Managing Trade: Evidence from China and the US

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Fourth IMF-Atlanta Fed Research Workshop on China's Economy
September 19-20, 2019

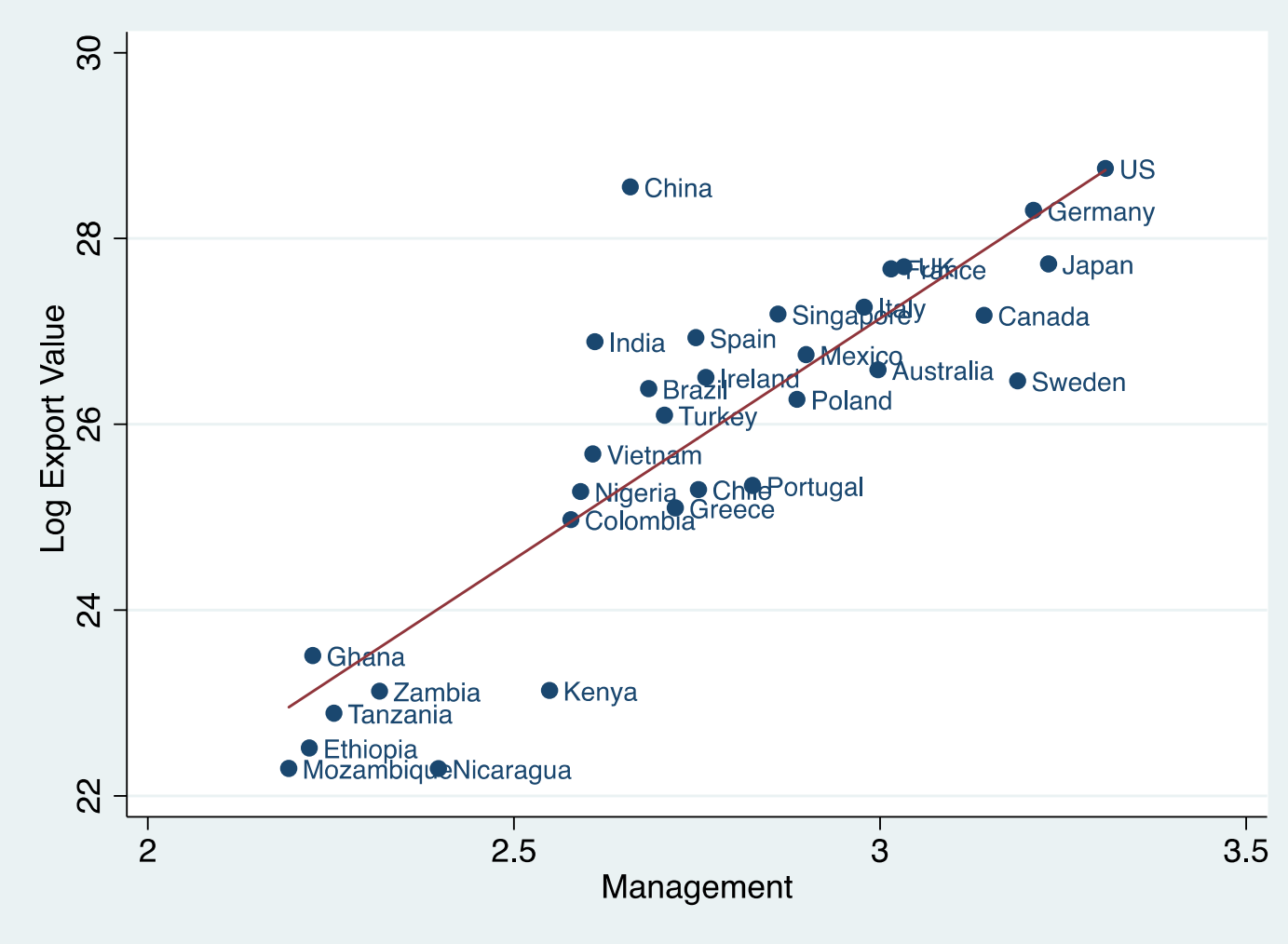
Motivation: Open Questions

- Productivity, management practices and trade activity vary dramatically across firms and countries

- Trade: what is productivity?
  - Long literature linking export performance to firm productivity
    (Melitz 2003, BEJK 2003, Melitz-Ottaviano 2008, Bernard et al 2007, …)
  - Recent focus on quality
    (Verhoogen 2008, Khandelwal 2010, Manova-Zhang 2012, …)
  - Link between management, quality and **back-box measure** of TFPR ?

- Management: how does good management manifest?
  - *Econ* Literature on productivity as good management (Walker 1887, Taylor 1912, Syverson 2011, …)
  - *Practitioner* literature on good management as quality - Lean and six-sigma (Deming 1950, Roos et al 1990…)

Trade & Management Across 31 Countries



Quality appears to be strongly connected with TFP & management

This paper examines trade, management and product quality – theory and empirics

- Examine the role of management practices for export performance to shed light on these open questions

- Theory: heterogeneous-firm trade model where management competence determines production efficiency and quality capacity

- Empirics: novel stylized facts consistent with model mechanisms
  - Unique data on plant-level production, plant-level management and transaction-level trade for world's two largest exporters
  - Consistent patterns for China and the US despite their different income level, institutional quality and market frictions

Where Does Good Management Come From?

- Exogenous draw (e.g. entrepreneurial talent)
- Endogenous choice based on firm primitive and economies of scale (e.g. hired manager)
  - Deterministic (e.g. efficient labor markets)
  - Stochastic (e.g. labor market frictions, match quality)

➔ Hard to distinguish causal effect of management from equilibrium correlation between joint outcomes of firm's profit maximization

➔ Either way, learn about management mechanisms

- Report conditional correlations: cross-section China, US
- Also provide suggestive causal evidence: panel US, RCT India

Academic and Policy Implications

- Firm growth, productivity, management and welfare, e.g.
  - Aggregate productivity & gains from trade (Hsieh-Klenow 2009, Arkolakis et al 2012, Melitz-Redding 2013)
  - Distributional effects across firms (and workers) (Melitz 2003, Pavcnik 2002, Bernard et al 2006, Bustos 2011)

- Developing countries look to trade for growth, especially exports to rich markets that demand quality and efficiency (Sutton, 2007, World Bank 2017)

Outline

1. Theoretical model
2. Six datasets
3. Empirical results

Partial Equilibrium Multi-Product Firm Model

- Building on Bernard-Redding-Schott (2010), Kugler-Verhoogen (2012) and Manova-Yu (2012)

- Consumers have CES preferences over differentiated goods i

$$U_j = \left[\int_{i \in \Omega_j} \left(q_{ji} x_{ji} \right)^{\alpha} di \right]^{1/\alpha}$$

$$\Rightarrow \quad x_{ji} = R_j P_j^{\sigma-1} q_{ji}^{\sigma-1} p_{ji}^{-\sigma}$$

  - x_{ji} , q_{ji} , p_{ji} are quantity, quality, price of variety i in country j
  - $\sigma = 1/(1-\alpha)$>1 : elasticity of substitution
  - $\boldsymbol{q_{ji} \propto \ln x_{ji} + \sigma \ln p_{ji}}$: sufficient statistic for product quality (similar to Khandelwal 2010, Khandelwal, Schott & Wei 2013)

Production Technology

- Firms pay entry sunk cost and draw management level $\varphi \epsilon (0, \infty) \sim g(\varphi)$
  - Extend to entrepreneurial talent φ and endogenous management
- Firms also draw vector of product-specific expertise levels $\lambda_i \epsilon (0, \infty) \sim z(\lambda)$
- Quantity production function
  - Producing 1 unit of physical output requires $(\varphi \lambda_i)^{-\delta}$ workers
  - $\delta \geq 0$: elasticity of production efficiency wrt management
- Quality production function
  - Producing 1 unit of quality requires $(\varphi \lambda_i)^{\theta - \delta}$ workers
  - $q_i(\varphi, \lambda_i) = (\varphi \lambda_i)^{\theta}$, θ elasticity of product quality wrt management

Predictions on Better Managed Firms

Proposition 1 More likely to export

Proposition 2 Enter more markets, with more products, and earn higher export revenues and profits.

