

Managerial Capital and Productivity: Evidence from a Training Program in the Bangladeshi Garment Sector

Rocco Macchiavello - *University of Warwick*

Andreas Menzel *University of Warwick*

Christopher Woodruff - *University of Warwick*

25 September 2014



Motivation: Why focus on the garment sector?

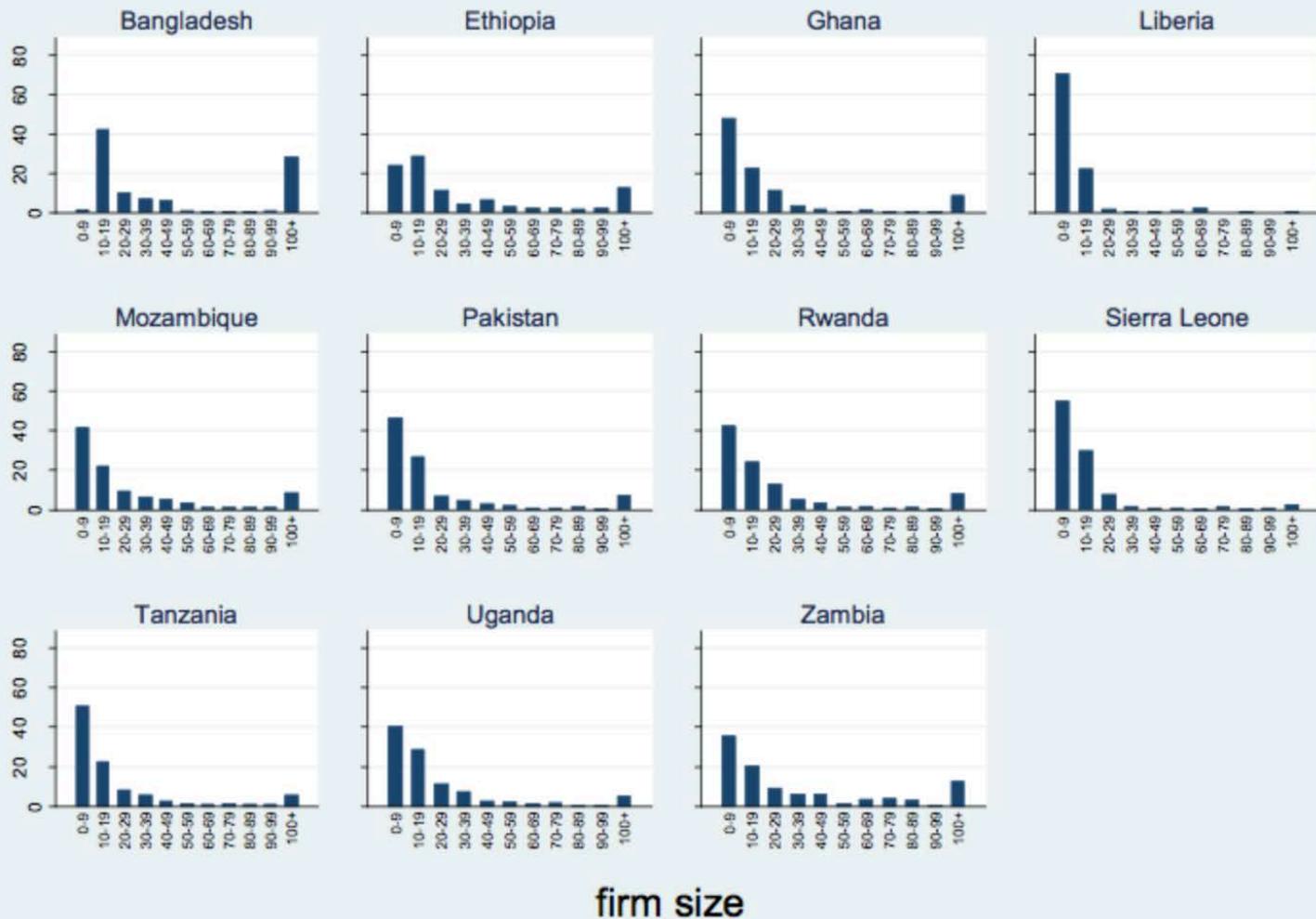


- Garments are and have been a key sector in the process of industrial development in many developing countries.

Exports of clothing, selected countries
Billion of USD and world share
Source: WTO

Country	Exports: 2011 (Billions USD)	Share of world market		Share of country's exports, 2011
		2011	2000	
1 China	\$154	37.3%	18.2%	8.1%
3 Bangladesh	\$20	4.8%	2.6%	81.6%
4 India	\$14	3.5%	3.0%	4.7%
5 Turkey	\$13	3.4%	3.5%	10.3%
6 Vietnam	\$13	3.2%	0.9%	13.6%
7 Indonesia	\$8	2.0%	2.4%	4.0%
12 Pakistan	\$5	1.1%	1.1%	18.0%
14 Cambodia	\$4	1.0%	0.5%	58.3%

Motivation: Why focus on the Bangladeshi garment sector?



Notes: Includes firms with 5+ employees. Firm size is measured as number of full-time employees.

Motivation: why focus on gender?



Some Facts

Bangladesh female LFPR increased from 22% in 2000 to 34% in 2010.

Garment sector played a massive role in this: Employs 4 million workers, 80% of whom are women.

Women make up only ~5-10% of the sewing section supervisors – probably lower percentage of at higher management levels.



Two Questions

Q1. Why is there such a huge gender imbalance in manager roles?

Q.2 Does this imbalance hamper productivity and worker well-being?



