



Lecture 9: Management

Williams College ECON 204:
Global Poverty and Economic Development
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photo: Per Gunvall / World Bank

What Is Productivity?

- A Cobb-Douglas production function (à la the Solow Model): $Y = AK^\alpha L^{1-\alpha}$
 - ▶ Y is output
 - ▶ K is capital stock
 - ▶ L is labor (which can be modified to reflect human capital)
 - ▶ A is a technology parameter
- What is A , and is it the same for all countries and for all firms?

What Is Productivity?

- We can re-write our production function in terms of **output per worker**: $y = Ak^\alpha$
 - ▶ $y = Y/L$ is output per worker
 - ▶ $k = K/L$ is capital per worker

- Taking logs of both sides and rearranging, we have:

$$\ln A = \ln y - \alpha \ln k$$

where α is between 0 and 1

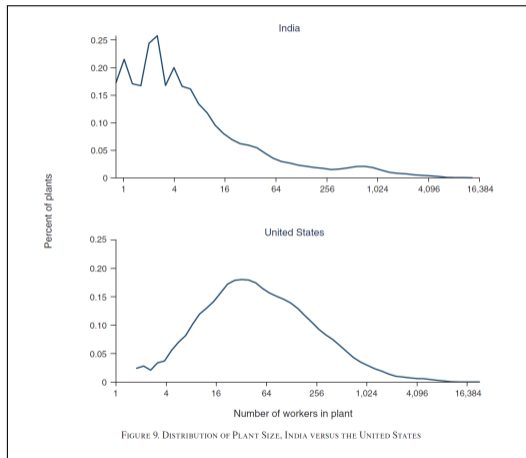
- The A (or $\ln A$) term is **total factor productivity** (TFP)
 - ▶ Unexplained differences in output, after accounting for inputs

Cross-Country Differences in Total Factor Productivity

Country	Estimated A
United States	1.000
France	1.126
Italy	1.207
Mexico	0.926
Singapore	1.078
United Kingdom	1.011
Argentina	0.648
Brazil	0.758
Greece	0.674
Japan	0.658
New Zealand	0.631
China	0.106
India	0.267
Kenya	0.165
Zambia	0.079

source: Hall and Jones (1998)

Differences in Management Across Countries



source: Hsieh and Klenow (2010)

Within-Country Differences in Total Factor Productivity

Larger firms are more productive, and the firm-size distribution differs across countries

- Modal U.S. manufacturing firm has 45 worker, vs. 0 in India, Indonesia, and Mexico
- 10% of Mexican firms have at least 10 workers, vs. <1% in India and Indonesia

Firm-level TFP is also lower and more dispersed in China and India, relative to the U.S.

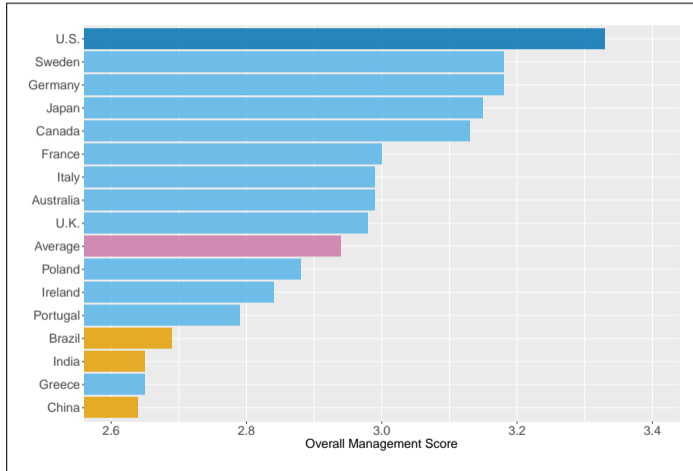
- Subsidies, political connections may favor relatively inefficient firms
- Credit market imperfections, weak legal systems may constrain growth of efficient firms
- Trade barriers may increase demand for goods from inefficient firms

What do we know about policy interventions to enhance firm productivity?