Proposition 3 Lower quality-adjusted prices and

- … higher-quality and higher-prices if $\theta > \delta > 0$. (China)
- … higher-quality and invariant-prices if $\theta = \delta > 0$. (US)
- … higher-quality and lower-prices if $\delta > \theta > 0$.
- … invariant-quality and lower-prices if $\delta > \theta = 0$.

Proposition 4 Use higher quality and more varied inputs if $\theta > 0$

Outline

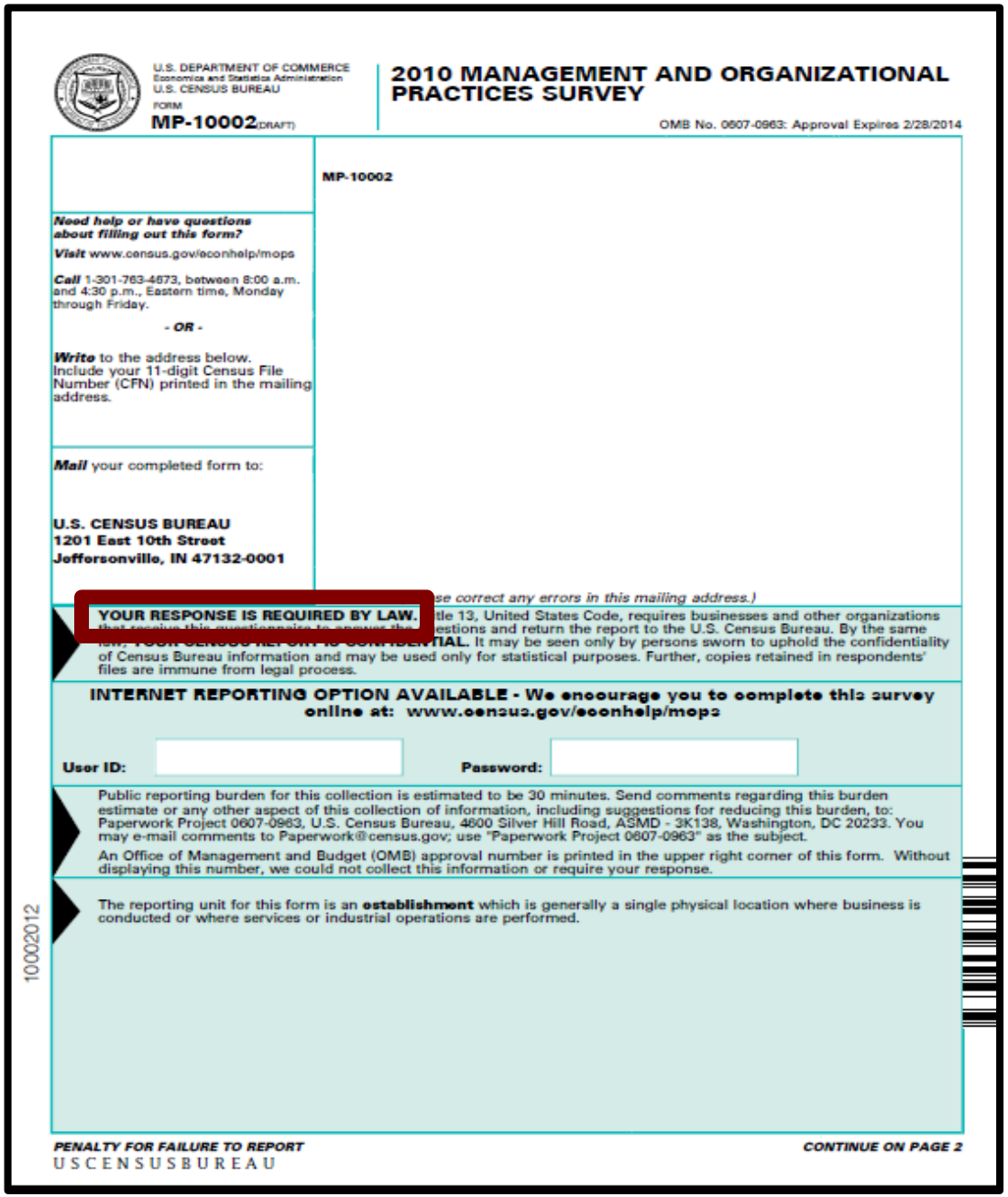
1. Theoretical model
2. Six datasets
3. Empirical results

6-Datasets Overview

	China	US
Management	WMS	MOPS
Production	ASIE	ASM
Transactions	CCTS	LFTTD

US Management Data: MOPS

- 47,534 plants
- Mandatory, 78% response rate
- 5.6m employees, >50% of US manufacturing
- 2 types of practices: monitoring and incentives



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Bloom, Manova, Sun, Van Reenen and Yu

Monitoring

2 In 2005 and 2010, how many key performance indicators were monitored at this establishment?

Examples: Metrics on production, cost, waste, quality, inventory, energy, absenteeism and deliveries on time.

Check one box for each year	2005	2010
1-2 key performance indicators	☐	☐
3-9 key performance indicators	☐	☐
10 or more key performance indicators	☐	☐
No key performance indicators (If no key performance indicators in both years, SKIP to **6**)	☐	☐

Incentives

14 In 2005 and 2010, what was the primary way **managers** were promoted at this establishment?

Check one box for each year	2005	2010
Promotions were based solely on performance and ability	☐	☐
Promotions were based partly on performance and ability, and partly on other factors (for example, tenure or family connections)	☐	☐
Promotions were based mainly on factors other than performance and ability (for example, tenure or family connections)	☐	☐
Managers are normally not promoted	☐	☐

6-Datasets Overview

	China	US
Management	WMS	MOPS
Production	ASIE	ASM
Transactions	CCTS	LFTTD

US Data: Production & Trade

- Production: Census Annual Survey of Manufacturers
  - ~45,000 plants and >10,000 firms in 2010
  - Covers about 2/3 all US manufacturing output
  - Data on output, exports, labor, capital, materials, …

- Trade: Census Longitudinal Federal Trade Transaction Database
  - ~100 million transactions a year
  - HS-10 product, month, source/destination country
  - Revenue, units, quantity

6-Datasets Overview

	China	US
Management	WMS	MOPS
Production	ASIE	ASM
Transactions	CCTS	LFTTD

World Management Survey

- World Management Survey
  - 20,000+ firms, 35 countries since 2004
  - 507 companies in China in 2007

- Survey procedure (Bloom and Van Reenen 2007)
  - 45min double-blind phone interview of plant managers
  - 18 questions on monitoring and incentives

6-Datasets Overview

	China	US
Management	WMS	MOPS
Production	ASIE	ASM
Transactions	CCTS	LFTTD

China Data: Management, Production & Trade

- Production: Annual Survey of Industrial Enterprises (National Bureau of Statistics)
  - >200,000 firms, 1999-2007
  - Output, total exports, employment, inputs, ownership, …
- Trade: transaction data from Chinese Customs Trade Statistics (Chinese Customs Office)
  - ~100 million transactions a year
  - HS-8 product, month, source/destination country, trade regime
  - Revenue, units, quantity

Outline

1. Theoretical model
2. Six datasets
3. Empirical results
   i. Baseline
   ii. Causality
   iii. Management vs TFPR

Empirical Strategy

- Document conditional correlation between trade and management

$$Trade_{ft} = \alpha + \beta \cdot Management_{f} + \delta' \cdot Z_{ft} + \varphi_{l} + \varphi_{i} + \varphi_{t} + \varepsilon_{ft}$$

$$Trade_{fcpt} = \alpha + \beta \cdot Management_{f} + \delta' \cdot Z_{ft} + \varphi_{l} + \varphi_{cp} + \varphi_{t} + \varepsilon_{fcpt}$$

  - $Trade_{ft}$, $Trade_{fcpt}$: export and imported-input activity
  - $Management_{f}$: management z-score
  - φ_{l}, φ_{i}, φ_{t} : 31 province FE, 82 SIC-3 industry FE, year FE (China)
  - φ_{l}, φ_{i} : 50 state FE, ~300 NAICS-6 industry FE (US)
  - φ_{cp} : country x HS-8 product pair FE
  - Z_{ft} : ownership, age, skill & capital intensity, noise; productivity; size
  - ε_{ft} : errors clustered by firm (China, US) or robust (US)

