

FIRM DECENTRALIZATION AROUND THE WORLD

GSB Management Course

Lecture 4: May 18th 2009

Nick Bloom (Stanford Economics)

John Van Reenen (LSE and Stanford GSB)



- **What is decentralization?**

- Measurement and Stylized facts
- Determinants of decentralization
- Firm Performance and decentralization



What is decentralization?

- One aspect of firm organization
- How is power and decision making distributed? And why?
- No “better” or “worse” - context dependent
- Why we care?
 - Designing your business
 - Inequality, wellbeing & productivity
 - Change over time towards decentralization and delayering. But why?



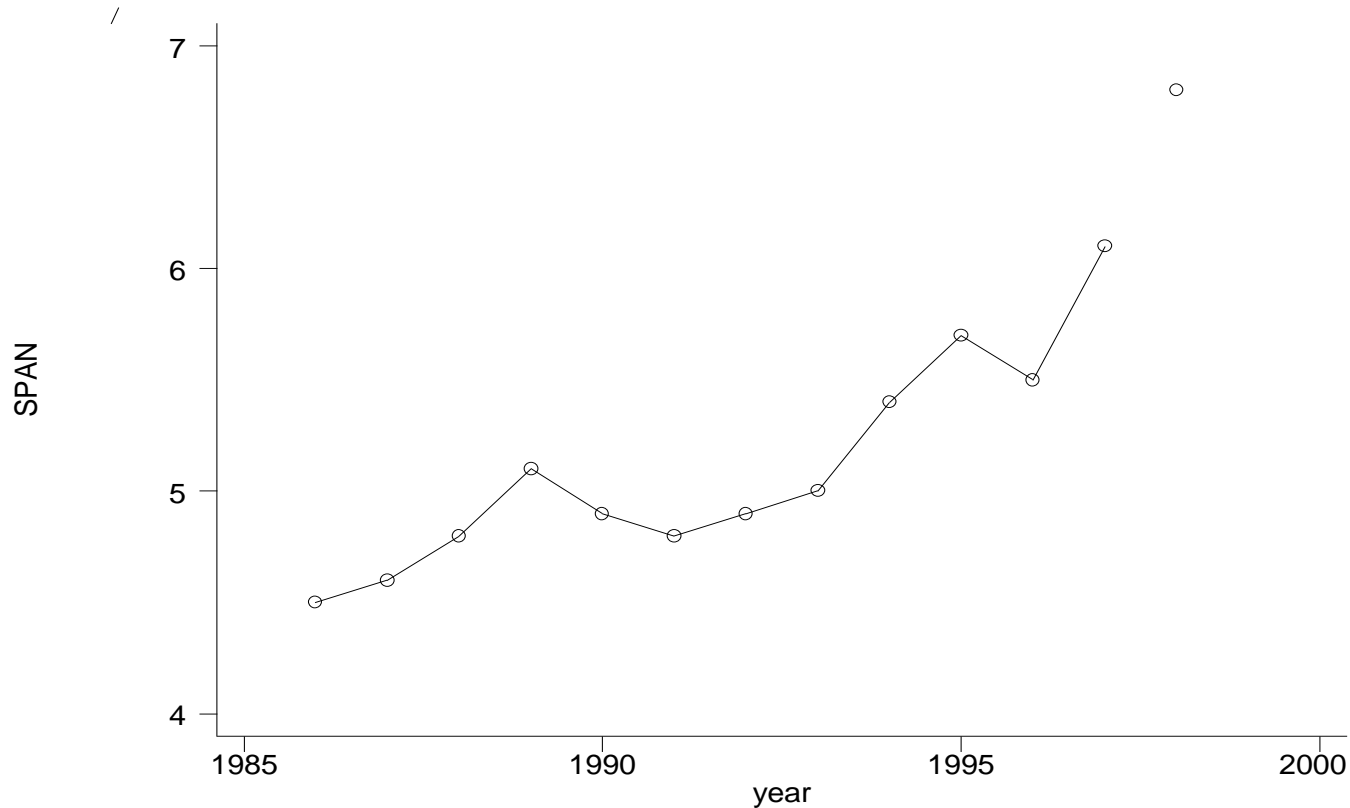
How are things Changing? More decentralization.....

"Globalization and the arrival of the information economy have rapidly demolished all the old precepts. The management of global companies, which must innovate simultaneously and speed information through horizontal globe-spanning networks, has become a daunting challenge. Old, rigid hierarchies are out"

Business Week The 21st Century Corporation, cover story August 21-28, 2000.



Increasing Delayering – No. Of positions reporting to CEO



Source: Rajan and Wulf, 2006, 300+ large US corporations



Formal vs. Real Authority

- Formal authority in the organization chart (“organogram”)
 - E.g. Profit centres vs. Cost/sales Centres
- Real authority
 - How things actually get done. Power
 - <http://www.youtube.com/watch?v=5FRVvjGL2C0>
- Centralized/Decentralized
 - Can be different across different types of decisions
 - e.g. strategic like M&A centralized



Alternative models of authority: Centralized



http://www.youtube.com/watch?v=wBlv_CSqyl&feature=related

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Alternative models of authority: Decentralized



e.g. Universities. But Academics not always the most efficient

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What types of decisions?

- Definition of firm is that ultimate strategic decisions formally made in the central head quarters (CHQ/CEO)
- But many more process decisions
- Example: CHQ and Plant Manager
 - Hiring and firing
 - Investment
 - Marketing and sales
 - Product introduction



What types of decisions?

- Plant Manager and worker
 - Pace of Work
 - Allocation of tasks
 - Teams vs. individuals



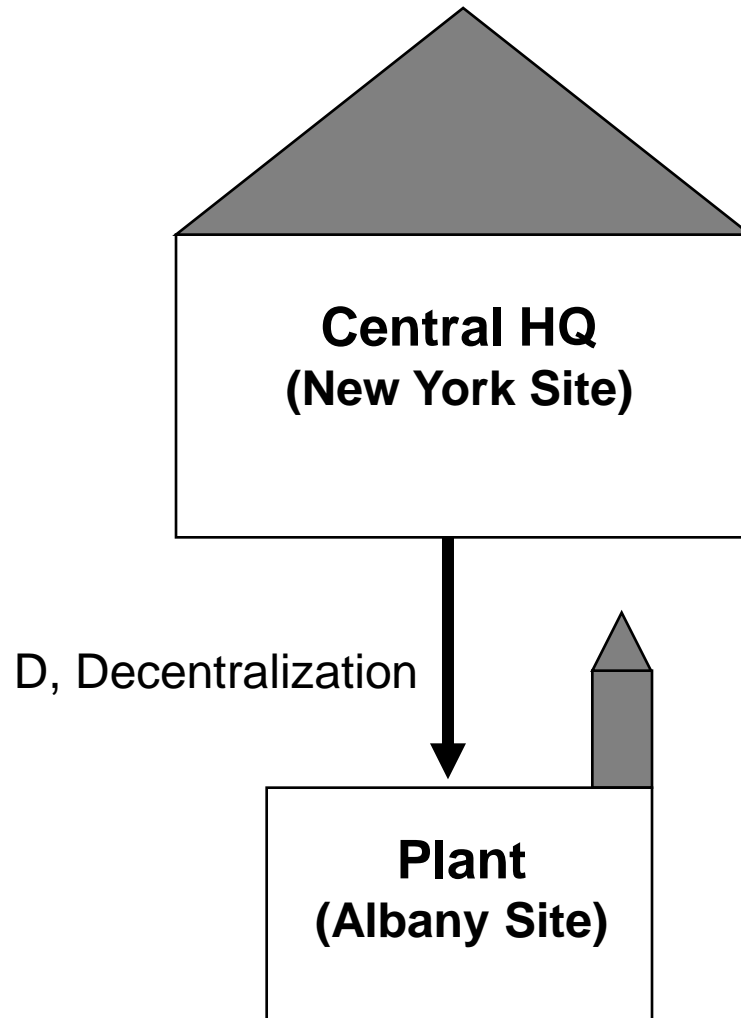
- What is decentralization?