Measuring Management

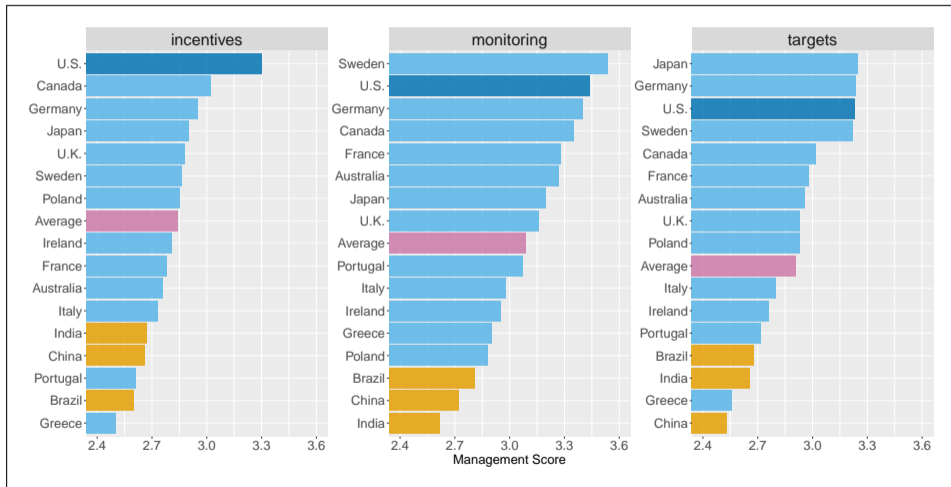
- Nicholas Bloom and John Van Reenan (2010) hired MBA students to survey medium-sized, public and private manufacturing firms in 17 (mostly high-income) countries
- Survey enumerators asked open-ended questions that were coded in terms of best practice:
 - ▶ **Incentives:** Does the firm attract and retain high-skill workers? Are workers promoted and/or rewarded for good performance? Are poor performers removed (i.e. fired)?
 - ▶ **Monitoring:** Is data used to track progress and identify inefficiencies? Is the production process monitored so that slowdowns can be addressed early on?
 - ▶ **Targets:** Do management targets reflect both short-term and long-term objectives? Are achievable targets set at levels that create incentives for workers and managers?
- Responses were aggregated into numeric scores, from 1 (worst) to 5 (best)
 - ▶ Scoring reflects **best practices** view of management

Differences in Management Across Countries



data source: Bloom and Van Reenan (2010)

Differences in Management Across Countries

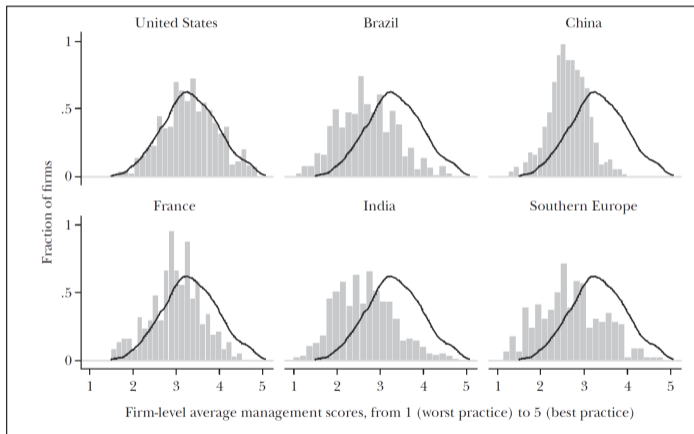


data source: Bloom and Van Reenan (2010)

Differences in Management Across Countries

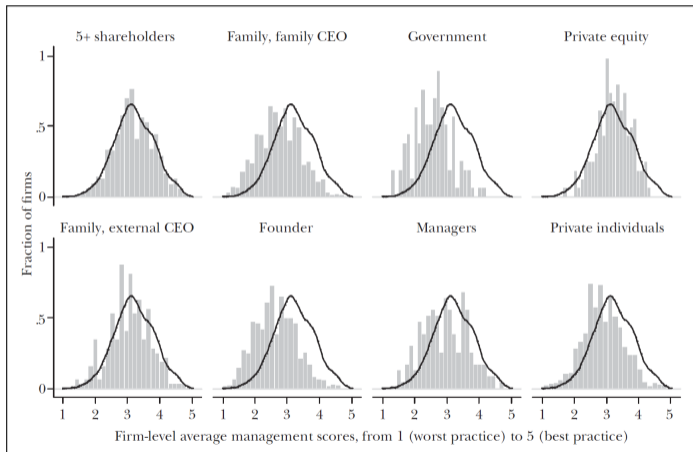
- Do cross-country differences support the **contingency view** of management?
 - ▶ Workers may respond differently to different management structures for cultural reasons
 - ▶ For example, U.S. workers might be more accepting of pay inequality and job insecurity, but less willing to tolerate the use of monitoring practices that they perceive as invasive
 - ▶ The U.S. is a major outlier in terms of “good” incentives
- A number of countries (Brazil, China, Greece, India) score badly across all domains
 - ▶ Many countries that have low scores across all three domains also have low TFP
 - ▶ Questions intended to capture agreed upon **best practices** in management

