Management practices

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Introduction to productivity

Productivity: essential concept in nearly every field of economics

- Efficiency with which firms transform inputs into outputs
- Here: think of "firms" broadly (schools, hospitals)
- A broad "fact" that has motivated a great deal of productivity-related research is that there exist large and persistent differences in measured productivity levels across firms
  - Syverson (2011) provides an excellent recent overview
  - Bob's org econ classes
- My goal in this lecture is to highlight some recent applied microeconomics research in this area

Conceptualizing productivity

Productivity: efficiency in production

- How much output is obtained from a given set of inputs
- TFP can be seen in the following type of production function:

$$Y_t = A_t F(K_t, L_t, M_t)$$

- Y_t: output
- $F(\cdot)$: function of observable inputs
- K_t: capital
- L_t: labor
- M_t: intermediate materials
- A_t: factor-neutral shifter
  - A_t *is* TFP
  - By construction, TFP is unmeasured - a residual

Measuring productivity

Straightforward to define, *really* difficult to measure

- How to aggregate multiple outputs?
- What measure of labor?
- How to measure capital?
- How to aggregate multiple inputs?

Not my focus: Syverson (2011) a good "getting started" guide

Persistent productivity differences across firms

- Analysis of firm heterogeneity long a focus of social sciences
- Bartelsman-Doms (*JEL* 2000): starting in 1990s, growing availability of longitudinal micro-level data sets that followed large numbers of establishments or firms over time
- Several new "facts" emerged, one of which was the remarkable degree of heterogeneity within industries

Syverson (2004): Productivity dispersion

Syverson (2004) provides a recent set of estimates

- 1977 Census of Manufactures
- Computes productivity distribution moments for four-digit manufacturing industries
- Estimates imply that the plant at the 90^{th} percentile of the productivity distribution produces almost *twice* as much output with the same measured inputs as the 10^{th} percentile plant

Hseih-Klenow (2009): larger differences in China and India, with average 90-10 TFP ratios of more than 5:1

Foster-Haltiwanger-Syverson (2008): Persistence

Productivity spreads tend to be very persistent over time

- Foster-Haltiwanger-Syverson (2008) regress producer's current TFP on its one-year-lagged TFP
- Estimate autoregressive coefficients on the order of 0.8
- Syverson (2011)'s summary: some producers seem to have figured out their business while others are woefully lacking

Measurement error

The natural question that arises is what could be explaining these differences, and how they could persist in equilibrium

- One explanation: measurement error
  - If we accounted properly for inputs perhaps there would be little residual dispersion in productivity
- *Long* literature chipping away at this by trying to develop better measures of capital, labor, intermediate materials *etc.*
- Also a long literature investigating how much of the residual could be accounted for by explicit measures of "intangible capital" like research and development (R&D)

Measurement error: Analogous to macro debate

Analogous to the historical macro productivity time series debate

- Solow: TFP was a large component of aggregate growth
- Critics: there is little role for TFP once all inputs are property measured (*e.g.* Griliches 1996)

Measurement error: Difficult to rule out, but...

While difficult to rule out measurement error as an explanation, two bodies of evidence support idea that measurement error is not the whole story:

1. Measured productivity differentials exist even within industries producing very homogenous products, such as ready mixed concrete (Foster-Haltiwanger-Syverson 2008).
2. Measured productivity differentials are strongly correlated with firm exit and growth.

Productivity dispersion: Take-away

Bloom-Van Reenen 2011 *Handbook of Labor Economics* chapter: *"In summary, there is a substantial body of evidence of persistent firm-level heterogeneity in productivity...in narrow industries in many countries and time periods. Differential observable inputs, heterogeneous prices, and idiosyncratic stochastic shocks are not able to adequately account for the remarkable dispersion of productivity."*

Productivity dispersion: Explanations?

What explains this productivity dispersion?

Syverson (*JEL* 2011) provides an excellent overview

1. Managerial practice
2. IT and R&D
3. Firm structure decisions
4. Competition
5. Regulation
6. ...

Focus here: link between managerial practice and productivity

1 Preliminaries

2 Management and productivity
- Bertrand and Schoar (2003)
- Bloom and Van Reenen (2007)
- Bloom et al. (2013)

3 Looking ahead

Management

Labor economics traditionally focused on labor market rather than looking inside "black box" of firms, but this has dramatically changed over the last two decades

- Empirical research on management is "new"...
- ...but idea is not new
- Walker (1887) conjectured variation in managerial ability was source of profit differences across businesses: *"Side by side, in the same business, with equal command of capital, with equal opportunities, one man is gradually sinking a fortune, while another is doubling or trebling his accumulations."*

Three recent contributions

1. Bertrand-Schoar (2003)
   - Do managers matter? (yes)
   - Data limited ability to say why
2. Bloom-Van Reenen (2007)
   - New micro-data: `http://worldmanagementsurvey.org/`
   - Measured various aspects of managerial input
3. Bloom et al. (2013)
   - Field experiment

1. Preliminaries

2. Management and productivity
   - Bertrand and Schoar (2003)
   - Bloom and Van Reenen (2007)
   - Bloom et al. (2013)

3. Looking ahead

Bertrand and Schoar (2003)

How much do individual managers matter for firm performance?