- **Measurement and Stylized facts**

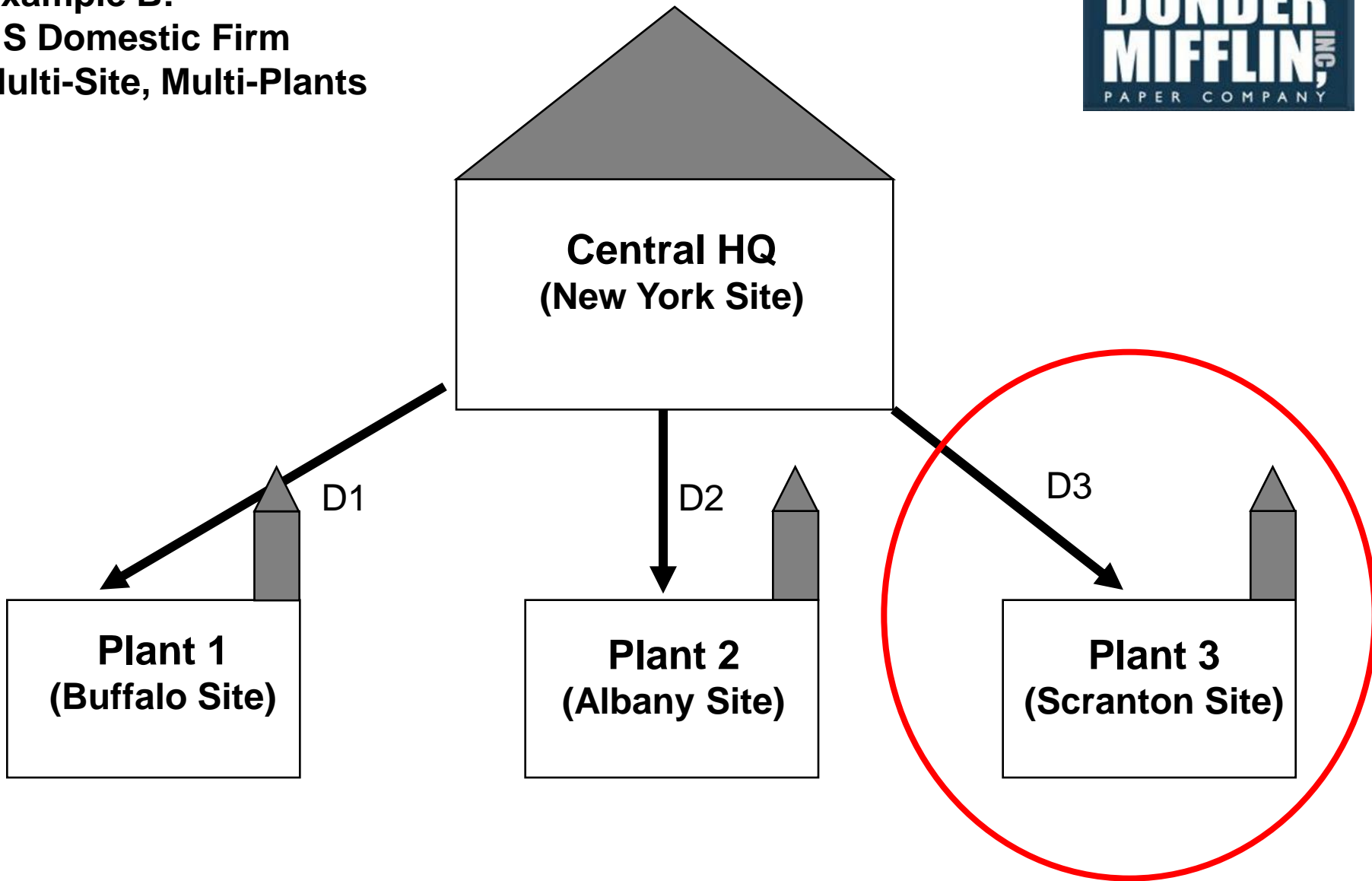
- Determinants of decentralization
- Firm Performance and decentralization



**Example A:
Domestic Firm
2 Sites, Single Plant**



**Example B:
US Domestic Firm
Multi-Site, Multi-Plants**



THE DECENTRALIZATION SURVEY PAGE

Company Name

WUZHILVYU CHEMICAL & ELECTRIC CO.LTD.

Scoring

1

3

5

To hire a FULL-TIME PERMANENT SHOPFLOOR worker what agreement would your plant need from CHQ?

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			1	3				5
			No authority - even for replacement hires	Requires sign-off from CHQ based on the business case. Typically agreed (i.e. about 80 or 90% of the time).				Complete authority - it is my decision entirely

Where are decisions taken on new product introductions - at the plant, at the CHQ or at both?

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			1	3				5
			All new product introduction decisions taken at the CHQ	New product introductions are jointly determined by the plant and CHQ				All new product introduction decisions take at the plant level

How much of sales and marketing is carried out at the plant level (rather than at CHQ)?

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			1	3				5
			None - sales and marketing is all run by CHQ	Sales and marketing decisions are split between the plant and CHQ				The plant runs all sales and marketing