Differences in Management Across Countries



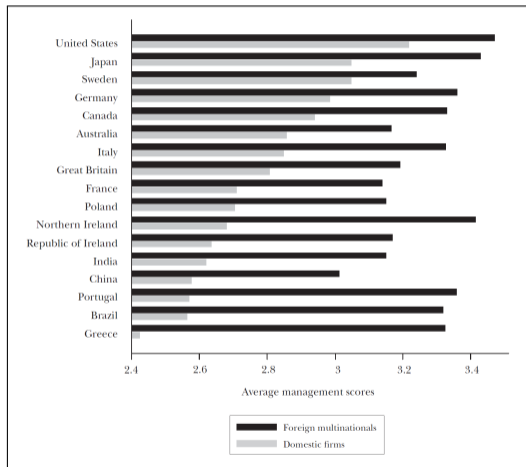
source: Bloom and Van Reenan (2010)

Family-Run Firms, State-Owned Enterprises are Badly Managed



source: Bloom and Van Reenan (2010)

Multinationals Are Managed Well Everywhere



source: Bloom and Van Reenan (2010)

Cross-Country Variation in Management Practices: Takeaways

- Management practices differ across countries, and are correlated with productivity
 - ▶ This does not rule out contingency view: U.S. differs from Europe, for example
 - ▶ Multinationals are well-managed in all countries studied, so differences not purely cultural
- Cross-country differences in management partially attributable to composition of firms
 - ▶ Public enterprises, family-run firms managed by a (male) relative, and founder-managed firms tend to be badly managed, and are more common in some countries than in others
 - ▶ Legal structure likely to matter for firm ownership, and in turn management practices
- Badly-managed firms do not go out of business in many parts of the world (esp. LMICs)

Management Consulting as Development Policy?

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DOES MANAGEMENT MATTER? EVIDENCE FROM INDIA*

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A long-standing question is whether differences in management practices across firms can explain differences in productivity, especially in developing countries where these spreads appear particularly large. To investigate this, we ran a management field experiment on large Indian textile firms. We provided free consulting on management practices to randomly chosen treatment plants and compared their performance to a set of control plants. We find that adopting these management practices raised productivity by 17% in the first year through improved quality and efficiency and reduced inventory, and within three years led to the opening of more production plants. Why had the firms not adopted these profitable practices previously? Our results suggest that informational barriers were the primary factor explaining this lack of

source: Bloom et al. (2013)

Management Consulting as Development Policy

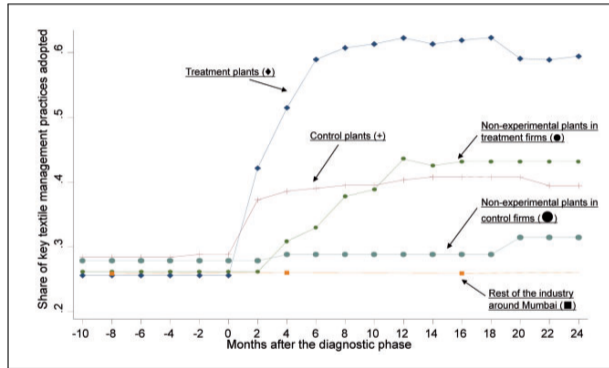
- Policy intervention: management consulting to improve business practices
 - ▶ The World Bank and Stanford hired Accenture (?) to work with firms
 - ▶ Goal of the experiment was to see if improved management led to increased productivity
- Sampled textile manufacturers in two towns near Mumbai, India
 - ▶ Sample restricted to firms with between 100 and one thousand employees
 - ▶ There are only 66 such firms: 34 expressed interest, 17 included in study
 - ▶ All firms that agreed to participate were family owned