- Manager-firm matched panel data set
- Tracks individual top managers as they move across firms
  $\Rightarrow$ can separate manager fixed effects from firm fixed effects
- Note: methodology (Abowd et al., Card et al., Dube et al.)

TABLE II

EXECUTIVE TRANSITIONS BETWEEN POSITIONS AND INDUSTRIES

to:	CEO	CFO	Other
from:			
CEO	117	4	52
	63%	75%	69%
CFO	7	58	30
	71%	71%	57%
Other	106	0	145
	60%		42%

a. This table summarizes executives' transitions across positions and industries in the manager-firm matched panel data set (as described in subsection III.A and Table I). All transitions are across firms. The first entry in each cell reports the number of transitions from the row position to the column position. The second line in each cell reports the fraction of the transitions in that cell that are between different two-digit industries.

b. "Other" refers to any job title other than CEO or CFO.

Estimation strategy

$$y_{it} = \alpha_t + \gamma_i + \beta X_{it} + \lambda_{\text{CEO}} + \lambda_{\text{CFO}} + \lambda_{\text{Others}} + \varepsilon_{it}$$

- Goal is not to estimate causal effect of managers
- Rather: aim to test for evidence that firm policies systematically change with the identity of the top managers
- Today: would want event study graphs

Results

Tables 3 and 4 report F-tests and adjusted R^2's from the estimation for different sets of corporate policy variables

- First row: controls only
- Second row: add CEO FE
- Third row: add all top executive FE

Manager-specific effects appear to matter both economically and statistically for the policy decisions of firms, and for firm outcomes

Bertrand and Schoar (2003) Table 3

TABLE III

EXECUTIVE EFFECTS ON INVESTMENT AND FINANCIAL POLICIES

Panel A: Investment policy

	F-tests on fixed effects for							
	CEOs		*CFOs*		*Other executives*		*N*	*Adjusted R^2*
Investment							6631	.91
Investment	16.74	(<.0001, 198)					6631	.94
Investment	19.39	(<.0001, 192)	53.48	(<.0001, 55)	8.45	(<.0001, 200)	6631	.96
Inv to Q sensitivity							6631	.95
Inv to Q sensitivity	17.87	(<.0001, 223)					6631	.97
Inv to Q sensitivity	5.33	(<.0001, 221)	9.40	(<.0001, 58)	20.29	(<.0001, 208)	6631	.98
Inv to CF sensitivity							6631	.97
Inv to CF sensitivity	2.00	(<.0001, 205)					6631	.98
Inv to CF sensitivity	0.94	(.7276, 194)	1.29	(.0760, 55)	1.28	(.0058, 199)	6631	.98
N of acquisitions							6580	.25
N of acquisitions	2.01	(<.0001, 204)					6580	.29
N of acquisitions	1.68	(<.0001, 196)	1.74	(.0006, 55)	4.08	(<.0001, 203)	6580	.36

Panel B: Financial policy

	F-tests on fixed effects for							
	CEOs		*CFOs*		*Other executives*		*N*	*Adjusted R^2*
Leverage							6563	.39
Leverage	0.99	(.5294, 203)					6563	.39
Leverage	0.86	(.9190, 199)	1.43	(.0225, 54)	1.21	(.0230, 203)	6563	.41
Interest coverage							6278	.31
Interest coverage	0.56	(.99, 193)					6278	.31
Interest coverage	0.35	(.99, 192)	13.85	(<.0001, 50)	2.61	(<.0001, 192)	6278	.41
Cash holdings							6592	.77
Cash holdings	2.52	(<.0001, 204)					6592	.78
Cash holdings	2.48	(<.0001, 201)	3.68	(<.0001, 54)	2.53	(<.0001, 202)	6592	.80
Dividends/earnings							6580	.65
Dividends/earnings	5.78	(<.0001, 203)					6580	.71
Dividends/earnings	4.95	(<.0001, 199)	1.07	(.3368, 54)	1.74	(<.0001, 203)	6580	.72

a. Sample is the manager-firm matched panel data set as described in subsection III.A and Table I. Details on the definition and construction of the variables reported in the table are available in the Data Appendix.

