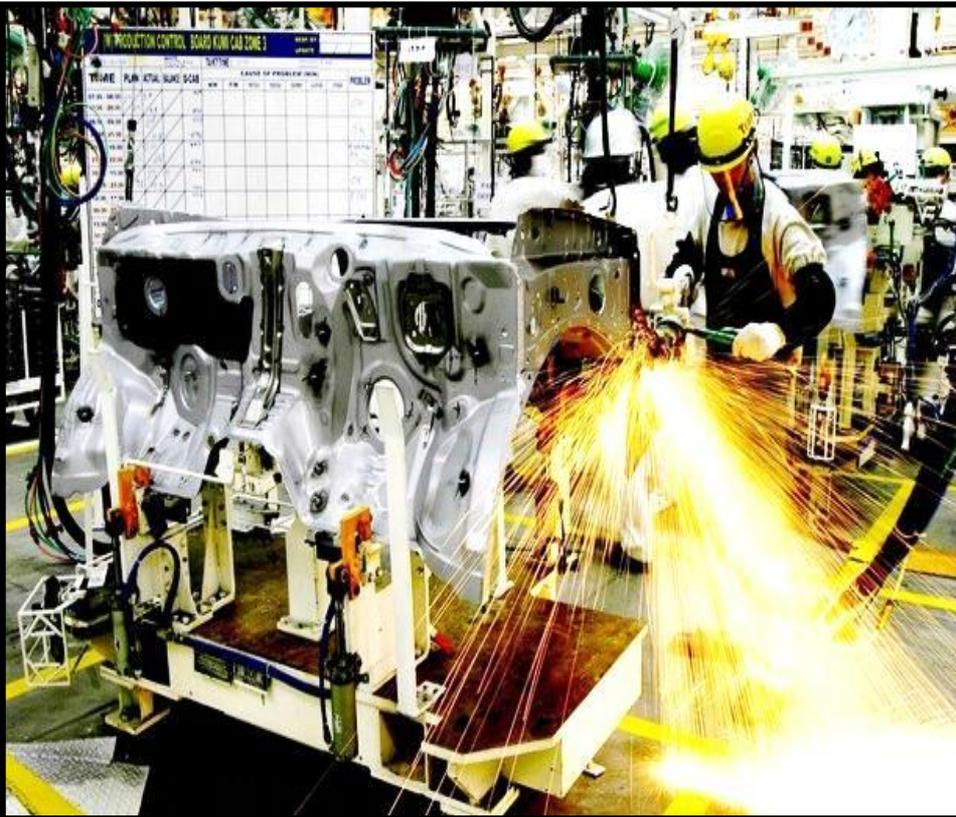


Explaining Firm Productivity: Impact of Management Practices on Performance

John Van Reenen, Organizational Economics, 2020



Non-experimental studies

RCTs

Long-Run Outcomes

MANAGEMENT PRACTICES & PERFORMANCE

- Survey in Bloom & Van Reenen (2011)
- Large literature on incentive pay
 - Often a focus on **perverse incentives**: Oyer (1998) end of year effects; Asch (1990) Navy Recruiters quotas; Coutry & Marschke (2004) Federal job training centers; Jacob & Levitt (2003) Teacher cheating; Chevelier & Ellison (1997) Mutual Fund managers (risk); Larkin (2007) Salespeople in software firm
- More general management practices
 - Large number of cross sectional studies with positive correlations (e.g. Huselid, 1995)
 - But (as mentioned) usually zero when firm fixed effects included (e.g. Black and Lynch, 2001, 2004; Osterman, 1994)
 - 3 problems: Small & often selected samples; Measurement error attenuating coefficient to zero; Endogeneity

Examples from single firm's piece rate pay changes

- Growing literature (Lazear & Oyer, 2013 survey)
- **Example 1:** Lazear (2000, AER) classic paper on individual incentive pay scheme for Safelite Glass
- **Example 2:** Bandiera, Barankay & Rasul (2005). Absolute vs. relative compensation schemes
- **Example 3:** Bandiera, Barankay & Rasul (2007). Flat vs incentive pay for managers
- Other examples include Lavy (2008, AER) quasi-RDD design on teachers pay; Khan, Khwaja & Olken (2016, QJE) an RCT on tax collectors in Punjab; Hamilton et al (2003, JPE) on group incentives in garment factory

Lazear (2000, AER) study on Safelite glass

Studies introduction of one piece-rate pay on worker performance (average # of units of glass installed in a month)

The setting is **Safelite Glass**, who replace car windscreens, who rolled out a switch from flat to piece-rate across regions.



Lazear (2000, AER) study on Safelite glass

- Examines performance-data for 19 months before and after the switch from hourly rates to piece-rate
 - 2,755 workers; 29,837 person-months
- **Results:**
 - Increase in productivity of 44% (very large)
 - About $\frac{1}{2}$ selection and $\frac{1}{2}$ effort effects. Assesses by looking at impact with and without worker fixed effects

Including worker fixed effects roughly halves the coefficient on treatment

TABLE 3—REGRESSION RESULTS

Regression number	Dummy for PPP person-month observation	Tenure	Time since PPP	New regime	R ²	Description
1	0.368 (0.013)				0.04	Dummies for month and year included
2	0.197 (0.009)				0.73	Dummies for month and year; worker-specific dummies included (2,755 individual workers)
3	0.313 (0.014)	0.343 (0.017)	0.107 (0.024)		0.05	Dummies for month and year included
4	0.202 (0.009)	0.224 (0.058)	0.273 (0.018)		0.76	Dummies for month and year; worker-specific dummies included (2,755 individual workers)
5	0.309 (0.014)	0.424 (0.019)	0.130 (0.024)	0.243 (0.025)	0.06	Dummies for month and year included

Notes: Standard errors are reported in parentheses below the coefficients.

Dependent variable: In output-per-worker-per-day.

Number of observations: 29,837.

Lazear (2000, AER) study on Safelite glass

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- **Results:**
 - Increase in productivity of 44% (very large)
 - About $\frac{1}{2}$ selection and $\frac{1}{2}$ effort effects. Assesses by looking at impact with and without worker fixed effects
 - Selection comes from entry of higher productivity workers & exit of low productivity workers (easier to identify exitors because know pre-treatment productivity)
 - Compensation rose by about 7%, implying that profits also rose
 - Variance of productivity/wages increases
 - Quality did not fall

Lazear (2000, AER) study on Safelite glass

- Can include time dummies because roll-out varied across regions of US
 - Raises issue of non-randomness: e.g. did places where productivity was rising anyway get treatment first?
 - Argues that roll-out was quasi-random to do with geography & not productivity trends (OK on observable productivity trends, but what about unobservables?)
- Entry/ exit endogenous to treatment (part of question). If selection on permanent levels it's OK, but not if selection is on individual productivity shocks (“dynamic selection”)
- General issue of why didn't the firm introduce this already?
 - Profits vs productivity (but find profits effects as well)
 - Big general question in social science that we'll return to

External survey validation: back to World Management Survey

Performance measure - e.g. output of firm i (in country c year t)

$$y_{it} = \beta M_{it} + \alpha_l l_{it} + \alpha_k k_{it} + \gamma' x_{it} + u_{it}$$

management
(average z-scores)

In(labor)

In(capital)

other controls

- Controls include dummies for country, 3 digit industry, time; skills, average hours “noise” (e.g. interviewer dummies),
- Note – **not a causal relationship**, only an association (external validity)

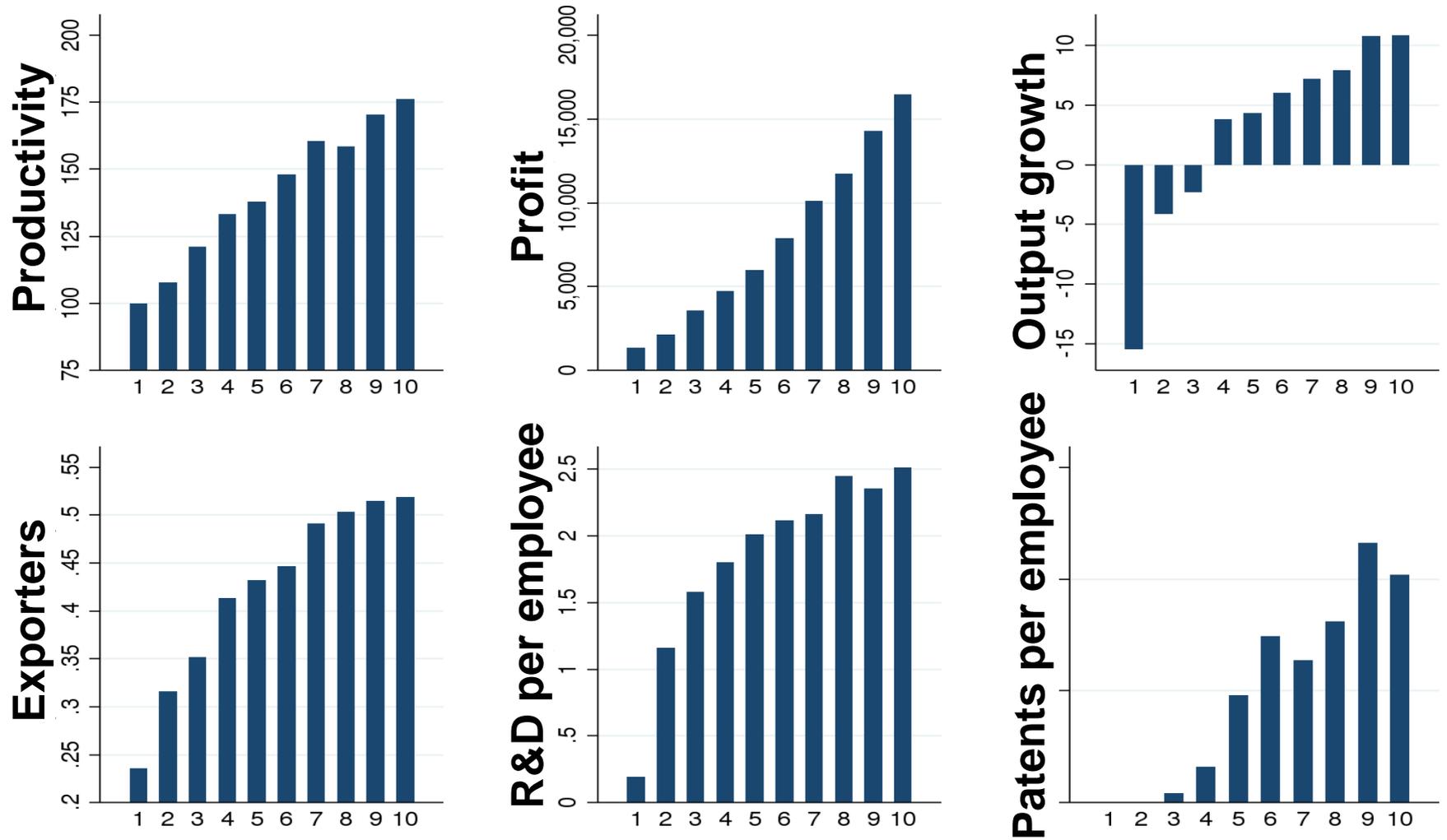
Management *correlated* with performance after adding in many other controls (WMS)

Dependent variable	Ln(Value added)	Ln(Value added)	Ln(Value added)	Ln(Employment)	Profit rate (ROCE)	5yr Sales growth	Survival
	OLS	(Olley-Pakes)	Fixed Effects	OLS	OLS	OLS	OLS
Firm sample	All	2+ surveys	2+ surveys	All	All	All	All
Management(SD=1)	0.139*** (0.018)	0.102*** (0.013)	0.028** (0.013)	0.404*** (0.014)	1.202*** (0.264)	0.040*** (0.013)	0.006*** (0.002)
Ln(emp)	0.669*** (0.030)	0.593*** (0.025)	0.424*** (0.058)				
Ln(capital)	0.260*** (0.022)	0.403*** (0.009)	0.193*** (0.041)				
Obs	9,334	8,701	9,334	25,947	13,255	12,046	7,726

Source: Bloom, Sadun & Van Reenen (2017) "Management as a Technology"

Notes: *M*, Management Index is z-score of average 18 questions z-scored (sd=1). Other controls include % employees with college, av hours, firm age, noise controls (e.g. interviewer dummies) 3-digit industry, country & time dummies. Standard errors clustered by firm. In OP coefficients on L and K are from first & second stage estimation procedure

Management scores are associated with significantly better performance (MOPS)



Management score decile

Source: Bloom, Brynjolfsson, Foster, Jarmin, Patnaik, Saporta-Eksten & Van Reenen (2019, AER) "What Drives management?"

MOPS Management score can account for ~22% of 90-10 productivity spread, similar or greater to other variables we measure in the US Census

Dependent Variable:	(1)	(2)	(3)	(4)	(5)
	Firm Level Log(Labor Productivity)				
Management score	0.864 (0.043)				0.612 (0.043)
R&D		0.133 (0.010)			0.095 (0.010)
ICT/worker			0.062 (0.006)		0.047 (0.006)
Skills (% employees with college degree)				0.800 (0.064)	0.208 (0.060)
Observations	~18,000	~18,000	~18,000	~18,000	~18,000
Share of 90-10 explained	0.216	0.216	0.120	0.159	0.441
Share of S.D explained	0.193	0.219	0.134	0.142	0.282

Notes: OLS coefficients with standard errors in parentheses (clustered at the firm level). Dependent variable is firm level log(Value Added over Employment) built from industry de-meant plant-level Log(Value Added over Employment) weighted up by plant's shipments. Right-hand side variables are management score, R&D from BRDIS measured as log(1+R&D intensity) where R&D intensity is the total domestic R&D expenditure divided by total domestic employment, ICT investment per worker (1000* spending on information and communication technology hardware and software per employee), skill measured by the share of employees (managers and non-managers) with a college degree. All these variables are also weighted up to the firm level using plant's total value of shipments. Missing values have been replaced by zero for R&D and by means for the other variables. Industry demeaning is at NAICS 6 level. All regressions are weighted by the number of establishments in the firm. "Share of 90-10 explained" is calculated by multiplying the coefficient on the key driver variable (e.g., management in column 1) by its 90-10 spread and dividing this by the 90-10 spread of TFP. Share of S.D. explained corresponds to the square root of the R^2 in the regression.

Positive correlations of WMS management scores with performance in many sectors

- **Hospitals**
 - **UK NHS:** Survival rates from AMI & other conditions; waiting times; staff turnover; Infection rates (MRSA). Bloom, Propper, Seiler & Van Reenen (2015, ReStud)
 - **International:** AMI survival (Bloom, Lemos, Sadun & Van Reenen, 2019); Chandra et al (2016, AER) on US.
- **Schools**
 - School test scores, value added (Bloom, Lemos, Sadun & Van Reenen, 2016)
- **Universities** (McCormack et al, 2014)
- **Not-for-Profits** (Delfgaauw et al, 2011)
- **Civil Service** (Rogger & Rasul, 2016, 2019)

BACK TO MANAGERS VS MANAGEMENT PRACTICES

- Bender et al (2018): Use German IAB employer-employee data to get worker & manager individual fixed effects in wages (pre-2004). Combine with WMS from 2004 onwards
- Firms with high WMS score have higher quality employees, especially managers (partly because they recruit & retain higher ability individuals)
- When include average individual FE coefficient on management in TFP equation falls ~30%-50% (almost all managerial FE)
 - **Interpretation?** much of the TFP-management practice correlation is not individual “atoms” of general human capital but the way these are combined in different firms
- All these are interpretations of correlations (recall general problems with production function)
 - One strategy to focus on narrower environments (next)
 - Another way to look for RCTs/natural experiments

Ichniowski, Shaw and Prennushi (1997, AER)

- Integrated steel mills in US
- Collect detailed monthly performance and management data on 36 steel lines owned by 17 firms over 5 years
- Performance measured by downtime due to defect rates
- Conducted survey on large number of HR practices with questions on when they were introduced. 7 dimensions – incentive pay; careful hiring; teams; training; information sharing; broad job design and job security
- Narrow sector (“insider econometrics”) approach to control for many unobservable confounders



Ichniowski, Shaw and Prennushi (1997, AER)

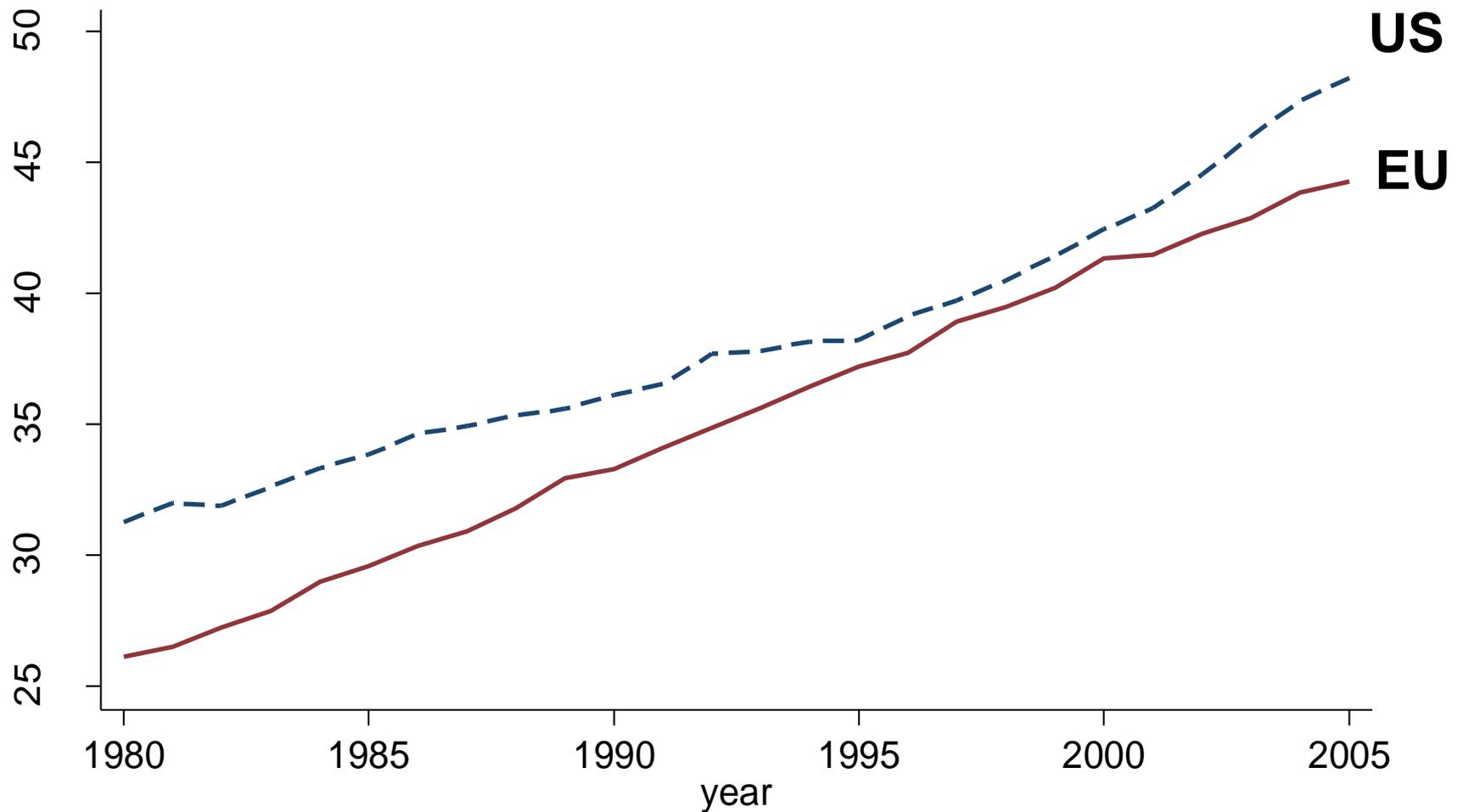
- Line FE & month dummies (Diff in Diff)
- Introducing high-performance management linked to improved performance (robust to various controls)
- Impact comes from into “HR systems” (combination of large numbers of practices). Introduction of just one or two individual practices didn’t have much impact
- They interpreted their results as supporting Milgrom & Roberts complementarity view of practices (“rugged terrain”)
- But alternative is a latent factor interpretation: lots of noisy indicators of one underlying unobserved management quality factor (Bloom & Van Reenen, 2007, original interpretation)
- We will discuss econometrics of complementarity later. But for now, one substantive point....

