



# **Managing Trade: Evidence from China and the US**

Nick Bloom, Stanford & NBER

Kalina Manova, Stanford, Oxford, NBER & CEPR

John Van Reenen, London School of Economics & CEP

Zhihong Yu, Nottingham

**4<sup>th</sup> CEPR Workshop on Incentives, Management and  
Organization, September 25, 2015**

# Motivation

- ❑ Tremendous variation in export activity across firms
  - More productive firms more likely to export, enter more markets with more products, and export more (Melitz 2003, Bernard et al 2007)
  - More successful exporters use high-quality inputs to produce high-quality goods (Verhoogen 2008, Manova 2012)
  - Important to understand sources of firm heterogeneity
- ❑ Appears that managerial competence enhances firm performance
  - Superior management practices associated with higher firm productivity and profits (Bloom-Van Reenen 2007, Bloom et al 2013)
  - Little known about underlying mechanisms

# This Paper

- Provide first evidence on link between managerial competence and export performance to inform underlying mechanisms
  - Exploit unique data on management practices, balance sheets, and comprehensive export and import activity at the firm level
  - Study two major export economies with different income levels, institutional and market frictions: China and the US

## **Conclusion:** Managerial quality associated with export success

- Better managed firms are more likely to export, sell more products to more markets, and have higher export sales
- Better management enables firms to produce complex, quality goods
- Trade appears particularly sensitive to managerial quality

# Why Do We Care?

- ❑ Firm heterogeneity matters for aggregate productivity, welfare and gains from trade (Hsieh-Klenow 2009, Arkolakis et al 2012, Melitz-Redding 2013)
    - Reallocation across firms and productivity upgrading within firms important in adjustment to trade reforms (Pavcnik 2002, Bernard et al 2006, Bustos 2011)
    - Nature of firm heterogeneity shapes distributional effects of globalization
  - ❑ Weak managerial talent and poor product quality hinder growth and entrepreneurship in developing countries
    - Growth in developing countries critically depends on trade with developed markets that maintain high quality standards
    - Access to more numerous and to higher-quality inputs from abroad stimulates firm productivity and expansion (Goldberg et al 2013)
- ➔ Trade reforms may generate higher welfare gains if accompanied with improvements in managerial practices

# Outline

1. Motivation
2. Data and estimation
3. Empirical evidence
4. Conclusions

# World Management Surveys

- ❑ Managerial practices of 20,000+ firms, ~40 countries since 2002
  - Stratified representative samples
  - 45min phone interviews of manufacturing plant managers
  - Participation encouraged by high endorsements
- ❑ Double-blind interviews
  - Interviewers do not know companies' performance
  - Managers are not informed in advance they are scored
- ❑ Scorecard for 18 standardized questions
  - Monitoring: data collection and analysis
  - Targets: design, integration and realism of production targets
  - Incentives: rewarding high performers and improving low performers