Overarching Goal

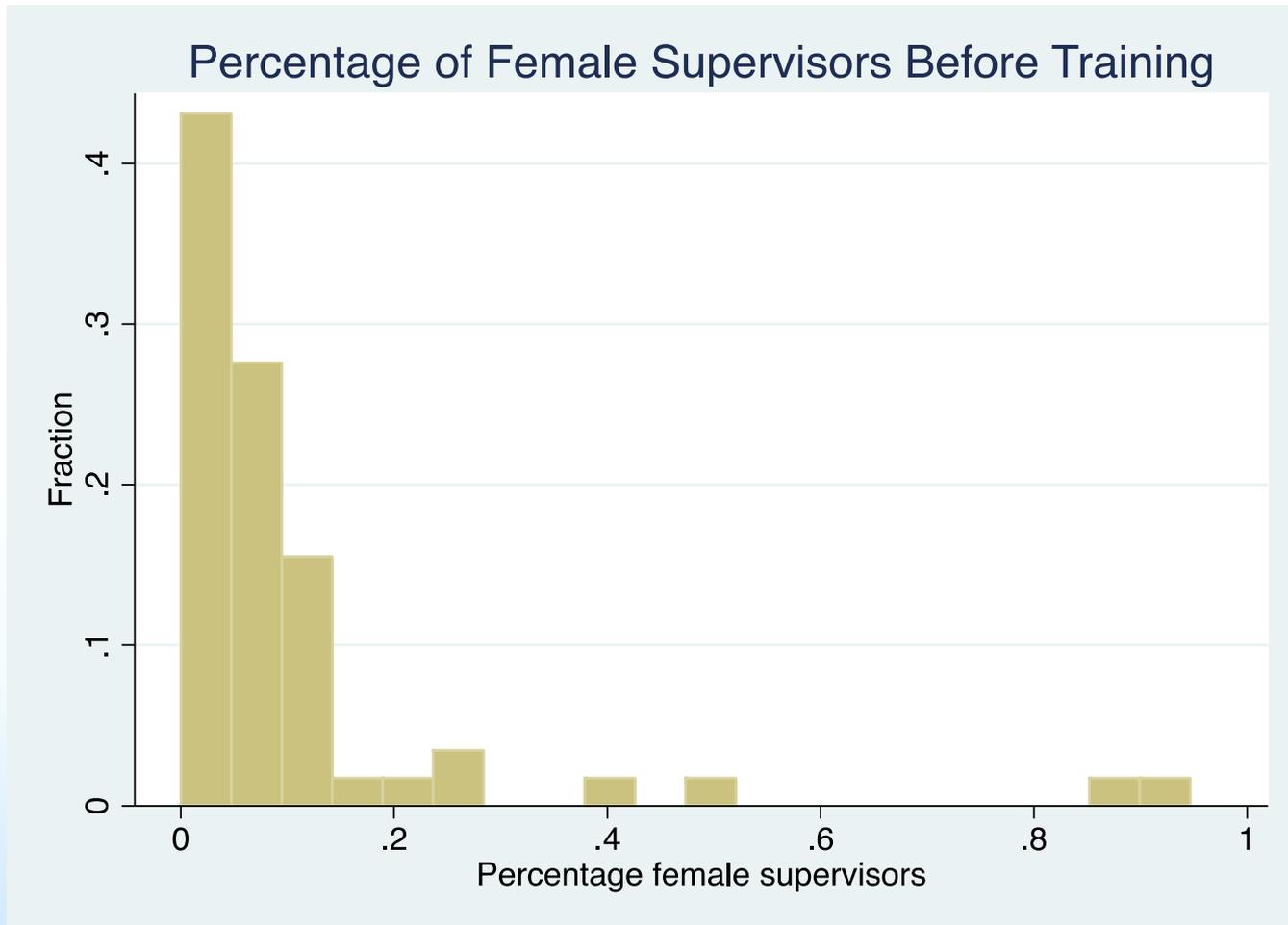
The overriding goal of the project is to understand productivity in the ready-made garment (RMG) sector in Bangladesh (and in other countries), and in particular, the interaction between management and productivity.

Gender and productivity



- Why are the ratios so skewed?
- We see explanations clustered: learning and comparative advantage.
- Learning (too little experimentation?):
 - Factories have always promoted men, and may think they understand how to select men.

Baseline: % SVs Female



Gender and productivity



- Why are the ratios so skewed?
- We see explanations clustered: learning and comparative advantage.
- Learning (too little experimentation?):
 - Factories have always promoted men, and may think they understand how to select men.
 - If women don't expect to be promoted, they don't invest in the skills needed to become a supervisor.
- Comparative advantage
 - Different skill sets (e.g., assertiveness)
 - Management expresses doubt that women will remain in the labour force after they have children.
- Also: There may also be bias (and a willingness to pay for it).

Project design



- We implemented GIZ's 6 – week training program The program was designed to train sewing machine operators to be line supervisors in the woven / light knit segments of the RMG sector.
- In Phase I of the project, we:
 - worked with 60 factories – large, with ~1100 workers in the sewing section, on average
 - Train four women and one man in each factory
 - Provided training for 277 operators, including 220 females
 - Factories agree ex ante to try out all of the trainees.
- Phase II involves another 20+ factories and 150 trainees. Currently in process.
- **Training is a way to induce factories to promote women**

Outline for talk



- Motivation
- **Project outline: Assessing the marginal choice of supervisors**
- How effective are women as supervisors?
- Outcomes:
 - Retention and promotion
 - Management simulation exercises
 - Productivity
- Attitudes toward trainees

Line Supervisors



Table 1: Factory-Level Summary Statistics

	Mean	Median
Number of sewing lines	19	14
Number of employees, total	2116	2000
Number of employees, Sewing Operators per sewing line	1171	1000
Number of sewing supervisors	48	47
Number of sewing supervisors	48	36
Percentage female supervisors	10.8%	5.6%
Percent conducting training	68.1%	NA
Percent training outside factory	8.9%	NA
Year factory established	1999	2001