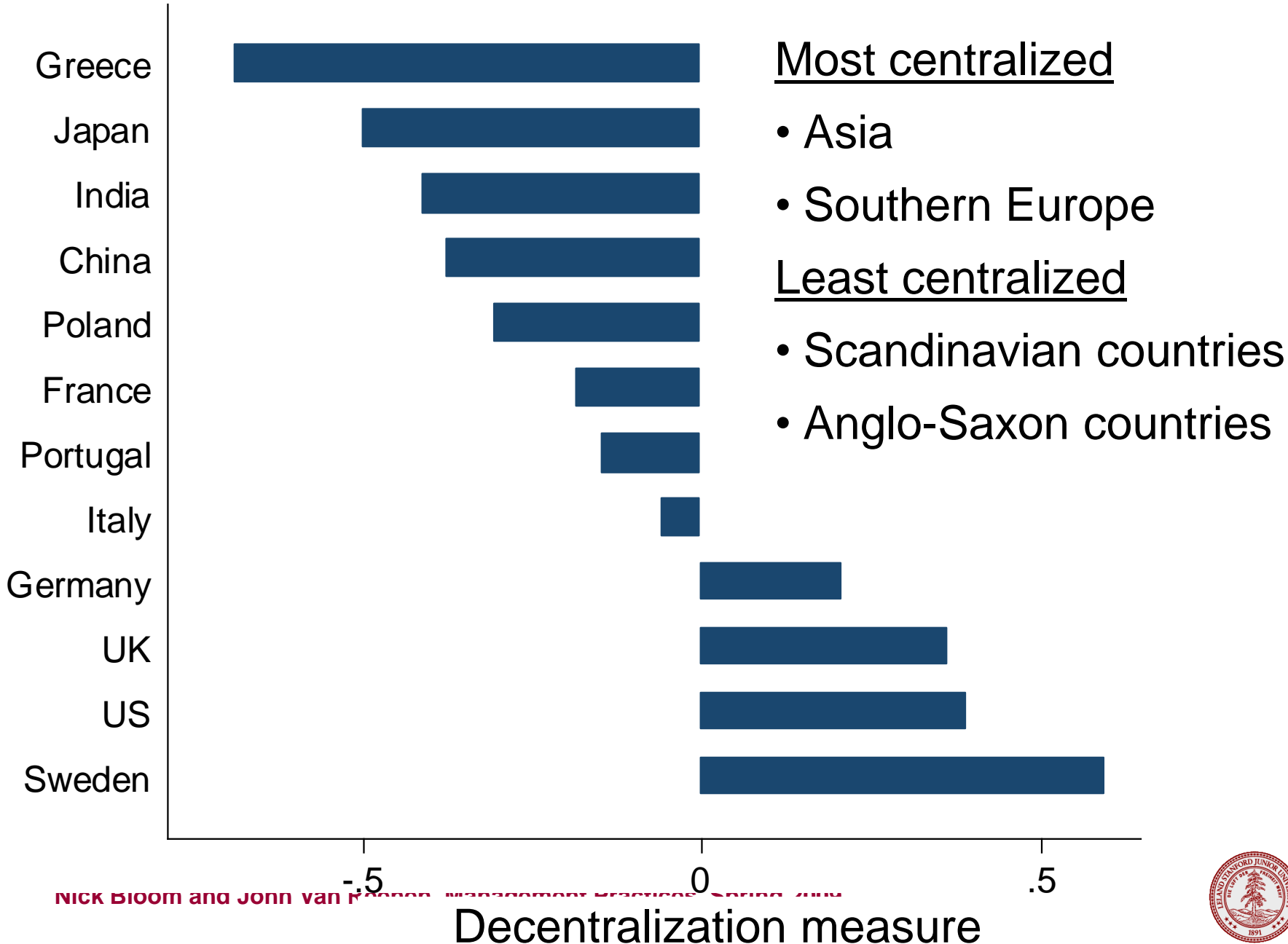


OUR EMPIRICAL DECENTRALIZATION MEASURE

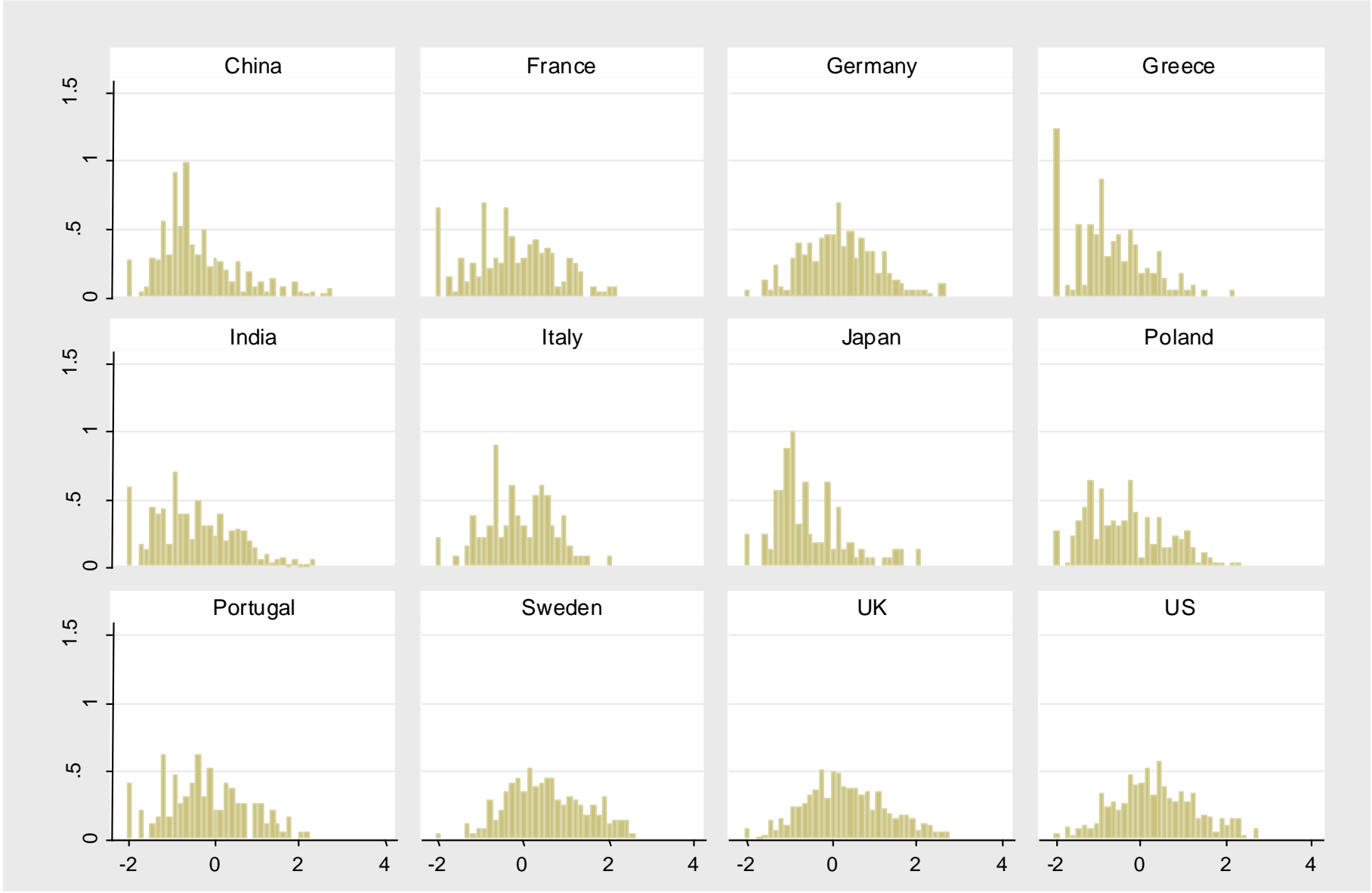
- Main measure averages the z-score (scores normalized to mean 0, standard-deviation 1) of each variable:
 - Hiring senior employees (discrete, 1 to 5)
 - Maximum Capital expenditure (continuous, in \$)
 - Introduction of new products (discrete, 1 to 5)
 - Sales and marketing (discrete, 1 to 5)



DECENTRALIZATION VARIES ACROSS COUNTRIES



DECENTRALIZATION ALSO VARIES ACROSS FIRMS



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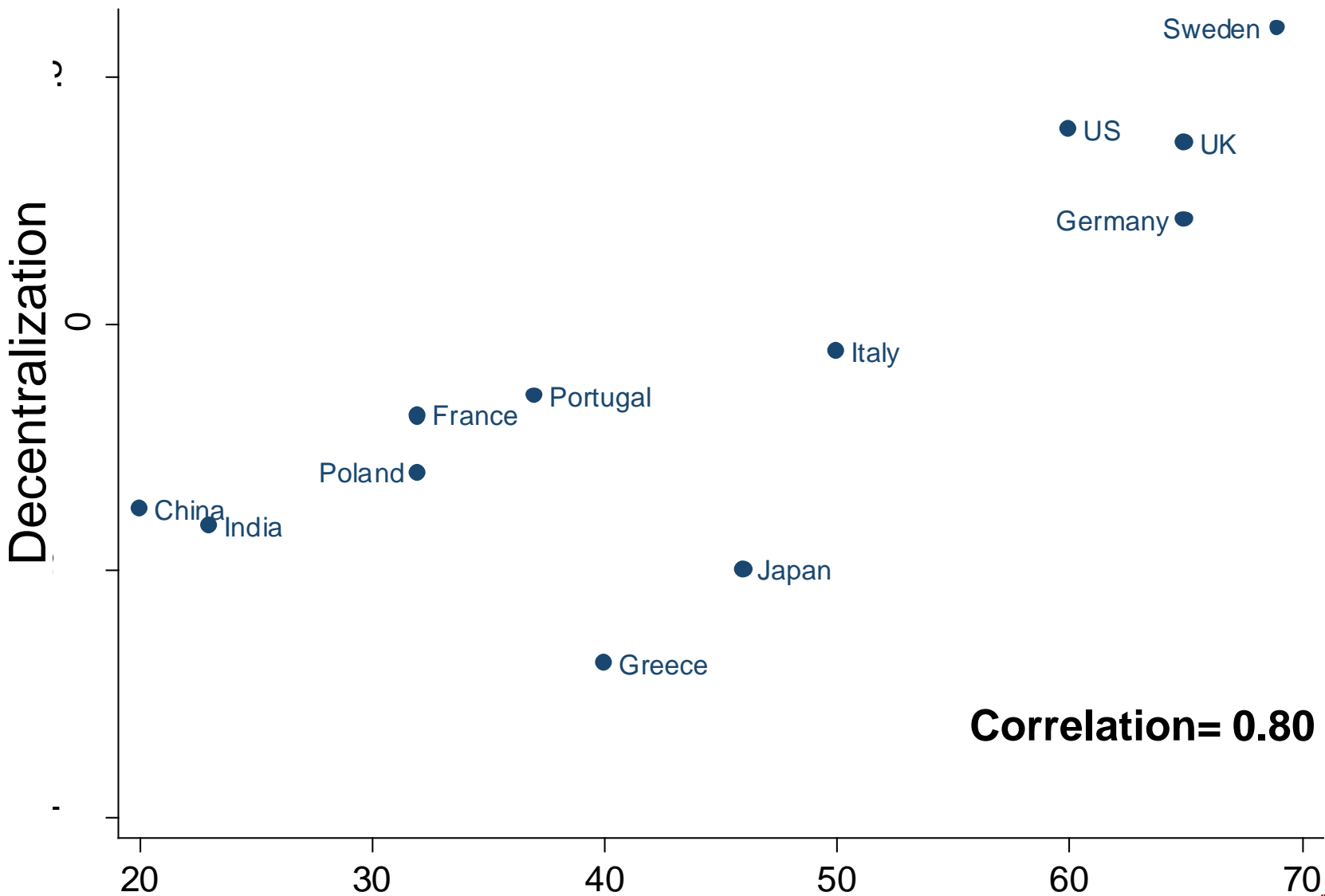
Decentralization measure (higher number is more decentralized)

EXTERNAL VALIDATION – COUNTRY LEVEL (1/2)

- Do these cross-country values look sensible?
- Only prior firm decentralization measure to cross-check against we are aware of is from Hofstede
 - Surveyed c.100,000 IBM employees across 50 countries during the 1970s & 1980s
 - Questions on management style (autocratic/paternalistic or consultative) and *preferences* for delegation
 - Combined into *Power Distance* index (1-100), low means limited (preference for) delegation



'POWER DISTANCE' SEEMS CORRELATED WITH OUR DECENTRALIZATION MEASURE



What do you think are the
benefits and costs of
decentralization?