## Example Monitoring: how is performance tracked?

**Score**

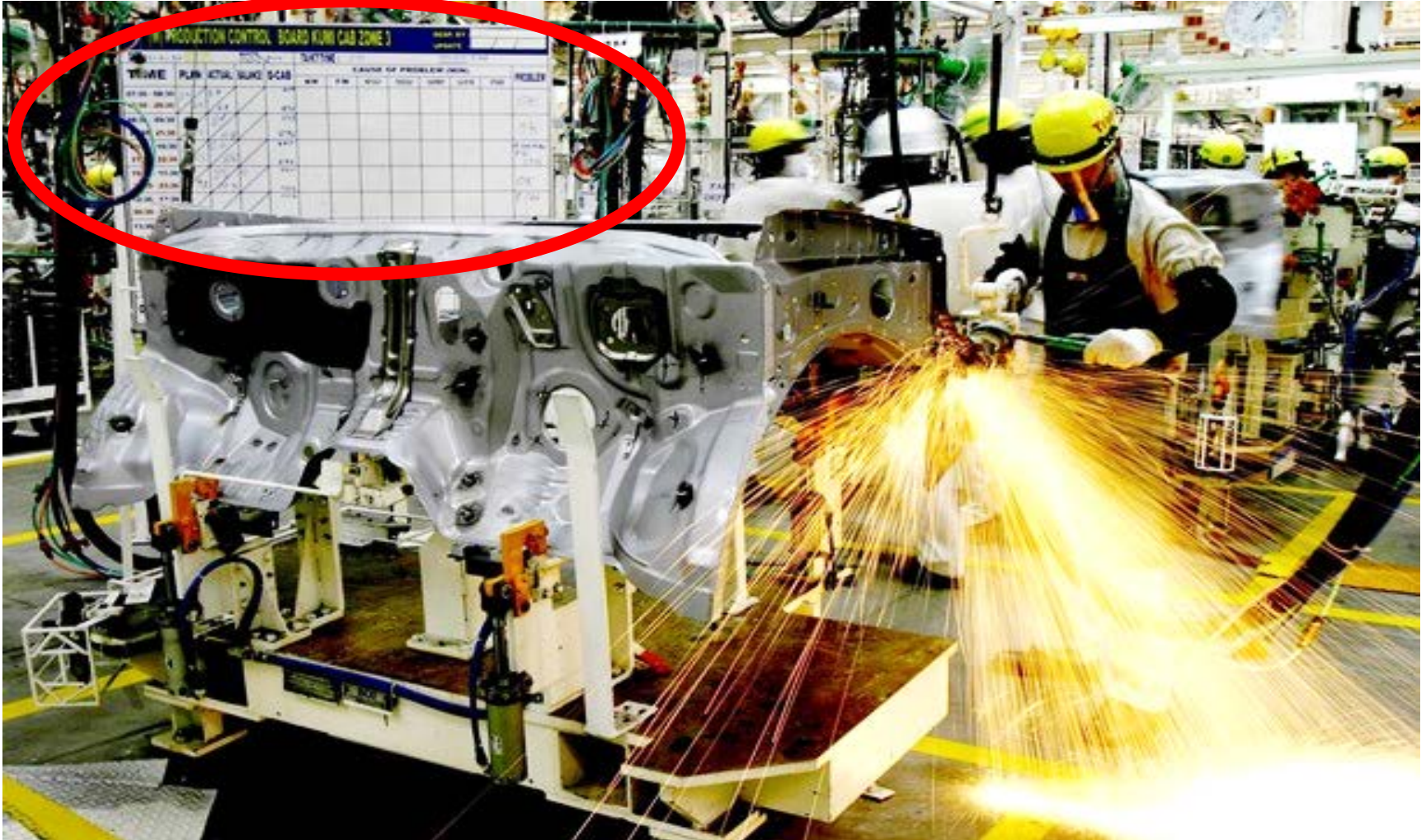
**(1): Measures tracked do not indicate directly if overall business objectives are being met. Certain processes aren't tracked at all**

**(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 of Performance Metrics: Car Plant





## Example of No Performance Metrics: Textile Plant



## **Example Incentives: how does promotion work?**

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

# Example Monitoring: number of KPIs

**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 . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
3-9 key performance indicators . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
10 or more key performance indicators . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
No key performance indicators (If no key performance indicators in both years, SKIP to <b>6</b> ) . . . . .	<input type="checkbox"/>	<input type="checkbox"/>