b. Reported in the table are the results from fixed effects panel regressions, where standard errors are clustered at the firm level. For each dependent variable (as reported in column 1), the fixed effects included are row 1: firm and year fixed effects; row 2: firm, year, and CEO fixed effects; row 3: firm, year, CEO, CFO, and other executives fixed effects. Included in the "Investment to Q" and "Investment to cash flow" regressions are interactions of these fixed effects with lagged Tobin's Q and cash flow, respectively. Also the "Investment," "Investment to Q," and "Investment to cash flow" regressions include lagged logarithm of total assets, lagged Tobin's Q, and cash flow. The "Number of Acquisitions" regressions include lagged logarithm of total assets and return on assets. Each regression in Panel B contains return on assets, cash flow, and the lagged logarithm of total assets.

c. Reported are the *F*-tests for the joint significance of the CEO fixed effects (column 2), CFO fixed effects (column 3), and other executives fixed effects (column 4). For each *F*-test we report the value of the *F*-statistic, the *p*-value, and the number of constraints. For the "Investment to Q" and "Investment to Cash Flow" regressions, the *F*-tests are for the joint significance of the interactions between the manager fixed effects and Tobin's Q and cash flow, respectively. Column 5 reports the number of observations, and column 6 the adjusted R^2's for each regression.

How large are observed differences between managers?

Table 6 reports the size distribution of the manager fixed effects

- Difference between a manager at the 25^{th} percentile of investment level and one at the 75^{th} percentile is 0.20
- Can be benchmarked against the average ratio of capital expenditures to assets in this sample, which is 0.30

Bertrand and Schoar (2003) Table 6

TABLE VI

SIZE DISTRIBUTION OF MANAGER FIXED EFFECTS

	Median	Standard deviation	25th percentile	75th percentile
Investment	0.00	2.80	−0.09	0.11
Inv to Q sensitivity	−0.02	0.66	−0.16	0.12
Inv to CF sensitivity	0.04	1.01	−0.17	0.28
N of acquisitions	−0.04	1.50	−0.54	0.41
Leverage	0.01	0.22	−0.05	0.09
Interest coverage	0.00	860.0	−56.0	51.7
Cash holdings	0.00	0.06	−0.03	0.02
Dividends/earnings	−0.01	0.59	−0.13	0.11
N of diversifying acquis.	−0.04	1.05	−0.28	0.21
R&D	0.00	0.04	−0.10	0.02
SG&A	0.00	0.66	−0.09	0.09
Advertising	0.00	0.04	−0.01	0.01
Return on assets	0.00	0.07	−0.03	0.03
Operating return on assets	0.00	0.08	−0.02	0.03

a. The fixed effects used in this table are retrieved from the regressions reported in Tables III and IV (row 3).

b. Column 1 reports the median fixed effect for each policy variable. Column 2 reports the standard deviation of the fixed effects. Columns 3 and 4 report the fixed effects at the twenty-fifth percentile and seventy-fifth percentile of the distribution, respectively.

c. Each fixed effect is weighted by the inverse of its standard error to account for estimation error.

Why do managers matter?

Fixed effect estimates do not tell us much about which specific managerial traits, characteristics, or practices matter

- Look at MBA graduation, birth cohort/age
- Limit here is data constraint

1. Preliminaries

2. Management and productivity
   - Bertrand and Schoar (2003)
   - Bloom and Van Reenen (2007)
   - Bloom et al. (2013)

3. Looking ahead

Bloom and Van Reenen (2007)

- New survey instrument
- Measured management practices at 732 medium-sized manufacturing firms in US, UK, France, and Germany
- Paper has two parts:
  1. Validation of survey
  2. Analysis of the distribution of management practices