Propositions 1 & 2

↑ management ↔ ↑ export probability, ↑ global exports

	China				US			
Dep Variable:	Exporter Dummy		Log Exports		Exporter Dummy		Log Exports	
Management	0.040**	0.048***	0.260**	0.231*	0.042***	0.031***	0.488***	0.373***
	(2.30)	(2.75)	(2.14)	(1.81)	(13.92)	(10.13)	(21.72)	(16.79)
Capital Intensity		-0.01		0.145		-0.020***		0.193***
		(-0.76)		(1.43)		(-6.04)		(7.35)
Log Wage		0.041*		0.401**		0.106***		0.904***
		(1.82)		(2.17)		(9.82)		(11.84)
Age		0.030		0.153		0.044***		0.411***
		(1.53)		(1.01)		(11.47)		(13.29)
	Own, Prov, SIC3 Ind, Year FE; Noise Controls				State, NAICS6 Ind FE; Noise Controls			
R-squared	0.41	0.43	0.40	0.43	0.26	0.27	0.33	0.37
# observations	3,233	3,123	2,236	1,935	32,000	32,000	13,000	13,000

Proposition 2

↑ management ↔ ↑ **extensive** & ↑ intensive export margins

Dep Variable:	Log # Dest	Log # Prod	Log # Dest-Prod	Log Avg Exports per Dest-Prod	Log Avg Exports per Dest-Prod
<u>China</u>	Own, Prov, SIC3 Ind, Year FE; Noise + Firm Controls				
Management	0.185***	0.166***	0.215***	0.017	0.196*
	(2.80)	(3.33)	(2.89)	(0.20)	(1.74)
R-squared	0.44	0.42	0.40	0.45	0.431
# observations	1,935	1,935	1,935	1,935	1,935
<u>US</u>	State, NAICS6 Ind FE; Noise + Firm Controls				
Management	0.134***	0.165***	0.195***	0.177***	0.320***
	(13.08)	(15.32)	(15.13)	(12.75)	(16.05)
R-squared	0.37	0.33	0.37	0.32	0.36
# observations	13,000	13,000	13,000	13,000	13,000

Proposition 3

↑ management ↔ ↑ production efficiently, ↑ product quality

- Model-consistent measure of quality : σ p + x , σ=5
- $\theta^{China} > \theta^{US}$, $\delta^{China} > \delta^{US}$, $\theta^{China} - \delta^{China} > \theta^{US} - \delta^{US} = 0$

	China				US			
Dep Variable:	Log Export Quality	Log Quality-Adj Export Price	Log Export Price	Log Export Quantity	Log Export Quality	Log Quality-Adj Export Price	Log Export Price	Log Export Quantity
Structural Parameter:	θ^{CH}	$-\delta^{CH}$	$\theta^{CH} - \delta^{CH}$		θ^{US}	$-\delta^{US}$	$\theta^{US} - \delta^{US}$	
Management	0.531*	-0.385*	0.146**	-0.200	0.048***	-0.045***	0.003	0.034***
	(1.95)	(-1.82)	(2.16)	(-1.49)	(2.60)	(-2.91)	(0.68)	(2.83)
	Own, Prov, Dest-Product, Year FE; Noise + Firm Controls				State, Dest-Product FE; Noise + Firm Controls			
R-squared	0.92	0.89	0.92	0.79	0.96	0.95	0.97	0.83
# observations	58,101	58,101	58,101	58,101	290,000	290,000	290,000	290,000

Proposition 4

↑ management ↔ ↑ input quality

	China				US			
Dep Variable:	Log Imports	Log $\frac{\text{Imports}}{\text{Inputs}}$	Log Avg Origin Income	Log Import Input Price	Log Imports	Log $\frac{\text{Imports}}{\text{Inputs}}$	Log Avg Origin Income	Log Import Input Price
Management	0.550***	0.222*	0.046**	0.101**	0.344***	-0.003	0.037***	-0.001
	(4.32)	(1.86)	(2.11)	(2.36)	(11.83)	(-0.03)	(3.89)	(-0.34)
	Own, Prov, Ind, Year FE; Noise + Firm Controls				State, Ind FE; Noise + Firm Controls			
				Orig-Prod FE				Orig-Prod FE
R-squared	0.56	0.50	0.38	0.81	0.31	0.27	0.21	0.97
# observations	1,778	1,778	1,778	76,626	10,000	10,000	10,000	140,000

Proposition 4

↑ management ↔ ↑ assembly complexity

	China			US		
Dep Variable:	Log # Origins	Log # Import Prod	Log # Origin-Prod	Log # Origins	Log # Import Prod	Log # Origin-Prod
Management	0.168***	0.123*	0.145**	0.058***	0.079***	0.087***
	(4.24)	(1.82)	(2.09)	(7.41)	(6.81)	(6.97)
Log # Export Products	0.245***	0.387***	0.441***	0.426***	0.561***	0.632***
	(7.69)	(6.97)	(7.77)	(66.14)	(58.70)	(60.40)
	Own, Prov, SIC3 Ind, Year FE; Noise + Firm Controls			State, NAICS6 Ind FE; Noise + Firm Controls		
R-squared	0.52	0.58	0.60	0.33	0.30	0.32
# observations	1,778	1,780	1,780	10,000	10,000	10,000

Management vs. TFPR

- Bloom et al (2017) decompose TFPR in same ASM-WMS US data
  - ~1/2 of TFPR is ME
  - Management ~1/5 of TFPR, ~1/3 of corrected TFP

➔ Management and TFPR may both significantly enter trade regressions for 2 reasons that we cannot distinguish

1. ME in TFPR
2. Multiple TFP components

➔ We regress TFPR on management and extract the residual as "Non-management TFPR"

- Regress trade outcomes on both management and TFPR

Management vs. TFPR : China

Dep Variable:	Exporter Dummy	Log Exports	Exporter Dummy	Log Exports	Log Export # Dest-Prod	Export Quality	Log Import # Ctry-Prod	Import Quality
Management			0.053***	0.287**	0.250***	0.520*	0.194***	0.592***
			(2.93)	(2.34)	(3.32)	(1.89)	(2.83)	(3.14)
TFPR	-0.006	0.274***						
	(-0.45)	(3.54)						
Non-Management TFPR			-0.006	0.246***	0.139***	0.242**	0.117**	0.411***
			(-0.49)	(3.28)	(3.29)	(2.3)	(2.37)	(2.87)
Effect of 1 SD Management	-	-	10.7%	11.3%	19.0%	5.4%	12.2%	4.5%
Effect of 1 SD Non-ManTFP	-	-	1.5%	12.1%	11.5%	2.5%	8.2%	3.1%
Marginal R2 from Control variables only								
+ Management only			0.60%	0.70%	1.98%	0.02%	2.12%	0.07%
+ NonMan TFP only			0.01%	0.83%	0.77%	0.02%	0.94%	0.06%
+ Both			0.61%	1.51%	2.71%	0.04%	2.89%	0.13%

Management vs. TFPR : US

Dep Variable:	Exporter Dummy	Log Exports	Exporter Dummy	Log Exports	Log Export # Dest-Prod	Export Quality	Log Import # Ctry-Prod	Import Quality
Management			0.031***	0.364***	0.191***	0.042***	0.199***	0.050**
			(9.72)	(17.21)	(14.81)	(2.96)	(13.64)	(2.01)
TFPR	0.040***	0.307***						
	(11.49)	(12.09)						
Non-Management TFPR			0.037***	0.273***	0.025**	0.025**	0.142***	0.035**
			(10.56)	(10.79)	(2.14)	(2.14)	(8.38)	(2.12)
Effect of 1 SD Management	-	-	6.2%	13.1%	11.6%	0.5%	0.7%	12.8%
Effect of 1 SD Non-ManTFP	-	-	16.3%	22.2%	21.3%	0.7%	1.1%	20.5%
Marginal R2 from Control variables only								
+ Management only	-	-	0.0%	1.3%	1.0%	0.0%	0.0%	0.0%
+ NonMan TFP only	-	-	1.0%	0.8%	0.7%	0.0%	0.0%	0.0%
+ Both	-	-	0.7%	2.2%	1.7%	0.0%	0.0%	0.0%