Characteristics of Textile Firms Included in th Study

	All				Treatment Mean	Control Mean	Diff <i>p</i> -value
	Mean	Median	Min	Max			
Number of plants	28	n/a	n/a	n/a	19	9	n/a
Number of experimental plants	20	n/a	n/a	n/a	14	6	n/a
Number of firms	17	n/a	n/a	n/a	11	6	n/a
Plants per firm	1.65	2	1	4	1.73	1.5	0.393
Employees per firm	273	250	70	500	291	236	0.454
Employees, experimental plants	134	132	60	250	144	114	0.161
Hierarchical levels	4.4	4	3	7	4.4	4.4	0.935
Annual sales (\$m) per firm	7.45	6	1.4	15.6	7.06	8.37	0.598
Current assets (\$m) per firm	8.50	5.21	1.89	29.33	8.83	7.96	0.837
Daily mtrs, experimental plants	5,560	5,130	2,260	13,000	5,757	5,091	0.602
BVR management score	2.60	2.61	1.89	3.28	2.50	2.75	0.203
Management adoption rates	0.262	0.257	0.079	0.553	0.255	0.288	0.575
Age, experimental plant (years)	19.4	16.5	2	46	20.5	16.8	0.662
Quality defects index	5.24	3.89	0.61	16.4	4.47	7.02	0.395
Inventory (1,000 kilograms)	61.1	72.8	7.4	117.0	61.4	60.2	0.945
Output (picks, million)	23.3	25.4	6.9	32.1	22.1	25.8	0.271
Productivity (in logs)	2.90	2.90	2.12	3.59	2.91	2.86	0.869

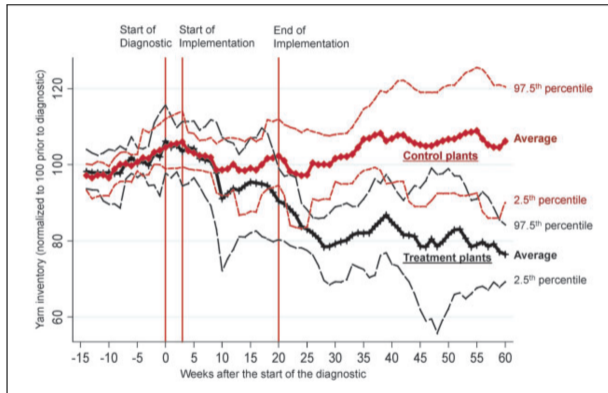
source: Bloom et al. (2013)

The Impacts of Consulting on Management Practices



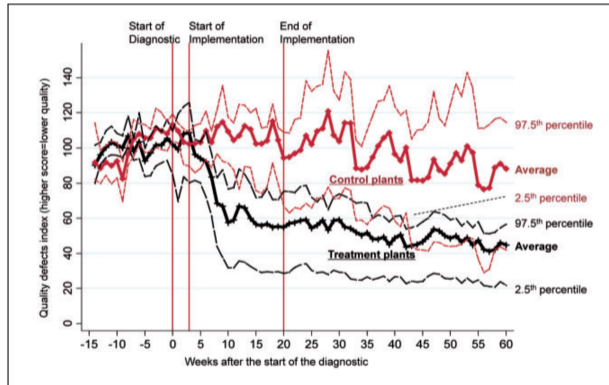
source: Bloom et al. (2013)

Impacts on Yarn Inventory



source: Bloom et al. (2013)

Impacts on Frequency of Defects



source: Bloom et al. (2013)

Impacts on Productivity

Bloom et al. calculate plant-level productivity assuming a Cobb-Douglas production function:

$$Y_{it} = \bar{A}_i A_{it} K_{it}^{\alpha} L_{it}^{1-\alpha}$$

where:

- Y_{it} is output at plant i in time period t , measured in cycles of weaving shuttles
- \bar{A}_i is a fixed plant-level productivity parameter
- A_{it} is a time-varying plant-level productivity parameter
- K_{it} is physical capital including working capital (inventory), measured in rupee
- L_{it} is hours worked by employees and subcontractors, including mending hours
- $\alpha = 0.42$ is a factor-share, estimated from Indian Annual Survey of Industry