- What is decentralization?
- Measurement and Stylized facts

- **Theories & Determinants of decentralization**

- Firm Performance and decentralization



Some Benefits of Decentralization

- Saves on costs of communication and information transfer
- Improves swiftness of reacting to market changes [e.g. Because of less specialization, more multi-tasking]
- Reduction in costs of monitoring
- Increase in employee involvement and job satisfaction (so more productive)



Some Costs of Decentralization

- Duplication of information
- More “mistakes” (e.g. co-ordination in price setting)
- Agency issues
- Harder to exploit returns to scale/specialization
- More stress so decrease in job satisfaction and productivity?



Theories

- Information
 - **Static.** Can local manager solve the problem herself or ask her boss? (Garicano, 2000)
 - **Dynamic.** How can manager learn what is the right thing to do (e.g. Adopt a new technology?). Learning (Acemoglu et al, 2007)
- Incentives
 - Complete contract?



Factors affecting Decentralization

1. Technological
2. Economic
3. Cultural/Legal



Technological Factors affecting Decentralization

- Size, scope, complexity
- Complexity: (a) size, (b) multinational status
- Learning: (a) age, (b) innovation, (c) heterogeneity
- Information costs
- Communication costs



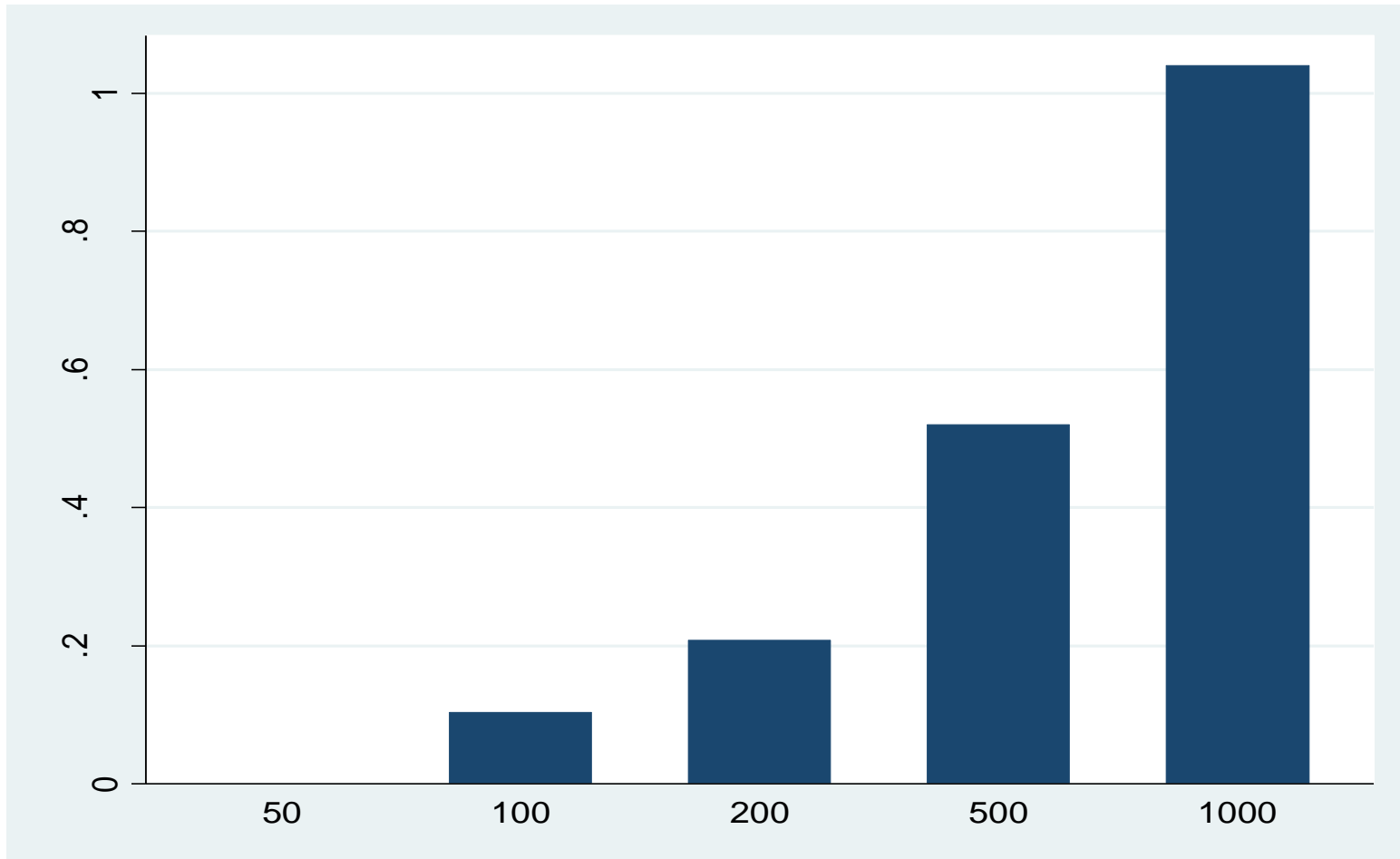
Firms that are larger, multinational or more highly skilled have greater decentralization

Dependent variable: Decentralization

Ln(Firm employment)	0.052** (0.022)
Plant employment	0.089***
<i>Plant employees as a % of firm</i>	(0.030)
Foreign Multinational	0.157***
<i>=1 if firm belongs to a foreign multinational</i>	(0.058)
Plant Skills	0.085***
<i>Ln(% Plant employees with a College degree)</i>	(0.015)
Observations	3,660
Industry dummies (112)	yes
Country dummies (12)	yes
Other controls (60)	yes



Larger Firms are more decentralized



Number of employees in the firm



Figure 3: Age and decentralization
Decentralization to Profit Centres (COI)

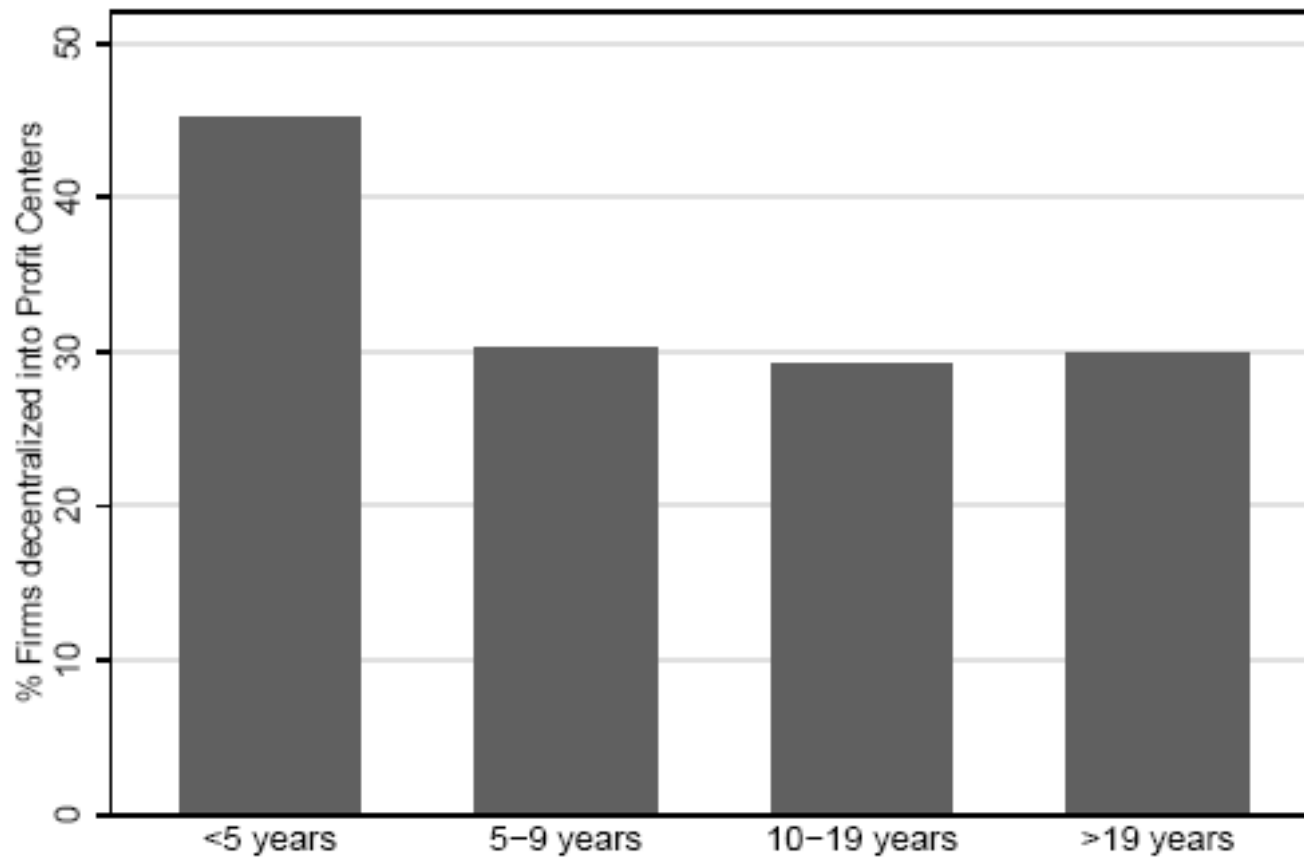


Figure 2: Proximity to frontier and decentralization
Decentralization to Profit Centers (COI)