Conclusions – Management, Trade and Quality Tightly linked

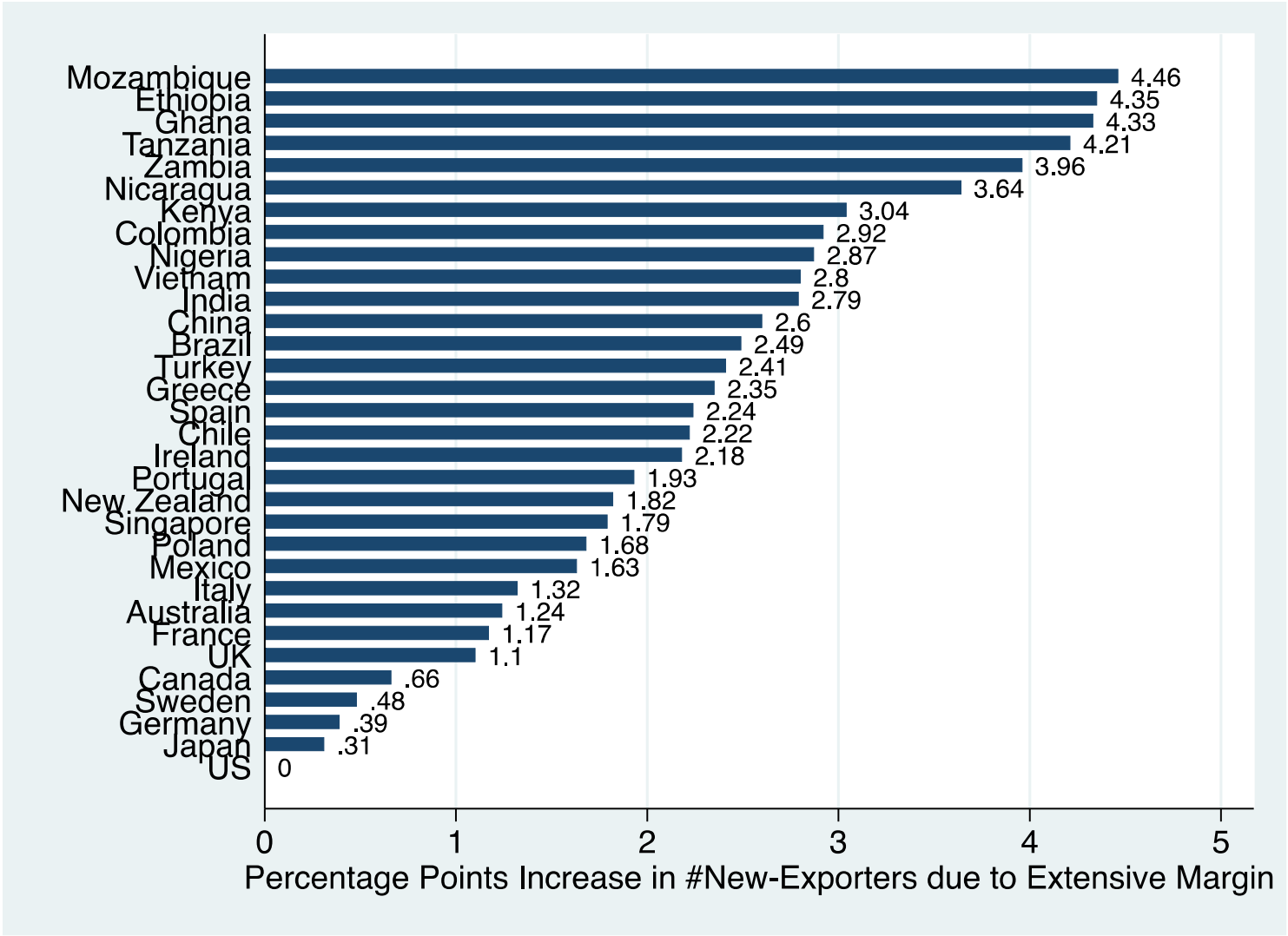
- Good management enhances trade through more efficient and higher quality production in China and US

- Suggests management and quality inputs shape growth, trade and impact of export reforms in LDCs

- Future work: How does management affect …
  - Overall trade activity
  - Multinational activity
  - Response to shocks (2008-2009 crisis)

BACK UP

What if Avg US Management Worldwide?



Summary Statistics

	China			US		
	N	Mean	St Dev	N	Mean	St Dev
Log Exports	2,236	14.80	2.31	13,000	13.79	2.77
# Export Products	2,236	8.65	11.58	13,000	18.94	47.50
# Export Destinations	2,236	12.85	14.99	13,000	12.95	16.72
Log Imports	2,048	13.87	2.97	10,000	13.93	2.96
# Import Products	2,048	33.45	51.43	10,000	19.67	43.09
# Import Origin Countries	2,048	6.30	5.67	10,000	6.20	8.02

Management vs. TFPR

Dep Variable:	TFPR	Exporter Dummy	Log Exports	Log # Dest-Prod	Log Avg Exports per Dest-Prod
China	Own, Prov, SIC3 Ind, Year FE; Noise + Firm Controls				
Management	0.086*	0.054***	0.243*	0.240***	0.003
	(1.69)	(2.94)	(1.87)	(3.19)	(0.03)
TFPR		-0.006	0.257***	0.139***	0.118*
		(-0.49)	(3.35)	(3.29)	(1.94)
US	State, NAICS6 Ind FE; Noise + Firm Controls				
Management	0.090***	0.026***	0.348***	0.181***	0.167***
	(10.10)	(8.66)	(15.69)	(14.05)	(11.94)
TFPR		0.037***	0.280***	0.160***	0.120***
		(10.50)	(11.25)	(10.56)	(8.32)

Economic Magnitudes

- Improving management in China (US) by 1 standard deviation associated with
  - 5% (3%) higher probability of exporting
  - 24% (37%) higher exports
  - 36% (11%) higher export profits

  - 19% (13%) more destinations
  - 17% (17%) more export products
  - 22% (20%) more destination-products
  - 2% (18%) higher avg exports per dest-prod

Economic Magnitudes

- Improving management in China (US) by 1 standard deviation associated with
  - 14% (~0%) higher export prices
  - 51% (4.8%) higher export quality
  - 36% (4.5%) lower quality-adjusted export prices

  - 4.7% (3.7%) higher avg origin income
  - 10% (~0%) higher import prices
  - 20% (21%) more origin–import products

Example Targets: How are targets set?

Score	(1): Goals are exclusively financial or operational	(3): Goals include non-financial targets, which form part of the performance appraisal of top management *only*	(5): Goals are a balance of financial and non-financial targets. Senior managers believe the non-financial targets are often more inspiring and challenging than financials alone

Example Monitoring: How is performance tracked?

Score	(1): Measures tracked do not indicate directly if overall business objectives are being met. Certain processes aren't tracked at all	(3): Most key performance indicators are tracked formally. Tracking is overseen by senior management	(5): Performance is continuously tracked and communicated, both formally and informally, to all staff using a range of visual management tools

Trade vs. Domestic Activity

- Global exports rise faster with management than domestic sales

Dep Variable:	Log Dom Sales	Exporter Dummy	Log Exports	Log # Dest-Prod	Log Avg Exports per Dest-Prod
China	Own, Prov, SIC3 Ind, Year FE; Noise + Firm Controls				
Management	0.475***	0.058***	0.250*	0.219***	0.032
	(2.97)	(3.32)	(1.96)	(2.96)	(0.37)
Log Dom Sales		-0.025***	-0.035	-0.007	-0.028
		(-7.33)	(-1.46)	(-0.43)	(-1.50)
US	State, NAICS6 Ind FE; Noise + Firm Controls				
Management	0.344***	0.022***	0.164***	0.072***	0.092***
	(29.43)	(6.92)	(7.35)	(5.54)	(6.46)
Log Dom Sales		0.028***	0.605***	0.358***	0.247***
		(9.87)	(33.62)	(33.85)	(21.83)

Academic and Policy Implications

- Firm heterogeneity and welfare
  - Aggregate productivity & gains from trade (Hsieh-Klenow 2009, Arkolakis et al 2012, Melitz-Redding 2013, Berthou-Manova-Sandoz 2017, …)
  - Distributional effects across firms and workers (Melitz 2003, Pavcnik 2002, Bernard et al 2006, Bustos 2011, Verhoogen 2008, …)

- Developing countries look to trade for growth, especially exports to rich markets that demand quality and efficiency
  - Access to foreign inputs (Goldberg et al 2013, Fieler et al 2015, Manova-Zhang 2012, …)
  - Effective GVC participation (Alfaro et al 2016, Chor-Manova-Yu 2017, ...)