Impacts on Productivity

Solving the production function for the time-varying measure of productivity:

$$Y_{it} = \bar{A}_i A_{it} K_{it}^\alpha L_{it}^{1-\alpha}$$

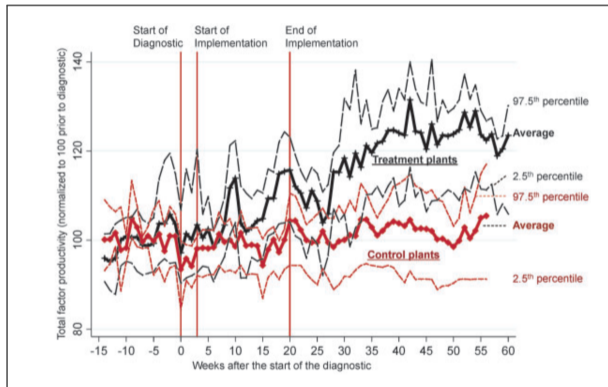
$$\Leftrightarrow \ln Y_{it} = \ln \bar{A}_i + \ln A_{it} + \alpha \ln K_{it} + (1 - \alpha) \ln L_{it}$$

$$\Leftrightarrow \ln A_{it} = \ln Y_{it} - \ln \bar{A}_i - \alpha \ln K_{it} - (1 - \alpha) \ln L_{it}$$

$\ln Y_{it} - \ln \bar{A}_i$ is the deviation of log output from the plant-level mean (of log output)

- TFP represents “unexplained” changes in output (not driven by changes in K or L)

Impacts on Productivity



source: Bloom et al. (2013)

Impacts on Improved Management Practices: Summary

Dependent variable	(1) Quality defects	(2) Inventory	(3) Output	(4) TFP	(5) Quality defects	(6) Inventory	(7) Output	(8) TFP
Specification	ITT	ITT	ITT	ITT	Weeks of treatment	Weeks of treatment	Weeks of treatment	Weeks of treatment
Intervention _{<i>i,t</i>}	-0.564** (0.235)	-0.245** (0.117)	0.090** (0.037)	0.154* (0.084)				
During implementation _{<i>i,t</i>}	-0.293** (0.137)	-0.070 (0.093)	0.015 (0.031)	0.048 (0.056)				
Cumulative treatment _{<i>i,t</i>}					-0.032** (0.013)	-0.015** (0.005)	0.006*** (0.002)	0.009** (0.004)
<i>Small sample robustness</i>								
Ibragimov-Mueller (95% CI)	[-1.65,0.44]	[-0.83,-0.02]	[0.05,0.38]	[-0.014,0.79]				
Permutation test (<i>p</i> -value)	.001	.060	.026	.061				
Time FEs	127	127	127	127	127	127	127	127
Plant FEs	20	18	20	18	20	18	20	18
Observations	1,807	2,052	2,393	1,831	1,807	2,052	2,393	1,831

Notes. All regressions use a full set of plant and calendar week dummies. Standard errors are bootstrap clustered at the firm level. *Intervention* is a plant level dummy equal to 1 after the implementation phase at treatment plants and 0 otherwise. *During implementation* is a dummy variable equal to 1 from the beginning of the diagnostic phase to the end of the implementation phase for all treatment plants. *Cumulative treatment* is the cumulative weeks of treatment since the beginning of the implementation phase in each plant (0 in both the control group and prior to the implementation phase in the treatment group). *Quality defects* is the log of the quality defects index (QDI), which is a weighted average score of quality defects, so higher numbers imply worse quality products (more quality defects). *Inventory* is the log of the tons of yarn inventory in the plant. *Output* is the log of the weaving production picks. *TFP* is plant-level total factor productivity defined as $\log(\text{output})$ measured in production picks less $\log(\text{capital})$ times capital share of 0.42 less $\log(\text{labor})$ times labor costs share of 0.58. *ITT* reports the intention to treat results from regressing the dependent variable directly on the intervention dummy. *Time FEs* report the number of calendar week time fixed effects. *Plant FEs* reports the number of plant-level fixed effects. Two plants do not have any inventory on site, so no inventory data are available. *Small sample robustness* implements two different procedures (described in greater detail in the Appendix and Online Appendix B) to address issues of plant heterogeneity, within plant (and firm) correlation, and small sample concerns. *Ibragimov-Mueller (95% CI)* report 95% confidence interval estimates from firm-by-firm parameter estimates treating the estimates as draws from independent (but not identically distributed) normal distributions and conducts a two-sample *t*-test. *Permutation test* reports the *p*-values for testing the null hypothesis that the treatment has no effect for the ITT parameter by constructing a permutation distribution of the ITT estimate using the 12,376 possible permutations of treatment assignment. These tests have exact finite sample size. *** denotes 1%, ** denotes 5%, * denotes 10% significance.