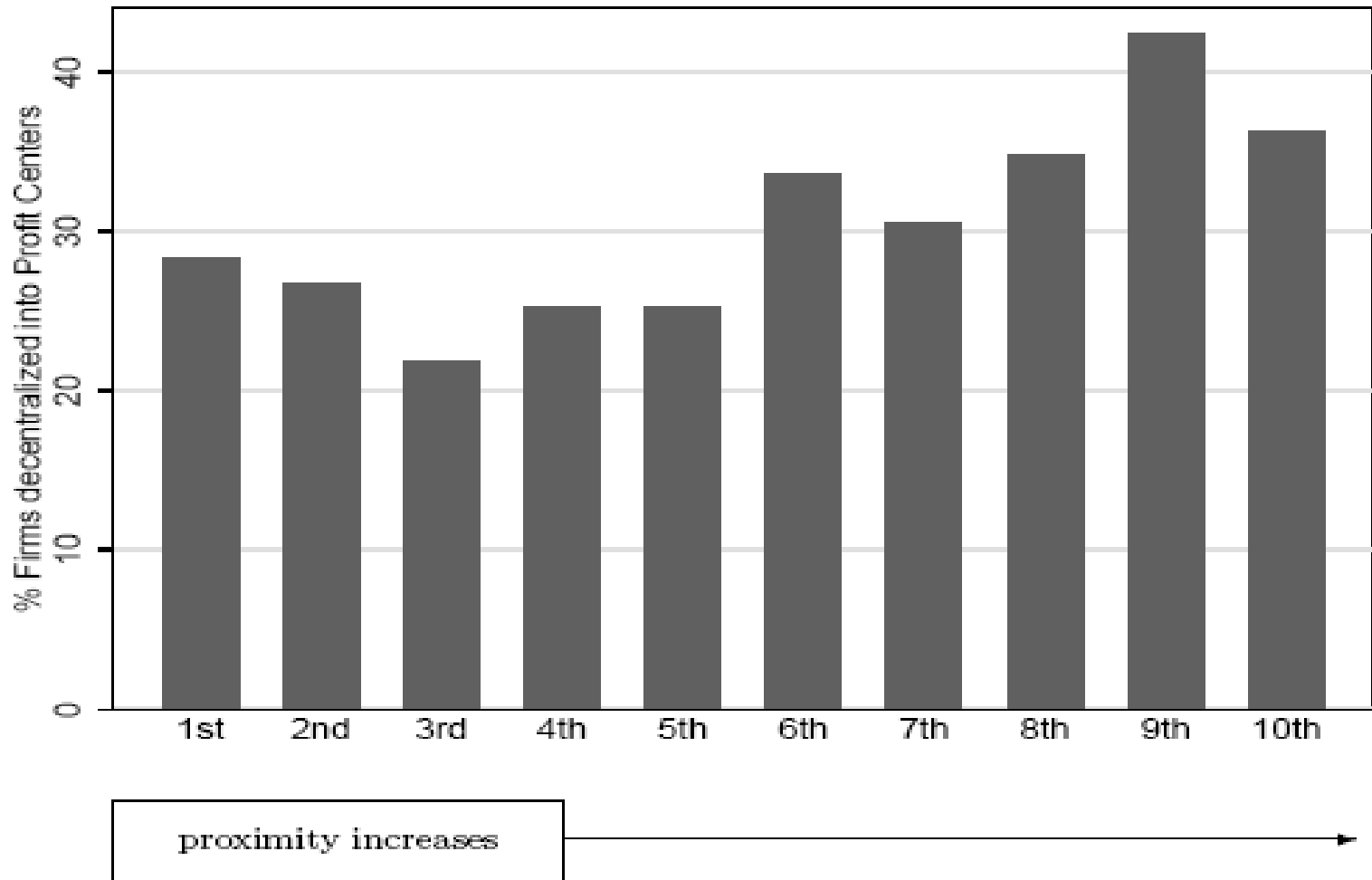
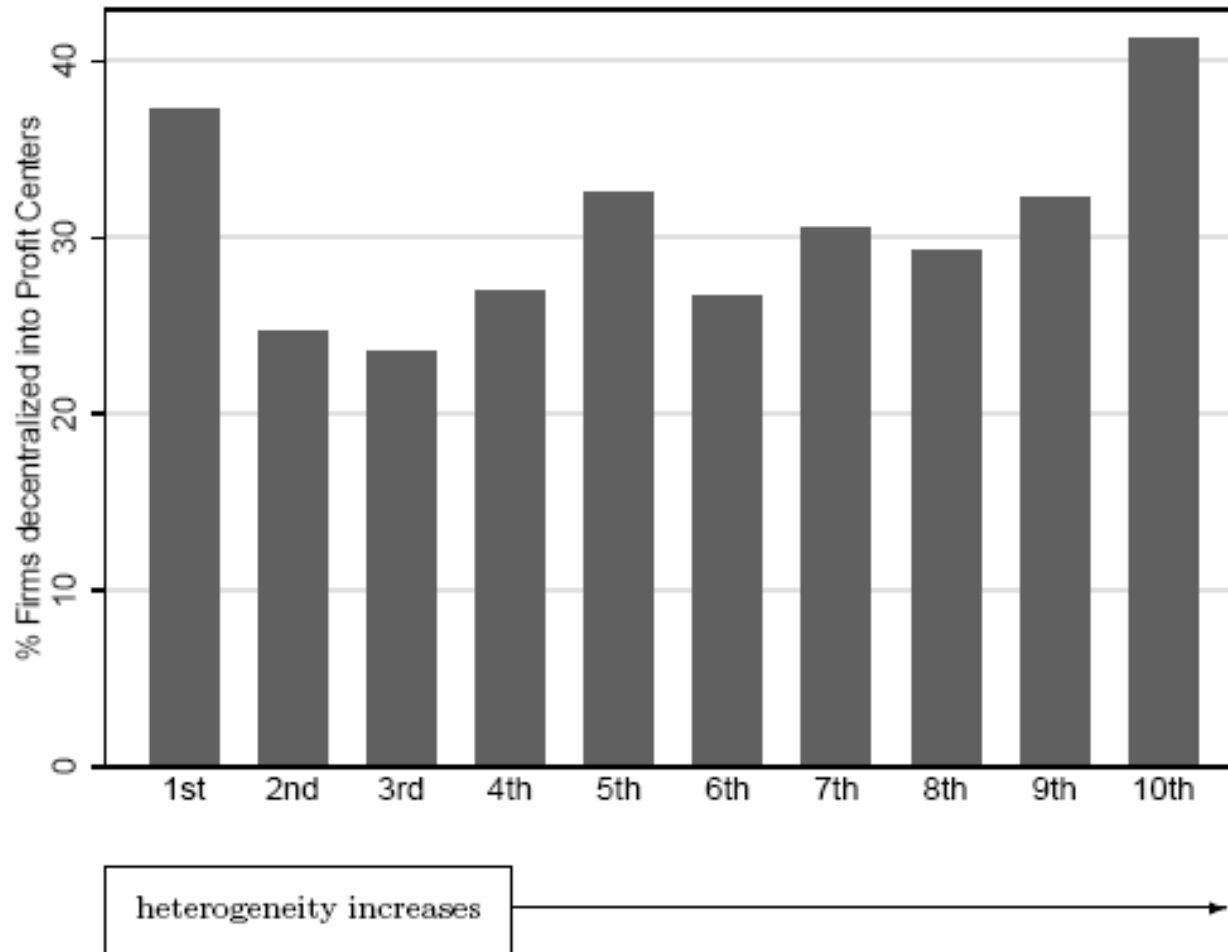


Figure 1: Heterogeneity and decentralization
Decentralization to Profit Centers (COI)



Economic Factors affecting Decentralization

- *Competition*
 - information: Improves the value of timely responses to local conditions
 - incentives: Lower risk of manager abusing autonomy as incentives more aligned with firm
- *Skill*: more able workers better at coping with responsibility