Technology, management & complementarities

- Complementarity discussion between management practices highlights the problem with thinking of productivity explanations as technology **vs.** management
- Much evidence that technology & management (& org practices more general) interact together
- Case studies show that many organizations can invest heavily in technology (e.g. IT in UK NHS) & make little/no return
- Econometric work on impact of IT on firm performance shows very heterogeneous impacts (e.g. Stiroh, 2010; Draca et al, 2007 survey)
- Evidence of technology & managerial practice complementarity in productivity: Bresnahan, Brynjolfson & Hitt (2002) US; Bloom, Sadun & Van Reenen (2012) EU; Atkin et al (2017) Pakistan soccer balls

“Americans do IT better” (Bloom, Sadun and Van Reenen, AER 2012)

Why did productivity growth accelerate in US 1995-05, but not in EU?



US productivity miracle linked to use of IT



- Prices of IT fell rapidly post 1995, and IT using sectors showed rapid TFP growth in the US
- US firms have higher scores on people management so able to use IT better. European firms low scores and struggled to adapt
- Test this by examining US multinationals in Europe. Find:
 - US multinationals much higher impact of IT on output compared to non-US multinationals
 - True even after take-overs with about a 3 year lag
 - Once control for better management in US multinationals we explain all of the US advantage in IT productivity

US management \approx 50% of faster TFP growth than EU after 1995

- Implications for impact of AI and robotics?

TABLE 6—EUROPEAN FIRM-LEVEL PANEL DATA WITH DIRECT MEASURES OF MANAGEMENT

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	$\ln(Q/L)$	$\ln(Q/L)$	$\ln(Q/L)$	$\ln(Q/L)$	$\ln(Q/L)$	$\ln(Q/L)$	$\ln(C/L)$	$\ln(C/L)$
Fixed effects	NO	NO	NO	NO	YES	YES	NO	NO
USA $\times \ln(C/L)$		0.1790** (0.0733)		0.0784 (0.0720)	0.0518 (0.0713)	0.0192 (0.0785)		
USA ownership \times computers per employee								
MNE $\times \ln(C/L)$		-0.0263 (0.0586)		-0.0235 (0.0553)	0.0218 (0.0547)	0.0235 (0.0550)		
Non-US multinational \times computers per employee								
People management			0.0271 (0.0219)	0.0271 (0.0219)				0.1268*** (0.0353)
People management $\times \ln(C/L)$			0.1451*** (0.0331)	0.1404*** (0.0344)	0.1284* (0.0773)	0.0994* (0.0581)		
People management \times computers per employee								
$\ln(K/L)$	0.2401*** (0.0163)	0.1838*** (0.0284)	0.1782*** (0.0276)	0.1791*** (0.0276)	0.2347** (0.0926)	0.2316*** (0.0882)		
Non IT capital per employee								
$\ln(L)$	-0.0182 (0.0162)	0.0421 (0.0360)	0.0421 (0.0344)	0.0409 (0.0349)	-0.2182 (0.2600)	-0.2347 (0.2497)		
Labor								
$\ln(C/L)$		0.1256*** (0.031)	0.1430*** (0.0284)	0.1463*** (0.0303)	-0.0493 (0.0596)	-0.2282 (0.1738)		
Computers per employee								
USA	0.2548*** (0.0438)	0.0779 (0.0481)	0.1111** (0.0446)	0.0837* (0.046)			0.2601*** (0.0742)	0.2150*** (0.0732)
USA ownership								
MNE	0.1909*** (0.0304)	0.1597*** (0.0363)	0.1604*** (0.0355)	0.1618*** (0.0357)			0.0492 (0.0596)	0.0367 (0.0591)
Non-US multinational								
$\ln(\text{degree})$		0.0433** (0.0183)	0.0375** (0.0184)	0.0370** (0.0184)			0.0585** (0.0293)	0.0359 (0.0296)
Percentage employees with a college degree								
$\ln(\text{degree}) \times \ln(C/L)$						0.0700 (0.0484)		
Percentage employees with a college degree \times computers per employee								
Observations	9,463	2,555	2,555	2,555	2,555	2,555	2,555	2,555
Test USA $\times \ln(C/L) =$ MNE $\times \ln(C/L)$, p -value		0.0189		0.2419	0.6360	0.9565		
Test USA = MNE, p -value	0.1789	0.1206	0.3094	0.1264			0.0095	0.0253

Non-experimental evidence

- Many studies suggesting an important role for management practices explaining productivity
- But still concerns over endogeneity even in studies using panel data
 - Look at RCTs
 - Look at a natural experiment over long-term outcomes

Non-experimental studies

RCTs

Long-Run Outcomes

IDENTIFYING CAUSAL EFFECTS

- Some part of this correlation also appears to be causal
 - **Randomized Control Trials:** e.g. **Bloom et al (2013, 2019)**; Blader et al (2019), Brooks et al (2018); Bruhn et al, (2018); Fryer (2017); Iacovone et al (2019); Karlan et al (2015); Cai and Szeidl (2018); Higuchi et al (2019); Gosnell, List and Metcalfe (2019)
 - Bandiera et al (2017) meta-study; McKenzie & Woodruff (2013) survey
- **Quasi-experiments:** Bianchi and Giorcelli (2019) **Michela Giorcelli (2018, AER)**; Bandiera et (2005, 2007, 2011); Huber et al (2018)



Evidence from micro-enterprises in developing countries



Evidence from micro-enterprises in developing countries

- Examples: Karlan and Valdivia (2011) in Peru; Bruhn, Karlan and Schoar (2016, JPE) in Mexico; Karlan, Knight and Udry (2015, JEBO) Ghanaian tailors; Higuchi et al (2019) on Tanzanian manufacturers
- Surveys in Karlan, Knight & Udry (2012); McKenzie & Woodruff (2013); Bandiera et al (2017) meta-study
- These usually provide a limited amount (≈ 50 hours) of basic training to small firms – e.g. accounting, marketing, pricing, strategy etc.
- This training is provided randomly and performance measured before and after the intervention

Evidence from micro-enterprises in developing countries

- Some studies find evidence of impact of management training on performance (e.g. Bruhn et al, 2016, JPE); Higuchi et al (2019), others do not (Karlan et al, 2015)
- Maybe management does not matter in these small firms, or the intervention is very poor quality?
 - Brooks et al (2018) RCT on Kenyan entrepreneurs. Formal management training (like Karlan et al, 2015) doesn't affect performance, but mentorship ↑ profits 20%
- McKenzie & Woodruff (2013, 2017) argue that most of these RCTs do not have enough power to reject positive effects. Their WMS style SME management survey more positive

RCT on management (Bloom, Eifert, Mahajan, McKenzie and Roberts, 2013, QJE).

Management consultancy delivered by Accenture to 20 plants in medium-sized (average 300 employees and \$7m sales) textile firms near Mumbai, India

38 practices tied to operations, quality, HR & inventory control

Control firms get one month of diagnostic. Treatment firms get one month of diagnostic, four months of intervention.

Collect weekly data for all plants from 2008 to August 2010, and long-run size and management data from 2008 to 2011

Findings:

- 2 SD increase in management score & 20% higher TFP

Exhibit 1: Plants are large compounds, often containing several buildings.



Exhibit 2: Plants operate continuously making cotton fabric from yarn



Fabric weaving

Exhibit 3: Many parts of these Indian plants were dirty and unsafe



Garbage outside the plant



Garbage inside a plant



Flammable garbage in a plant



Chemicals without any covering

Exhibit 4: The plant floors were often disorganized and aisles blocked



Instrument not removed after use, blocking hallway.

Old warp beam, chairs and a desk obstructing the plant floor



Dirty and poorly maintained machines



Tools left on the floor after use

Intervention aimed to improve 38 core textile management practices in 6 areas – for example

Area	Specific practice	Targeted practices in 6 areas: operations, quality, inventory, HR and sales & orders
Factory Operations	<p>Preventive maintenance is carried out for the machines</p> <p>Preventive maintenance is carried out per manufacturer's recommendations</p> <p>The shop floor is marked clearly for where each machine should be</p> <p>The shop floor is clear of waste and obstacles</p> <p>Machine downtime is recorded</p> <p>Machine downtime reasons are monitored daily</p> <p>Machine downtime is analyzed at least fortnightly & action plans created and implemented to try to reduce this</p> <p>Daily meetings take place that discuss efficiency with the production team</p> <p>Written procedures for warping, drawing, weaving & beam gaiting are displayed</p> <p>Visual aids display daily efficiency loomwise and weaverwise</p> <p>These visual aids are updated on a daily basis</p> <p>Spares stored in a systematic basis (labeling and demarked locations)</p> <p>Spares purchases and consumption are recorded and monitored</p> <p>Scientific methods are used to define inventory norms for spares</p>	
Quality Control	<p>Quality defects are recorded</p> <p>Quality defects are recorded defect wise</p> <p>Quality defects are monitored on a daily basis</p> <p>There is an analysis and action plan based on defects data</p> <p>There is a fabric gradation system</p> <p>The gradation system is well defined</p> <p>Daily meetings take place that discuss defects and gradation</p> <p>Standard operating procedures are displayed for quality supervisors & checkers</p>	

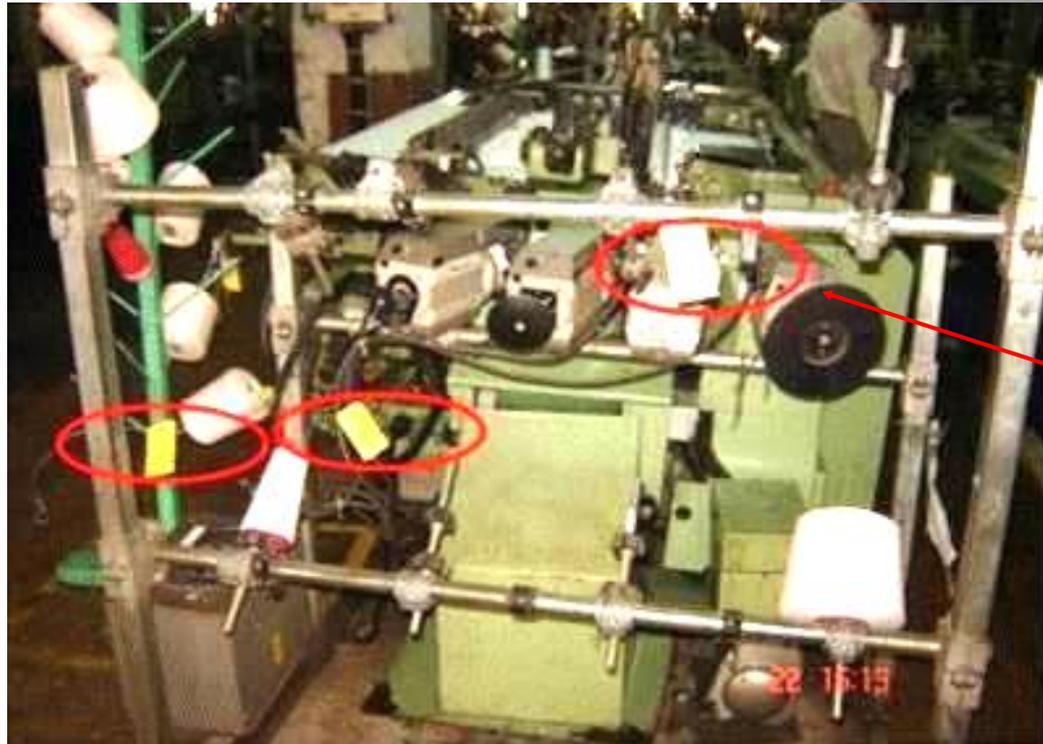
Organizing and racking inventory enables firms to substantially reduce capital stock



Stock is organized, labeled, and entered into the computer with details of the type, age and location.

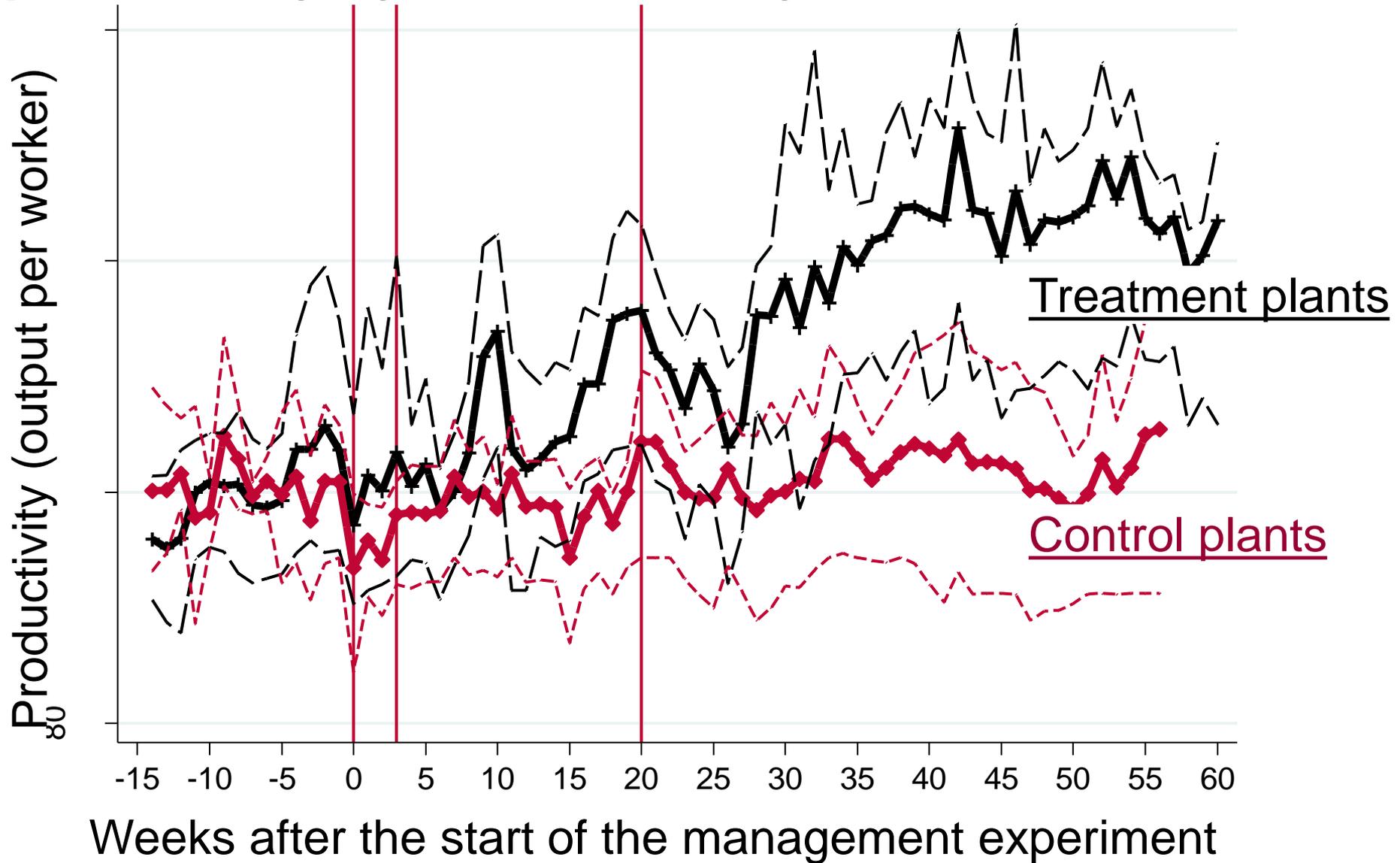
Many treated firms have also introduced basic initiatives to organize the plant floor

Marking out the area around the model machine



Snag tagging to identify the abnormalities

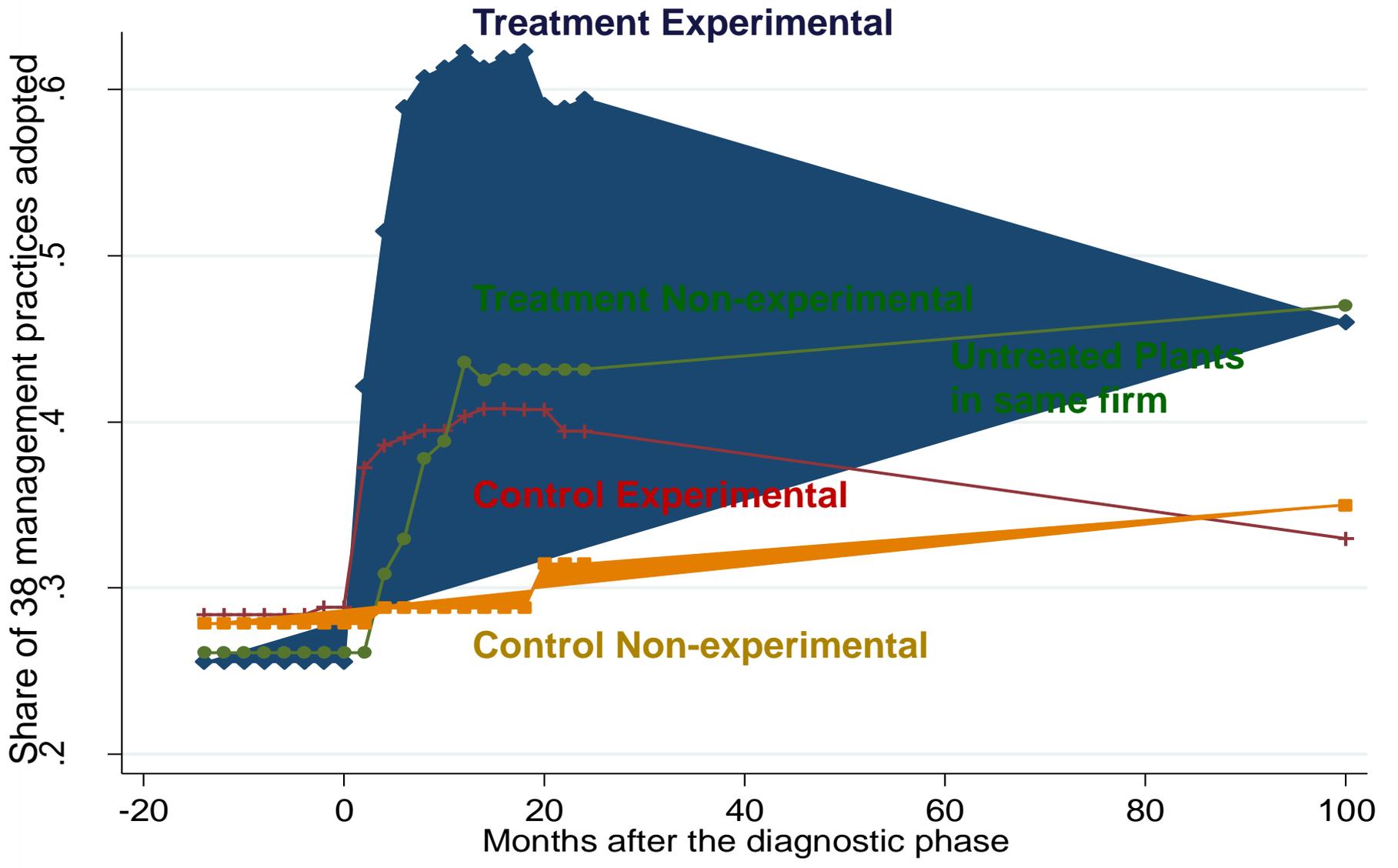
These management improvements increased productivity by 20% within 1 year alone



Issues with Bloom et al (2013) India experiment

- Small sample size (28 plants)
- Hawthorne effects? Both groups have a treatment: difference is between high & low intensity.
- After treatment, Management improves & productivity up.
Possible that it wasn't management that increased productivity
- What are long-run effects?