Line Supervisors

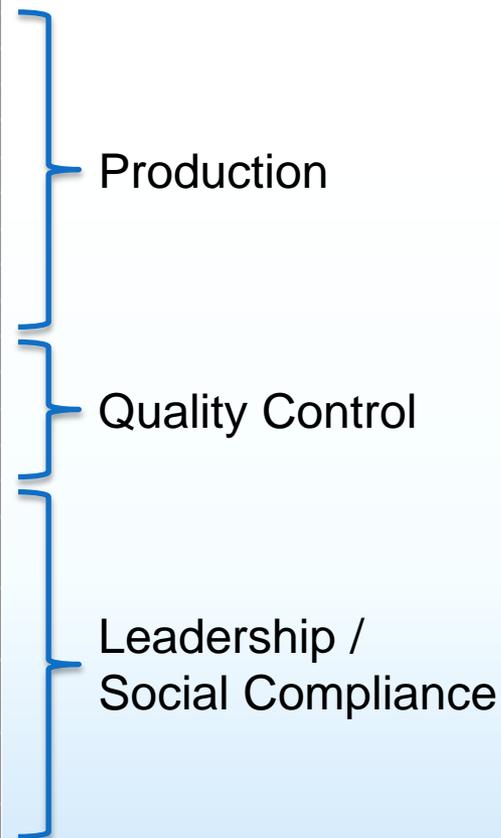


<http://static.guim.co.uk/sys-images/Environment/Pix/pictures>

Contents of the training



Modules	Training subjects	days
Module 1: Introduction to the training	Workshop Introduction	2
	Overview over Bangladesh RMG Industry	
	Overview Knit sector	
Module 2: Preproduction Process	Familiarize with production inputs (fabric, yarn)	4
	Sample procedure, trim card, tech pack	
	Store management, pattern and cutting process	
	Introduction to machine, needle, folder, attachment	
Module 3: Production Process	Work study	9
	Machine lay out	
	Operation break-down	
	Performance Measurement	
	Trouble Shooting	
Module 4: Quality Control	House keeping (5'S)	5
	Defects & measurements check	
	Inspection Procedure	
	Traffic light system	
Module 5: Social compliance	Code of Conduct	7
	Grievance Handling Procedure	
	Worker Welfare Committee	
	Health and Fire Safety	
	Leave & wage calculation	
Module 6: Leadership	7 habits of effective leadership	5
	Communication & decision making	
	Motivation	
	Presentation skill	
Model 7: Post training activities	Final Examination inclusive self-evaluation, Individual coaching and counseling	4
	Experience sharing events	
	Orientation program inside the factory	
Total training days		36



Characteristics of trainee pool female vs. male



PANEL A: DEMOGRAPHIC CHARACTERISTICS

	Mean		Unconditional Comparisons	
	Female (All) N = 403	Male N = 136	Female (All) vs. Male	Best Female vs. Male
Age	23.10	24.79	-1.69***	-1.44***
Migrant	0.71	0.74	-0.03	-0.02
Married	0.61	0.54	0.07*	0.11***
Number of Children	0.50	0.35	0.15***	0.2***
Education (= years in school)	8.14	8.71	-0.56***	-0.31
Experience in Garments	3.45	3.52	-0.08	0.15
Tenure in Factory	3.12	3.04	0.08	0.27
Ever Received Training	0.14	0.17	-0.03	-0.03
Expected time in factory	5.23	5.44	-0.22	-0.20
Overall job satisfaction	3.48	3.48	-0.01	-0.06
Pay is good	2.99	3.11	-0.11	-0.22***
Job makes me learn new things	3.08	3.08	0.01	-0.06
At work I am treated with respect	3.66	3.80	-0.13***	-0.12***
I find work stressful	1.57	1.37	0.21***	0.25***