➔ Direct evidence that poor management hurts quality capability
  - impedes growth, trade and entrepreneurship in developing countries
  - amplifies distributional effects of globalization

Dep Variable:	TFPR	Exporter Dummy	Log Exports	Exporter Dummy	Log Exports	Log Export Quality	Log Qual-Adj Exp Price	Log Imp Input Quality
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. China								
Management	0.150***			0.053***	0.287**	0.520*	-0.363*	0.592***
	(3.48)			(2.93)	(2.34)	(1.89)	(-1.69)	(3.14)
TFPR		-0.006	0.274***					
		(-0.45)	(3.54)					
Non-Management TFPR				-0.006	0.246***	0.242**	-0.192**	0.411***
				(-0.49)	(3.28)	(2.30)	(-2.32)	(2.87)
Fixed Effects	Province, SIC-3 Industry, Own, Year							
Noise, Firm Controls	Y	Y	Y	Y	Y	Y	Y	Y
Country-Product FE	--	--	--	--	--	Y	Y	Y
R-squared	0.49	0.42	0.44	0.43	0.46	0.90	0.89	0.78
# observations	2,800	2,802	1,880	2,800	1,880	54,565	54,565	70,270

Dep Variable:	TFPR	Exporter Dummy	Log Exports	Exporter Dummy	Log Exports	Log Export Quality	Log Qual-Adj Exp Price	Log Imp Input Quality
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. China								
Management	0.150***			0.053***	0.287**	0.520*	-0.363*	0.592***
	(3.48)			(2.93)	(2.34)	(1.89)	(-1.69)	(3.14)
TFPR		-0.006	0.274***					
		(-0.45)	(3.54)					
Non-Management TFPR				-0.006	0.246***	0.242**	-0.192**	0.411***
				(-0.49)	(3.28)	(2.30)	(-2.32)	(2.87)
Fixed Effects	Province, SIC-3 Industry, Own, Year							
Noise, Firm Controls	Y	Y	Y	Y	Y	Y	Y	Y
Country-Product FE	--	--	--	--	--	Y	Y	Y
R-squared	0.49	0.42	0.44	0.43	0.46	0.90	0.89	0.78
# observations	2,800	2,802	1,880	2,800	1,880	54,565	54,565	70,270
Panel B. US								
Management	0.090***			0.026***	0.358***	0.041***	-0.045***	0.049**
	(10.10)			(8.66)	(16.37)	(2.96)	(-3.64)	(2.50)
TFPR		0.040***	0.307***					
		(11.49)	(12.09)					
Non-Management TFPR				0.037***	0.273***	0.025**	-0.024**	0.035***
				(10.50)	(11.12)	(2.30)	(-2.38)	(2.58)
Fixed Effects	State, NAICS-6 Industry							
Noise, Firm Controls	Y	Y	Y	Y	Y	Y	Y	Y
Country-Product FE	--	--	--	--	--	Y	Y	Y
R-squared	0.83	0.28	0.38	0.28	0.41	0.97	0.96	0.93
# observations	32,000	32,000	13,000	32,000	13,000	290,000	290,000	140,000

	Export Activity		Quality and Efficiency			Imported Input Quality and Assembly Complexity		
Dep Variable:	Exporter Dummy	Log Exports	Log Export Quality	Log Qual-Adj Export Price	Log Export Price	Log Avg Origin Income	Log Imp Input Quality	Log # Origin-Prod
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. China								
Monitoring & Targets	0.061***	0.012	0.558*	-0.378	0.180**	0.059**	0.353	0.373***
	(2.68)	(0.08)	(1.84)	(-1.58)	(2.54)	(2.19)	(1.64)	(3.89)
Incentives	-0.030	0.266*	-0.008	-0.024	-0.032	-0.013	0.289	-0.195**
	(-0.58)	(1.96)	(-0.03)	(-0.11)	(-0.52)	(-0.42)	(1.23)	(-2.09)
Fixed Effects	Province, SIC-3 Industry, Own, Year							
Noise, Firm Controls	Y	Y	Y	Y	Y	Y	Y	Y
Country-Product FE	--	--	Y	Y	Y	--	Y	--
R-squared	0.43	0.43	0.9	0.89	0.92	0.38	0.78	0.61
# observations	3,123	1,935	58,101	58,101	58,101	1,778	76,626	1,778
Panel B. US								
Monitoring & Targets	0.022***	0.307***	0.050**	-0.050***	-0.005	0.045***	0.052**	0.101***
	(6.99)	(13.11)	(2.56)	(-3.88)	(-1.10)	(4.52)	(2.57)	(7.67)
Incentives	0.013***	0.141***	0.017	-0.006	0.001	-0.003	0.014	0.011
	(4.63)	(6.57)	(1.03)	(-0.057)	(0.16)	(-0.29)	(0.86)	(0.88)
Fixed Effects	State, NAICS-6 Industry							
Noise, Firm Controls	Y	Y	Y	Y	Y	Y	Y	Y
Country-Product FE	--	--	Y	Y	Y	--	Y	--
R-squared	0.27	0.39	0.96	0.96	0.97	0.21	0.93	0.53
# observations	32,000	13,000	290,000	290,000	290,000	10,000	140,000	10,000

Management As Productivity

We measure how well firms manage physical and human capital, and view it as critical to total factor productivity

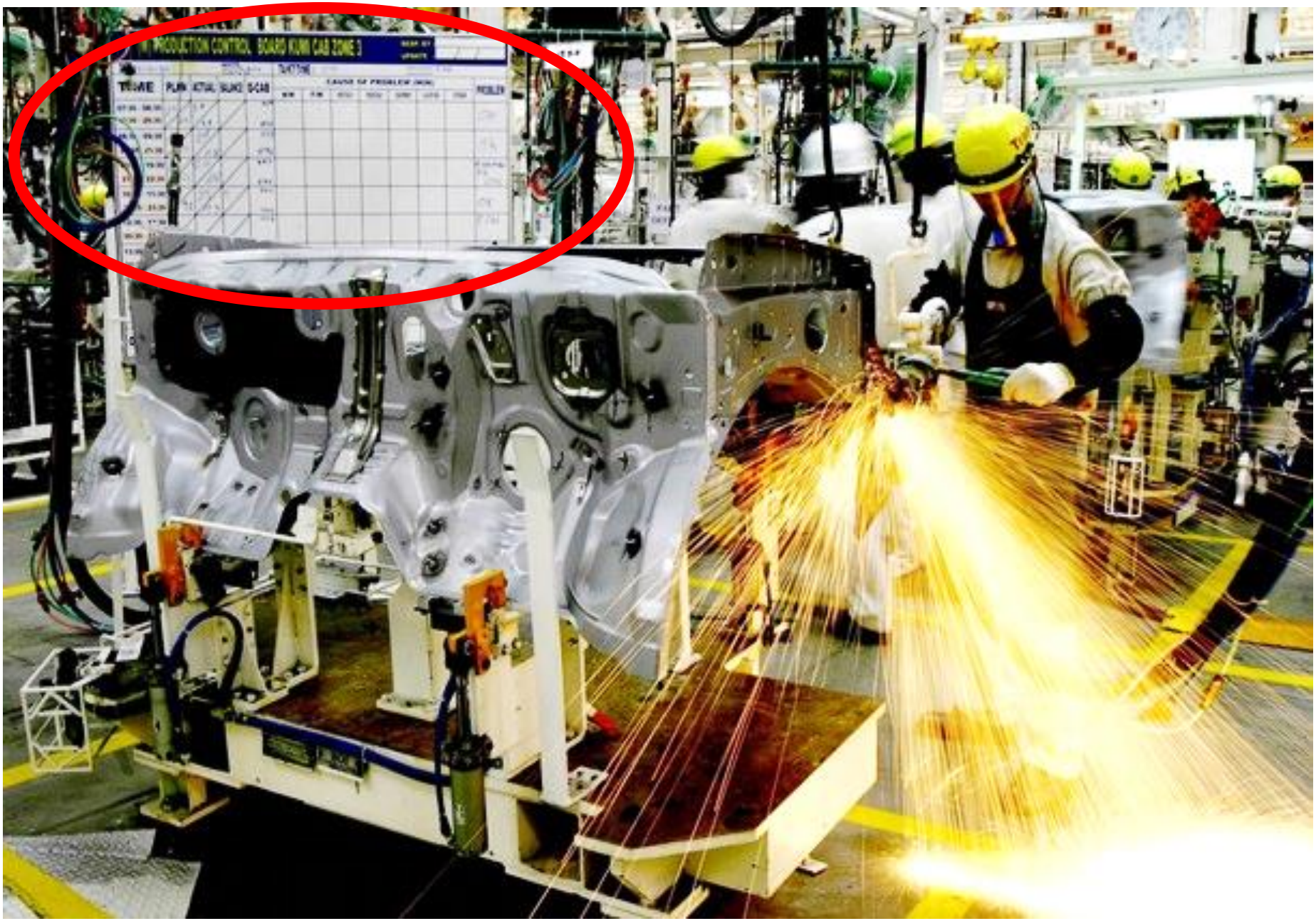
- Standard TFPR measures of unobserved TFPQ face 2 challenges:
  1. Estimation bias due to endogenous prices and mark-ups
  2. Black box due to residual from production function estimate