The management intervention was surprisingly persistent



Notes: Sample comprised of the balanced panel of plants from 2008 to 2017 (11 treatment experimental, 6 treatment non-experimental, 6 control experimental and 2 control non-experimental). **Source:** Bloom et al (2018)

Non-experimental studies

RCTs

Long-Run Outcomes

What are the long-run effects of management?

- Research focuses on short-run outcomes, 1-2 years out at best
- But bigger questions over longer run outcomes
- Giorcelli (2019) an exception. Uses the element of Marshall Aid in post-WW2 Europe

Summary of Giorcelli (2019, AER)

- Transfer of US management to Europe (1952-1958)
- Management-training trips for European managers in US firms
- Loans restricted to purchase technologically-advanced US machines [paper has a lot on this, but I will focus on the management element – they are separated out in paper]
- 6,065 Italian firms eligible to participate in the program; Balance sheets from 5 years before to 15 after. Applicants to program
- **Identification strategy:** Unexpected US budget cut before program started. She compares: (i) Firms that eventually participated vs. (ii) Firms initially eligible, excluded after the cut that applied for the *same* US transfer before the cut

Results

- Better management practices:
 - Large and persistent effects on firm survival chances; sales; employment
 - Productivity: +16% after one year, +46% after 15 years

Intervention

- Training based on *Training Within Industry* (TWI)
 1. **Factory operations** (Regular machinery maintenance; General maintenance of safety conditions within the firm)
 2. **Production planning** (Sales and order control)
 3. **HRM** (Training and supervision of employees; Constant improvement of the production methods)
 4. **Marketing** (Market research, product requirements, Branding & design; Advertising, distribution channels)
- **Organization of training trips**
 - Teams of 15-20 people spent 8-12 weeks in 5/6 US firms
 - Firms in same sector & achievable scale in 10 years
- **Content** – seminars; side by side working; 3 year technical assistance when back in Italy

Data

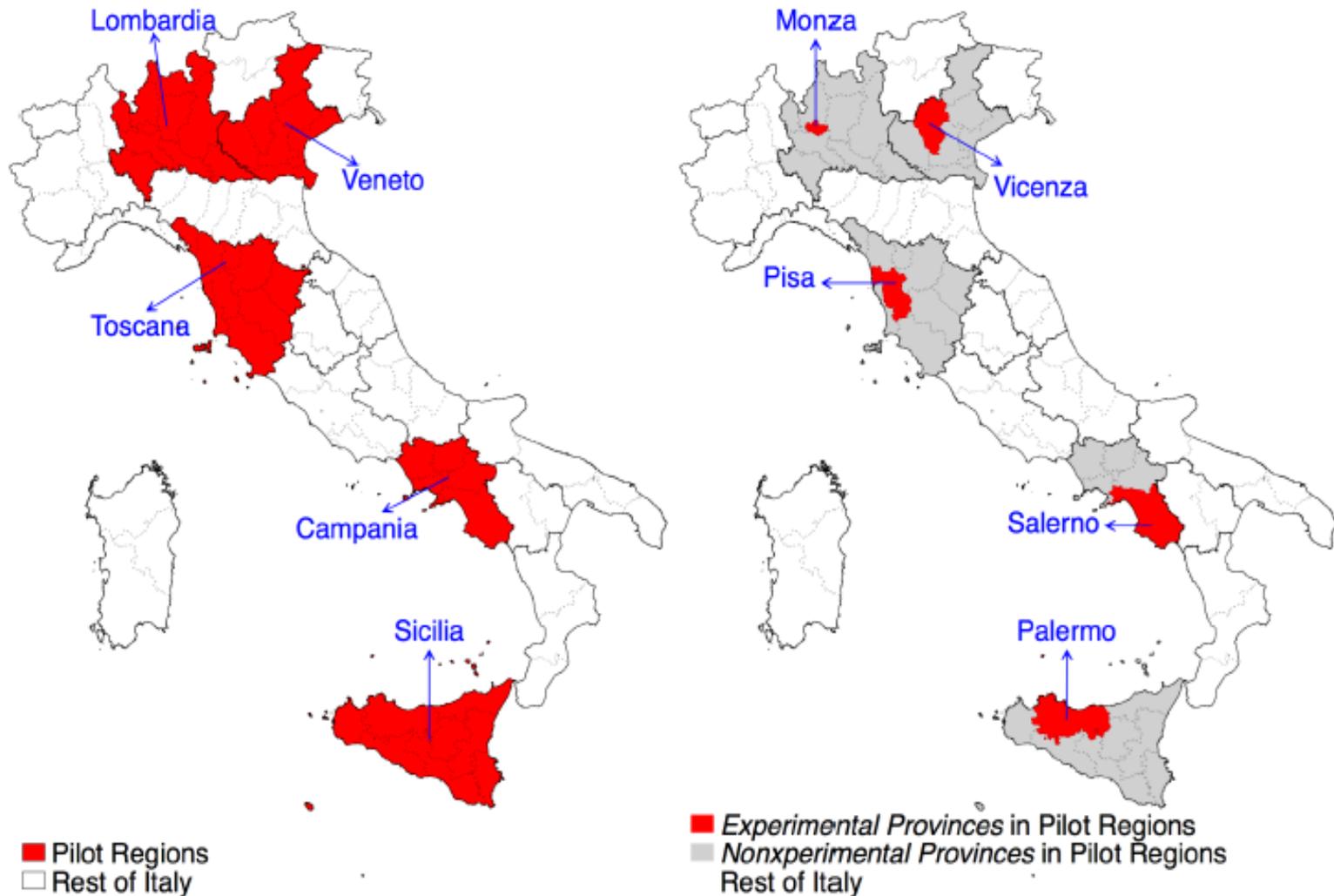
- Small and Medium Sized Enterprises in 5 pilot regions
- **Data:**
 1. 1951 Confindustria (6,065 eligible firms)
 2. Accounting data 1946-1973
 3. Applications to program from archives.
 - 809 Management treatment
 - 1,990 Technology treatment
 - 1,625 both treatments

Summary Statistics of 6,065 Eligible Firms

	Mean	St. Dev.	Min	Max
Plants per firm	1.33	1.58	1	5
Employees per firm	47.67	56.39	15	250
Current assets (k USD)	1,632.59	2,355.67	356.72	9,432.76
Annual sales (k USD)	1,015.63	1,956.78	193.46	7,487.91
Value added (k USD)	491.55	773.45	60.93	3,945.09
Age	12.41	7.44	4	43
Productivity (log TFPR)	2.48	0.51	1.98	3.71
Export	0.13	0.33	0	1
Family-managed	0.43	0.50	0	1
N	6,065	n/a	n/a	n/a

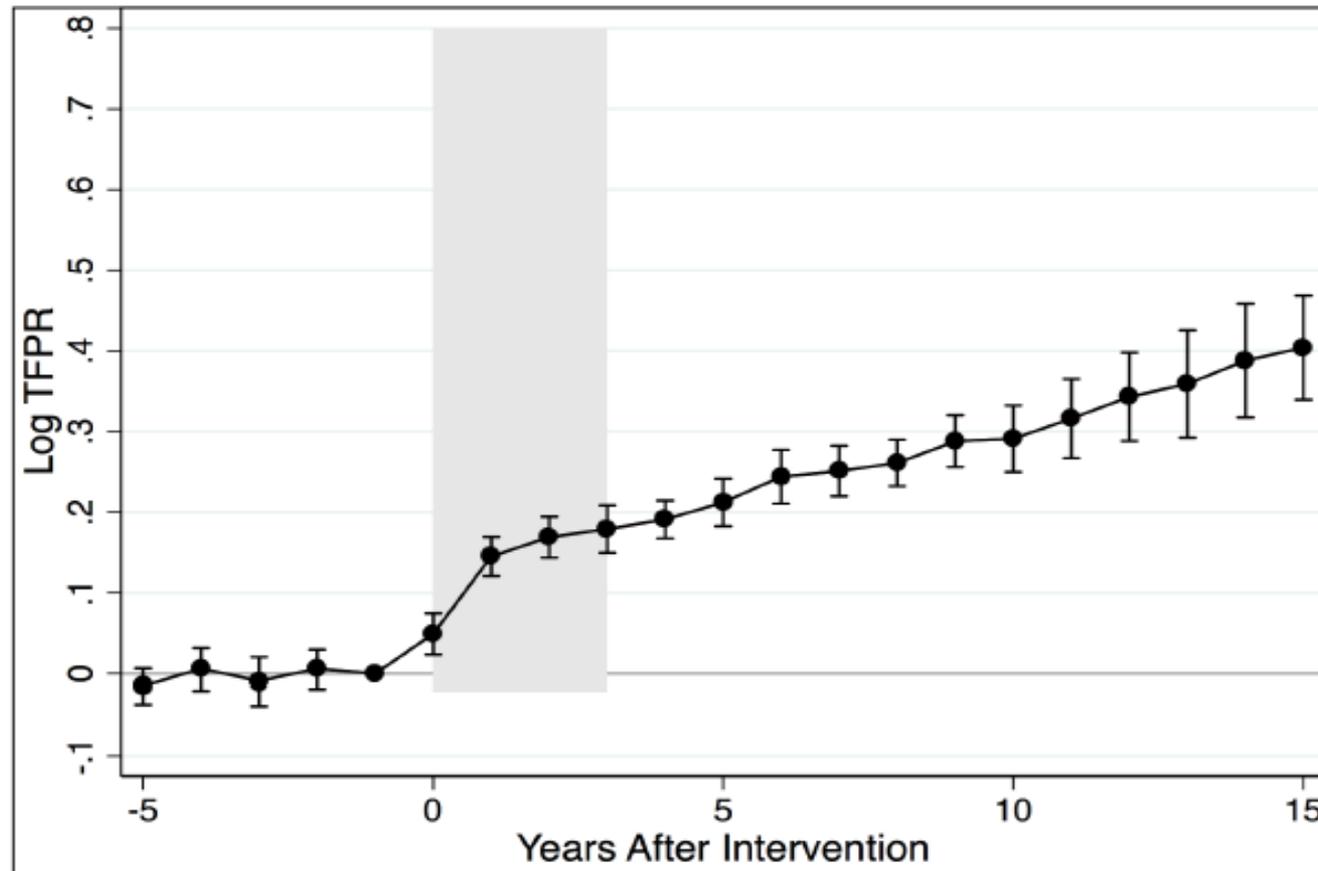
Notes. Summary statistics for the 6,065 firms eligible to apply for the Productivity Program in 1951. Data are provided at firm level. *Current assets*, *Annual sales*, and *Value added* are in 2010 USD, reevaluated from 1951 to 2010 values at 1 lira=30.884 euros and exchanged at 0.780 euro=USD 1; *Productivity (log TFPR)* is the logarithm of total factor productivity revenue, estimated using the Akerberg et al. (2006) method.

Pilot Regions (1950) and Experimental Provinces (1952)



Positive effects on Productivity

Management: 46.3% Increase in TFPR after 15 Years



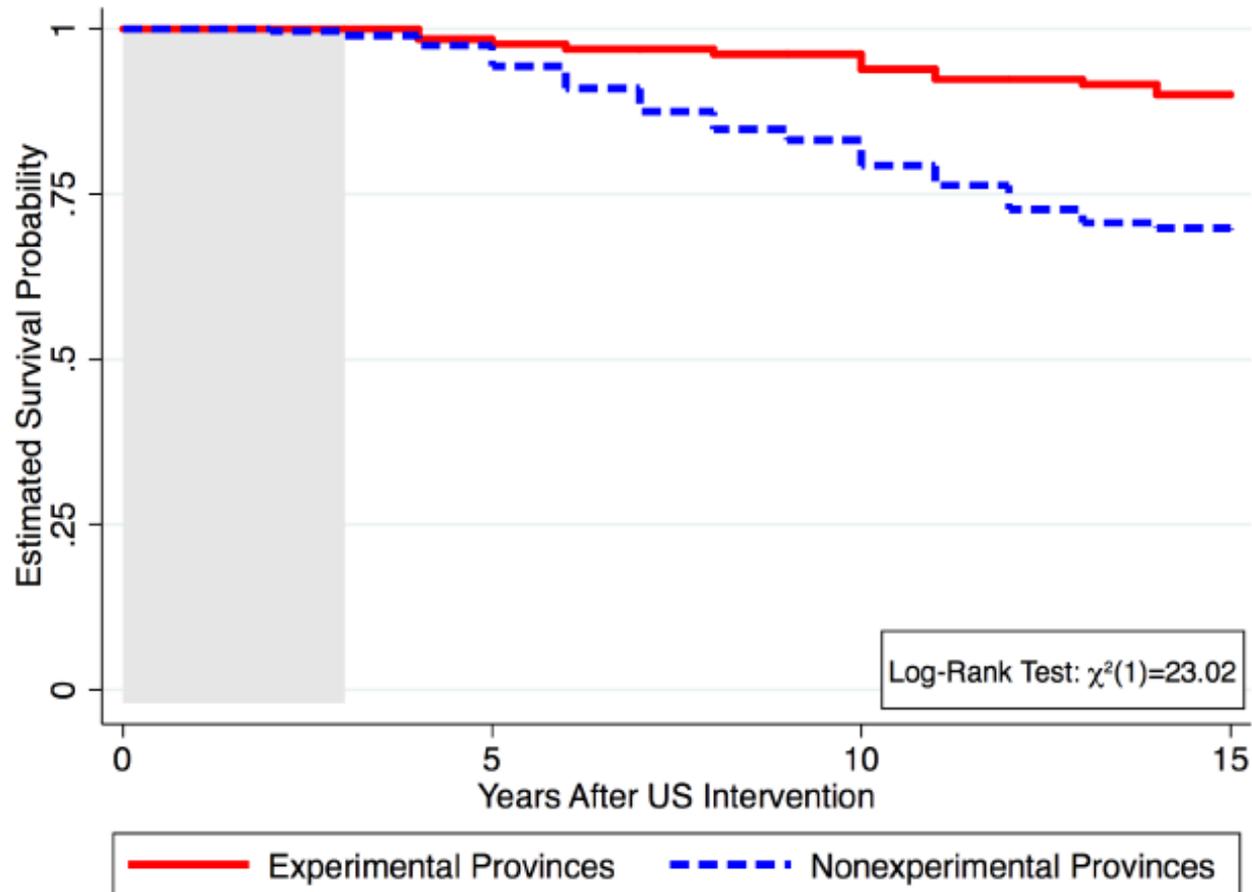
Notes. The dependent variables are logged TFPR, estimated with the Akerberg et al. (2006) method. Standard errors are clustered at the province level.

Design

- Applications in 1950
- US budget cuts in 1951 meant that only applicants from “experimental” provinces covered.
 - These provinces chosen to be “middling”
 - Look the same on observable trends and levels to rest of provinces
 - Eligible and now ineligible firms also look the same

Positive effects on survival

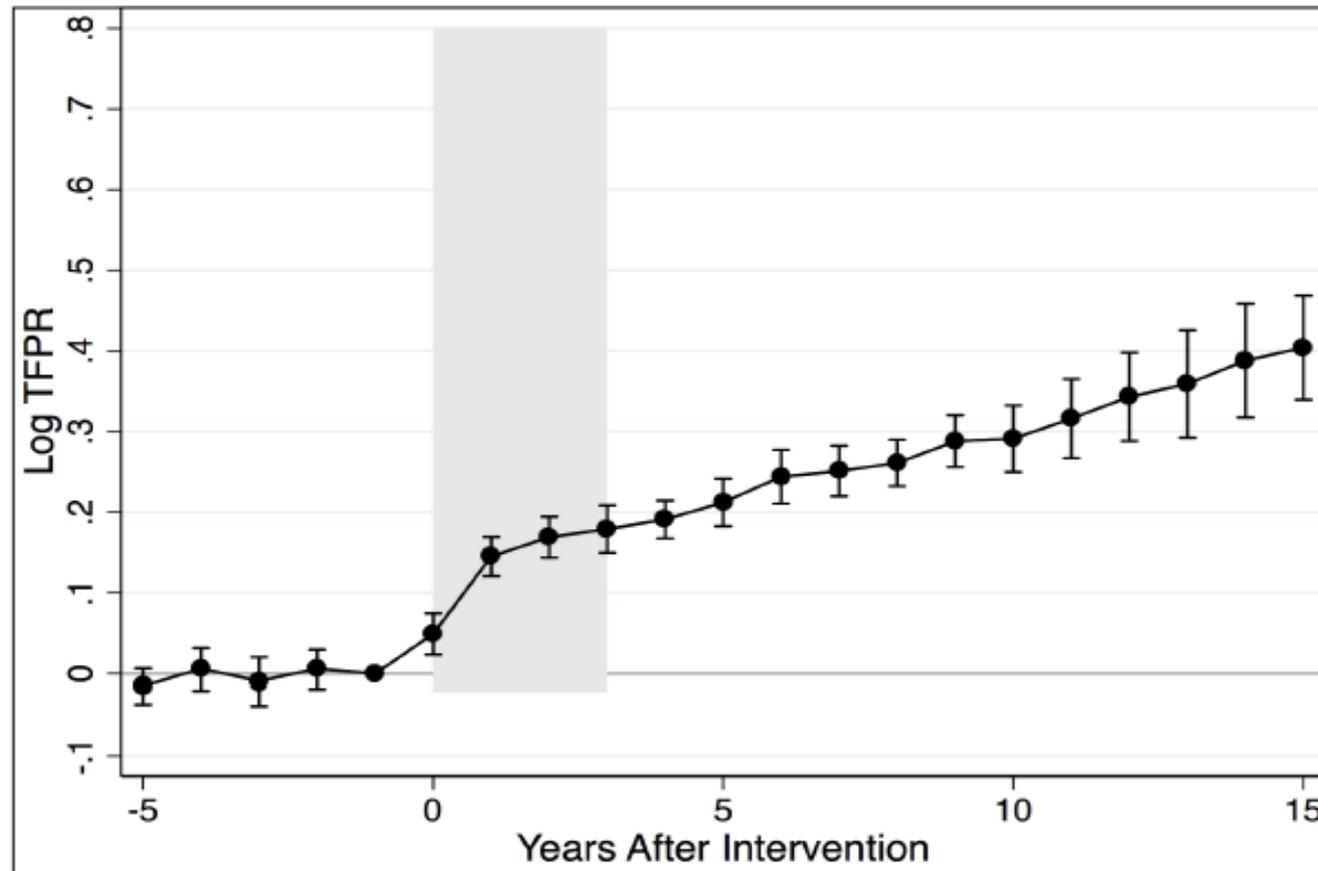
Management: 90% vs 68% Survival Probability, 15 Years



Notes. Kaplan-Meier survivor function. Data are provided at firm level. The gray shaded area corresponds to the three-year follow-up period after the US intervention.