Outline for talk

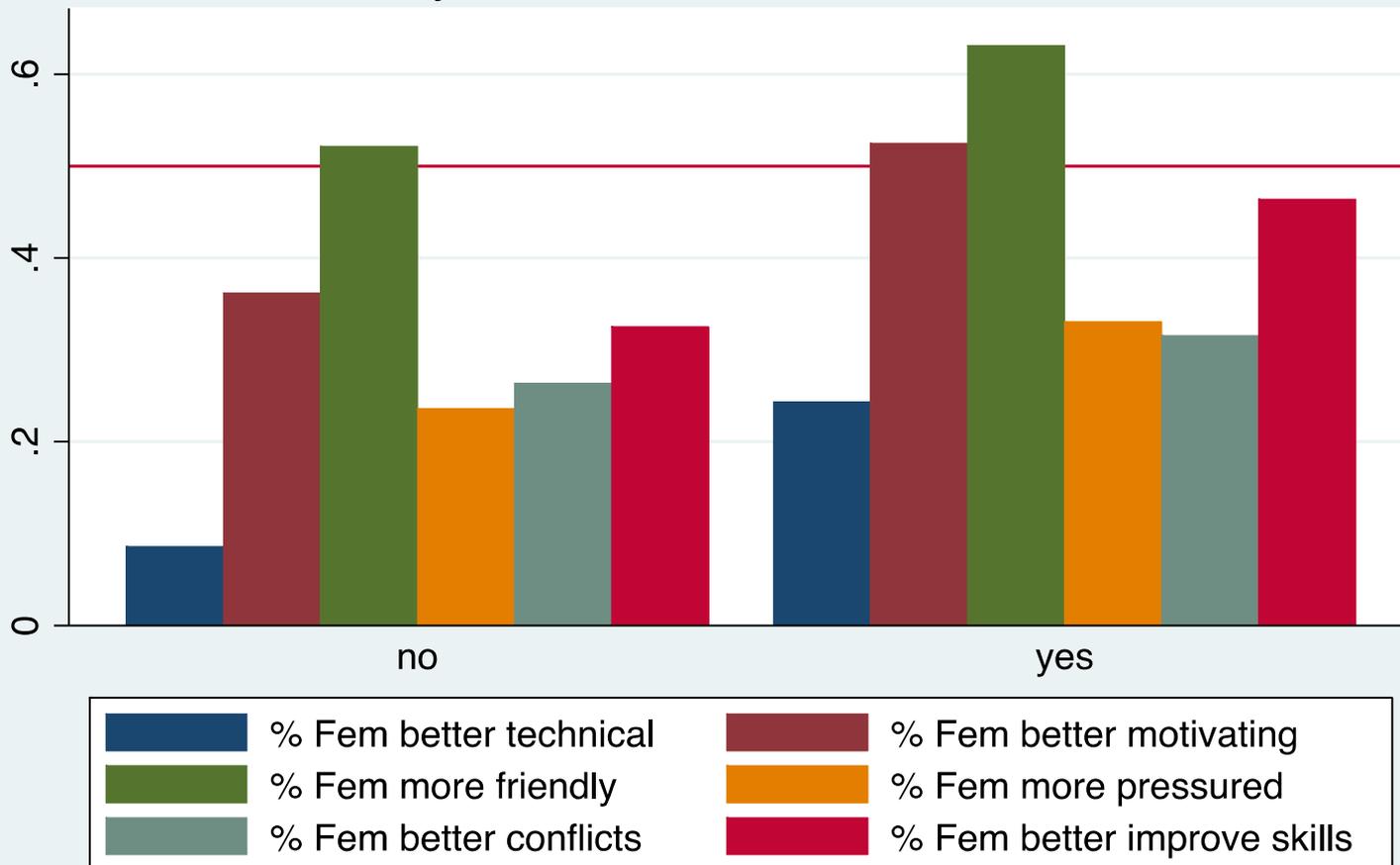


- Motivation
- Project outline: Assessing the marginal choice of supervisors
- **How effective are women as supervisors?**
- Outcomes:
 - Retention and promotion
 - Management simulation exercises
 - Productivity
- Attitudes toward trainees

In the abstract, % of operators saying females are better at...



Operator comparison of Female and Male SVs
By whether worked under female SV



Outline for talk

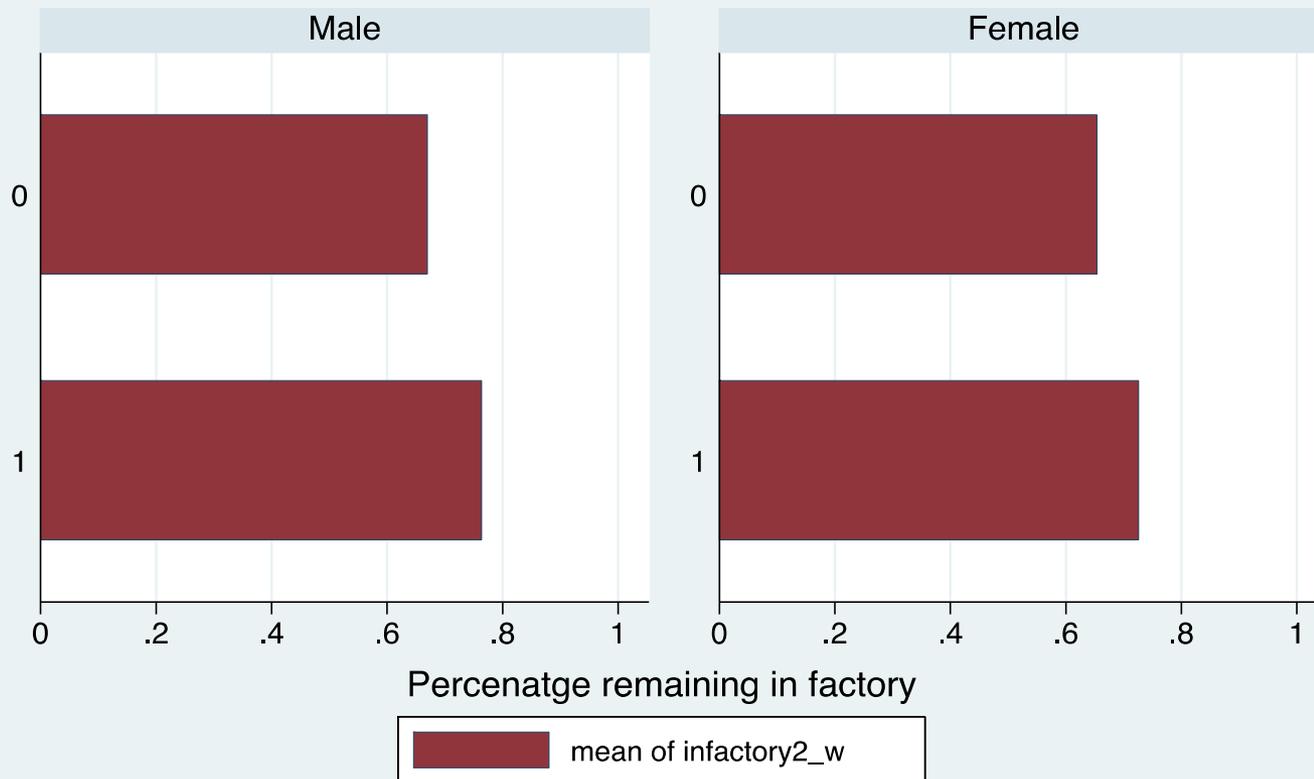


- Motivation
- Project outline: Assessing the marginal choice of supervisors
- How effective are women as supervisors?
- **Outcomes:**
 - Retention and promotion
 - Management simulation exercises
 - Productivity
- Attitudes toward trainees