Bloom and Van Reenen (2007) Figure 1

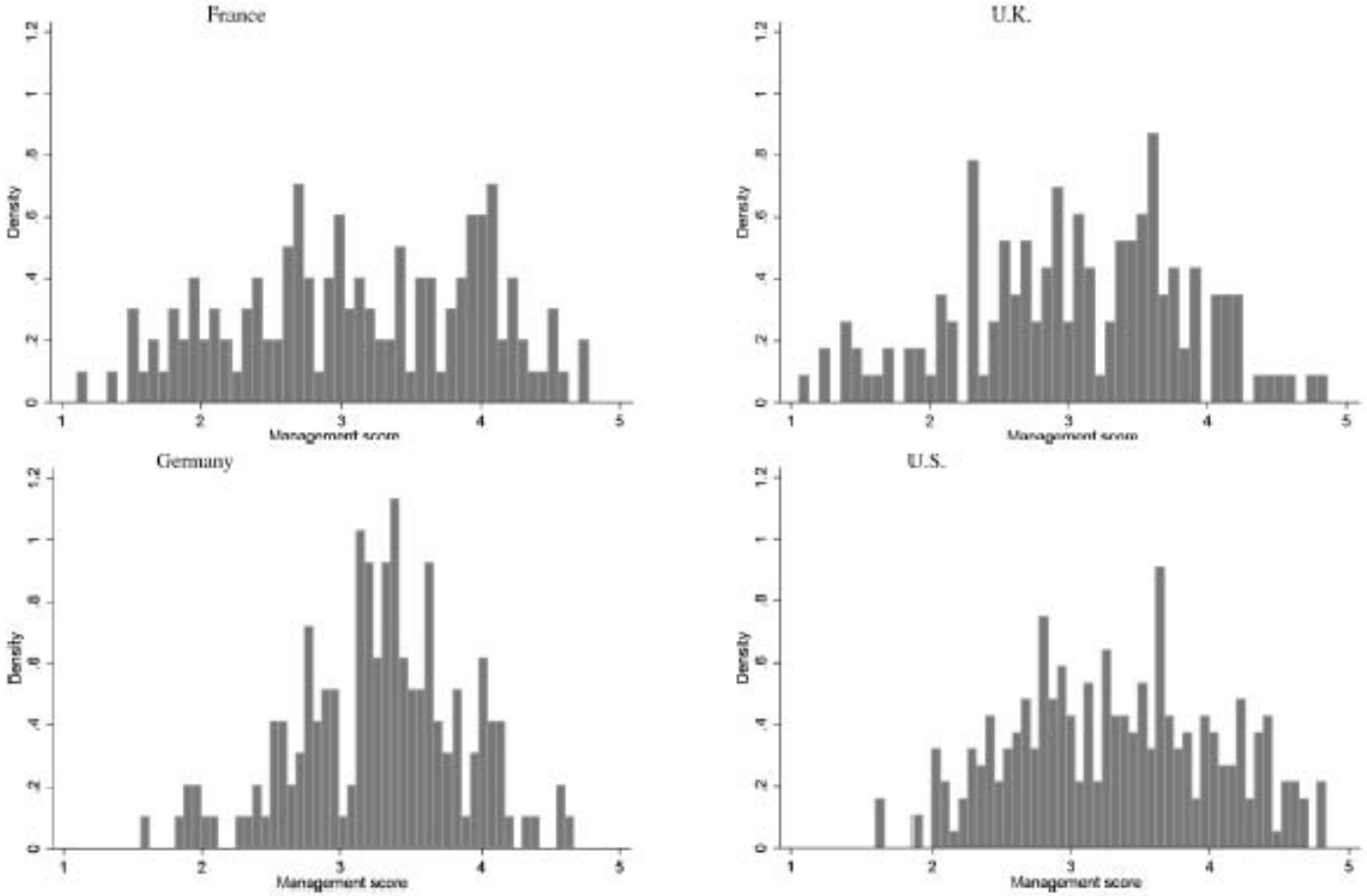

FIGURE I

Distribution of Management Scores by Country

Notes: These are the distributions of the raw management scores (simple averages across all 18 practices for each firm). 1 indicates worst practice, 5 indicates best practice. There are 135 French observations, 156 German observations, 151 UK observations, and 290 U.S. observations.

Product market competition

Table 3 investigates the relationship between product market competition and management scores

- Positive, large, statistically significant correlations
- Condition on "stuff" (no instrument for competition)
- Argue endogeneity bias would understate effect

Bloom and Van Reenen (2007) Table 3

TABLE III
MANAGEMENT AND PRODUCT MARKET COMPETITION

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dependent variable	Management *z*-score	Management *z*-score	Management *z*-score	Management *z*-score	Management *z*-score	Management *z*-score	Management *z*-score	Management *z*-score
Import penetration (5-year lagged)	0.144 (0.045)	0.166 (0.071)					0.123 (0.044)	0.180 (0.073)
Lerner index (5-year lagged)			1.516 (0.694)	1.192 (0.568)			1.204 (0.621)	1.257 (0.562)
Number of competitors					0.143 (0.051)	0.140 (0.040)	0.125 (0.043)	0.120 (0.038)
Firms	732	732	726	726	732	732	726	726
General controls	No	Yes	No	Yes	No	Yes	No	Yes