Positive effects on Productivity

Management: 46.3% Increase in TFPR after 15 Years



Notes. The dependent variables are logged TFPR, estimated with the Akerberg et al. (2006) method. Standard errors are clustered at the province level.

Positive effects on size

Management: 38.5% Increase in Employees after 15 Years

	Log Employees		
Year1AfterPP	0.011 (0.015)	0.008 (0.011)	0.012 (0.013)
Year5AfterPP	0.069*** (0.019)	0.067*** (0.016)	0.076*** (0.023)
Year10AfterPP	0.219*** (0.046)	0.209*** (0.038)	0.257*** (0.051)
Year15AfterPP	0.326*** (0.054)	0.312*** (0.047)	0.384*** (0.073)
Observations	10,760	10,760	13,902
Number of firms	538	538	731
Sample	Balanced	Balanced	Full
Region, Industry FE	Yes	No	Yes
Time FE	Yes	Yes	Yes
Firm FE	No	Yes	No

Notes. The dependent variable is logged *employment*. Standard errors clustered at the province level are presented in parentheses.

► Comparison of Effects over Time

Other results from Giorcelli (2019)

- Also effects on hiring managers with college degree
- No effect on worker training, wages
- Technology treatment also had effect on capital, but short-run
- Biggest effects from combination of management & technology (complementarity?)

Issues/Summary

- Not random assignment, so could be unobservable confounders
- Unclear whether some selection of the better firms
- What is mechanism?
- External validity because of post-war situation
- But: fairly compelling evidence for an effect of management on long-run firm performance

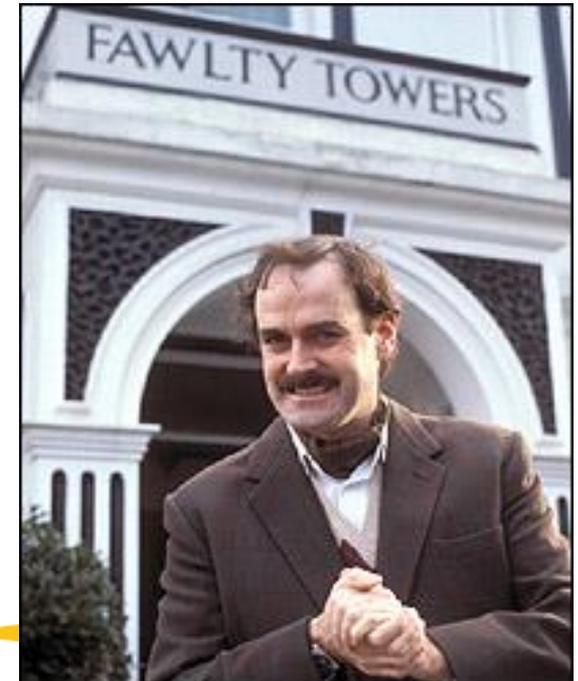
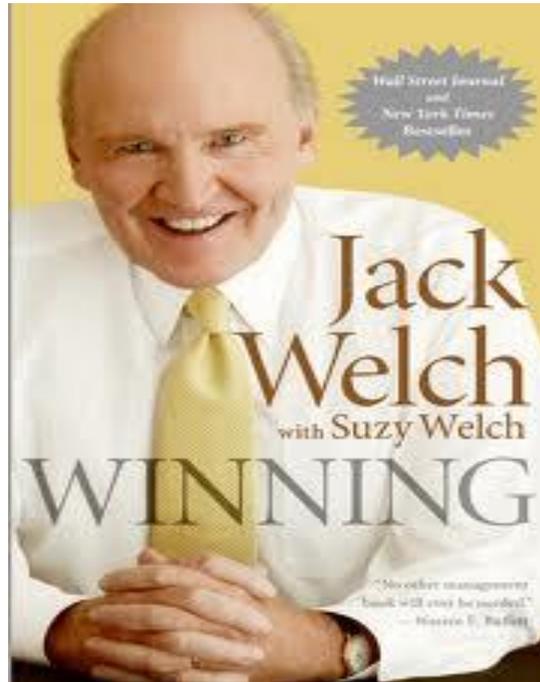
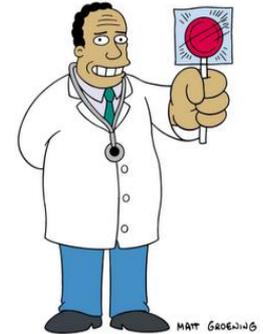
Summary of Management & Performance

- Still a very new literature with lots of room for contributions
- Substantial evidence of correlations in cross section.
- Non-experimental panel data more mixed, but recent work using better data & designs finding positive effects
- RCT evidence also mixed, but some “management consultancy” interventions do seem to suggest potentially large treatment effects
 - Long-run impacts may be even larger
 - Like performance pay literature, growing evidence of important performance effects
- Note “training interventions” a joint test of (i) “Does management work?” AND (ii) “does this policy intervention work?” (i) may be true even if (ii) is not
- **But if management is so important, why do so many firms appear to have poor management practices?**

“Drivers” of Management Practices

John Van Reenen

Labor Economics, 2020



What determines management practices?

- **“Design” or “Contingency” Perspective**
 - Standard Org Econ: Firms are choosing organizational features rationally & optimally at all times
 - e.g. Performance pay. A focus on magnitude of β in linear total remuneration contract: $Y = w + \beta x$ where x is some objective signal of performance
 - Noisiness of signal; Degree of risk aversion of the agent; uncertainty of the environment, etc.
- **Productivity Perspective**
 - Some core management practices will raise output in almost all environments
 - Management an intangible capital in production function
 - Why don't all firms adopt? Parallel question in technological diffusion

Design

- Clearly firms are making management decisions & this is likely to be influenced by environment
- But difficult to create experiments that induce different types of adoption.
- Literature more successful at looking at impact of management than at determinants.

Example of contingency

- Bloom & Van Reenen (2007) and Bloom, Sadun and Van Reenen (2017) show how in WMS data firms specialize in types of management practice depending on environment
- Group WMS practices into “people” (pay, promotion, firing, hiring) vs. “monitoring/targets” (collecting and using information)
- Industries with high human capital & high rates of innovation have relatively higher intensity of people management
- Industries with high physical capital have relatively higher intensity of targets/monitoring management

Contingency – people management more prevalent than monitoring in high R&D, high human capital, less capital intensive sectors

	People Management (P)	Monitoring & Targets (MT)	Relative People (P-MT)	Relative People (P-MT)
Countries	All	All	All	OECD
Measure	US SIC4	US SIC4	US SIC4	KLEMS SIC2
ln(K/L)	-0.000 (0.014)	0.096*** (0.016)	-0.125*** (0.019)	-0.126*** (0.037)
R&D Intensity	0.031 (0.062)	-0.125* (0.072)	0.201*** (0.074)	0.721** (0.306)
ln(%degree)	0.139*** (0.008)	0.123*** (0.007)	0.011 (0.010)	0.070*** (0.019)
Observations	13,681	13,681	13,681	4,855

Notes: “People management” is the index for all questions in questions 13 – 18 (i.e. take the average of these z-scores and then z-score this index) and “Monitoring and targets” are all the remaining questions. US SIC4 from NBER Bartelsman-Gray data, KLEMS is country by SIC2 industry specific.

Source: Bloom, Sadun & Van Reenen (2017, table 6) “Management as a Technology”

Incidence of Incentive Pay

- Prendergast (1999) Incidence of incentive pay doesn't seem to match well to theory predictions.
 - Beta in linear performance contracts not generally higher in more uncertain environments (risk averse agent should want lower beta, but if anything incentives appear more high powered in such environments)
- One explanation is that when uncertainty high the value of agent's knowledge more important. Therefore greater need to delegate (Aghion & Tirole, 1997) & create stronger incentives to align principal & agent's interests
 - This prediction has held up better. Discuss this next semester when we look at empirical decentralization studies (also empirics of franchising; share-cropping)
- Essentially missing variable problem. Akerberg & Botticini (2002) on agricultural contracts on Renaissance Tuscany

General perspective on why seemingly beneficial management practices are not adopted (Jan Rivkin, 2000)

- Not knowing firm has poor management practices
- Knowing that management is poor, but not knowing how to change
- Knowing firm is poorly managed & what do, but weak incentives to change (economics focus)
- Knowledge & strong incentives but political problems within firm (relational contracts)

So why does management vary across countries and firms?

Some factors that seem important. Illustrate using WMS & MOPs (see Bloom et al, 2014, JEEA for summary)

- **Product Market Competition**

- Family firms
- Multinationals
- Labor market regulations
- Education
- Information

Theories of Competition and Management

- **Selection (positive)**
 - Poorly managed/low TFP firms more likely to exit. And even if they survive have lower market shares.
- **Incentives (ambiguous)**
- **Positive:** Agency issues (e.g. Hart, 1983)
 - Bankruptcy threat stronger & this can align incentives between managers and shareholders (Schmidt, 1997)
 - Greater competition implies that reduction in marginal costs (from managerial effort) has bigger effect on market shares (Raith, 2003).
- **Negative:** “Schumpeterian” lower price cost margins ex-post, less incentive to invest in management ex-ante
 - Like innovation models, theory has ambiguous predictions over Management (e.g. Aghion et al (2005) argue for inverted U)

Most Studies find competition has positive effect on TFP

Surveys in Holmes & Schmitz (2010); Van Reenen (2011); De Loecker & Goldberg (2014, AR). **Examples:**

Nickell (1996, JPE) shows changes in competition lead to faster TFP growth within a panel of firms

Syverson (2004, JPE) on US concrete industry. More competitive markets had higher average levels of TFP & less dispersion.

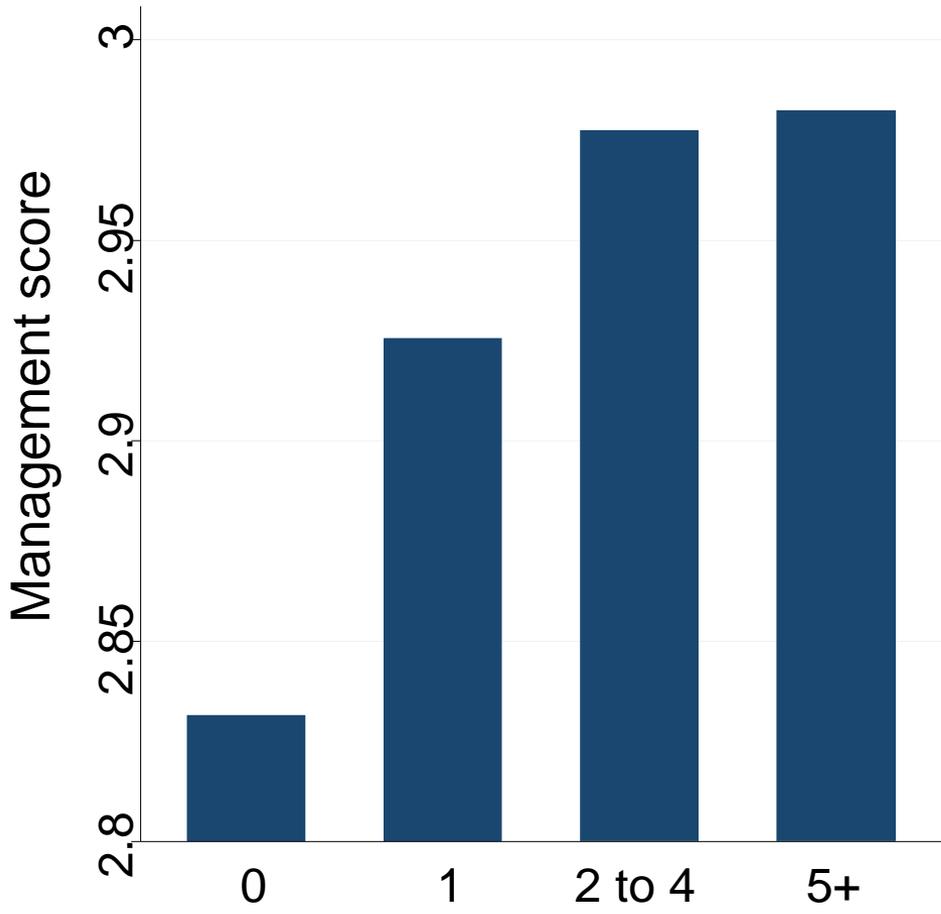
Trade Reforms (big lit.): Pavcnik (2002, REStud) in Chile. Generally positive, stress between firms (Melitz, 2003).

Olley-Pakes (1996, ECMA) Deregulation of telecom equipment

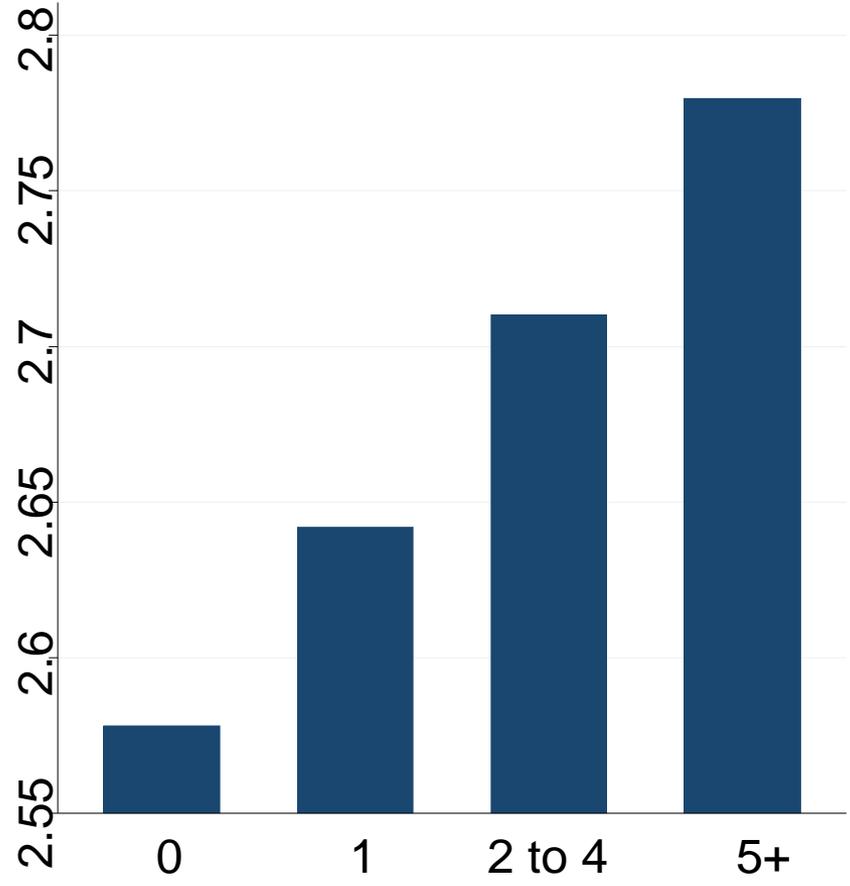
Schmitz (2005, JPE) shows Great Lakes iron-producers responded positively to import competition

Competition Appears Linked to Better Management in WMS

Manufacturing and Retail (the private sector)



Hospitals and Schools (the public sector)



Number of Reported Competitors

Sample of 9469 manufacturing and 661 retail firms (private sector panel) and 1183 hospitals and 780 schools (public sector panel). Reported competitors defined from the response to the question “How many competitors does your [organization] face?”

Changes in competition & improved management (WMS & similar correlations in MOPS)

TABLE 4: COMPETITION AND MANAGEMENT

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: Management						
(1-Lerner)	0.990*** (0.366)	1.751*** (0.443)				
Import Penetration			0.398** (0.170)	0.830** (0.327)		
Import Penetration - China					2.090** (0.972)	2.204* (1.137)
Observations	8,630	8,630	8,630	8,630	8,630	8,630
Size- weight the regressions?	n	y	n	y	n	y

Notes: Includes SIC-3 industry * country dummies, firm-size, public and interview noise (interviewer, time, date & manager characteristic) controls. Clustered by industry*country

Source: Bloom, Sadun & Van Reenen (2017)

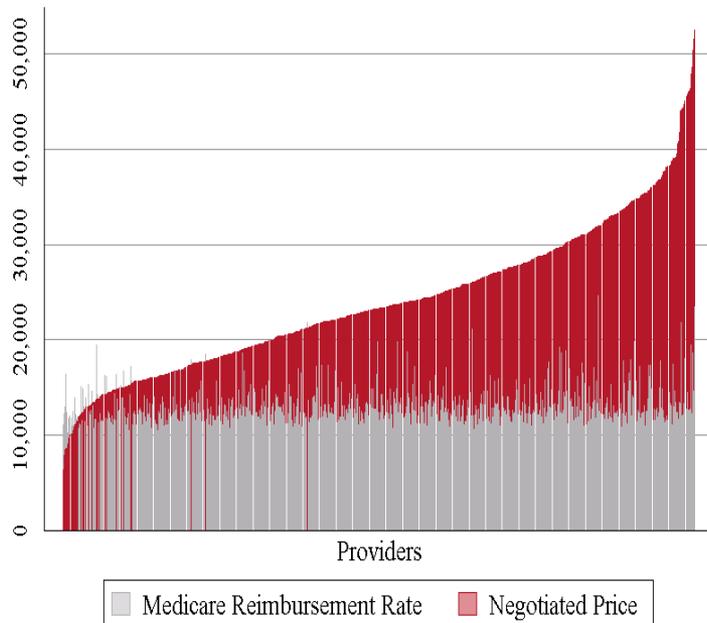
Other competition natural experiments looking at management directly as well as TFP

- **Chinese trade**: Growth of Chinese exports by industry using WTO accession natural experiment where quotas fell dramatically in textiles & apparel (Bloom, Draca and Van Reenen, 2016, ReStud; Shu & Steinwender, 2019)
- **Findings**
 - Increase in productivity, innovation and management quality (WMS)
 - Improvements a combination of within firm effect AND selection effects
- In WMS more generally, reducing competitive frictions (tariffs, regulations, etc.) causes reallocation towards better managed firms