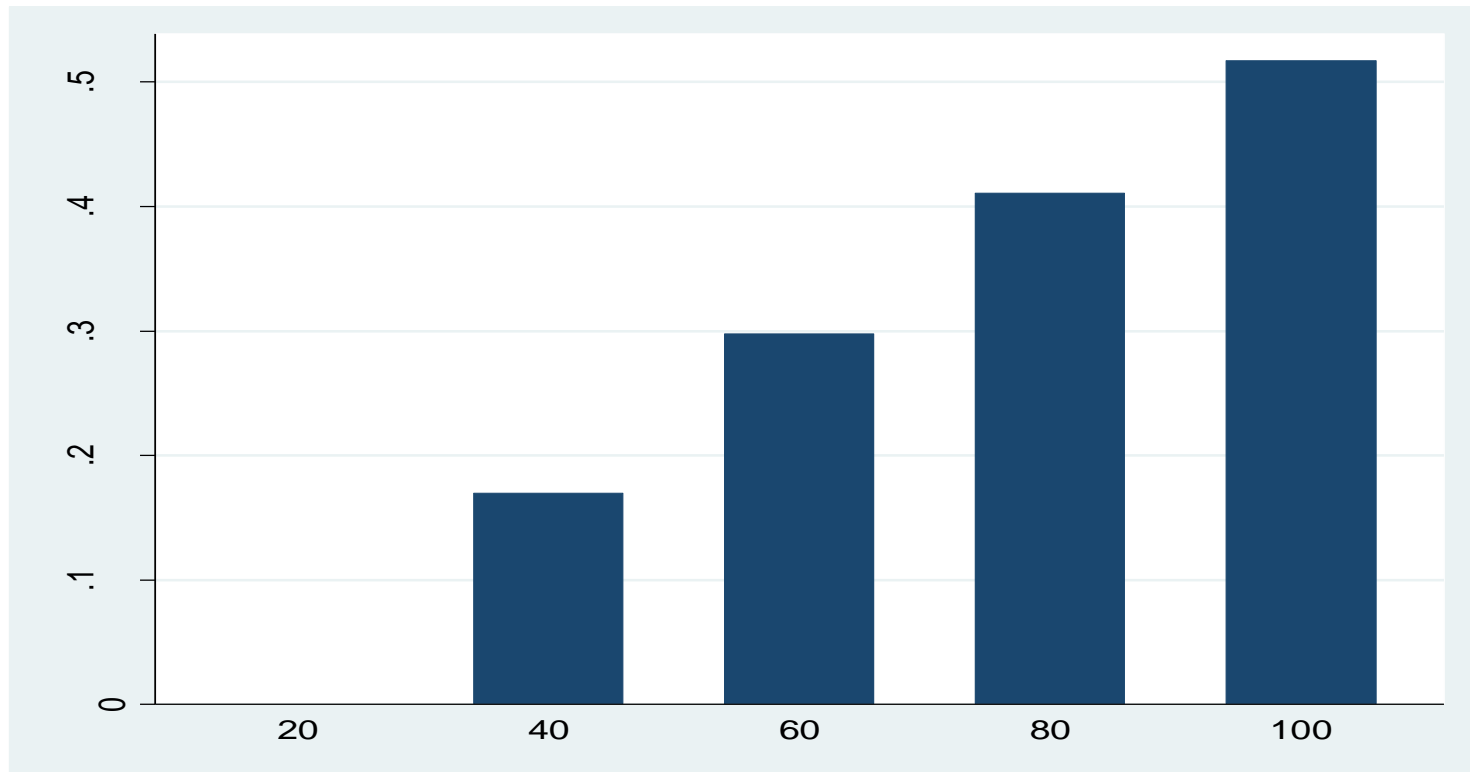


Firms facing more competition are more decentralized

Competition proxies	Dependent variable: Decentralization		
Imports/production (three digit industry, 1995-99)	0.184*** (0.073)		
Lerner Index of competition (three digit industry except firm itself, 1995-99)	2.265*** (1.081)		
Number of competitors	0.094** (0.034)		
Observations	2,497	3,587	3,587

Notes: Other controls are SIC3 dummies, 12 country dummies, noise controls (interviewer dummies Interviewee tenure and seniority, etc.), public listing, CEO onsite, plant size,

Plants with more skilled workers are more decentralized



Proportion of employees with a college degree



Legal/Cultural Factors affecting Decentralization

- Trust
- Rule of Law



TRUST AND DECENTRALIZATION

- Trust can affect decentralization
 - Facilitate cooperative solutions
 - Reflect congruence of preferences
- We find evidence of robust positive relationship between trust in region where plant is located and decentralization
- How to measure trust? World Value Survey has question:
“Generally speaking, would you say that most people can be trusted or that you can’t be too careful in dealing with people?”
Trust by region of the country defined as % of people answering “yes” to first part of the trust question
- Experimental studies show this question linked with trust/trusting behavior (Glaeser et al, 2000, Sapienza et al, 2007)



TRUST AND DECENTRALIZATION

Trust (region)	1.196*** (0.429)	0.825*** (0.290)	0.732** (0.298)
Rule of law (country)		0.473*** (0.102)	
Observations	3549	3549	3549
Country dummies	no	no	yes
Other controls	no	no	yes

Notes: Other controls are SIC3 dummies, noise controls (interviewer dummies Interviewee tenure and seniority, etc.), public listing, CEO onsite, plant size, competition