Notes. Coefficients from OLS regressions with standard errors in parentheses (robust to arbitrary heteroscedasticity and clustered by country × industry pair). Sample is a single cross section. General controls includes a full set of three-digit industry dummies, four country dummies, ln(firm size), ln(firm age), a dummy for being listed, the share of workforce with degrees, the share of workforce with MBAs, a dummy for being consolidated, and the noise controls (16 interviewer dummies, the seniority, gender, tenure, and number of countries worked in of the manager who responded, the day of the week the interview was conducted, the time of the day the interview was conducted, the duration of the interviews, and an indicator of the reliability of the information as coded by the interviewer). Import penetration = ln(import/production) in every country × industry pair with the average over 1995–1999 used. Lerner index of competition is constructed, as in Aghion et al. (2005), as the mean of (1–profit/sales) in the entire database (excluding the firm itself) for every country-industry pair (average over 1995–1999 used). Number of competitors is constructed from the response to the survey question on number of competitors, and is coded as zero for none (1% of responses), 1 for less than 5 (51% of responses), and 2 for "5 or more" (48% of responses).

Family firms

Table 5 investigates link between management and family firms

- Many firms have a family member as CEO, and of those many choose CEOs by primogeniture (succession to the eldest son)
  - Most common in France, UK
- Family ownership per se is not associated with depressed firm performance, nor is family management
- Family management via primogeniture strongly negatively and statistically significantly related to management scores
- While not randomly assigned, this primogeniture correlation is robust to the inclusion of many control variables

Bloom and Van Reenen (2007) Table 5

TABLE V
MANAGEMENT AND FAMILY FIRMS

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS
Sample	All	All	All	All	All	Family and external owners
Dependent variable	Management z-score	Management z-score	Management z-score	Management z-score	Management z-score	Management z-score
Family largest shareholder	0.005				0.138	0.137
	(0.063)				(0.086)	(0.090)
Family largest shareholder and family CEO		−0.105			−0.010	−0.040
		(0.075)			(0.113)	(0.114)
Family largest shareholder, family CEO, and primogeniture			−0.317	−0.590	−0.410	−0.379
			(0.096)	(0.098)	(0.122)	(0.128)
Firms	732	732	732	732	732	618
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
General controls	Yes	Yes	Yes	No	Yes	Yes

Notes. Coefficients from OLS regressions with standard errors in parentheses (robust to arbitrary heteroscedasticity). The sample is a single cross section. In columns (1) to (5), the complete sample is used; in column (6), founder firms are dropped. "General controls" are a full set of three-digit industry dummies, ln(firm size), ln(firm age), a dummy for being listed, share of workforce with degrees, share of workforce with MBAs, a dummy for being consolidated, and the noise controls (16 interviewer dummies, the seniority, gender, tenure, and number of countries worked in of the manager who responded, the day of the week the interview was conducted, the time of day the interview was conducted, the duration of the interviews, and an indicator of the reliability of the information as coded by the interviewer).

Quantification

- Scores < 2 "really bad"
- Quantify that competition and primogeniture account for over half of the tail of badly managed firms

Bloom and Van Reenen (2007) Figure 2

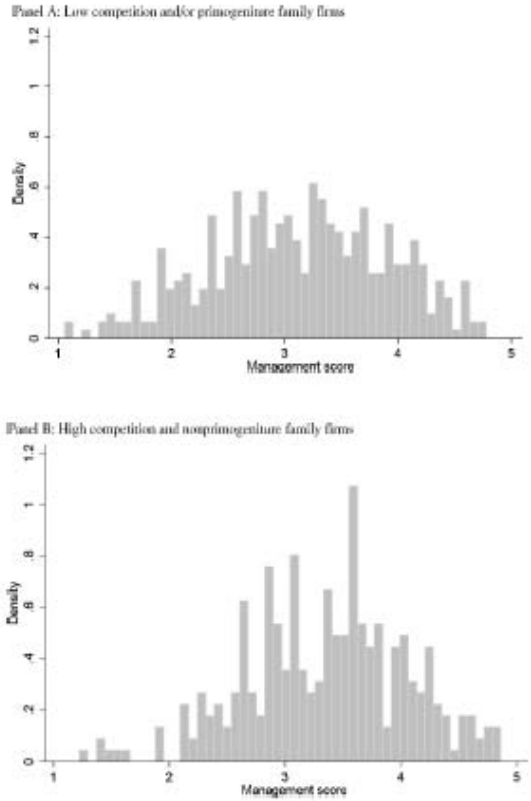

FIGURE II
The Distribution of Management Scores Split by Production Market Competition and Family Firms