     (e.g. Hsieh-Klenow 2009, De Loecker 2011, Bartelsman et al 2013)

➔ Management is a direct, independent measure of a tangible TFP component that overcomes both challenges

  1. No non-classical ME in trade ↔ management
  2. Clear policy implications

Example of Performance Metrics: Car Plant

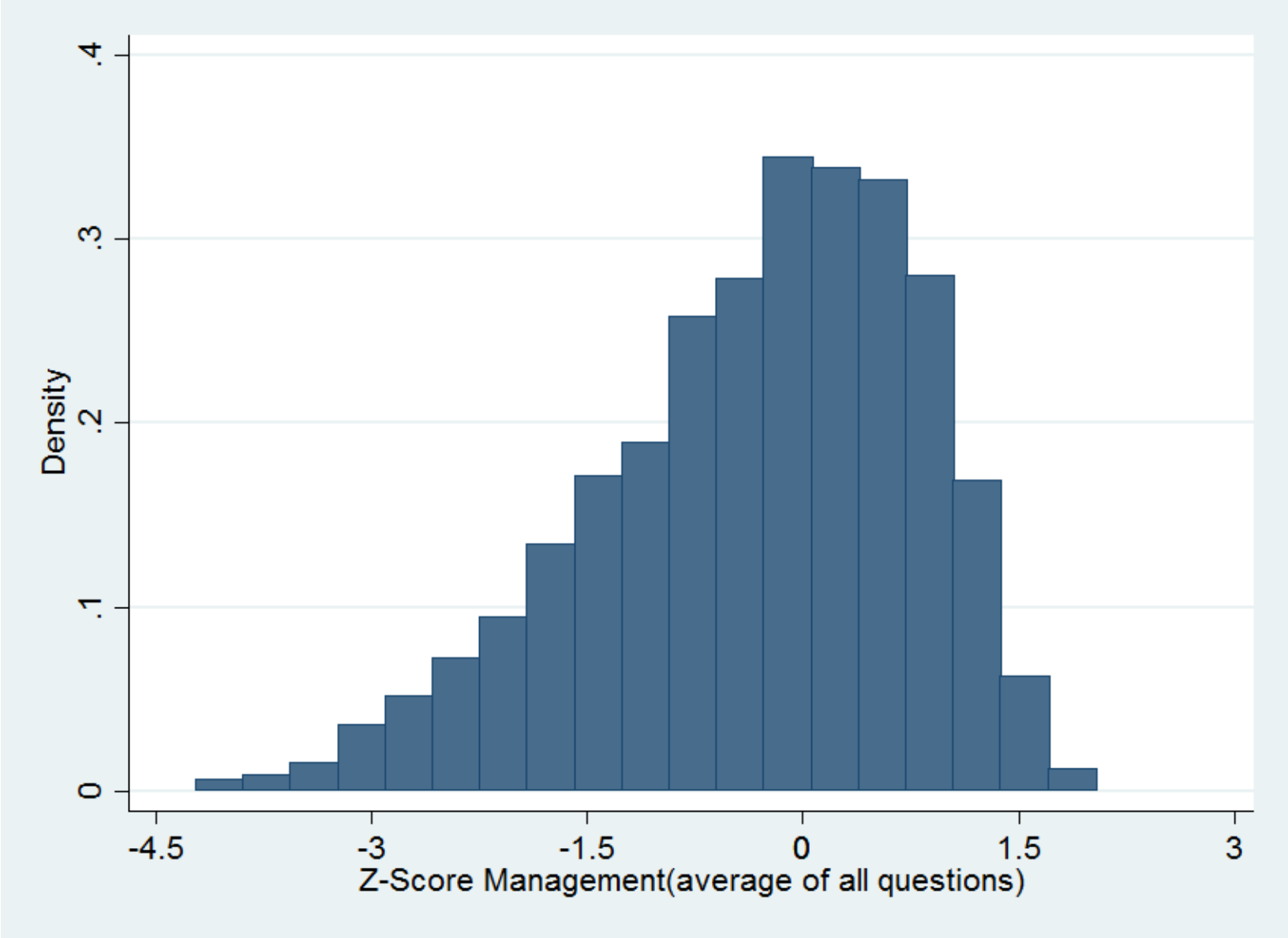


Example of Performance Metrics: Hospital

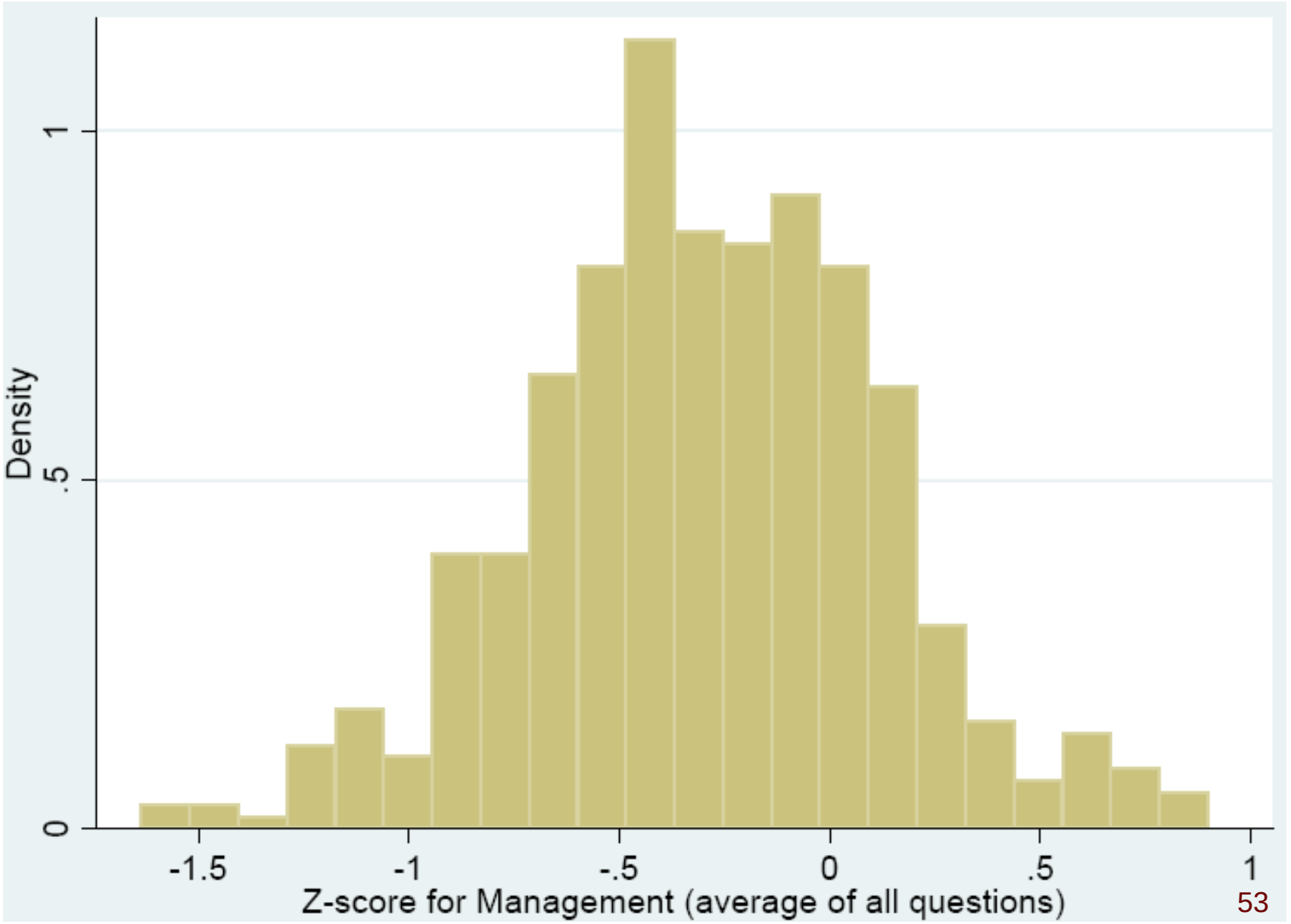
Examples of performance metrics – Retail