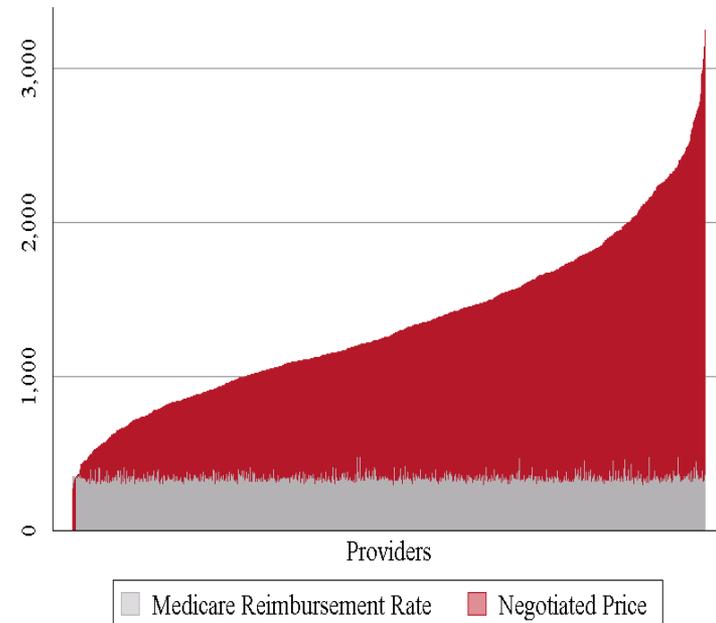
Enormous variation in US hospital prices even within homogenous narrowly defined treatments such as lower limb MRIs

FIGURE III: NATIONAL VARIATION IN HOSPITAL PRICES FOR KNEE REPLACEMENT AND LOWER LIMB MRIs, 2011

Panel A: Knee Replacement Prices



Panel B: Lower Limb MRI Prices



Source: Cooper, Craig, Gaynor & Van Reenen (2019 QJE), HCCI data

Other competition natural experiments looking at management directly as well as TFP

- **Political marginals:**

- Hospital competition in UK NHS under mid-2000s reforms. Under publicly run system hospitals rarely closed down in districts that are politically marginal.
- Implies some exogenous variation in hospital market structure
- Bloom, Propper, Seiler & Van Reenen (2015, ReStud) find positive impact of competition (more hospitals) on management (& hospital outcomes such as AMI survival rates)

- Cooper et al. (2013, EJ); Gaynor et al (2016, AER) use Diff in Diffs comparing areas with many hospitals pre-reform (where comp could increase) vs. those with pre-reform few hospitals

Some Issues on competition results

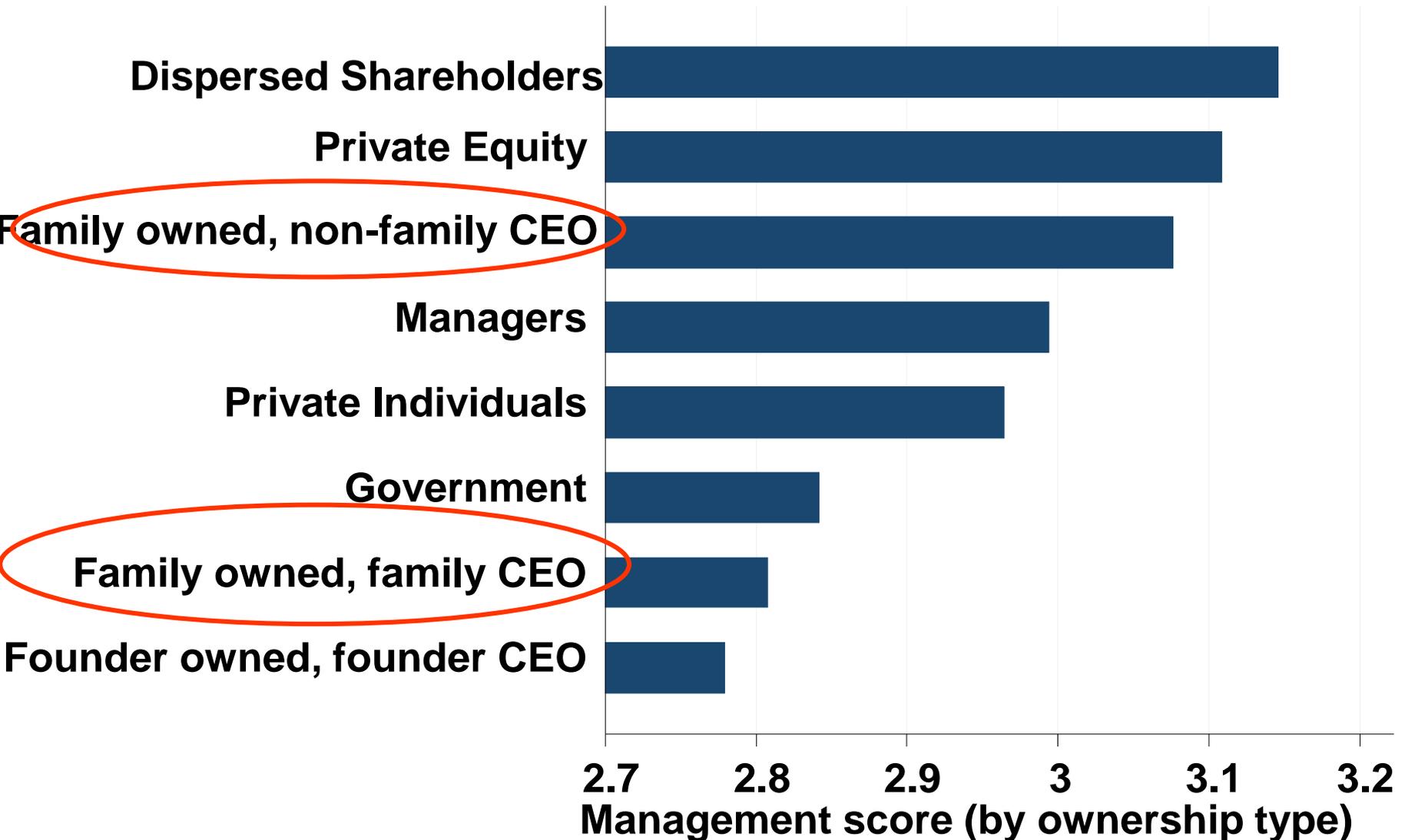
- What is the “correct” measures of competition?
 - Ideally some exogenous shifter in consumer sensitivity to price (or quality)
 - In practice, indirect proxies of this: price cost margin; reduction in trade/transport costs; regulatory change.
- Is the competition-induced increase in productivity DUE to the managerial improvements?

So why does management vary across countries and firms?

Factors that seem important

- Competition
- **Family firms**
- Multinationals
- Labor market regulations
- Education
- Information

Differences in management across ownership types (even controlling for country, industry and size)



Note: Management scores after controlling for country, industry and number of employees. Data from 9085 manufacturers. “Founder owned , founder CEO” firms are those still owned and managed by their founders. “Family firms” are those owned by descendants of the founder “Dispersed shareholder” firms are those with no shareholder with more than 25% of equity, such as widely held public firms.

Discussion of family firms

- Negative correlation of management with Primo Geniture robust to many other controls
- Consistent with earlier lecture on negative impact of family firms on performance
- Lemos and Scur (2019) use the gender composition (# male children controlling for family size) of founders' children. WMS data on 13 countries. Find family firms significantly reduce WMS scores under IV.
- Could reflect deeper rooted problems of contract enforceability, trust, corruption

So why does management vary across countries and firms?

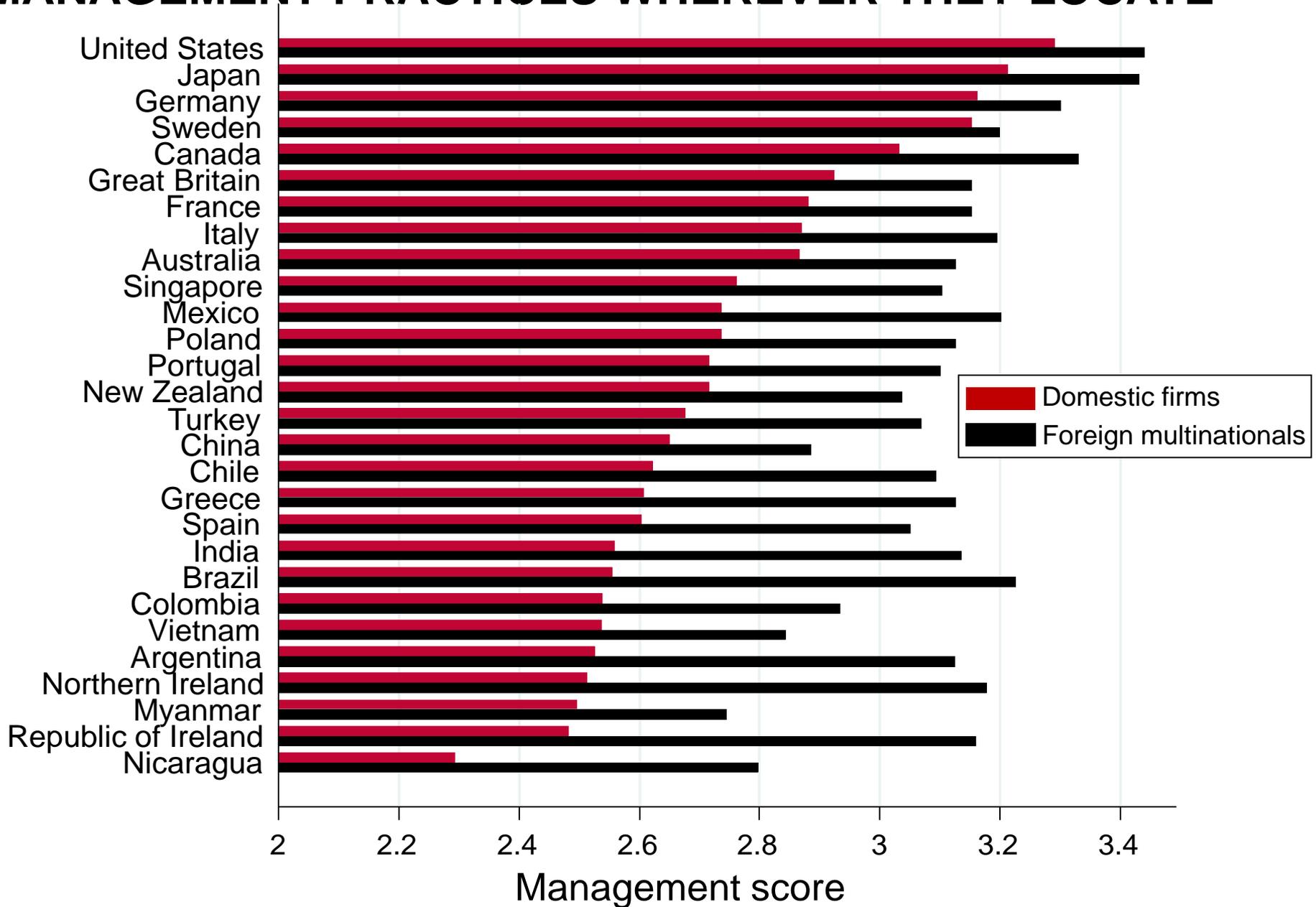
Factors that seem important

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Large literature on the effects of Foreign Direct Investment on Productivity

- Domestic firms learn from multinationals (Sutton, 2003)
- Empirics finds positive correlations, but exceptions esp. (e.g. Aitken & Harrison, 1999, on Venezuela)
- Application of problems of production functions. Large foreign plants could create more competition
 - For **outputs** (TFPR ↓). Same as competition more generally due to falls in margins. But maybe less likely if trade in international markets
 - For **inputs** (TFPR ↓). Competition over inputs
- Usual concerns over endogeneity of FDI
 - Greenstone, Hornbeck & Moretti (2010, JPE) suggest a quasi-experiment using “Million Dollar Plants”
 - Alfaro-Urena, Manelici & Vasquez (2020): Event studies over new links to MNEs in Costa Rica

OWNERSHIP: MULTINATIONALS ACHIEVE GOOD MANAGEMENT PRACTICES WHEREVER THEY LOCATE



Spillovers - Look at impact of winning a “Million Dollar Plant” versus being the runner up

Toyota Motor Corp. – Huntsville, Ala. \$220 million; 350 jobs

One of the Southeast's most prized catches of the year landed in Huntsville, Ala., where Japanese automaker Toyota Motor Corp. announced that it would locate a \$220 million, 350-job manufacturing plant for V-8 engines for the Toyota Tundra pickup.

Huntsville beat out Clarksville, Tenn., and Buffalo, W.Va.



Senator Jeff
Gov. Don Sieg
the future p

annual payroll of \$20.75 million, or about \$85,000 per job

“Million Dollar Plants” lead to localized (county-specific) spillovers in management, TFP and employment - if incumbent plant in sector with high managerial transitions movements from MDP sector

Dependent variable:	Change in Management	Change in Log(TFP)	Employment Growth
Panel A: All industries pooled			
MDP Opens	0.018** (0.007)	0.024 (0.017)	0.014** (0.005)
Panel B: Split high/low manager flow			
MDP Opens×High	0.031*** (0.008)	0.069*** (0.019)	0.017** (0.006)
MDP Opens×Low	-0.005 (0.011)	-0.050 (0.034)	0.009 (0.01)
P-value for equality	0.007	0.004	0.495
Observations	~2,500	~2,500	~2,500

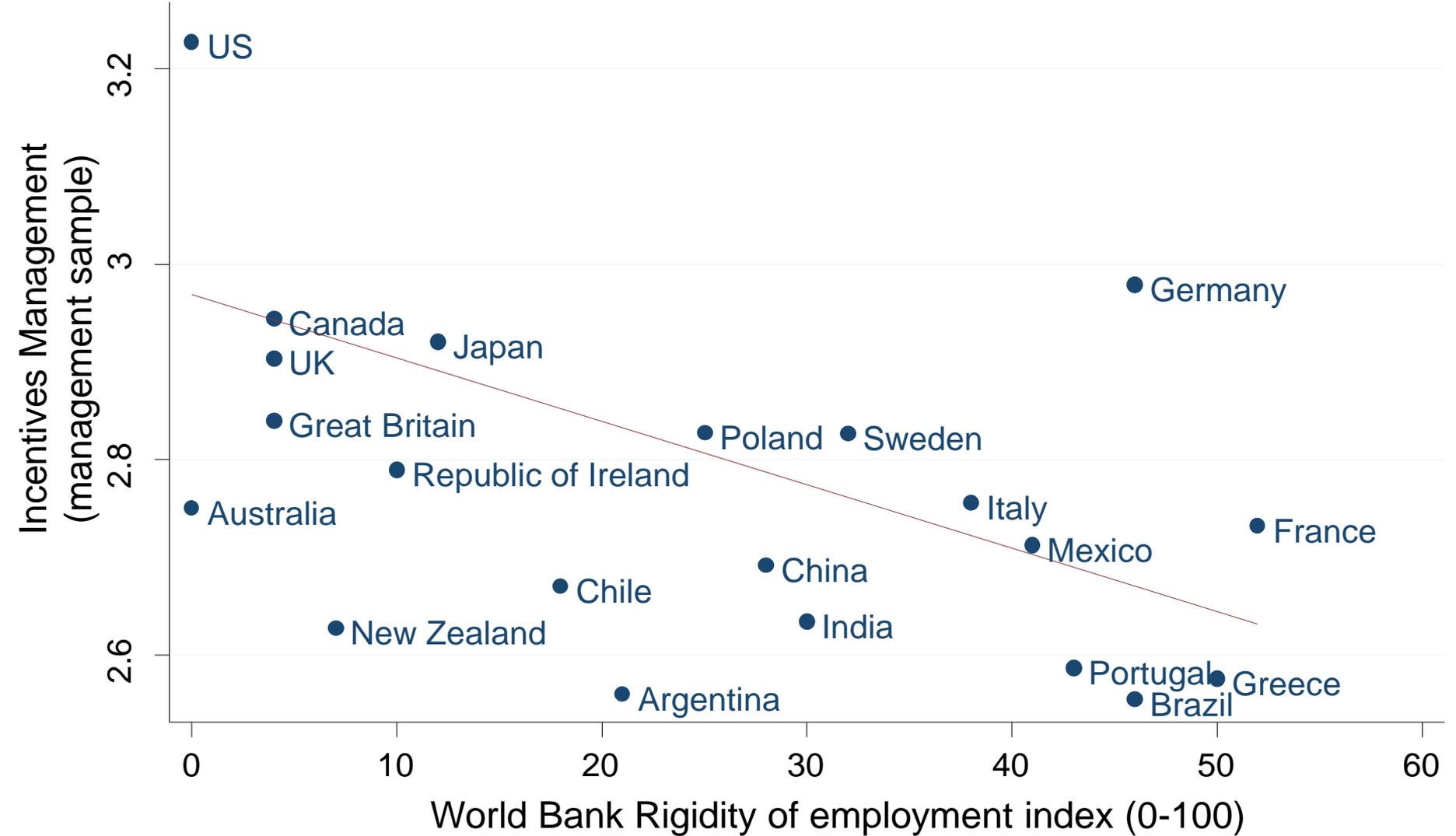
Source: Bloom, Brynjolfsson, Foster, Jarmin, Patnaik, Saporta-Eksten & Van Reenen (2019, AER) “What Drives management?”

So why does management vary across countries and firms?

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- Education
- Information

Labor Market Regulation & Incentives Management



Note: Averaged across all manufacturing firms within each country (9079 observations). We did not include other sectors as we do not have the same international coverage. Incentives management defined as management practices around hiring, firing, pay and promotions. The index is from the Doing Business database <http://www.doingbusiness.org/ExploreTopics/EmployingWorkers/>

Regulation – particularly “Right to work” - with five states (IN, WI, MI, OH & WV) voting on this since 2012

THE WALL STREET JOURNAL. ≡

OPINION

Nicholas's Journal ▾

Live Help

Q SEARCH

The New York Times

The Opinion Pages

ROOM for DEBATE

f FACEBOOK

t TWITTER

p PINTEREST

✉ EMAIL

TOP STORIES IN C


OPINION
Unions
Collective ba

✉ Email  Print

By ROBERT BAR
Updated Feb. 28, 20

How ironic that
and public- em
bargaining for
to introduce a
form of individ

What Happens as More States Curtail Labor's Rights?

Are "right to work" laws worthwhile?

[Read More »](#)

DEBATERS



Income Rises When These Laws Are Passed

RICHARD VEDDER, ECONOMICS PROFESSOR



Wages Are Lower in States With These Laws

ELISE GOULD, ECONOMIC POLICY INSTITUTE



A Key to Economic Growth

SCOTT MANLEY, WISCONSIN MANUFACTURERS AND COMMERCE



Call It 'Right-to-Work-for-Less'

GEORGE GRESHAM, 1199SEIU UNITED HEALTHCARE WORKERS EAST



Both Sides Exaggerate Its Effects

BARRY HIRSCH, ECONOMICS PROFESSOR

Call It 'Right-to-Work-for-Less,' Not Right-to-Work



George Gresham is the president of [1199SEIU United Healthcare Workers East](#).

UPDATED MARCH 12, 2015, 12:07 PM

What are called right-to-work laws would more accurately be termed “right-to-work-for-less,” for their aim is to deprive unions of dues and money essential to their ability to represent workers and enforce contracts.

