative Observation - 2

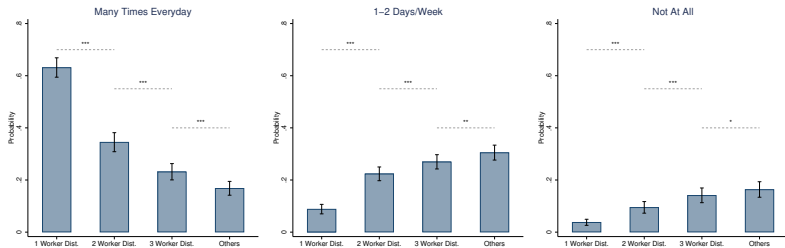
Time	Description of Activity
5:27-5:29 pm	Upon finishing his first back part, subject goes to the supervisor for measurement. Supervisor suggested using increased weight...
5:37 PM	Chitchat with the operator to his left
5:42-5:43 pm	Upon finishing the second back part goes to the Supervisor for measurement once again. Comes back singing.
6:00-6:03 pm	After finishing the third back part subject notices a fault. The operator facing him (subject 2) also notices it and the two examine the piece . They fold it; hold onto the two ends, and together, stretches the piece...
6:30 PM	Goes to the distribution room to get a cone of elastic thread and comes back in 30 seconds.
6:35 PM	Turns on the fan. The subjects machine is stationed just beside the wall where the switchboard is. Another operator playfully complains. Some chitchat among operators.
7:07 PM	Bundles the 24 sleeves he's finished, cleans up his machine and leaves floor.

Do Spatial Locations Matter? Survey Evidence from 2016



- Workers interact more with peers (i) in same block, & (ii) located closer.
- Similar pattern for socialization outside factory.

Intensity of Interactions

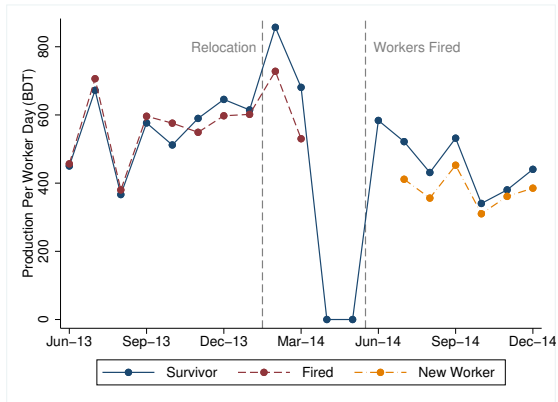


Variation in Location of Fired Peers



We use spatial distance to fired workers to compute exposure to firing.

Production Per Worker-Day for All Workers



Who got fired?

	(1)	(2)	(3)	(4) P(Fired)	(5)	(6)	(7)
1(Pre-Unrest Period Earnings >Median)	-0.0369 (0.0431)						
1(Pre-Unrest Period Production >Median)		-0.0369 (0.0431)					
Pre-Unrest Period Style Rent			-0.0412* (0.0214)				-0.0249 (0.0227)
1(Unrest Period Earnings >Median)				-0.145*** (0.0424)			
1(Unrest Period Production >Median)					-0.165*** (0.0422)		-0.125*** (0.0446)
1 (Tenure in Mar'14 >Median)						0.0836** (0.0417)	0.0842** (0.0415)
Constant	0.268*** (0.0314)	0.268*** (0.0314)	0.249*** (0.0214)	0.322*** (0.0301)	0.332*** (0.0299)	0.177*** (0.0293)	0.240*** (0.0358)
Observations	406	406	406	406	406	390	390

Fired workers (i) earn lower style rent before unrest, (ii) less productive during unrest, and (iii) longer-tenured.

Intensive vs Extensive Margin of Response

	(1) Monthly Production/Day	(2) Monthly Leave+Absent
(Exposure: Same Block) * Post	-33.85*** (7.523)	0.0905 (0.0834)
Observations	4,116	4,123
Number of Workers	304	304
Worker FE; Year-Month FE	Y	Y

Not Confounded by Selection of Workers into Locations

	(1)	(2)
	Monthly Production	
	Block Sim.	Block Sim.
(Recentered # Fired, Circle 1, SB) * Post	-1,151** (470.5)	-1,754*** (559.4)
(Recentered # Fired, Circle 2, SB) * Post	-1,203*** (462.0)	-1,377*** (523.8)
(Recentered # Fired, Circle 3+, SB) * Post	-648.5 (415.9)	-892.9** (439.7)
(Expected # Fired, Circle 1, SB) * Post		-884.3* (467.8)
(Expected # Fired, Circle 2, SB) * Post		-69.58 (284.6)
(Expected # Fired, Circle 3+, SB) * Post		-105.2 (236.0)
Observations	4,104	4,104
Number of Workers	303	303
Circle 1 = Circle 2	[0.858]	[0.375]
Circle 1 = Circle 3 on	[0.062]	[0.012]
% Workers Fired in Block * Post	Y	Y

Alternative Hypothesis - Lost Learning and Help

	(1) Mean Production Pre-Unrest	(2) Monthly Production Pre-Unrest	(3) Monthly Production Jun'14-Sep'14	(4) Monthly Production Jun'14-Sep'14	(5) Monthly Production Jun'13-Sep'14	(6) Monthly Production Jun'13-Sep'14
# in Circle 1: Same Block	97.45 (164.6)					
Normalized Man-days Peers Absent in Circle 1, SB		-360.5 (1,021)				
Normalized Man-days Peers Absent in Circle 2+, SB		28.13 (281.3)				
# of New Workers in Circle 1			367.7* (207.2)			285.1 (210.5)
# of New Workers in Rest of the Block			155.9 (99.33)			-6.753 (78.36)
% of New Workers in Circle 1				1,595 (1,422)		
% of New Workers in block except Circle 1				4,834** (2,173)		
(Exposure: Same Block) * Post					-1,639*** (271.1)	-1,820*** (309.9)
Observations	304	1,821	1,171	1,159	3,470	3,468
Number of Workers	304	304	296	291	304	304
Worker FE, Year-Month FE	N	Y	Y	Y	Y	Y

Note: All regressions include a constant. Circle 1 refers to co-workers at 1 Worker Dist., while Circle 2+ refers to co-workers at other locations.

Alternative Hypothesis - Survivors Look For New Job

	(1) Total Absent Days Jun-Dec'14	(2) Monthly Production Leavers	(3) Monthly Production Stayers	(4) Monthly Production/Day Stayers Abs+Leave<=3	(5) Monthly Production/Day Stayers Abs+Leave>3
1(Left in or before Dec'14)	3.750*** (0.531)				
(Exposure: Same Block) * Post		-1,097 (1,260)	-1,360*** (262.9)	-67.91*** (12.88)	-21.47** (8.285)
Observations	1,826	299	3,820	542	3,276
Number of Workers	297	27	277	50	227
Worker FE; Year-Month FE	N	Y	Y	Y	Y

Robustness: Floor Map

	(1) Monthly Production
1(Front Worker Fired) * Post	-3,162*** (848.8)
Observations	4,044
Adj. R-Sq	0.253
Number of Workers	299
Worker, Year-Month FE	Y