Migration at 10 months



Factory retention rates after 10 months
By gender and trainee / control

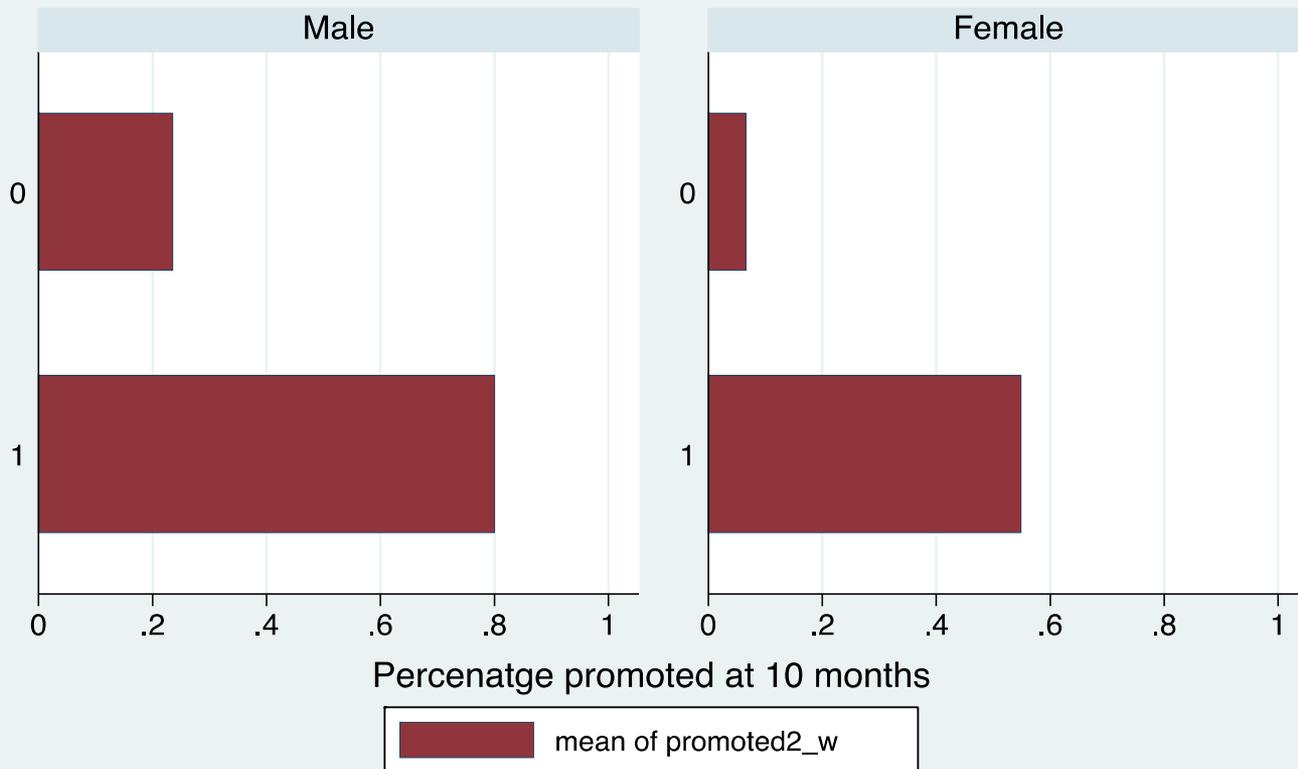


Graphs by 12. Gender

Promotion after 10 months

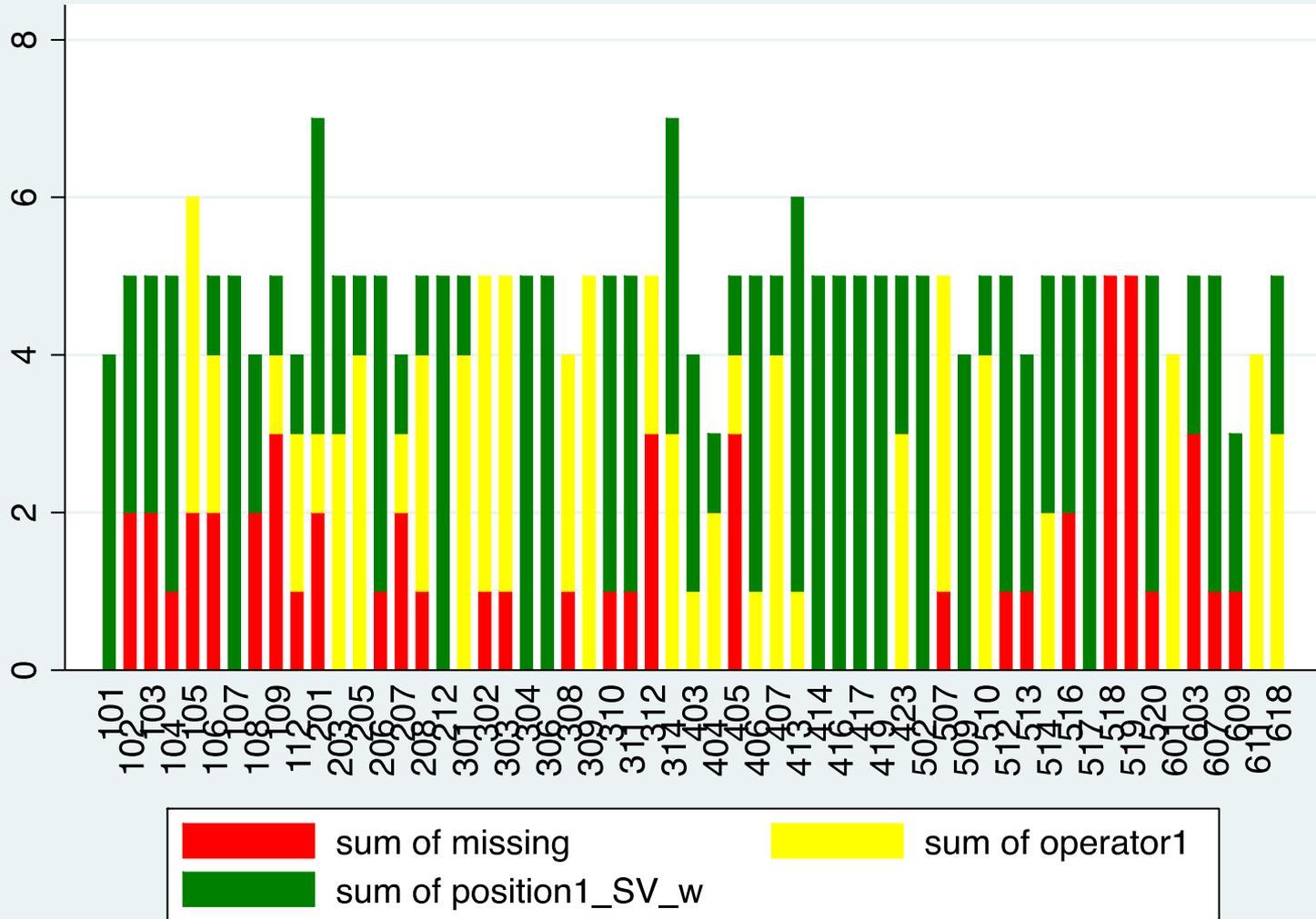


Promotion after 10 months
By gender and trainee / control



Graphs by 12. Gender

Outcomes: Attrition and Promotion, worker reports



Productivity effects



- The standard way of assessing training programs is to look at changes in wages. We view this as problematic for several reasons.
- We aim to measure actual changes in productivity. We are unaware of other attempts to do this in the context of training programs.