A signal achievement of the New Deal was the Wagner Act of 1935, guaranteeing labor's rights to organize and bargain collectively. It established that when the majority of workers in a facility votes for union representation, all the members of the bargaining unit are union members and pay membership dues. Unions saw enormous growth, and their strength helped create conditions and legislation that benefited all of society — including the weekend, the 8-hour day, Social Security, unemployment compensation and the elimination of child labor.

But since World War II, we have witnessed a war by corporate America to weaken workers and their unions. The first blow came with the 1947 Taft-

Its aim is to deprive unions of dues money

How to Tease Out the Causal Effect of RTW?

First approach:

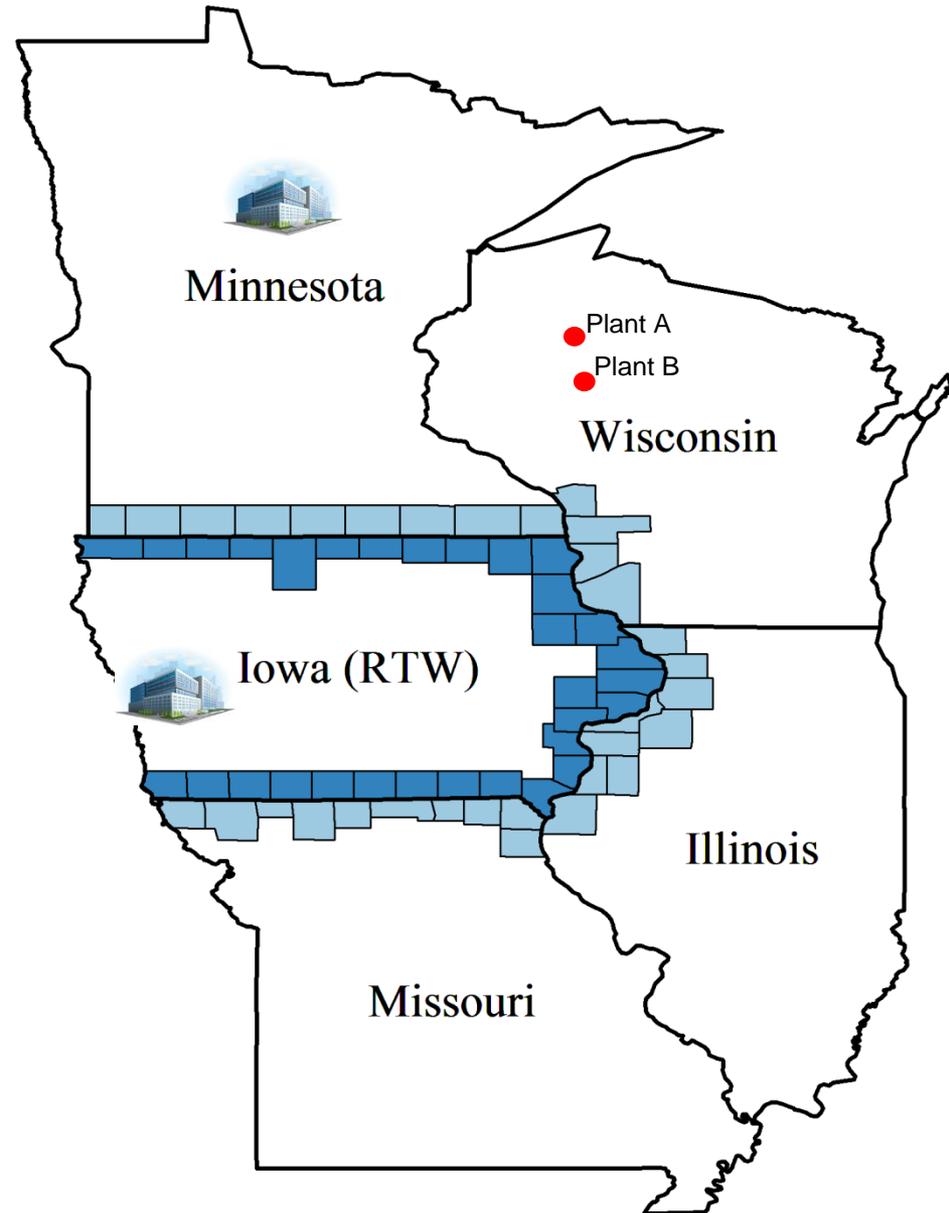
Focus on counties 30 miles of the RTW state border (Holmes 1998).
Use spatial RD Design

Second approach:

Use MOPS 2015 for DID over states that changed since 2010 (IN, MI, WI)

Results:

Both approaches suggest RTW improves people management, but not other aspects



So why does management vary across countries and firms?

Factors that seem important

- Competition
- Family firms
- Multinationals
- Labor market regulations
- **Education**
- Information

Education for Non-Managers and Managers Appear Linked to Better Management (in manufacturing and retail)



Sample of 8,032 manufacturing and 647 retail firms. We did not collect comparable education data in hospitals and schools.

Human capital and management

- Feng & Valero (2019) show plants located closer to universities have more educated employees & higher WMS management scores
- Bloom et al (2019): hospitals located closer to colleges offering clinical and business education (Med Schools + B-Schools) had higher WMS management scores & better clinical outcomes

So why does management vary across countries and firms?

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- Education
- **Information**

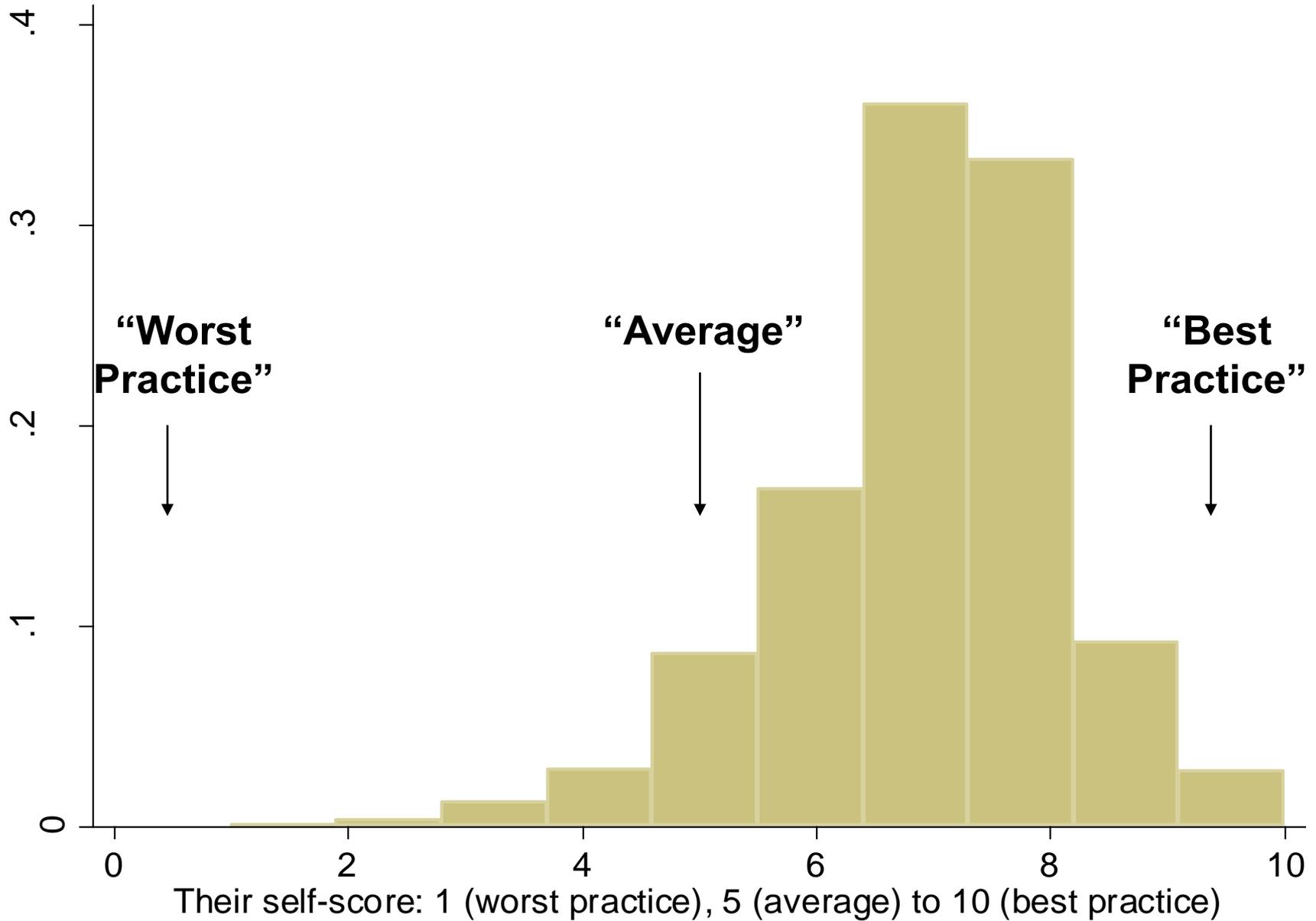
INFORMATION: ARE FIRMS AWARE OF THEIR MANAGEMENT PRACTICES BEING GOOD/BAD?

We asked:

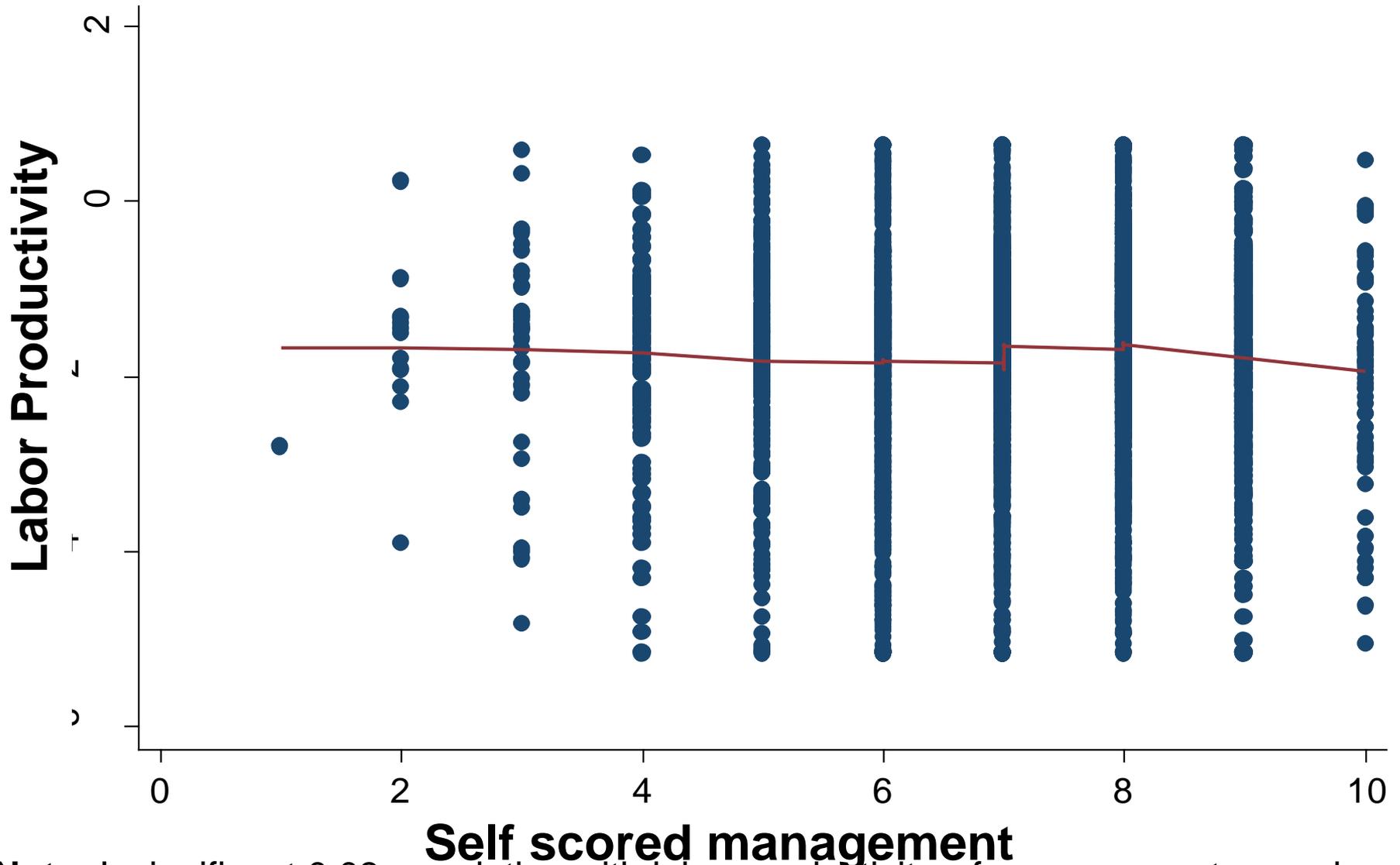
“Excluding yourself, how well managed would you say your firm is on a scale of 1 to 10, where 1 is worst practice, 5 is average and 10 is best practice”

We also asked them to give themselves scores on operations and people management separately

MOST MANAGERS THINK THEY ARE WELL ABOVE AVERAGE



SELF-SCORES UNCORRELATED WITH PRODUCTIVITY



Note: Insignificant 0.03 correlation with labor productivity, cf. management score has a correlation of 0.30

Managerial Informational RCTs

- **Cai and Szeidl (2018, QJE)**
 - 2,820 Chinese firms randomized into small groups whose managers met monthly for a year vs. no-meetings
 - MOPs style management scores rise significantly (~ 0.2 sd)
 - Revenue rises by 8.1%; profits \uparrow , inputs \uparrow
 - Mechanism appears to be via **information** - finding more business partners (supplier-client matching; trust). Better peers (i.e. if randomly matched to larger firms) increases benefits
- **Brooks et al (2018)**. Female Kenyan entrepreneurs
 - Formal business skill intervention (e.g. book-keeping) raised management scores but not performance
 - Mentorship by established entrepreneur raised profits 20% (local specific, information)
- Network formation important (Fafchamps & Quinn, 2016)

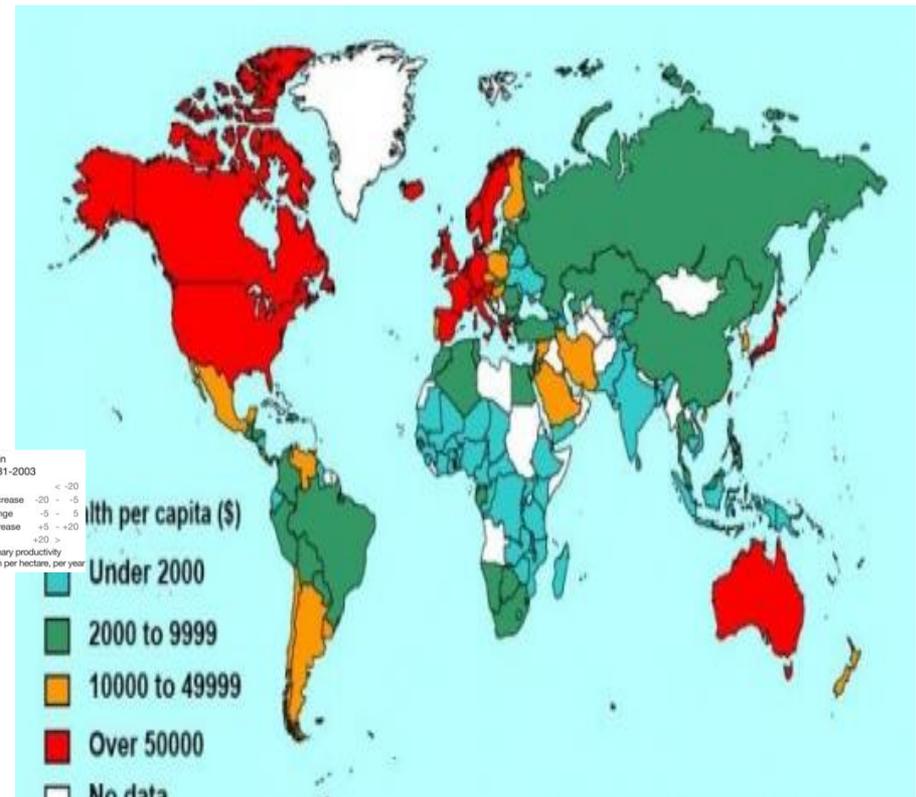
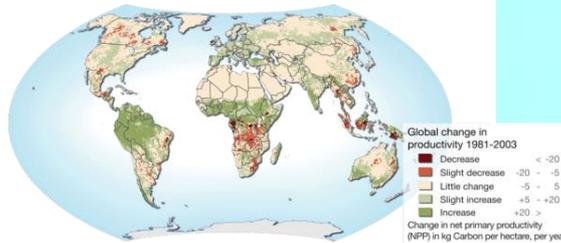
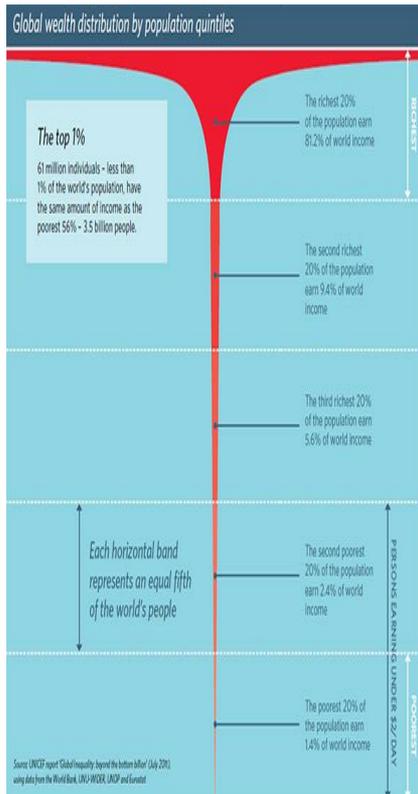
Summary

- Management is partially contingent, but some core practices (WMS style) do seem to raise performance in a variety of contexts
- Robust correlations with structural features of environment
- But there is far too much we do not know in this area. A rich seam of potential research projects
- Finally: does this matter from a macro-economic perspective?

Linking Micro to Macro: Productivity & Management

John Van Reenen

Labor Economics, 2020



Bloom, Sadun & Van Reenen (2017)

“Management as a Technology”

- Considers a model in the same spirit as BHS but argues that **Management** is key source of TFPQ heterogeneity & measures this explicitly
- When firm enter they draw: management quality (M) as well as TFPQ (A)
- Non-managerial capital and management capital can be adjusted in each period subject to an adjustment cost, so we have usual dynamic programming problem
- Numerically simulate model to characterize steady state (like Bartelsman, Haltiwanger & Scarpetta, 2013).