# Example Targets: use of production targets

**8** In 2005 and 2010, who was aware of the production targets at this establishment? *Check one box for each year*

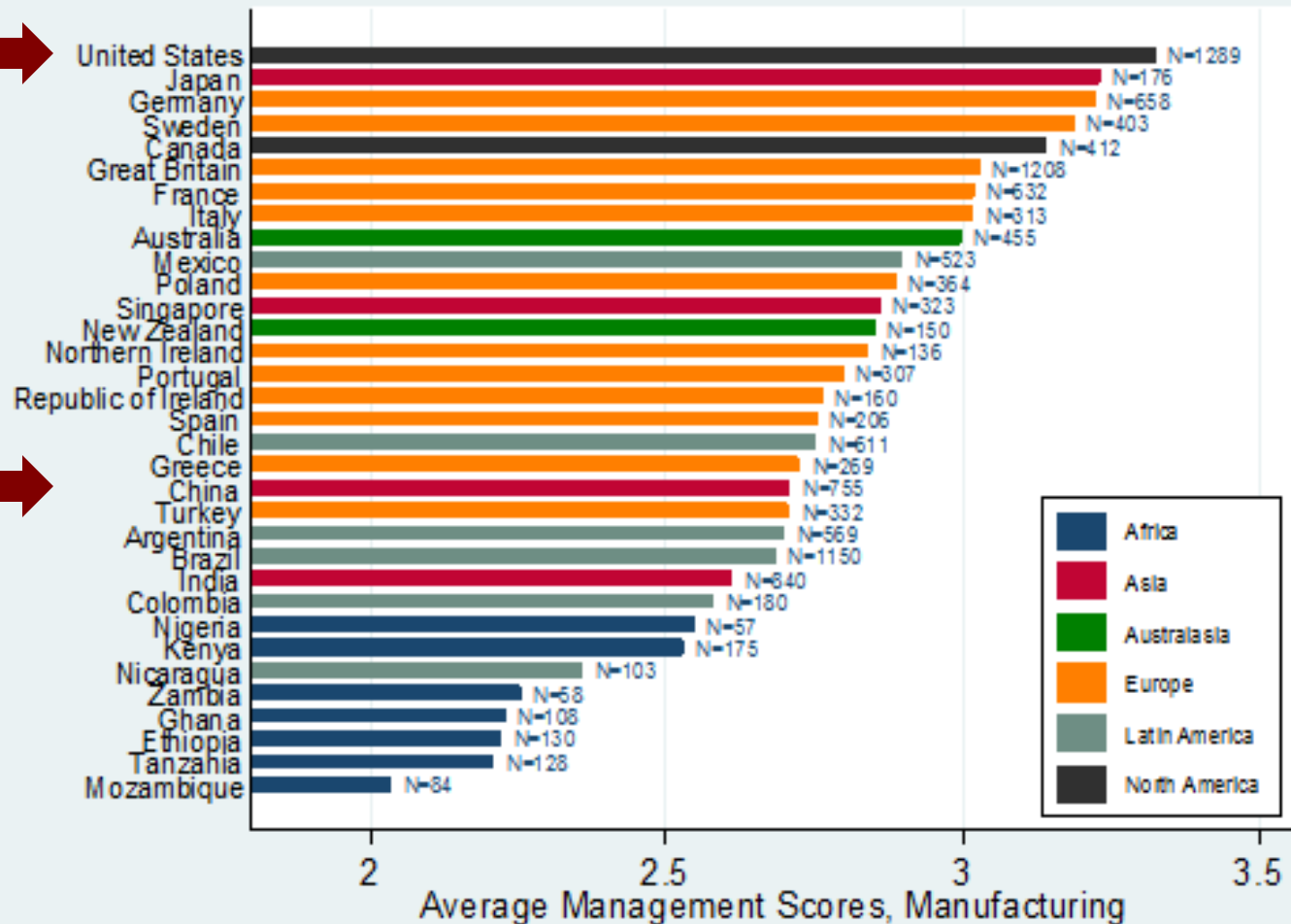
	2005	2010
Only senior managers . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
Most managers and some production workers . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
Most managers and most production workers . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
All managers and most production workers . . . . .	<input type="checkbox"/>	<input type="checkbox"/>

# Example Incentives: performance bonuses

**10** In 2005 and 2010, when production targets were met, what percent of **non-managers** at this establishment received performance bonuses? *Check one box for each year*

	2005	2010
0% . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
1-33% . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
34-66% . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
67-99% . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
100% . . . . .	<input type="checkbox"/>	<input type="checkbox"/>
Production targets not met . . . . .	<input type="checkbox"/>	<input type="checkbox"/>