source: Bloom et al. (2013)

Impacts on Improved Management Practices: Expansion

LONG-RUN IMPACT OF THE EXPERIMENT ON FIRM SIZE AND DECENTRALIZATION						
Dependent variable	Firm size			Delegation to plant management		
	(1) No. of plants	(2) No. of plants	(3) No. of plants	(4) z-score	(5) z-score	(6) z-score
Sample	Industry	Experiment	Industry	Industry	Experiment	Industry
Time period	2011	2008–2011	2008–2011	2011	2008–2011	2008–2011
Management _{it}	1.040* (0.563)			0.597† (0.370)		
Male family members _{it}	0.210*** (0.065)			0.010 (0.042)		
Posttreatment _{it}		0.217* (0.122)	0.259** (0.110)		0.103** (0.049)	0.171*** (0.035)
Plant manager related _i				0.423*** (0.150)		
Plant manager tenure _i				0.014** (0.007)		
<i>Small sample robustness</i>						
Permutation tests (<i>p</i> -value)	n/a	0.21	0.02	n/a	0.12	0.001
Time FEs	n/a	3	3	n/a	3	3
Plant/Firm FEs	n/a	17	121	n/a	28	128
Observations	107	68	468	120	108	499

Notes. The *size* dependent variable in columns (1)–(3) is the number of plants in the firm. The *decentralization* dependent variable in columns (4)–(6) is the z-score index of plant decentralization, which is the sum of the four z-scored (normalized to a mean of 0 and standard deviation of 1) individual responses over plant manager autonomy over weaver hiring, junior manager hiring, spare parts purchasing authority, and days the director does not visit the factory (see Online Appendix A.I for details). Columns (1)–(3) are run at the firm level (because firm-size is a firm-level variable) and columns (4)–(6) are run at the plant level (because decentralization is a plant-level variable). *Management* is the adoption share of the 16 management practices starred in Appendix Table A.I and discussed in Online Appendix A.I, averaged across all plants within the same firm in columns (1)–(3). *Male family members* is the number of adult sons and brothers of the interviewed director, which includes all male family members currently working (even working in another firm) but excludes those in school of university. This is designed to measure the supply of male family members that could work in the firm. *Post treatment* takes the value 1 for a treatment firm/plant after the implementation phase and 0 otherwise. *Plant manager related* reports if the plant manager is related to the director, including cousins, uncles, and other indirect family members. *Plant manager tenure* measures the number of years the plant manager has been working at the firm. *Time FEs* report the number of calendar week time fixed effects. *Firm/Plant FEs* reports the number of firm-level fixed effects (columns (1)–(3)) or plant-level fixed effects (columns (4)–(6)). Standard errors clustered at the firm level in all columns. *Permutation test* reports the *p*-values for testing the null hypothesis that the treatment has no effect for the ITT parameter by constructing a permutation distribution of the ITT estimate using the 12,376 possible permutations of treatment assignment. *** denotes 1%, ** denotes 5%, * denotes 10%, †denotes 15% significance.

source: Bloom et al. (2013)

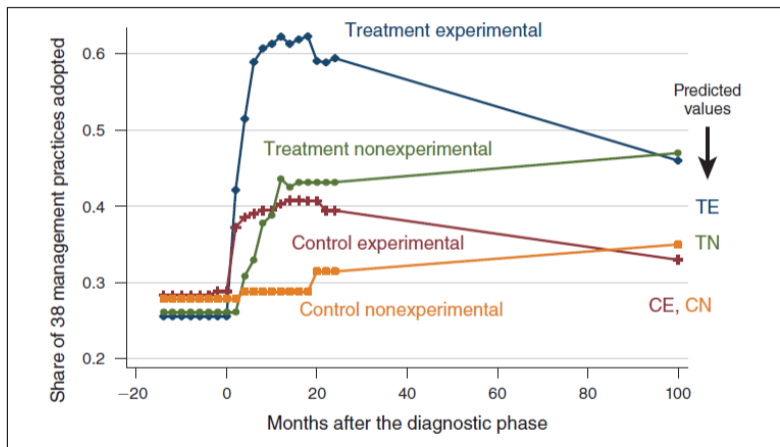
Reasons for Non-Adoption of Improved Management Practices