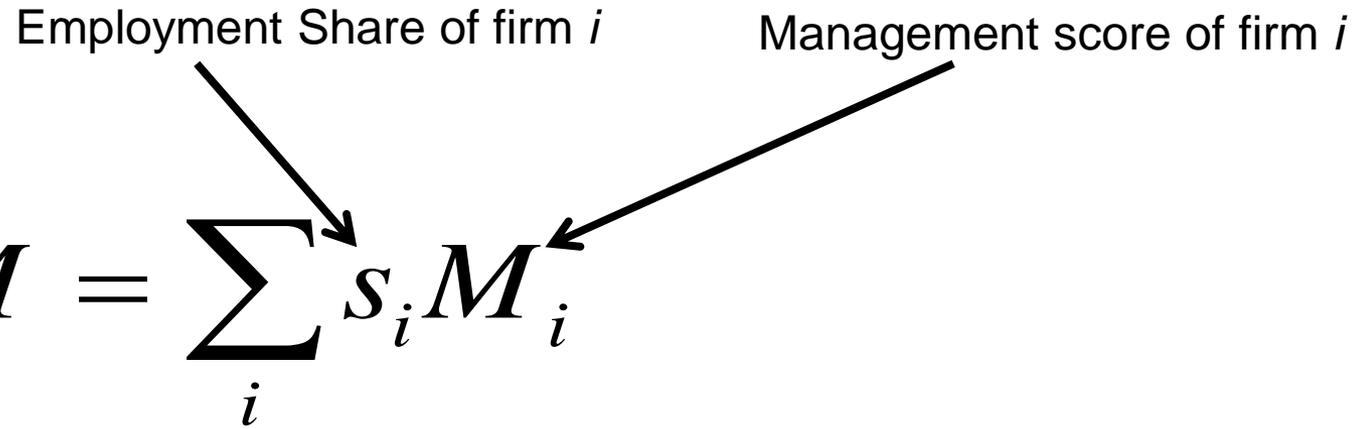
Summary of the paper

1. Data on management from $\approx 15,000$ firms in 34 countries
2. Model $Y=AF(K,L,M)$, firms draw initial management (M) endowment, can invest in M (w. adjustment costs), no resale
 - a) *Performance*: \uparrow in management
 - b) *Management*: \uparrow with product market *competition*
 - c) *Management*: \uparrow with firm *age* & supply of *skills*
3. Estimate model by SMM and show broadly matches data
4. Given data and model, estimate management may account for roughly 1/3 of cross-country & firm spread in TFP

“OLLEY PAKES” (OP) DECOMPOSITION OF SIZE WEIGHTED AVERAGE MANAGEMENT SCORE (M) IN GIVEN COUNTRY

Employment Share of firm i

Management score of firm i

$$M = \sum_i s_i M_i$$


“OLLEY PAKES” (OP) DECOMPOSITION OF WEIGHTED AVERAGE MANAGEMENT SCORE (M) IN GIVEN COUNTRY

Employment Share of firm i

Management score of firm i

$$M \equiv \sum_i s_i M_i$$

$$= \sum_i [(s_i - \bar{s})(M_i - \bar{M})] + \bar{M}$$

$$= OP + \bar{M}$$

Covariance
(Olley-Pakes, 1996,
reallocation term)

Unweighted mean
of management score

DECOMPOSING THE RELATIVE MANAGERIAL DEFICIT BETWEEN COUNTRY j AND THE US ECONOMY

$$M^k - M^{US} = (OP^k - OP^{US}) + (\bar{M}^k - \bar{M}^{US})$$

Difference in aggregate
share-weighted
Management scores

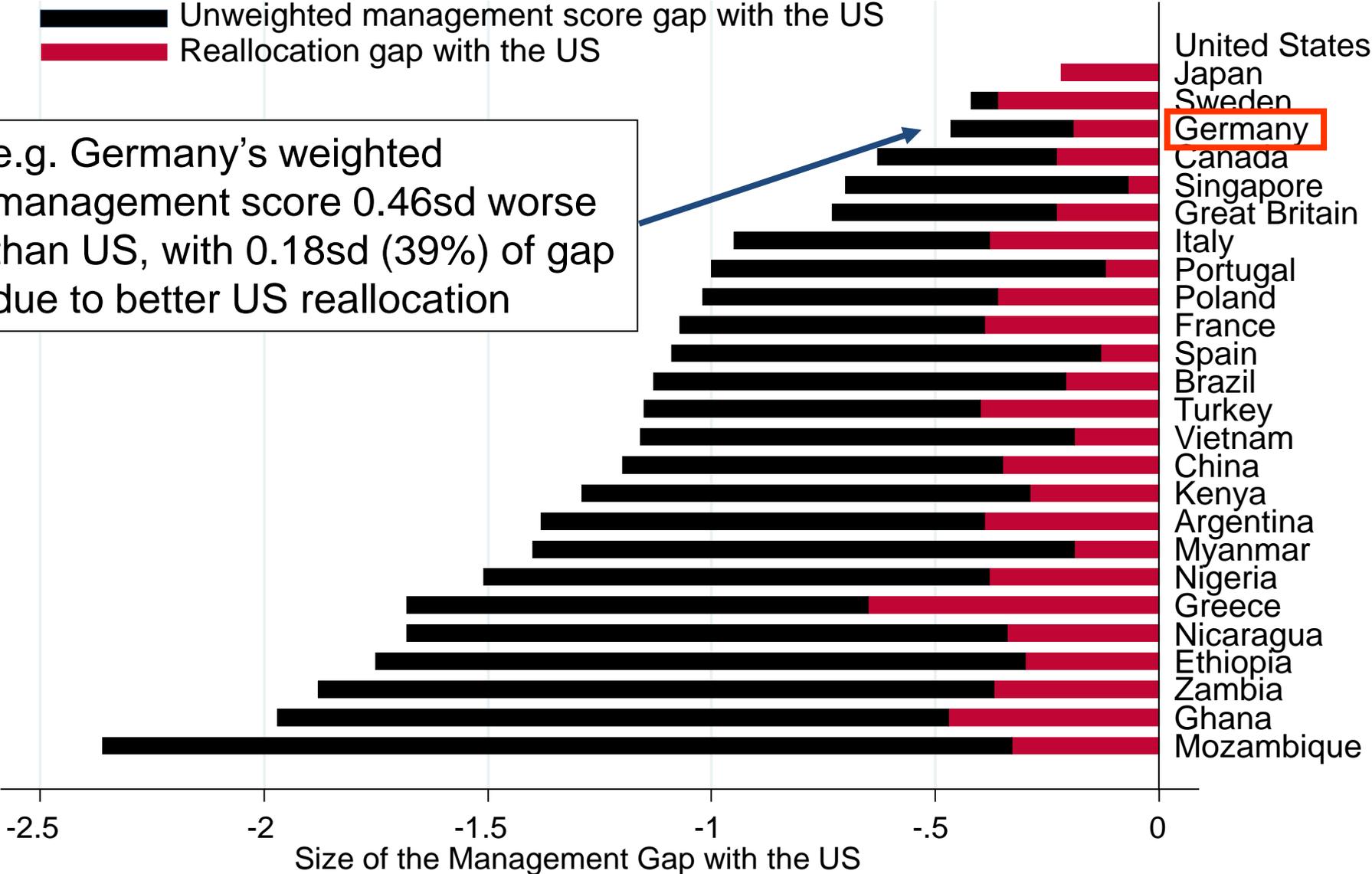
Difference in reallocation
(between firm)

Difference in unweighted
Means (within firm)

Management and Reallocation by Country

Unweighted management score gap with the US
 Reallocation gap with the US

e.g. Germany's weighted management score 0.46sd worse than US, with 0.18sd (39%) of gap due to better US reallocation



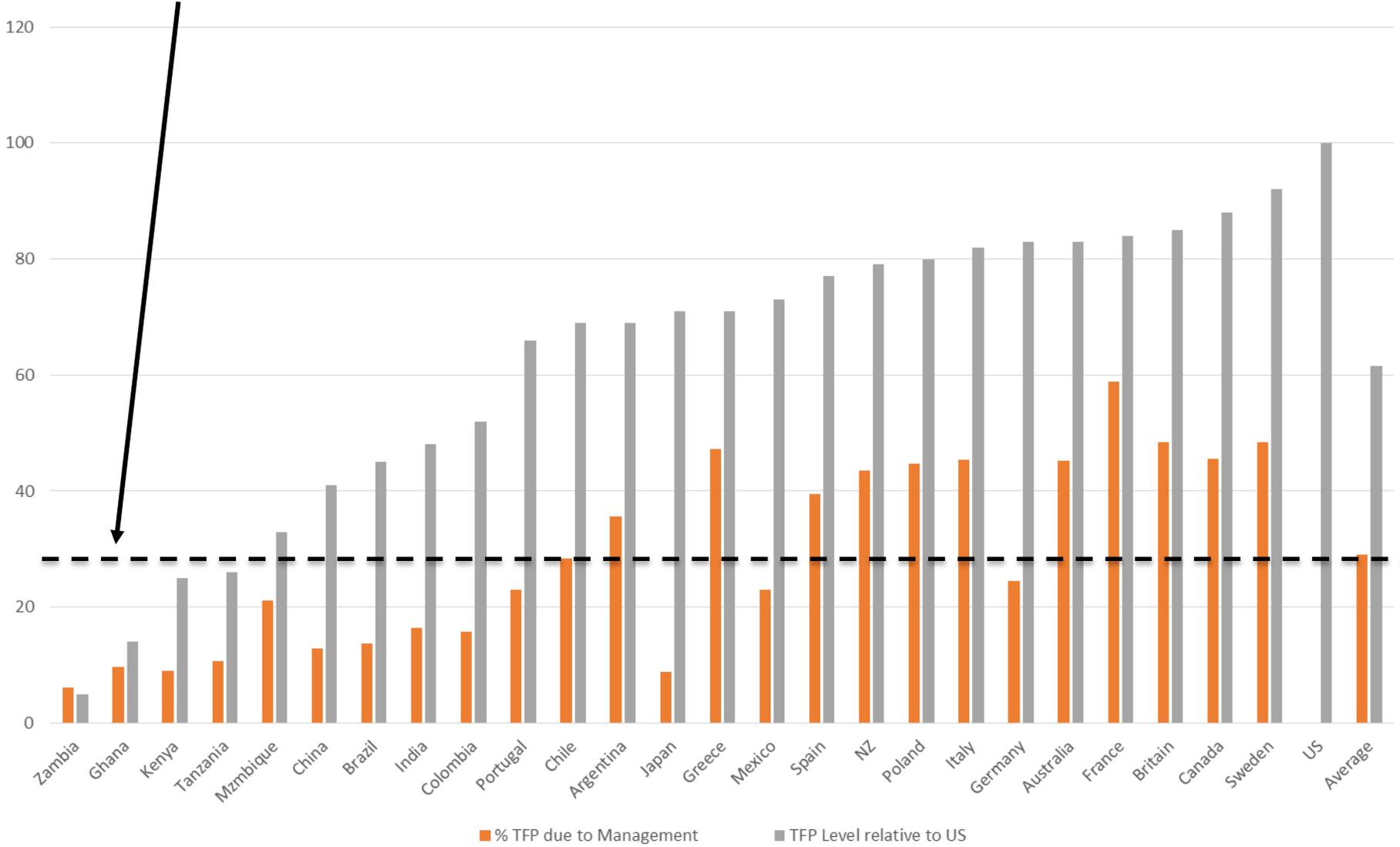
Notes: Share-weighted management score differences relative to the US (in terms of management score standard deviations). Length of bar shows total deficit, composed of the sum of the (i) the unweighted average management scores (black bar) and the Olley-Pakes reallocation effect (red bar). Domestic firms only with management scores corrected for sampling selection bias.

Step 2: What fraction of country's TFP gap (with the US) can this management gap explain?

$$\begin{array}{l} \text{\% TFP gap accounted} \\ \text{for by management} \end{array} = \gamma \times \frac{(\bar{M}^k / \bar{M}^{US})}{TFP^k / TFP^{US}}$$

where γ = impact M on TFP

Management accounts for ~30% of TFP Gap with US



Source: Bloom, Sadun & Van Reenen (2017)

Notes: TFP gaps from Penn World Tables; fraction accounted for by management uses the weighted average management scores and an assumed 10% impact of management on TFP

Summing Up

- Large differences between country TFP: development accounting struggles to rationalize
- Recent work suggests a substantial fraction could be due to misallocation: more efficient firms cannot produce the output we would expect.
- Management appears to be important in accounting for an important part of cross-country TFP differences
- Importance of having micro data to tackle macro questions

MY FAVOURITE QUOTES:

The bizarre

Interviewer: “[long silence].....hello, hello....are you still there....hello”

Production Manager: “.....I’m sorry, I just got distracted by a submarine surfacing in front of my window”

SOME FIRMS SEEMED TO BE TOO TRUTHFUL

Who rules the home in Ireland

Interviewer: “Would you mind if I asked how much your bonus is as a manager?”

Manager: “I don't even tell my wife how much my bonus is!”

Interviewer: “Frankly, that’s probably the right decision...”

Staff retention the American way

Manager: “I spend most of my time walking around cuddling and encouraging people - my staff tell me that I give great hugs”

The trusted Secretary

French secretary: “You want to talk to the plant manager? There are legal proceedings against him, so hurry up!!”

MY FAVOURITE QUOTES (AFRICA):

Interviewer “What kind of Key Performance Indicators do you use for performance tracking?”

Manager: “Performance tracking? That is the first I hear of this. Why should we spend money to hire someone to track our performance? It is a waste of money!”

Interviewer “How do you identify production problems?”

Production Manager: “With my own eyes”

Back Up

TABLE 2—MEAN AND STANDARD DEVIATIONS OF KEY VARIABLES BY PAY STRUCTURE

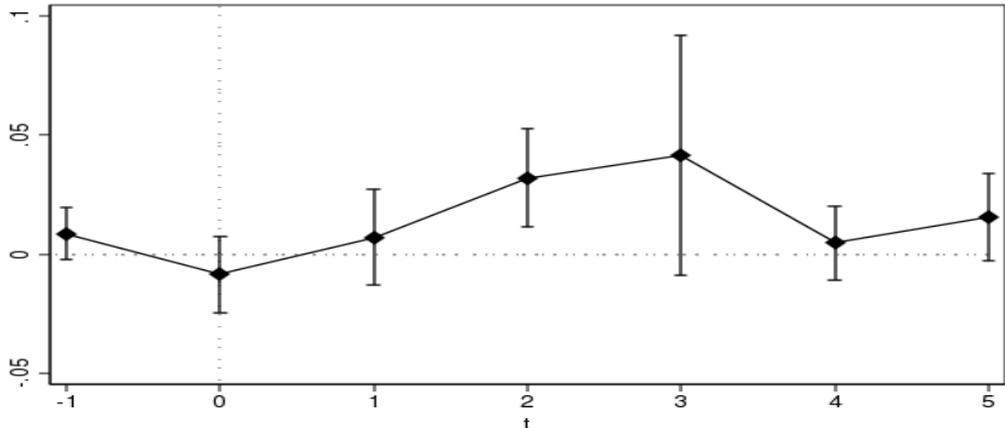
	Hourly wages		Piece rates	
Variable	Mean	Standard deviation	Mean	S.D.
Number of observations	13,106		15,246	
Units-per-worker-per-day	2.70	1.42	3.24	1.59
Actual pay	\$2,228	\$794	\$2,283	\$950
PPP pay	\$1,587	\$823	\$1,852	\$997
Cost-per-unit	\$44.43	\$75.55	\$35.24	\$49.00

Note: 1,485 observations were dropped because the individual spent part of the month on PPP and part on hourly wages.

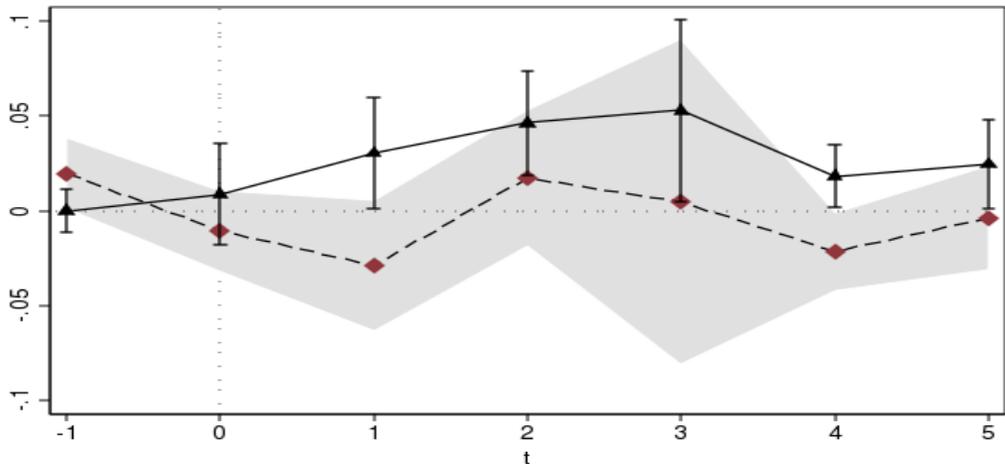
Some Outstanding issues

- Hopenhayn (2016) hard to get first order losses in standard models because only marginal firms deterred. But Baquee & Fahri (2017) claim to
- What exactly is A (org econ question)?
- Endogenous A ? – R&D models like Acemoglu, Akcigit, Bloom & Kerr (2013)
- Linking distortions more precisely to regulations: a black box
- Are these “distortions” really open to policy manipulation?
May be just technological adjustment costs

Figure 5: Event Studies of impact of Million Dollar Plants on incumbent plants



Panel A:
Overall Treatment Effect



Panel B:
Breaking MDP Treatment Effect
down by High and Low managerial
flow Industries



Notes: These are event studies estimated in a window of one year before the MDP arrives ($t = -1$) through to five years afterwards ($t = 5$). Panel A is the dynamic version of the results in Table 8 Panel A column (1) with the same controls variables (dummy for each pair of MDP winner and loser, recall dummy, and NAICS and state dummies). Panel B allows MDP effect to differ by whether incumbent plant in industry where there is a high frequency of job flows between the MDP’s industry and the plant’s industry (above median is “High” and below median is “Low”). Sample is all MOPS observations 11 or more non-missing responses to management questions (recalls only considered if respondent had at least 7 years of tenure). We also require (1) successful match to ASM; (2) positive values of value added, employment, materials, and capital; (3) all observations appear in at least 2 years (out of 2005, 2010 and 2015) in a county which either had an MDP established between 2005 and 2016 (“winner”), or competed for an MDP and lost (“loser”).

Having a university nearby is correlated with higher levels of firm skills and management scores

Dependent Variable:	Management	% firm employees with degree	Management	Management
	OLS	OLS	OLS	IV
Drive time to nearest university	-0.049*** (0.019)	-1.534*** (0.423)		
% employees with degree in the firm			0.789*** (0.082)	3.190*** (1.113)
Observations	6,406	6,406	6,406	6,406

Notes: Clustered by 313 regions. In final column proportion skilled is instrumented with distance to university. Controls include industry, regional (e.g. US state), local population density, distance to coast, weather and full set of firm and noise controls.