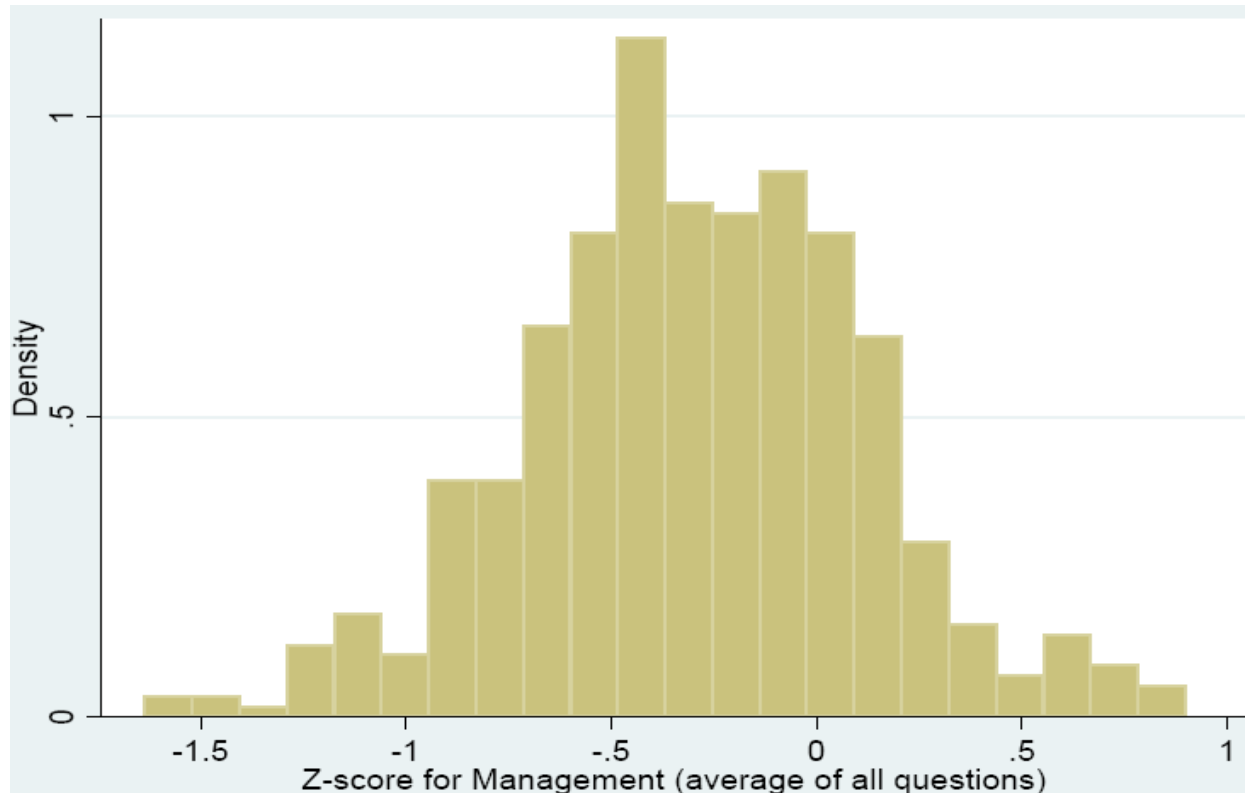
# Management Data



Note: Firms between 50 and 5000 employees

# Management Data

- ❑ China Management Survey (Bloom, Sadun & Van Reenen 2013)
  - 507 firms, 2007
  - 18 questions → management z-score: mean -0.298, st dev 0.418





## ... Matched to Balance-Sheet Data

- ❑ China's Annual Survey of Industrial Enterprises (NBS)
  - >200,000 firms, 1999-2007
  - Output, total exports, employment, inputs, ownership, ...
- ❑ Match 485 firms in management survey to ASIE
  - 60% of matched firms export
  - Unconditional export management premium: 23%

	Exporters	Non-exporters
# Observations	1,875	1358
Management score	-0.27	-0.34
Log Gross output	11.72	11.55
Log Employment	6.46	6.15

## ... Matched to Trade Data

- ❑ Chinese Customs Trade Statistics (GACC)
  - >120,000 firms, ~8,000 products, >200 countries, 2000-2008
  - All export and import transactions: value, quantity, trade regime, ...
- ❑ Match 334 firms in management survey to CCTS
  - 18% only export, 10% only import, 72% do both

	N	Mean	St Dev
Log Exports	2,236	14.80	2.31
# Export Products	2,236	8.65	11.58
# Export Destinations	2,236	12.85	14.99
Log Imports	2,048	13.87	2.97
# Import Products	2,048	33.45	51.43
# Import Origin Countries	2,048	6.30	5.67

# Empirical Strategy

- Document the conditional correlation between firms' managerial competence and trade performance

$$Trade_{ft} = \alpha + \beta \cdot Management_f + \delta' \cdot Z_{ft} + \varphi_p + \varphi_i + \varphi_t + \varepsilon_{ft}$$