REASONS FOR THE NONADOPTION OF THE 38 MANAGEMENT PRACTICES (% OF ALL PRACTICES), BEFORE AND AFTER TREATMENT								
Nonadoption reason	Group	Management practice type	Timing relative to treatment					
			1 month before	1 month after	3 months after	5 months after	7 months after	9 months after
<i>Lack of information</i> (plants never heard of the practice before)	Treatment	Common	3.3	3.2	0.5	0	0	0
	Treatment	Uncommon	64.0	19.1	2.9	1.5	0	0
	Control	Common	1.9	0	0	0	0	0
	Control	Uncommon	67.8	23.7	22.0	22.0	22.0	22.0
<i>Incorrect information</i> (heard of the practice before but think it is not worth doing)	Treatment	Common	30	22.4	15.4	15.2	14.4	14.4
	Treatment	Uncommon	30.9	50.7	50.7	49.3	49.3	47.1
	Control	Common	18.5	18.5	18.5	18.5	18.5	18.5
	Control	Uncommon	27.1	52.5	50.9	50.9	49.2	49.2
<i>Owner time, ability, or procrastination</i> (the owner is the reason for nonadoption)	Treatment	Common	1.1	0.8	0.5	0.8	1.6	0.8
	Treatment	Uncommon	3.7	13.2	13.2	13.2	13.2	14.0
	Control	Common	3.7	3.7	3.7	3.7	3.7	3.7
	Control	Uncommon	3.4	20.3	18.6	18.6	18.6	18.6
<i>Other</i> (variety of other reasons)	Treatment	Common	0	0	0	0	0	0
	Treatment	Uncommon	2.1	1.5	1.5	2.2	2.2	2.2
	Control	Common	0	0	0	0	0	0
	Control	Uncommon	0	0	0	0	0	0
<i>Total nonadoption</i>	Treatment	Common	34.6	26.4	16.3	16.0	16.0	15.2
	Treatment	Uncommon	98.5	84.6	78.2	66.2	65.1	63.2
	Control	Common	25.1	22.2	22.2	22.2	22.2	22.2
	Control	Uncommon	98.3	96.6	91.5	91.5	89.8	89.8

Notes. Percentages (%) of practices not adopted by reason. Common practices are the eight practices with more than 50% initial adoption, mainly quality and downtime recording, and worker bonuses (see Appendix Table A.I for details). Uncommon practices are the 10 practices with less than 5% initial adoption, mainly standard operating procedures, inventory norms, review meetings, and manager incentive schemes. Timing is relative to the start of diagnostic phase. Covers 532 practices in the treatment plants (38 practices in 14 plants), and 228 practices in the control plants (38 practices in 6 plants). Nonadoption was monitored every other month using the tool shown in Online Appendix Exhibit OV, based on regular discussions with the firms' directors, managers, and workers.

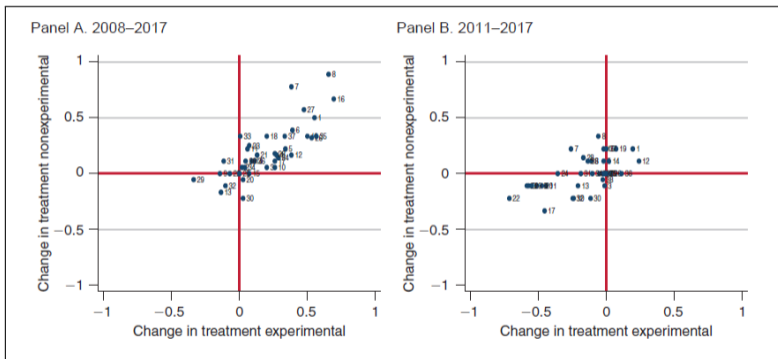
source: Bloom et al. (2013)

Long-Term Impacts of Improved Management Practices



source: Bloom et al. (2020)

The Diffusion of Management Practices in Firms



source: Bloom et al. (2020)