Productivity effects



- But, it's a heck of a lot easier just to look at wages, so let's do that.
 - Wages + 4000 per month among those promoted, + 2000 per month among all trainees (still in factory at FU2)
 - Cost of training ~ 48,000 BDT (including opportunity cost of time)
 - This implies an expected payoff (caveat, attrition to be dealt with) of 24 months, and a payoff conditional on promotion of 12 months.

Follow-up 2 Salaries (BDT per month)

Complying controls	5279
All trainees	7322
Trainees working as SVs	9025
Trainees working as Operators	4941

Productivity effects

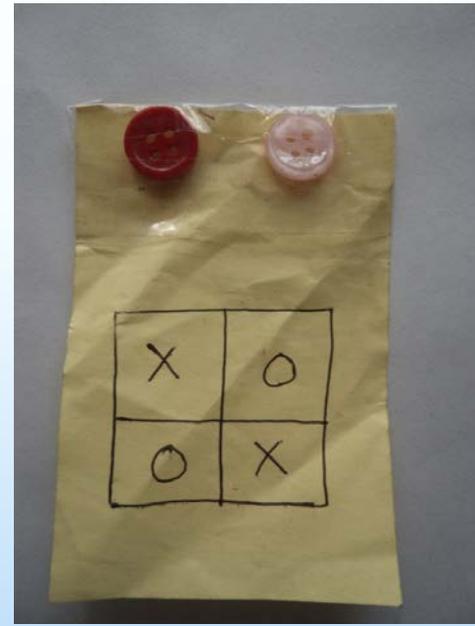
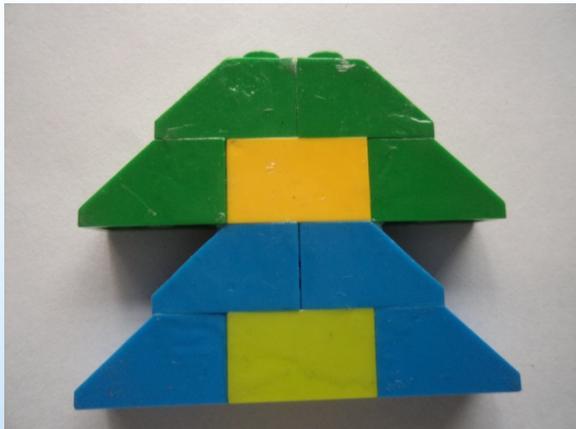


- We don't think factories would assess the effect of training using wage differentials. They would try to assess whether the training increased the productivity of SVs by enough to justify the costs.
- So, we also do that:
 - Management simulation exercise
 - Line-level productivity data

Management simulation



- Teams of two operators were asked to construct objects with Legos and buttons
 - Two sessions, one Legos, one buttons (random order)
 - Directed by a “team leader”: Trainee, control existing SV
 - Payoffs of games based on sum of output, max output, min output, joint production.



Management exercises: Female vs. male trainees



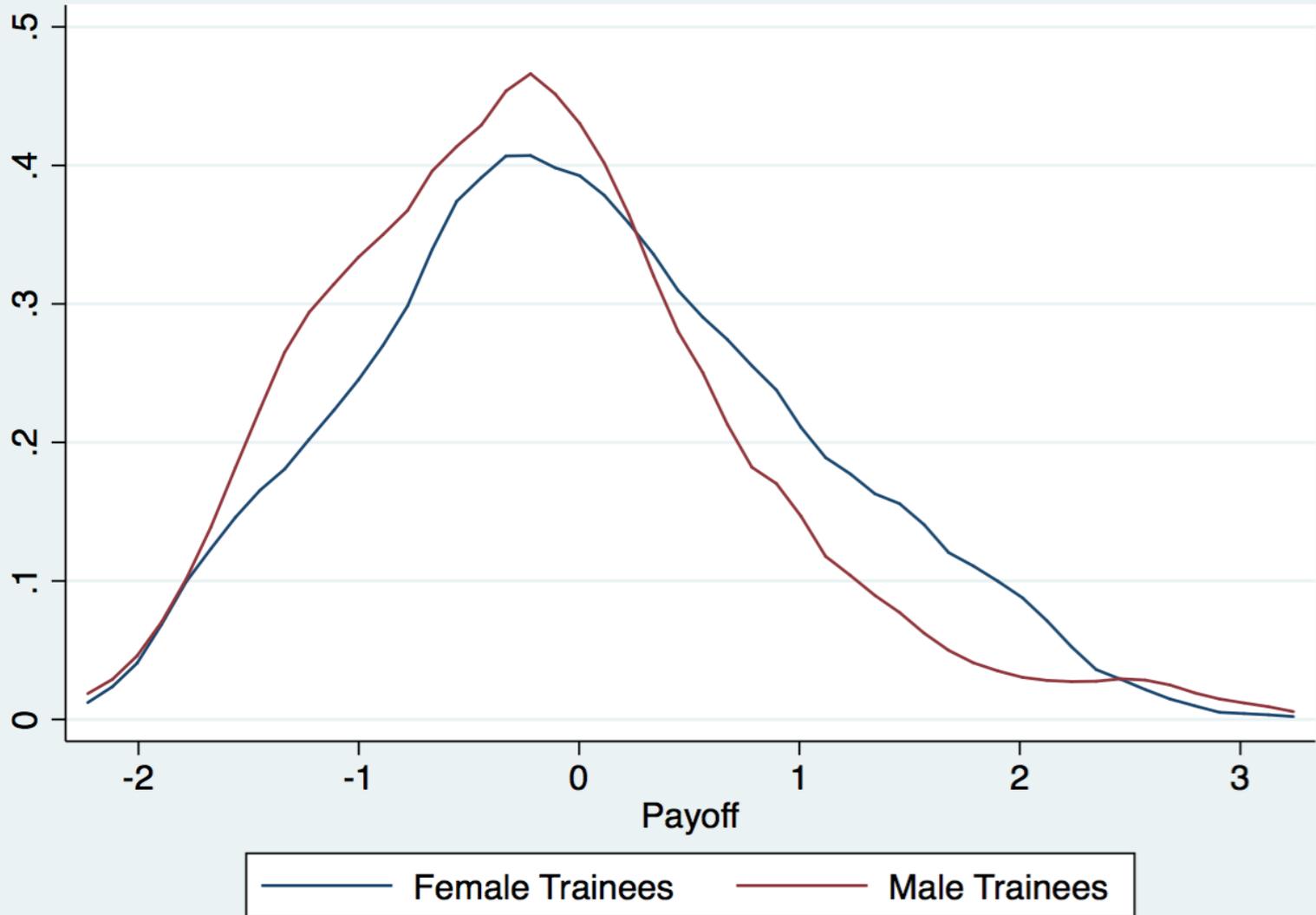
Management Exercises: Standardised Payoffs