Example of No Metrics: Textile Plant

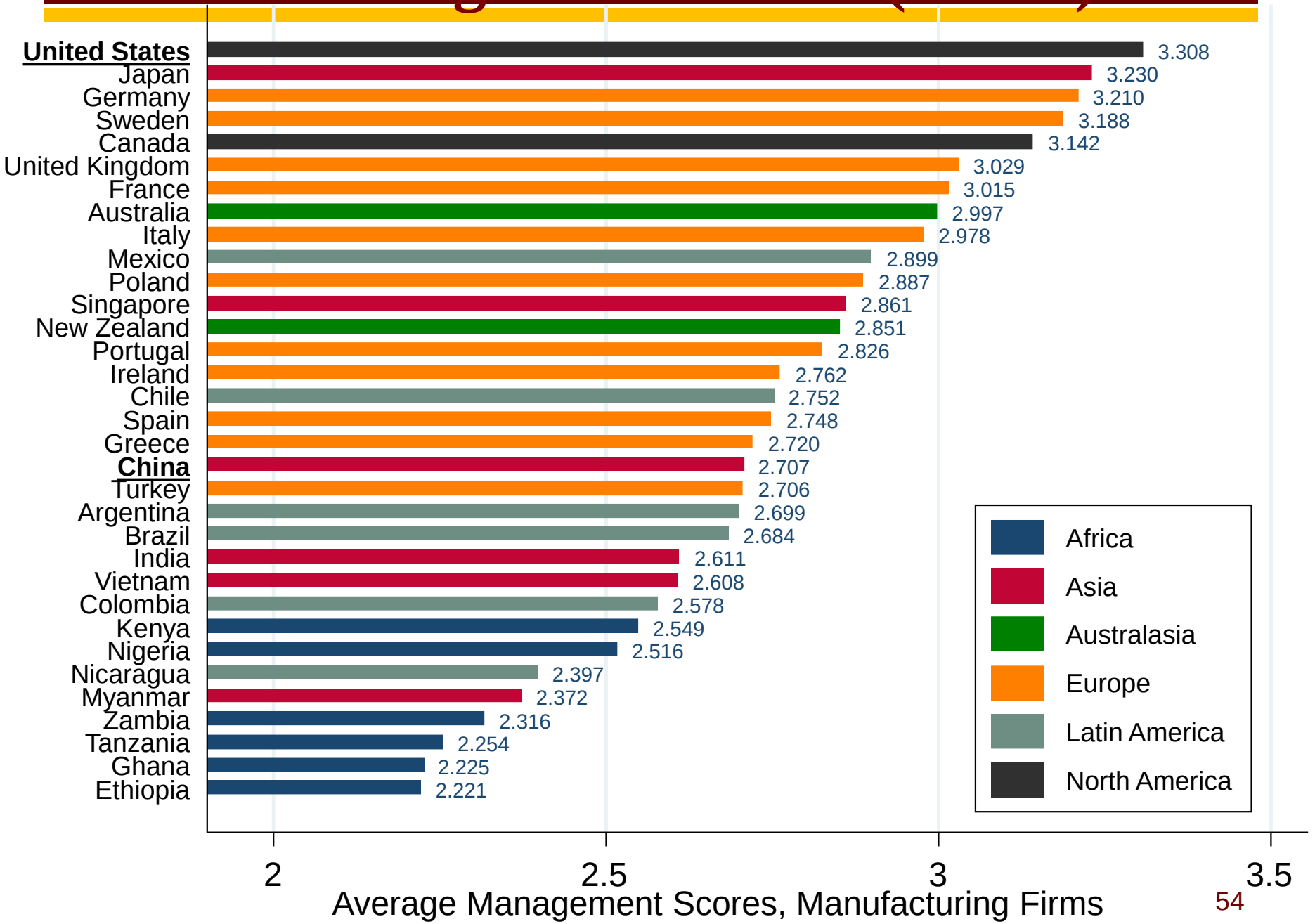
US: Management Distribution



China: Management Distribution



Global Management Scores (WMS)



Proposition 2

↑ management ↔ ↑ (export) profits

	China			US		
Dep Variable:	Log Profits			Log Profits		
	Baseline	Controls	Dom Sales	Baseline	Controls	Dom Sales
Management	0.546***	0.387***	0.361***	0.431***	0.340***	0.111***
	(6.98)	(5.70)	(5.43)	(32.61)	(27.01)	(10.21)
Log Dom Sales			0.097***			0.671***
			(5.85)			(64.28)
	Own, Prov, SIC3 Ind, Year FE; Noise Controls			State, NAICS6 Ind FE; Noise Controls		
R-squared	0.45	0.55	0.57	0.71	0.75	0.85
# observations	2,520	2,438	2,438	13,000	13,000	13,000

Which management components matter the most ?

- So far the management z-score is averaged across all practices surveyed

- We now unbundle this average into different sub-components

  - Monitoring & Targeting : collecting and processing information
  - Incentives : hiring , firing, pay and promotion

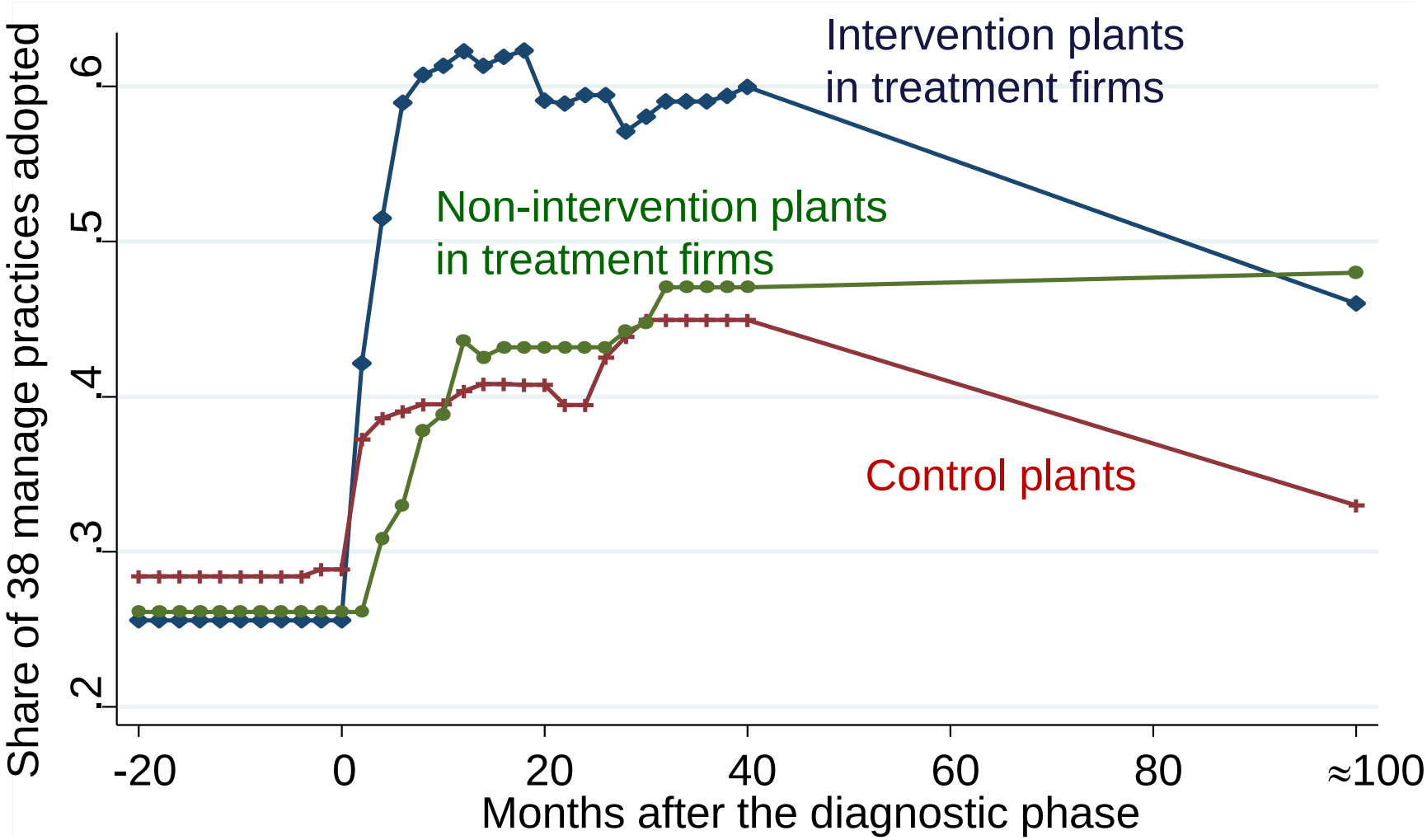
Which management components matter the most ?