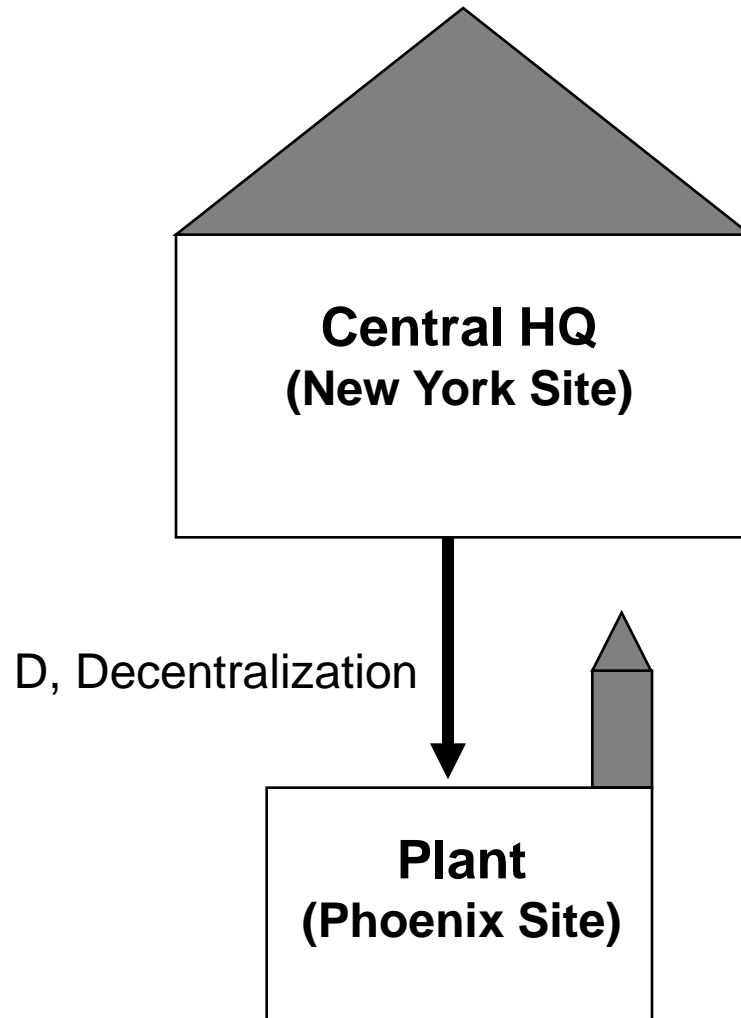


USE MULTINATIONALS AS A SECOND TEST FOR IMPORTANCE OF TRUST

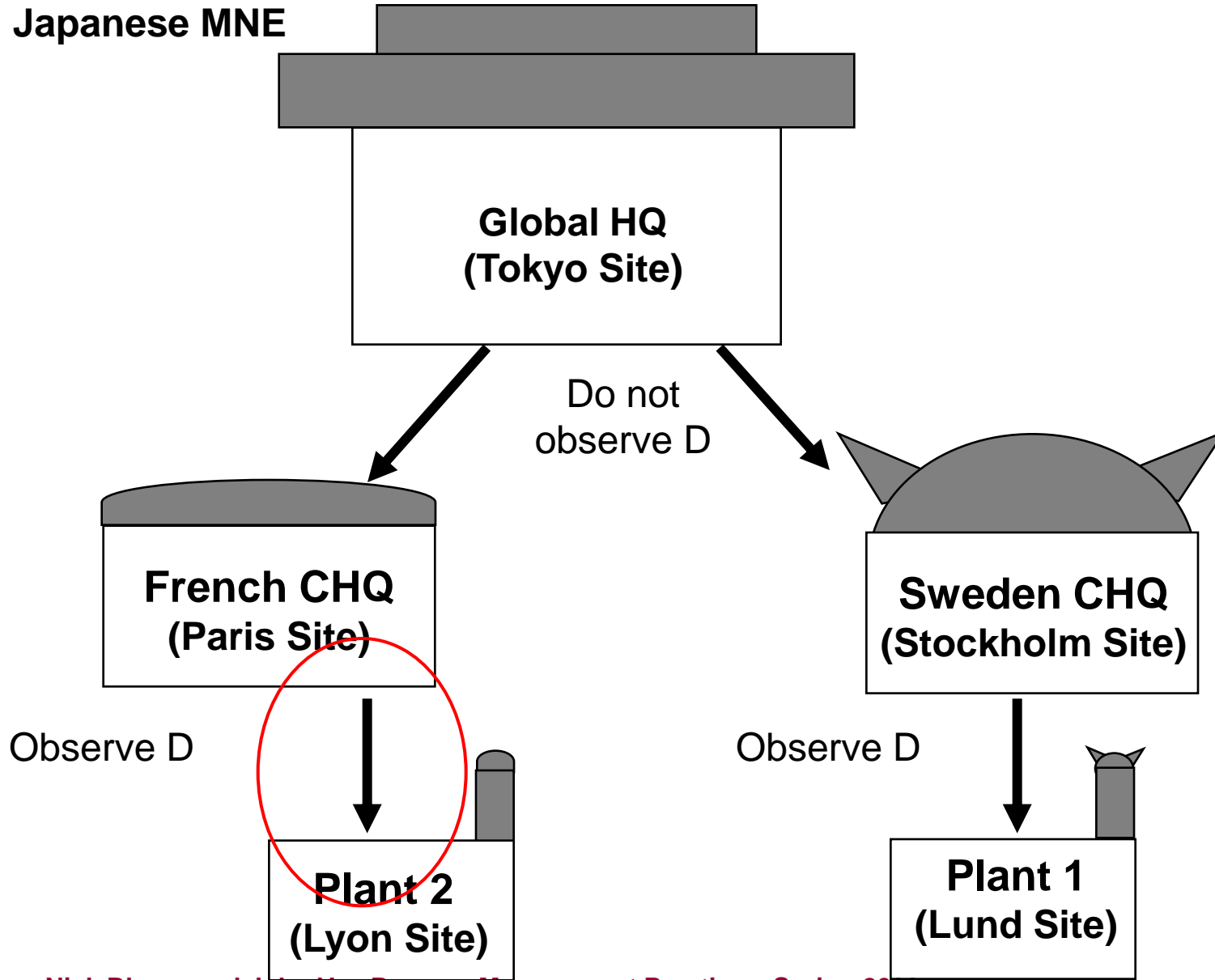
- Could worry about bias due to trust proxying for other country/regional variables
- So look at affiliates of foreign multinationals and investigate whether trust in their home country also matters
- **Bilateral trust:** (on average) how much do people in the multinational's home country trust people in the country where the subsidiary is located (Eurobarometer Survey)



**Example A:
Domestic Firm
2 Sites, Single Plant**



Example D
Japanese MNE



DECENTRALIZATION AND TRUST

Sample:

Multinational Firms

Trust (region of location)	0.609 (0.592)	0.563 (0.843)		0.446 (1.908)	
Trust (country of origin)		0.749*** (0.301)	0.698*** (0.331)	0.152 (0.152)	
Trust (bilateral from origin cty to location cty)				1.809*** (0.768)	2.101*** (1.035)
Full set of controls	Yes	Yes	Yes	Yes	Yes
Regional dummies	No	No	Yes	No	Yes
Country origin dummies	No	No	No	No	Yes
Clustering	Region	Region	Origin country	Origin country	Origin country
Observations	867	867	867	280	280



- What is decentralization?
- Measurement and Stylized facts
- Determinants of decentralization

- **Firm Performance and decentralization**



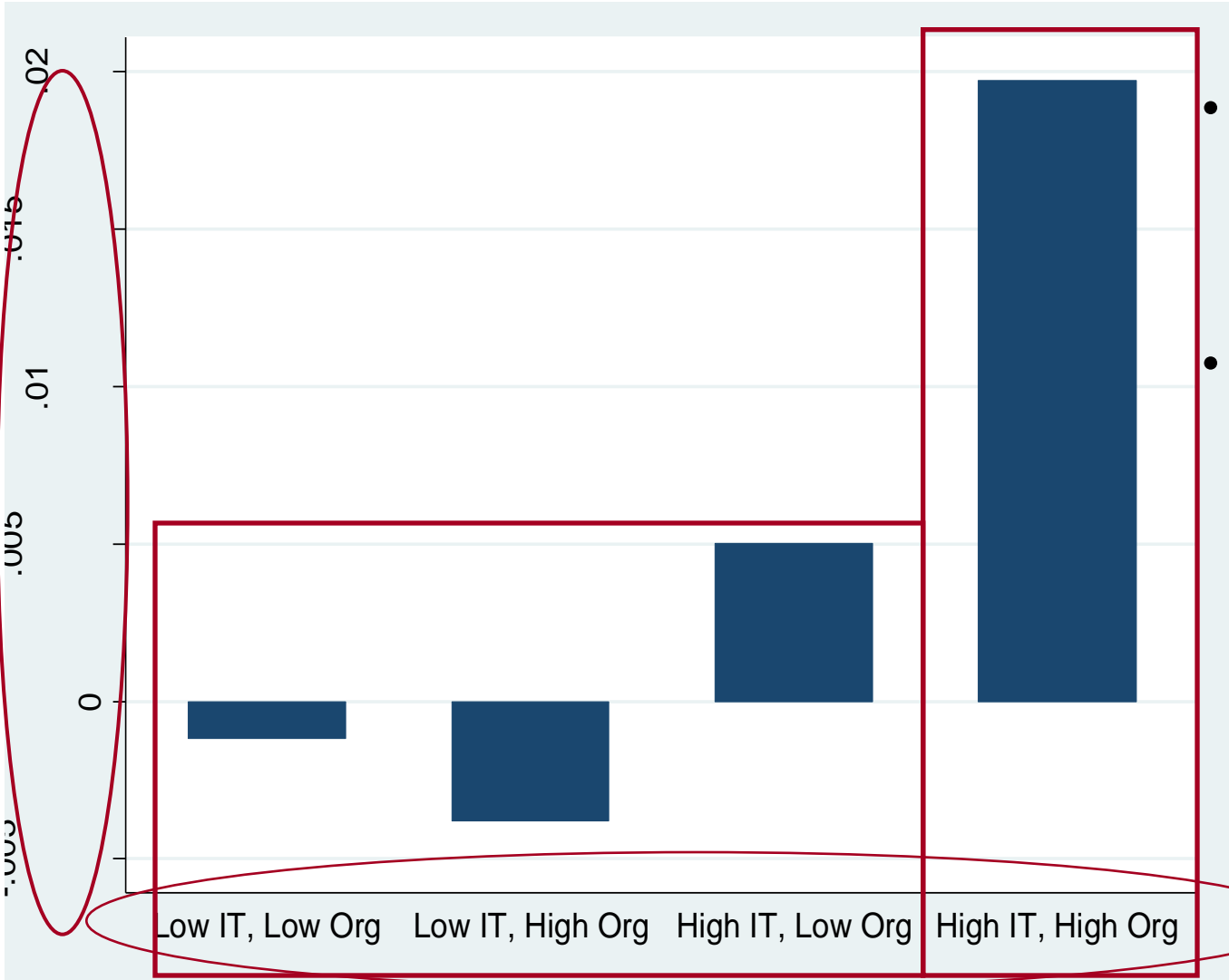
DECENTRALIZATION AND FIRM PERFORMANCE

- To be large you need some decentralization. Factors holding back decentralization (like trust)
 - distort firm size distribution
 - Affect industry structure
- For a given size/industry is decentralization linked to firm-level productivity outcomes?
- Much evidence that impact of IT on productivity very heterogeneous. This is linked to firm organization (hard to change quickly).
- Complementarities – e.g. IT and decentralization, skills.