Notes: Panel A shows average management scores for the 414 firms which (i) report facing "few" or "no" competitors, and/or (ii) have a family (second generation or more) as the largest shareholder with a family CEO chosen by primogeniture. Split by country is France (95), Germany (101), UK (84) and the U.S. (134). Overall 9.7% of the sample score two or less. 1 indicates worst practice, 5 indicates best practice. Panel B shows average management scores for the 308 firms which report facing "many" competitors and do not have a family (second generation or more) as the largest shareholder with a family CEO chosen by primogeniture. Split by country is France (34), Germany (51), UK (67) and the U.S. (156). Overall 2.9% of the sample score two or less. 1 indicates worst practice, 5 indicates best practice.

1. Preliminaries

2. Management and productivity
   - Bertrand and Schoar (2003)
   - Bloom and Van Reenen (2007)
   - Bloom et al. (2013)

3. Looking ahead

Bloom et al. (2013)

- Investigate whether differences in management practices can explain differences in productivity across firms by carrying out a field experiment on large Indian textile firms
- Treatment is free consulting on management practices provided by an international consulting firm

Empirical setting

- Argue that Indian firms are broadly representative of firms in emerging economies in terms of (poor) management practices as measured by BVR management practice scores
- Focus on the textile industry because it is the largest manufacturing industry in India; more specifically, focus on large woven cotton fabric firms located near Mumbai
- Chose large (multi-plant) firms because they argue the management practices are most clearly relevant for them

Sample selection

- Out of 66 potential subject firms, 17 selected to be in the experiment
- Argue that "project firms" do not differ on observables
- Argue these firms are most relevant to policy efforts
- Final sample: 28 plants across 17 firms

Pre-intervention conditions

- Firms are all family owned and managed by male family members
- At baseline, disorganized production practices lead to frequent quality defects, which require extensive checking and mending processes which employ 19% of factory manpower on average

Randomization

- Firm-level randomization (6 control; 11 treatment)
- 8 "non-experimental" plans (lack of pre-data)

Bloom et al. (2012): Table 1

- Treatment and control firms not statistically different on observables

TABLE I

THE FIELD EXPERIMENT SAMPLE

	All				Treatment	Control	Diff
	Mean	Median	Min	Max	Mean	Mean	*p*-value
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

Treatment

- Intervention ran from Aug-2008 to Nov-2011
- Hired consultants in the Indian office of a large international consulting firm
- Three phases:
  1. "Diagnosis": opportunities for improvement in 28 practices
  2. "Implementation": four months of intensive support for implementation of recommendations from the diagnosis phase
  3. "Measurement": data collection
- Control: 273 consultant hours; treatment: 781 consultant hours