- $Trade_{ft}$  : various export and import outcomes
- $Management_f$  : management z-score
- $\varphi_p, \varphi_i, \varphi_t$  : 31 province FE, 82 SIC3 industry FE, year FE
- $Z_{ft}$  : firm controls for ownership structure, skill and capital intensity, age, “noise” in management score
- $\varepsilon_{ft}$  : errors clustered by firm

# Management and Export Success

- Improving management by 1 standard deviation associated with 5% higher probability of exporting and 27% higher exports

Dep Variable:	Exporter Dummy		Log Exports	
Management Score	0.096** (2.30)	0.116*** (2.75)	0.638** (2.14)	0.566* (1.81)
Foreign	0.188*** (5.01)	0.202*** (5.45)	0.588** (2.28)	0.681*** (2.60)
SOE	-0.011 (-0.18)	-0.056 (-0.81)	0.658 (1.56)	0.532 (1.03)
Capital Intensity		-0.01 (-0.76)		0.145 (1.43)
Skill Intensity		-0.609*** (-3.10)		-4.231*** (-2.64)
Log Wage		0.041* (1.82)		0.401** (2.17)
Age		0.03 (1.53)		0.153 (1.01)
Province FE, Industry FE, Year FE, Noise Controls				
R-squared	0.41	0.43	0.40	0.43
# observations	3,233	3,123	2,236	1,935
# firms	485	465	334	305

# Extensive Margin of Exports

- Improving management by 1 standard deviation associated with 19% more destinations, 17% more export products, and 22% more destination-product pairs

Dep Variable:	Log # Destinations		Log # Products		Log # Dest-Prod Pairs	
	Baseline	Controls	Baseline	Controls	Baseline	Controls
Management Score	0.387** (2.51)	0.451*** (2.80)	0.372*** (3.06)	0.404*** (3.33)	0.487*** (2.72)	0.524*** (2.89)
Province FE, Industry FE, Year FE, Noise Controls						
R-squared	0.42	0.44	0.40	0.42	0.39	0.40
# observations	2,236	1,936	2,236	1,936	2,236	1,936
# firms	334	305	334	305	334	305

# Intensive Margin of Exports

- Better managed firms sell more in top destination-product markets but not more in average market because of entry into more markets

Dep Variable:	Log Exports Top Prod		Log Exports Top Dest		Log Exports Top Dest-Prod		Log Avg Exports per Dest-Prod	
	Baseline	Controls	Baseline	Controls	Baseline	Controls	Baseline	Controls
Management Score	0.634** (2.17)	0.559* (1.82)	0.568** (2.10)	0.477* (1.69)	0.552** (2.11)	0.478* (1.74)	0.151 (0.75)	0.042 (0.20)
Province FE, Industry FE, Year FE, Noise Controls								
R-squared	0.40	0.44	0.40	0.44	0.39	0.43	0.38	0.45
# observations	2,236	1,936	2,236	1,936	2,236	1,936	2,236	1,935
# firms	334	305	334	305	334	305	334	305

# Interpreting the Results

- ❑ Standard trade theory: more productive firms choose to use more and better inputs and thereby attain superior export performance
  - Some evidence that multiple firm attributes matter
  - No consensus on productivity-export link in China
- ❑ Management: TFP vs. input vs. second attribute
  - TFP: management better measures firm productivity in China
  - Input: more productive firms optimally adopt better management
  - Second attribute: management  $\perp$  productivity
  - Management results robust to productivity and input controls
- ❑ Learning from exporting?
  - We control for firm age and foreign ownership status



# Management vs. Productivity

Dep Variable:	TFP (Lev-Pet)	Exporter Dummy	Log Exports	Log # Dest	Log # Prod	Log # Dest- Prod	Log Avg Exports per Dest-Prod
Management Score	0.211* (1.69)	0.138*** (2.96)	0.593* (1.87)	0.484*** (2.92)	0.456*** (3.69)	0.586*** (3.19)	0.007 (0.03)
TFP (Lev-Pet)		-0.010 (-0.82)	0.257*** (3.35)	0.146*** (3.73)	0.055 (1.61)	0.139*** (3.29)	0.118* (1.94)
Province FE, Industry FE, Year FE, Noise Controls, Firm Controls							
R-squared	0.49	0.43	0.44	0.45	0.42	0.41	0.44
# observations	1,880	2,802	1,880	1,880	1,880	1,880	1,880
# firms	303	465	303	303	303	303	303

# In Pursuit of Mechanisms

Why is managerial competence associated with export success?