Dep Variable:	Exporter Dummy	Log # Exports	Log # Exp Prod-Dest	Log Export Quality	Log Qual-Adj. Exp Price	Log Export Price	Log Avg Origin Income	Log Imp Input Quality	Log # Origin-Prod
				Panel A. China					
Monitoring	0.069***	0.127	0.120	0.057	0.014	0.071	0.017	0.277	0.408***
	(2.92)	(0.75)	(1.06)	(0.19)	(0.06)	(1.06)	(0.53)	(0.98)	(3.59)
Incentives	-0.033	0.128	0.117	0.526*	-0.432**	0.093	0.032	0.331	-0.168
	(-0.58)	(0.86)	(1.15)	(1.92)	(-2.03)	(1.40)	(0.96)	(1.24)	(-1.53)
# observations	3123	1935	1935	58101	58101	58101	1778	1778	1778
				Panel B. US					
Monitoring	0.022***	0.307***	0.157***	0.050**	-0.050***	-0.005	0.045***	0.052**	0.101***
	(6.99)	(13.11)	(11.29)	(2.56)	(-3.88)	(-1.10)	(4.52)	(2.57)	(7.67)
Incentives	0.013***	0.141***	0.077***	0.017	-0.006	0.001	-0.003	0.014	0.011
	(4.63)	(6.57)	(6.04)	(1.03)	(-0.057)	(0.16)	(-0.29)	(0.86)	(0.88)
# observations	32000	13000	13000	290000	290000	290000	10000	140000	10000

Causality I: India RCT

- Bloom et al (2013): worked with *Accenture* to provide free management consulting to large Indian textile firms in 2008-2010
  - Diagnostics, intervention, 3 years of monthly performance data
  - Aimed at 38 core practices (factory operations, quality control, inventory control, loom planning, human resources, sales & orders)
  - 11 treated firms
    - 14 intervention plants (1 month diagnostic + 4 months consulting)
    - 5 non-intervention plants (1 month diagnostic)
  - 6 control firms with 9 control plants
- Bloom et al (2017): what happened 8 years after intervention?
  - Follow-up performance data in 2014 and 2017

India RCT: Management Improvements Lasted & Spread Across Plants (2008-2017)



India RCT: Large Causal Effect on TFP (↑20%) and Quality Control (↑56%) (2008-2011)

India RCT: Lasting Causal Effect on Efficiency & Export Activity (2008-2017)

Dep Variable	Looms per Employee (log)	Export Status (1/0)	Total Exports (log)	Export Share (%)
Panel A: Long-run performance				
$Treatment_i$*(Year>=2011)$_t$	0.236**	0.189*	0.416**	8.81**
	(0.109)	(0.106)	(0.109)	(3.84)
Panel B: Intervention and non-intervention plants				
Intervention*$Treatment_i$*(Year>=2011)$_t$		0.144	0.373**	7.70*
		(0.118)	(0.127)	(3.85)
Non-Intervention*$Treatment_i$*(Year>=2011)$_t$		0.333**	0.747***	12.38**
		(0.124)	(0.052)	(4.46)
Panel C: Treatment impact by period				
$Treatment_i$*(Year>=2011)$_t$		0.036	0.168*	1.219
		(0.024)	(0.078)	(0.753)
$Treatment_i$*(Year=2014)$_t$		0.294*	0.281	11.98*
		(0.144)	(0.197)	(5.92)
$Treatment_i$*(Year=2017)$_t$		0.183	0.533**	11.64*
		(0.208)	(0.241)	(6.68)
F-test $Treat_i$*(Year=2014)$_t$ & $Treat_i$*(Year=2017)$_t$		0.054	0.095	0.161
Years	2008, 11, 14, 17	2008, 11, 14, 17	2008, 11, 14, 17	2008, 11, 14, 17
Firms	17	17	17	17
Plants	31	31	31	31
Observations	109	109	109	109

Causality II: US Panel Data

	Export Performance			
Dep Variable:	Exporter Dummy	Log Exports	Log # Dest-Prod	Log Avg Exports per Dest-Prod
<u>Trade 2011 on Management 2010</u>				
Management	0.029***	0.395***	0.208***	0.187***
	(9.48)	(18.10)	(16.19)	(13.62)
	State, NAICS6 Ind FE; Noise + Firm Controls			
R-squared	0.29	0.39	0.33	0.32
# observations	31,000	13,000	13,000	13,000
<u>Δ Trade on Δ Managament, 2005→2010</u>				
Management	0.004***	0.055***	0.031***	0.025**
	(3.19)	(4.12)	(4.28)	(2.53)
	State, NAICS6 Ind FE; Noise + Firm Controls			
R-squared	0.10	0.06	0.07	0.06
# observations	31,000	13,000	13,000	13,000

Causality II: US Panel Data

	Production Efficiency and Product Quality			Imported Input Quality and Assembly Complexity			
Dep Variable:	Log Avg Export Quality	Log Avg Qual-Adj Export Price	Log Avg Export Price	Log Imports	Log Avg Origin Income	Log Avg Import Input Quality	Log # Origin-Prod
Trade 2011 on Management 2010							
Management	0.053***	-0.059***	-0.006	0.374***	0.038***	0.045**	-0.048***
	(3.25)	(-4.19)	(-1.61)	(13.23)	(3.86)	(2.21)	(-2.62)
	State, NAICS6 Ind FE; Noise + Firm Controls						
R-squared	0.97	0.96	0.98	0.33	0.21	0.93	0.91
# observations	300,000	300,000	300,000	150,000	150,000	150,000	150,000
Δ Trade on Δ Managament, 2005→2010							
Management	0.024**	-0.024**	0.001	0.050***	-0.018***	0.057***	0.031***
	(2.25)	(-2.49)	(0.41)	(2.76)	(-2.88)	(4.48)	(3.69)
	State, NAICS6 Ind FE; Noise + Firm Controls						
R-squared	0.04	0.04	0.08	0.09	0.09	0.07	0.08
# observations	13,000	13,000	13,000	10,000	10,000	10,000	10,000

Firm Maximization Problem

Four types of production/trade costs

- Fixed cost of production (headquarters)
- Fixed cost per product line
- Fixed cost per foreign market entered
- Iceberg variable trade costs

Example Monitoring: how is performance tracked?

Score	(1): Measures tracked do not indicate directly if overall business objectives are being met. Certain processes aren't tracked at all	(3): Most key performance indicators are tracked formally. Tracking is overseen by senior management	(5): Performance is continuously tracked and communicated, both formally and informally, to all staff using a range of visual management tools

Example Incentives: How does promotion work?

Score	(1) People are promoted primarily upon the basis of tenure, irrespective of performance (ability & effort)	(3) People are promoted primarily upon the basis of performance	(5) We actively identify, develop and promote our top performers