Bloom et al. (2012): Figure 5

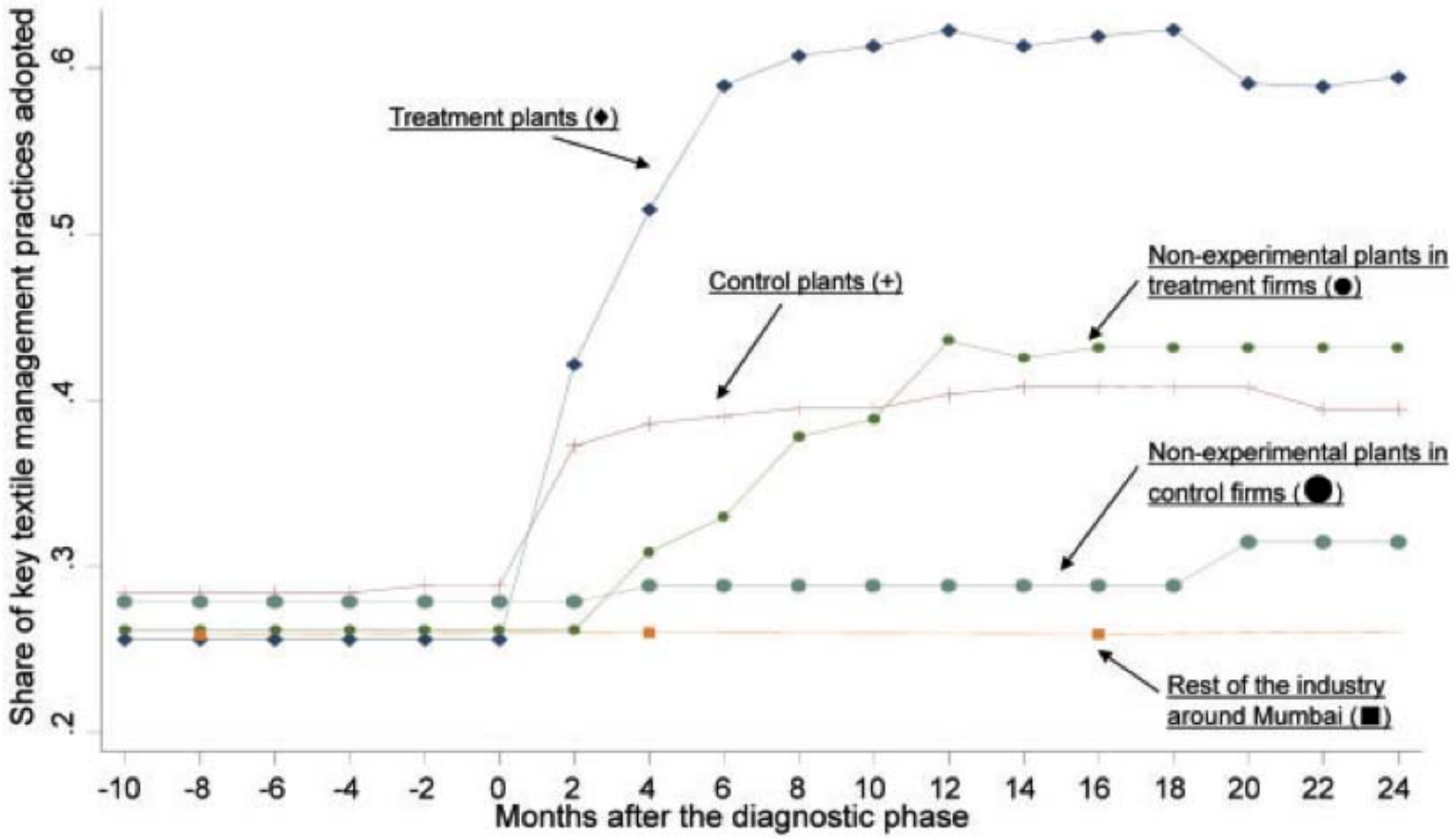

FIGURE V

The Adoption of Key Textile Management Practices over Time

Bloom et al. (2012): Table 2

- Inference: Permutation tests

TABLE II

THE IMPACT OF MODERN MANAGEMENT PRACTICES ON PLANT PERFORMANCE

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
$Intervention_{i,t}$	−0.564**	−0.245**	0.090**	0.154*				
	(0.235)	(0.117)	(0.037)	(0.084)				
$During\ implementation_{i,t}$	−0.293**	−0.070	0.015	0.048				
	(0.137)	(0.093)	(0.031)	(0.056)				
$Cumulative\ treatment_{i,t}$					−0.032**	−0.015**	0.006***	0.009**
					(0.013)	(0.005)	(0.002)	(0.004)
Small sample robustness								
Ibragimov-Mueller (95% CI)	[−1.65,0.44]	[−0.83,-0.02]	[0.05,0.38]	[−0.014,0.79]				
Permutation test (p-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