Trainees Females Vs. Males

	I	II	III	IV	V	VI	VII
Outcome Var.: Pay-Off in Games (Standardized)				Female team	Mixed / male team		
Female	0.290*** (0.109)	0.309** (0.127)	0.302*** (0.100)	0.570*** (0.171)	0.184 (0.282)	0.342** (0.135)	0.365*** (0.128)
Tried as Line Supervisor						0.321 (0.226)	
Promoted to Line Supervisor							0.538** (0.233)
Team Fixed Effects	no	no	yes	no	no	no	no
Game Fixed Effects	yes	yes	yes	yes	yes	yes	yes
Team Leader Demogr.	no	yes	yes	yes	yes	yes	yes
Number of Observations	676	592	600	380	212	592	588

Female trainees: 1) Perform better; 2) especially with all-female teams.

Payoffs: Females vs. males



Operator opinions: Management simulations



- In the management simulation games, we ask the production team operators to compare the two team leaders they worked with.
- 19 teams 'produced' for one female and one male trainee. Although the female team leaders yielded higher productivity, the males were seen as somewhat better at:
 - answering questions (22 vs. 16, $p=0.21$)
 - correcting mistakes (23 vs. 15, $p=0.13$)
 - motivating ($p=0.21$)
 - encouraging ($p=0.21$)
- Females are "always in pressure" (26 vs. 12, $p=0.02$)
- A small sample, but no clear differences between male and female operators.

Measuring productivity



- Construct a measure which is essentially Q / Hours :
 - Output minutes / input minutes
 - $$[\# \text{ pieces} * \text{SMV}] / [\# \text{ operators} * \text{runtime in minutes}]$$
- Typical factories in Bangladesh have efficiency levels of 35- 40 percent by this measure; best factories ~ 60 percent
 - In Sri Lanka, 70 – 80 percent
- Notes:
 - We focus on measures of efficiency in sewing only, since the training we conduct focuses on the sewing line. We generally ignore cutting, etc.
 - Capital obviously matters (though in sewing does not vary much within factory, typically); quality may as well (Hugo Boss vs. Walmart)
 - Several other outcomes of the training are of interest – quality defects, absenteeism. But all of these are important because they affect productivity.

(Preliminary) Productivity effects



Table 6: Productivity of Trainees on the Line

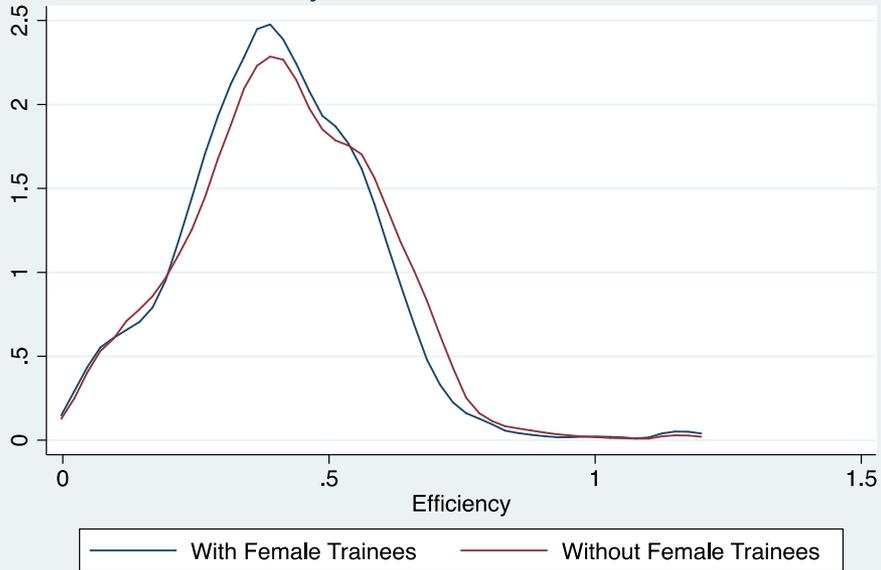
MODEL VARIABLES	(1) Line FE Efficiency	(2) Line FE Sh. Defective Output	(3) Line FE Sh. Absent Worker	(4) Line FE Daily Hours
Female Trained Supervisor	-0.019* (0.01)	-0.007 (0.00)	0.002 (0.01)	0.307** (0.15)
Male Trained Supervisor	0.006 (0.02)	-0.011* (0.01)	0.008 (0.01)	-0.028 (0.13)
Dep.Var. Pre-Placement				
Observations	102,348	73,323	44,454	101,689
R-squared	0.045	0.077	0.163	0.177
Number of factory_LLI	767	739	577	674
Line FE	YES	YES	YES	YES
Factory FE				
Date FE	YES	YES	YES	YES
TEST: Male Tr.SV. = Female Tr.SV, p-value	0.296	0.616	0.632	0.084
Nr. Lines with Male Tr.SV.:	24	21	12	21
Nr. Lines with Female Tr.SV.:	50	48	35	47

Female trainees generally perform insignificantly better than male trainees in efficiency and absenteeism, insignificantly worse on quality.