- ❑ Does good management increase overall firm activity?
  - Results robust to controlling for domestic sales, so that trade is disproportionately more sensitive to managerial quality

# Trade vs. Domestic Production

Dep Variable:	Log Output	Exporter Dummy	Log Exports	Log # Dest	Log # Prod	Log # Dest- Prod	Log Avg Exports per Dest-Prod
Management Score	0.747*** (5.30)	0.140*** (3.32)	0.611* (1.96)	0.446*** (2.78)	0.409*** (3.36)	0.533*** (2.96)	0.078 (0.37)
Log Domestic Sales		-0.025*** (-7.33)	-0.035 (-1.46)	0.005 (0.40)	-0.004 (-0.41)	-0.007 (-0.43)	-0.028 (-1.50)
Province FE, Industry FE, Year FE, Noise Controls, Firm Controls							
R-squared	0.64	0.43	0.44	0.44	0.42	0.40	0.45
# observations	1,935	3,123	1,935	1,935	1,935	1,935	1,935
# firms	305	465	305	305	305	305	305

# In Pursuit of Mechanisms

Why is managerial competence associated with export success?

- ❑ Does good management increase overall firm activity? Not only.
- ❑ Do some management practices matter more than others?
  - Operations and monitoring most important for export success, targets and people management less so
  - But all components matter for total output, value added, productivity

# Management Components

Dep Variable:	Exporter Dummy		Log Exports		Log Output		Log Value Added	TFP (Lev-Pet)
	Baseline	Controls	Baseline	Controls	Baseline	Controls		
Oper & Monitor	0.079*** (3.28)	0.080*** (3.19)	0.416** (2.54)	0.365* (1.92)	0.422*** (5.73)	0.359*** (5.46)	0.320*** (4.86)	0.136** (2.38)
Targets	0.038 (1.44)	0.048* (1.80)	0.178 (1.03)	0.161 (0.89)	0.496*** (6.44)	0.370*** (5.13)	0.370*** (5.30)	0.255*** (4.07)
People	0.021 (0.71)	0.041 (1.38)	0.477** (2.57)	0.469** (2.38)	0.439*** (4.61)	0.301*** (3.28)	0.362*** (3.92)	0.218*** (2.93)
Province FE, Industry FE, Year FE, Noise Controls								
# observations	3,233	3,123	2,236	1,935	1,935	1,935	1,935	1,935
# firms	485	465	334	305	305	305	305	305

# In Pursuit of Mechanisms

Why is managerial competence associated with export success?

- ❑ Does good management increase overall firm activity? Not only.
- ❑ Do some management practices matter more than others? A bit.
- ❑ Does good management increase production efficiency and/or product quality?

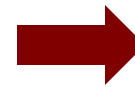
# Management and Product Quality

- ❑ Producing high-quality goods may require effective management
  - Establishing relationships with foreign buyers
  - Identifying and sourcing high-quality inputs
  - Ensuring quality control during manufacturing
  - Assembling complex products via multiple inputs/stages
  - Meeting buyers' specifications as per contract
  
- ❑ These activities will be more critical ...
  - ... in environments with limited contractibility, such as China
  - ... in industries with greater scope for quality differentiation
  - ... in industries with more technological sophistication
  - ... in industries intensive in relationship-specific investments



# Management and Product Quality

- ❑ Producing high-quality goods may require effective management



# Management and Product Quality

- ❑ Producing high-quality goods may require effective management



# Management and Export Quality

- Well managed firms export expensive varieties, esp in sectors intensive in advertising/R&D and relationship-specific investment
  - Similar results for product quality inferred from price and quantity

Dep Variable:	Log Export Value	Log Export Quantity	Baseline	Controls	Log Export Controls	Unit Value Controls	Firm FE	Firm FE
Management Score	0.025 (0.11)	-0.226 (-0.82)	0.251* (1.88)	0.335** (2.16)	0.180 (0.98)	-0.221 (-0.68)		
Management Score x Adv & RD Intensity					0.433* (1.73)		0.536** (2.14)	
Management Score x Relation Specificity						0.944* (1.79)		1.794*** (3.27)
Province FE, Year FE, Dest-Prod FE, Own FE, Noise Controls								
R-squared	0.74	0.79	0.91	0.92	0.92	0.92	0.93	0.93
# observations	68,057	68,057	68,057	58,102	57,814	57,817	61,796	61,799
# firms	330	330	330	303	302	302	315	315