Bloom et al. (2012): Figure 6

- Quality defects index; similar graphs for inventory and TFP

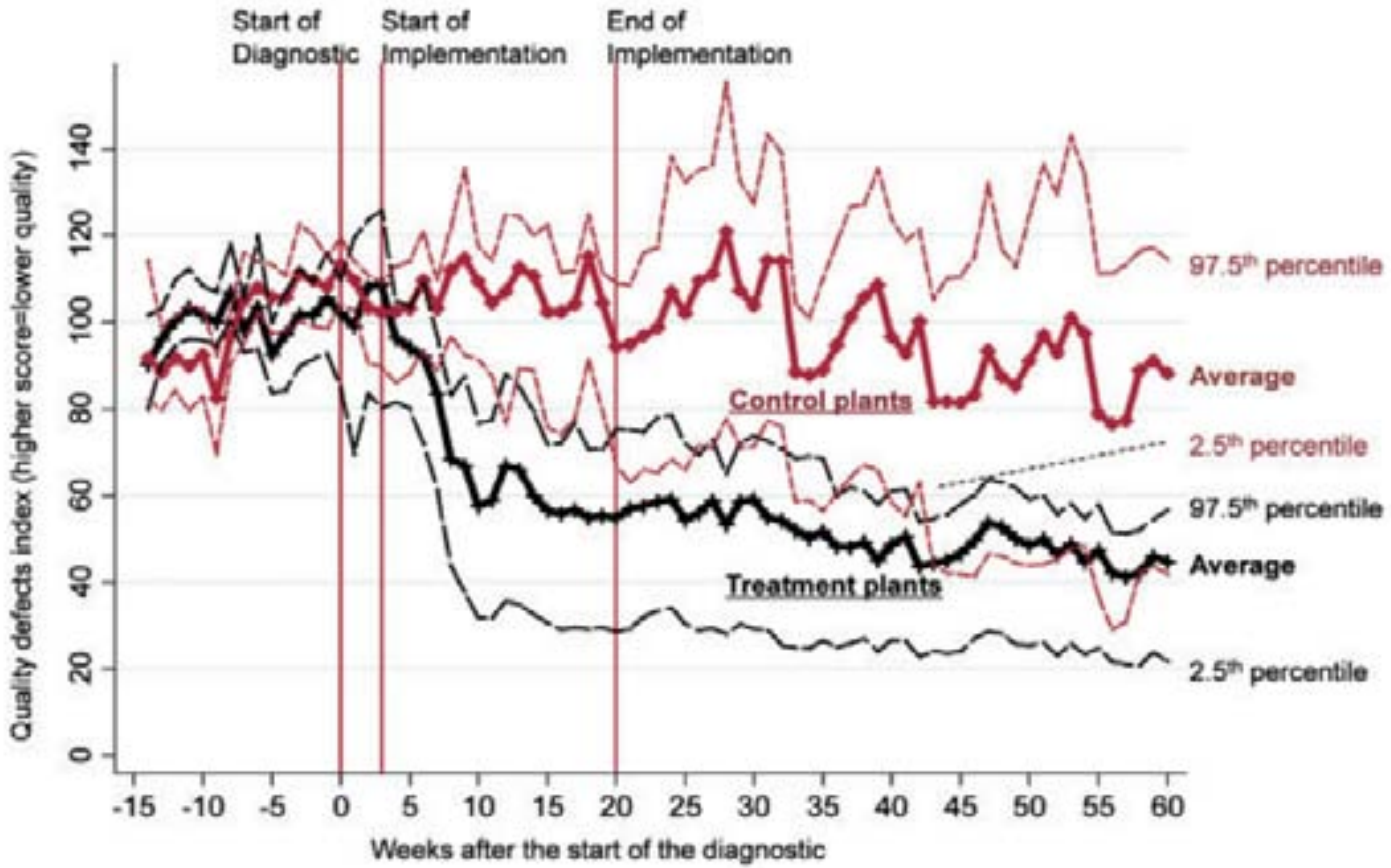

FIGURE VI

Quality Defects Index for the Treatment and Control Plants

Bloom et al. (2012): Table 3

- Use number of plants as a measure of long-run effects

TABLE III

LONG-RUN IMPACT OF THE EXPERIMENT ON FIRM SIZE AND DECENTRALIZATION

	Firm size			Delegation to plant management		
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	No. of plants	No. of plants	No. of plants	z-score	z-score	z-score
Sample	Industry	Experiment	Industry	Industry	Experiment	Industry
Time period	2011	2008–2011	2008–2011	2011	2008–2011	2008–2011
$\text{Management}_{i,t}$	1.040*			0.597†		
	(0.563)			(0.370)		
$\text{Male family members}_{i,t}$	0.210***			0.010		
	(0.065)			(0.042)		
$\text{Posttreatment}_{i,t}$		0.217*	0.259**		0.103**	0.171***
		(0.122)	(0.110)		(0.049)	(0.035)
$\text{Plant manager related}_i$				0.423***		
				(0.150)		
$\text{Plant manager tenure}_i$				0.014**		
				(0.007)		
Small sample robustness						
Permutation tests (p-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

Bloom et al. (2012): Table 4

- Speculate on reasons for non-adoption

TABLE IV

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
Lack of information (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
Incorrect information (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
Owner time, ability, or procrastination (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
Other (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
Total nonadoption	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

Speculation on constraints

- Low trust of managers and poor law enforcement
- Correlation between # plants and # male family members in Table 3

Take-aways

- Active work in macro (Hseih-Klenow 2009); IO (Syverson 2004)
- Important, interesting, open questions that would benefit from rigorous applied micro research
- Focus on firms, but natural analogs for e.g. schools, hospitals

1. Preliminaries

2. Management and productivity
   - Bertrand and Schoar (2003)
   - Bloom and Van Reenen (2007)
   - Bloom et al. (2013)

3. Looking ahead

Looking ahead

Two lectures on intergenerational mobility

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