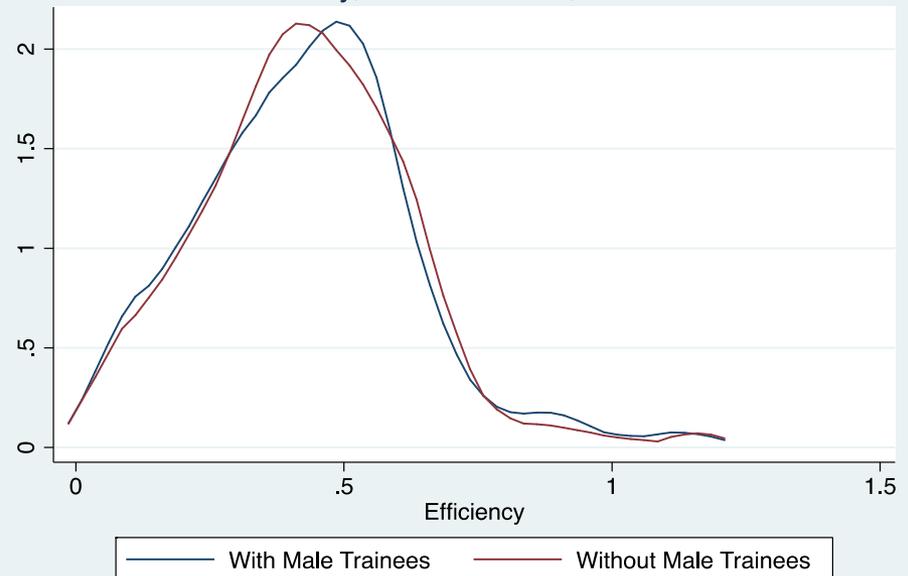
Females, efficiency, fixed lines



Efficiency, Female trainees, fixed lines



Efficiency, Male trainees, fixed lines



Outline for talk



- Motivation
- Project outline: Assessing the marginal choice of supervisors
- How effective are women as supervisors?
- Outcomes:
 - Retention and promotion
 - Management simulation exercises
 - Productivity
- **Attitudes toward trainees**

Cheating games



- We conducted ‘cheating games’ with operators, SVs and line chiefs.
 - Draw 5 buttons from cup (don’t show me!)
 - Give 20 BDT to “X” for each red button, you keep 20 BDT for each green button.
 - Operators, for example, draw 5.5 reds over 3 games (s/b 7.5)
- How do operators and LCs respond to the trainees? How do the trainees treat the operators / LCs?
 - Male trainees: give 2.19 / 5 (+0.18)
 - Female trainees: give 1.67 / 15 (-0.34***)
 - Other supervisors: give 2.01 / 15

Preferences and resistance



Do you prefer to work for a male or female SV?

	Males	Females
Prefer male	84%	49%
Prefer female	6%	44%
No preference	10%	7%

Resistance?



Promoted Trainees vs. Existing Supervisors: Cheating Game, Amount Received from ...

Outcome Variable	Operators		Other Supervisor		Line Chief	
Training	-0.15 [0.22]	-0.07 [0.31]	0.23 [0.34]	-0.07 [0.40]	-0.34 [0.28]	-0.28 [0.43]
Female	0.31** [0.16]	0.29* [0.16]	0.92*** [0.24]	0.91*** [0.25]	0.21 [0.25]	0.25 [0.26]
Training X Female	-0.06 [0.29]	-0.10 [0.33]	-0.86* [0.49]	-0.79* [0.53]	0.53‡ [0.40]	0.31 [0.46]
Mean (different from 2.5)	1.86***		2.02***		2.10***	
Factory Fixed Effects	yes	yes	yes	yes	yes	yes
Demo. Controls (Receiver)	no	yes	no	yes	no	yes
Demo. Controls (Giver)	no	yes	no	yes	no	yes
Number of Observations	348	348	348	348	348	348

Resistance?



Promoted Trainees vs. Existing Supervisors: Cheating Game, Amount Given to ...

Outcome Variable	Operators		Other Supervisor		Line Chief	
Training	0.41‡ [0.29]	0.56‡ [0.39]	0.27 [0.29]	0.03 [0.40]	0.01 [0.27]	0.19 [0.40]
Female	0.19 [0.21]	0.06 [0.23]	-0.41* [0.21]	-0.47** [0.22]	0.05 [0.28]	-0.03 [0.33]
Training X Female	-0.97*** [0.42]	-0.83** [0.37]	-0.21 [0.39]	-0.01 [0.46]	0.31 [0.41]	0.19 [0.50]
Mean (different from 2.5)	1.88***		2.02***		3.0***	
Factory Fixed Effects	yes	yes	yes	yes	yes	yes
Demographics Control	no	yes	no	yes	no	yes
Number of Observations	348	348	348	348	348	348

Conclusions



- Trained 4 female and 1 male operators from 60 factories. 85% of male and 56% of female trainees were promoted 10 months later.
- Outcomes:
 - Female trainees perform better in management simulations
 - Males perform slightly better in some aspects of productivity data. (Results should be sharper after phase II is complete.)
 - But... Resistance?
 - Even though female trainees perform better in the management simulation exercises, the operators report the male trainees are better at answering question, motivating them, etc.
 - Evidence from “cheating games” suggests friction between the female trainees and both the operators and other SVs.

Next Steps



- We are presently implementing a 'phase II' of the female training project. We are focused on:
 - A much more careful measurement of skills, both before and after training.
 - More balance between the number of females and males trained, to make a more direct comparison of female and male trainees.
 - We have learned a lot about measurement of productivity, and we expect this to lead overall to better quality production data.