# Management and Input Quality

- Better managed exporters use more imported inputs, more expensive inputs, from richer countries of origin
  - In China, foreign inputs from advanced countries are higher quality

Dep Variable:	Log (Imports/Inputs)		Log Imports		Log Avg Origin Income		Log Import Unit Value	
	Baseline	Controls	Baseline	Controls	Baseline	Controls	Baseline	Controls
Management Score	0.661** (2.15)	0.543* (1.86)	1.612*** (4.73)	1.341*** (4.32)	0.152*** (2.95)	0.113** (2.14)	0.174 (1.60)	0.245** (2.53)
Province FE, Industry FE, Year FE, Noise Controls							Province FE, Orig-Prod FE, Year FE,	
R-squared	0.48	0.50	0.48	0.56	0.34	0.38	0.81	0.81
# observations	1,824	1,778	2,048	1,778	2,048	1,780	82,467	76,626
# firms	301	290	317	290	317	290	317	290

# Management and Input Complexity

- Better managed exporters use more imported inputs, from more countries of origin
  - Manufacturing more complex products requires bigger input range
  - Robust to controlling for number of export products

Dep Variable:	Log # Origins		Log # Import Prod		Log # Origin-Prod	
	Baseline	Controls	Baseline	Controls	Baseline	Controls
Management Score	0.482*** (4.43)	0.435*** (4.47)	0.561*** (3.22)	0.415** (2.55)	0.610*** (3.35)	0.467*** (2.76)
Province FE, Industry FE, Year FE, Noise Controls						
R-squared	0.47	0.52	0.50	0.58	0.53	0.60
# observations	2,048	1,778	2,048	1,780	2,048	1,780
# firms	317	290	317	290	317	290

# Management and Profits

- ❑ Better managed exporters have higher profits, even controlling for domestic sales
  - Consistent with exporting fewer units of higher-quality products with higher profit margins (for same export revenues in dest-product mkt)

Dep Variable:	Log Profits		
	Baseline	Controls	Domestic Sales
Management Score	1.309*** (6.98)	0.928*** (5.70)	0.865*** (5.43)
Log Domestic Sales			0.097*** (5.85)
Province FE, Industry FE, Year FE, Own FE, Noise Controls			
R-squared	0.45	0.55	0.57
# observations	2,520	2,438	2,438
# firms	467	448	448

# Current Work: US

- ❑ Unique data for the US provides an opportunity to assess the relationship between trade and management with more comprehensive data for an advanced economy
  - Management Organizational Practices Survey: 47,000+ plants and 10,000+ firms in 2010
  - Census of Manufacturers + Annual Survey of Manufacturers + Longitudinal Business Database: balance sheets
  - Longitudinal Federal Trade Transaction Database: customs records
- ❑ US exhibits similar patterns as China
  - Only difference: significant results for export product quality, quantity and revenue but insignificant for export price



# Next Steps: Theory

- ❑ A heterogeneous-firm trade model with endogenous quality choice can rationalize these results and inform policy implications
- ❑ Complementarity between good management and product quality
  - Output quality depends on input quality and assembly technology
  - Output complexity depends on input complexity and assembly technology
  - Output quantity depends on input quantity and assembly technology
  - Assembly technology depends on managerial practices (& productivity?)
- ❑ Two alternative mechanisms for managerial competence
  - Exogenous draw
  - Fixed-cost technology chosen endogenously based on exogenous productivity draw

# Conclusions

- ❑ Firms' management practices appear important for firms' ability to produce sophisticated products and to export to foreign markets
  - Sheds new light on sources of firm heterogeneity
  - Informs mechanisms through which good management operates
  - Suggests management know-how and access to high-quality inputs jointly matter for the impact of trade reforms
  
- ❑ Future work
  - How do management practices affect response to economic shocks such as 2008-2009 global financial crisis, SARS epidemic in mid 2000s, and exchange rate fluctuations?