Source: Feng & Valero (2019)

Spare parts were also organized, reducing downtime (parts can be found quickly)



Nuts & bolts

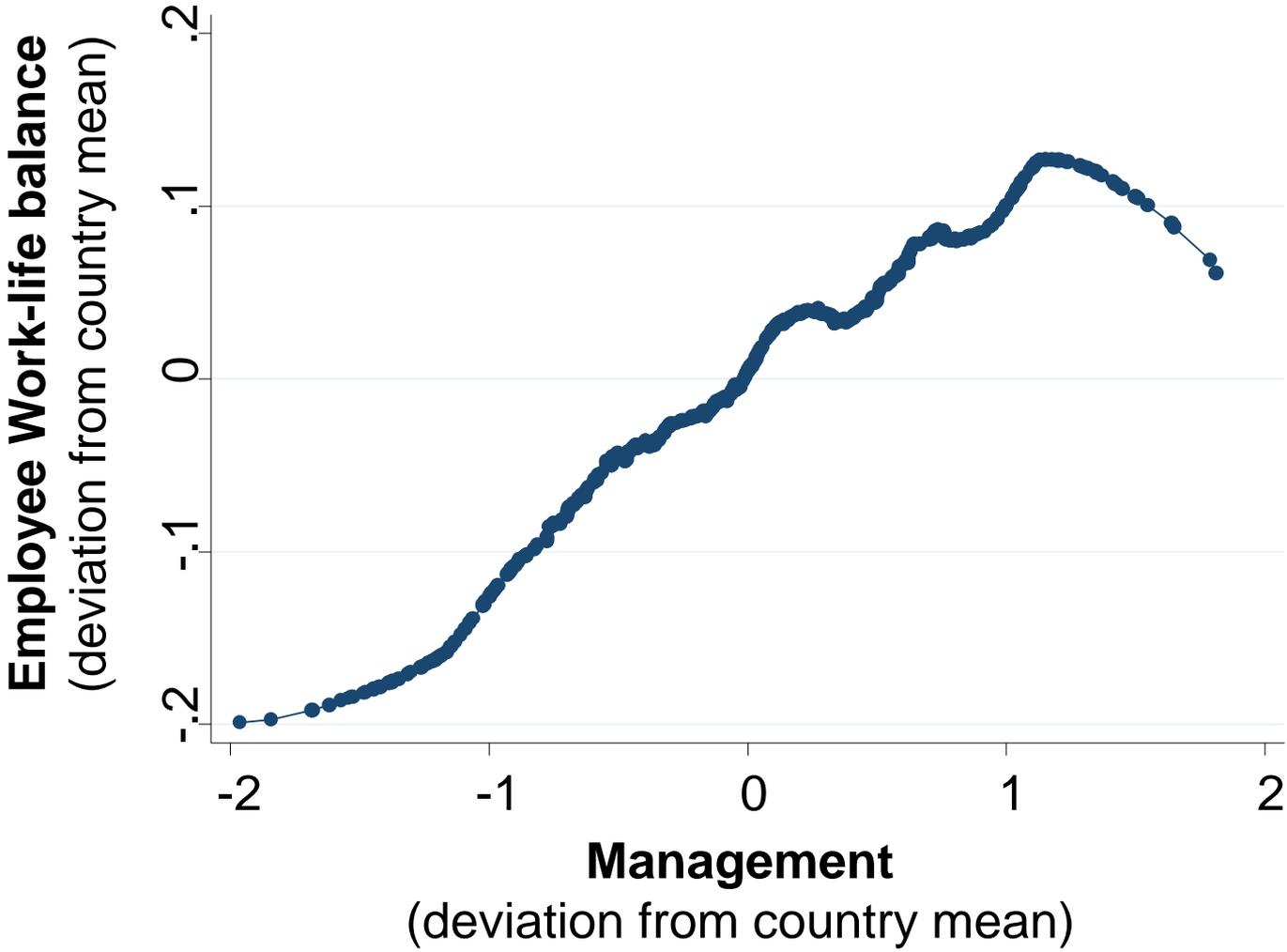


Spare parts

Tools



More broadly, better management is also associated with better employee treatment



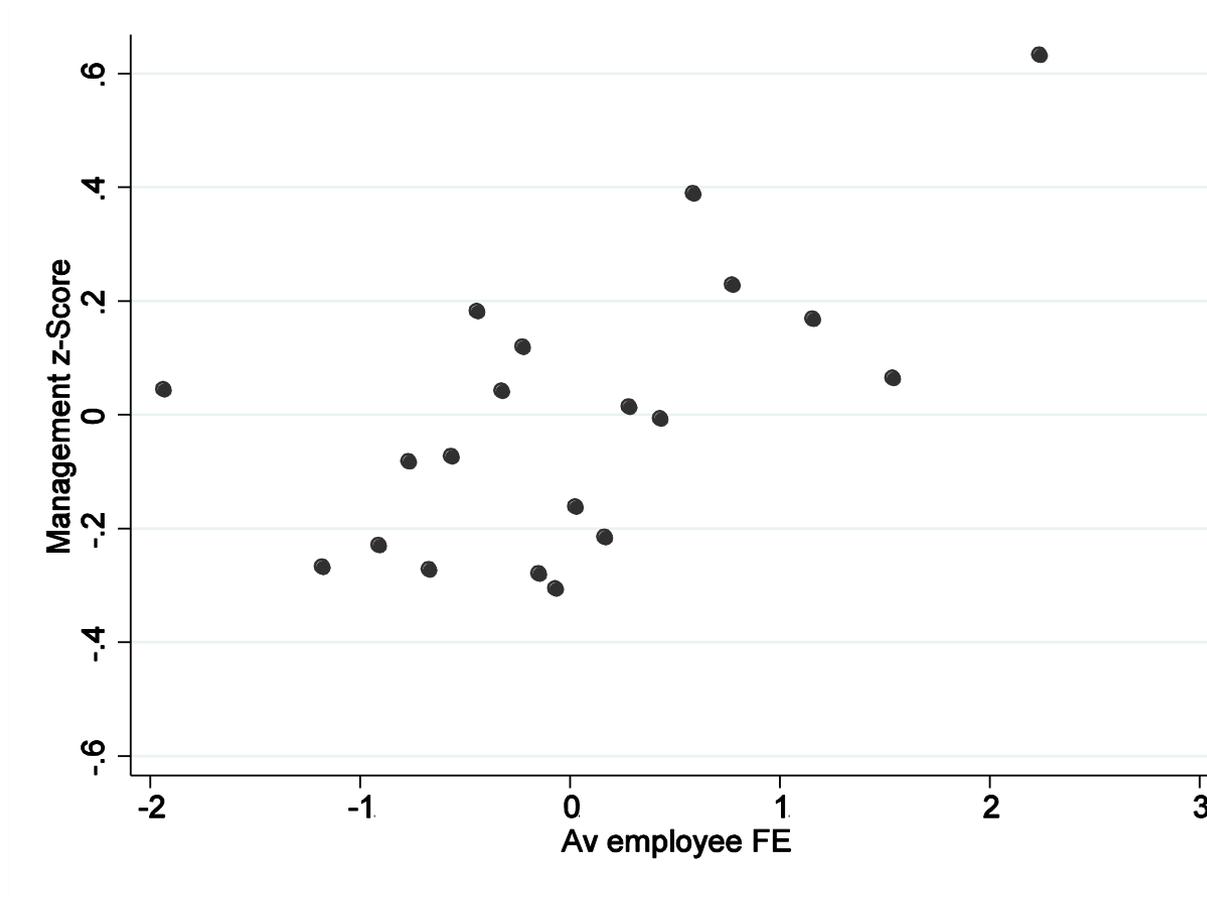
Source: Helping profits by helping employees? Work-life balance in America (2014, CAP) by Bloom, Sadun, Scur and Van Reenen. Sample of 540 firms in France, Germany, UK and US. Work-life balance scored on childcare flexibility, home-working entitlement, part-time and job-sharing flexibility, hours and holidays.

MOPS: Management *correlated* with performance

Dependent Variable	Log(Output/Employment)				Profit/Sales		Log(Output/Emp)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Management	1.351 (0.039)	0.209 (0.013)	0.079 (0.030)	0.096 (0.025)	0.074 (0.025)	0.095 (0.005)	0.051 (0.010)	0.105 (0.045)	0.071 (0.037)
Log(Capital/Emp)		0.100 (0.003)	0.012 (0.010)	0.096 (0.005)	0.096 (0.005)	0.026 (0.001)	0.023 (0.002)	0.004 (0.017)	0.016 (0.012)
Log(Material/Emp)		0.495 (0.004)	0.333 (0.016)	0.525 (0.008)	0.534 (0.009)	-0.068 (0.001)	-0.069 (0.003)	0.309 (0.030)	0.342 (0.018)
Log(Employment)		-0.027 (0.002)	-0.192 (0.019)	-0.054 (0.005)	-0.053 (0.005)	-0.002 (0.001)	-0.009 (0.002)	-0.217 (0.034)	-0.183 (0.023)
Share employees w. a college degree		0.223 (0.015)	0.013 (0.031)	0.180 (0.024)	0.179 (0.024)	0.023 (0.007)	0.025 (0.011)	0.064 (0.066)	-0.001 (0.035)
Observations	~82,500	~82,500	~33,000	~43,000	~43,000	~82,500	~43,000	~10,000	~23,000
Num. establishments	~52,500	~52,500	~16,500	~26,500	~26,500	~52,500	~26,500	~5,000	~11,500
Num. firms (clusters)	~32,500	~32,500	~9,800	~5,100	~5,100	~32,500	~5,100	~4,200	~6,800
Sample	All	All	Panel	Multi-plant firm		All	Multi-plant	Panel-Same responder	Panel-Different responder
Fixed Effects	None	Industry	Establish.	Firm	Firm*Year	Industry	Firm*Year	Establish.	Establish.

Notes: OLS coefficients with standard errors in parentheses (clustered at the firm level). The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample in columns 1, 2, and 6 is all MOPS observations with at least 10 non-missing responses to management questions and a successful match to ASM, which were also included in ASM tabulations, have positive value added, positive employment and positive imputed capital in the ASM. Recalls are used for respondents with at least 7 years of tenure at the establishment. Sample in column (3) includes only establishments with 2 observations (in 2010 and 2015 excluding recalls). Sample in columns (4), (5), and (7) includes establishments that have at least one sibling (i.e. from the same parents firm) in MOPS within the year. Columns (8) and (9) split the sample from column (3) to establishments with same respondent for 2010 and 2015 (8) and different respondent over the two years (9). In columns (1) through (5), (8), and (9) the dependent variable is log(real output over total employment). In column (6) to (7) profits are measured by value added minus wages and salaries over total value of shipments. All regressions include year fixed effect and recall dummy.

Figure 4
CORRELATION OF MANAGEMENT SCORE AND EMPLOYEE ABILITY
CONTROLLING FOR SIZE



NOTE. – The figure shows bin scatter of management scores against vigintiles of employee ability, as measured by the mean firm-level average of estimated employee effects (from the 1996-2002 period). Both variables are residualized by regressing the underlying variable on $\ln(\text{employment})$.

Multinationals use similar people management practices in their overseas affiliates

Figure 3a: People management z-scores, all firms by country of location

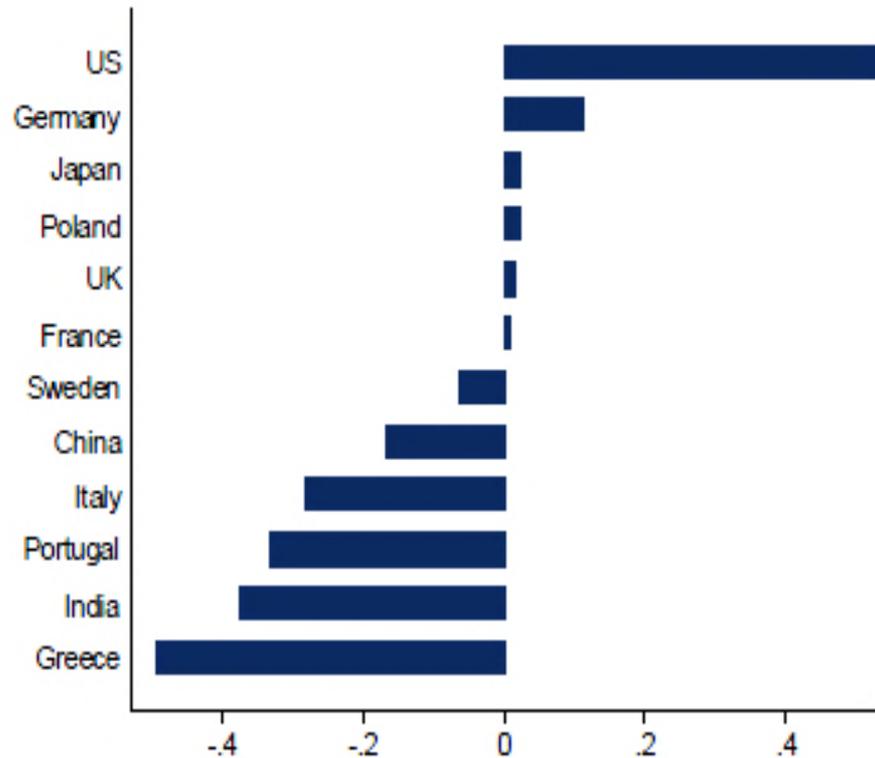
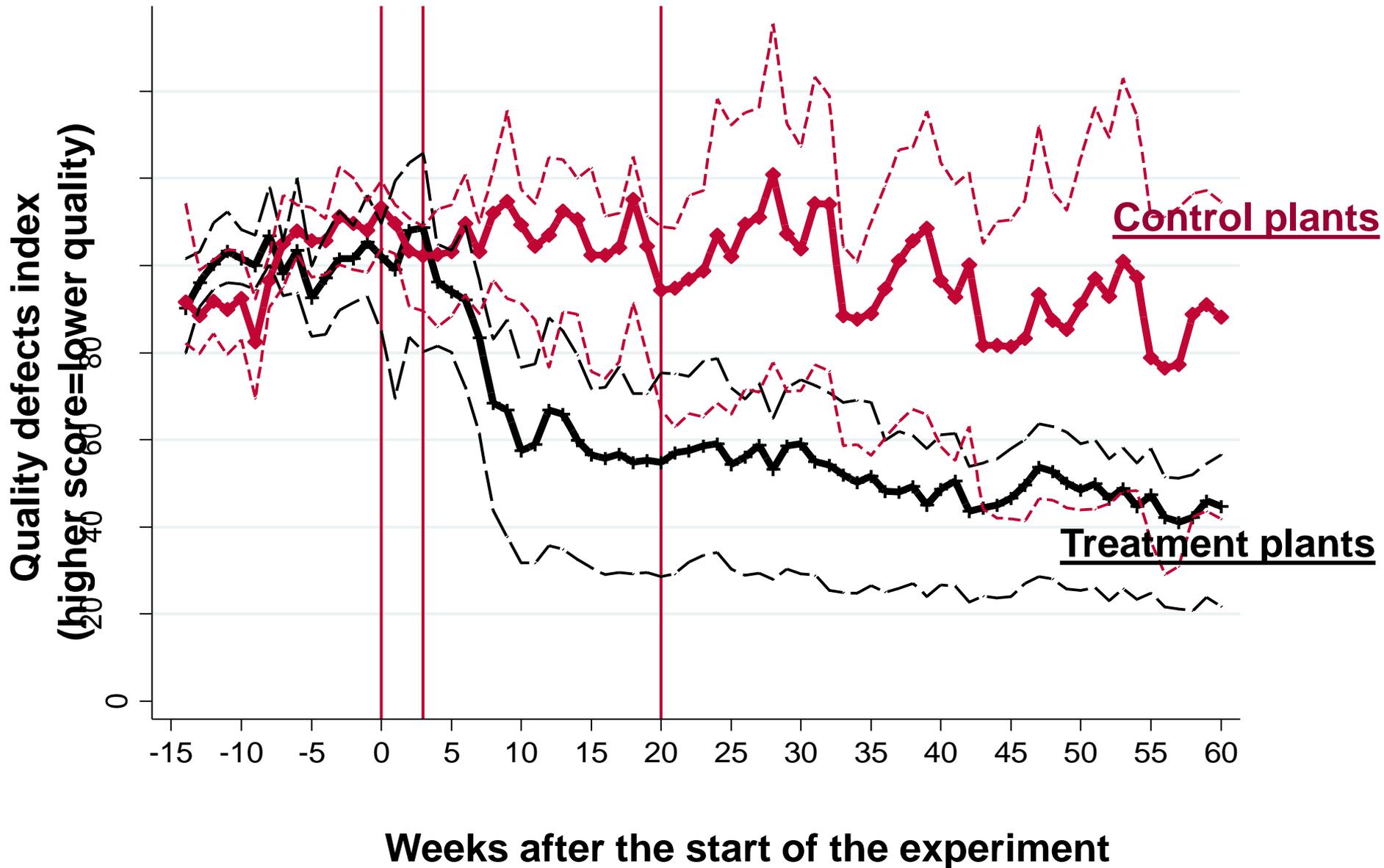


Figure 3b: People management z-scores, multinationals by country of origin



Quality improved significantly in treatment plants



Note: solid lines are point estimates, dashed lines are 95% confidence intervals

Do more competitive (less distorted) markets have more reallocation towards better managed firms?

$$Y_{ijk} = \alpha M_{ijk} + \beta (M * \text{FRICTION})_{ijk} + \gamma \text{FRICTION}_{ijk} + u_{ijk}$$

- Y_{ijk} = **SIZE** (or **GROWTH**) for firm i in industry j country k , and M is management
- **Frictions** = Proxies for frictions to competition
- Key test is $\beta < 0$ (less competition = less reallocation)

Find the US – where markets generally most competitive – has the most reallocation

Dependent Variable	Employees	Employees
Management (US=base)	182.6*** (20.8)	268.4*** (40.1)
MNG*Africa		-144.6*** (52.1)
MNG*Americas		-96.3** (43.9)
MNG*(“Northern” EU)		-46.6 (58.5)
MNG*(“Southern” EU)		-199.5*** (46.1)
MNG*Asia		-64.3 (52.3)
Observations	8,991	8,991

Reallocation towards better managed firms significantly worse in other countries than in US

Notes: US is the omitted country in columns 2 and 3. Includes year, country, 3-digit SIC dummies, firm and noise controls

Source: Bloom, Sadun & Van Reenen (2017)

Countries & industries with lower trade frictions (more competition) have greater allocation to well managed firms

Dependent Variable:	Employment	Employment	Employment
Management (M)	285.09*** (45.53)	463.23*** (105.09)	289.40*** (71.54)
Management*Trade Costs (World Bank Country Cost)	-0.10*** (0.03)	-0.16*** (0.05)	
Management*Job Regulation		-59.21* (30.66)	
Management*Tariff (country x industry)			-45.14* (24.65)
Fixed Effects	Industry, country	Industry, country	Industry* country
Observations	8,918	7,272	8,087

Notes: OLS, clustered by firm; Domestic firms only. Controls for firm age, skills, noise, SIC3, country dummies, Employment Protection is “difficulty of hiring” from World Bank (1=low, 100=high). Trade cost is the cost in \$ to export to the country (World Bank). Tariffs are MFN country-by-industry rates (in deviations from country & industry mean) from Feenstra and Romalis (2012).

Source: Bloom, Sadun & Van Reenen (2016)

Management RCT Evidence on developed Countries

- Incentives (see Bloom & Van Reenen, 2011 survey)
 - Schearer (2004). British Columbia tree planters randomized in & out of flat pay vs. piece rate pay. 20% increase in productivity
 - Angrist & Lavy (2009) on students
 - Duflo et al (2012) on teachers
- More broadly, WMS type management practices
 - Gosnell, List and Metcalfe (2018, f'coming JPE) Virgin Atlantic Airline pilots. Positive effects (esp. monitoring)
 - Fryer (2017) management intervention for teachers in Houston public schools. Positive effects when principal stayed.