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PRODUCTIVITY GROWTH IMPLICATIONS



- “High Org” = more decentralized
- IT and decentralization appear complementary



Summary of Results on productivity and decentralization

- Decentralization effect is context specific
- Overall falling IT prices imply that decentralization is desirable
- Firms/countries which already have a degree of decentralization are at an advantage



Summary

Today we covered:

- Organization and decentralization
- What factors cause firms (and nations) to be decentralized
- The relationship between ICT and decentralization

In the final session on Thursday we will examine:

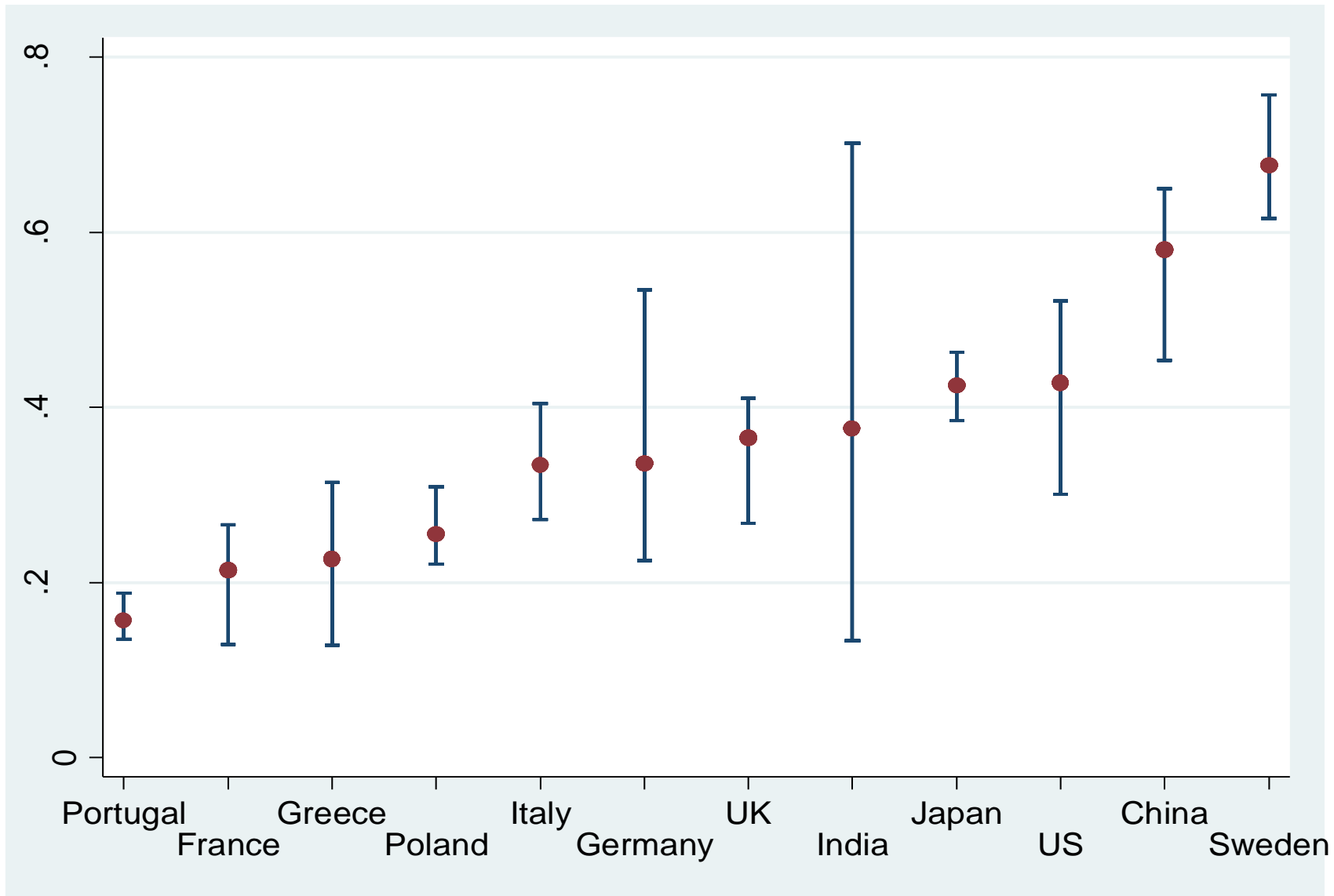
- Management (and organization) in Healthcare and other sectors
- Getting at the causal impact of management: field experiments in India



Quotes & Back-up



TRUST BY COUNTRY AND REGIONAL DISPERSION

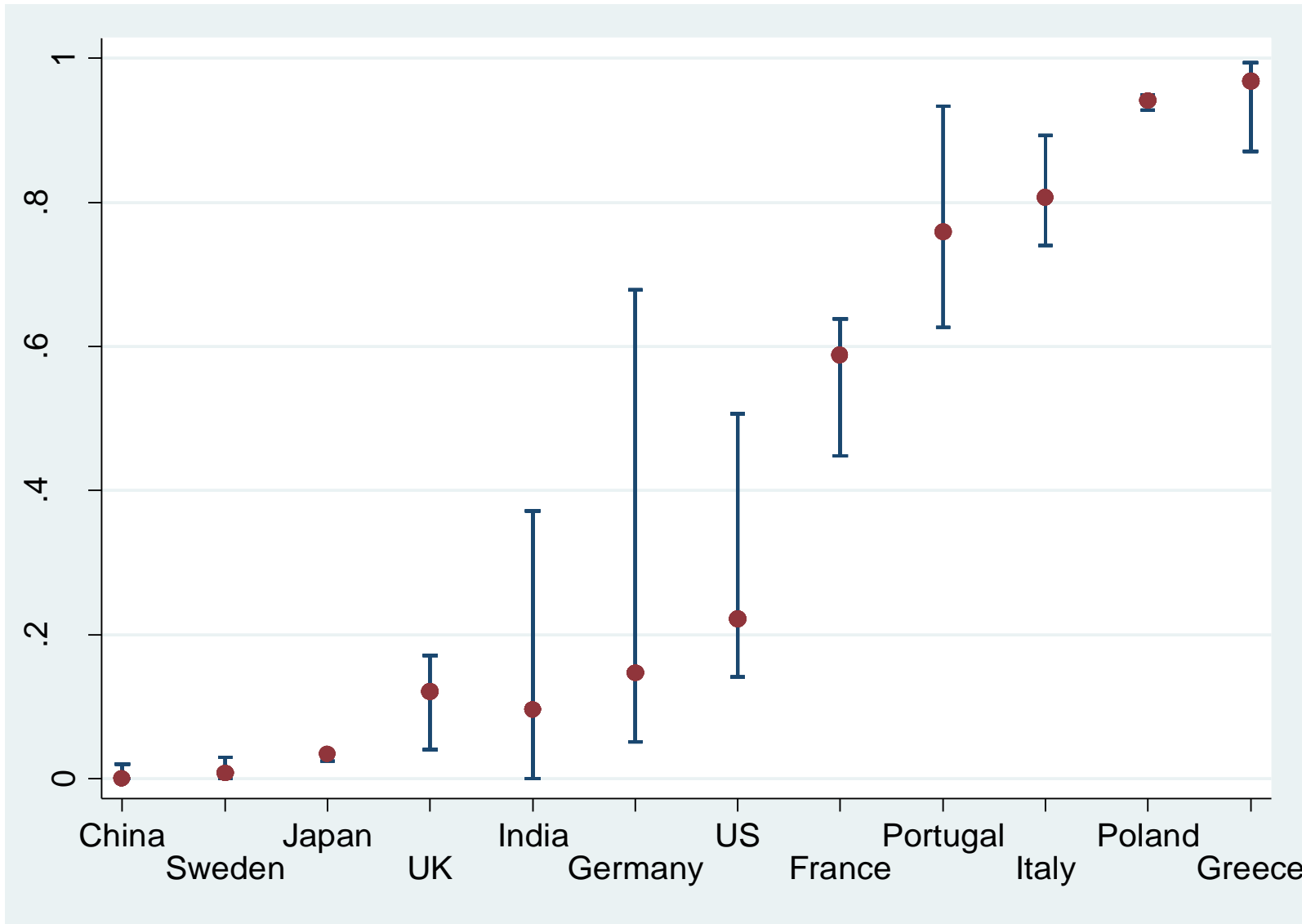


The graph shows median level of trust. The vertical bars denote minimum and maximum levels.

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RELIGION BY COUNTRY & REGIONAL DISPERSION



The graph shows median level of shares of hierarchical religion. The vertical bars denote minimum and maximum levels.

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Examples of Regional breakdown: US

US1	California	
US2	East North Central	Illinois, Indiana, Michigan, Ohio, Wisconsin
US3	East South Central	Alabama, Kentucky, Tennessee
US4	Middle Atlantic States	New Jersey, New York, Pennsylvania
US5	New England	Connecticut, Massachusetts, Vermont, New Heaven, Rhode Island,
US6	Northwest	Alaska, Oregon, Washington
US7	Rocky Mountain State	Wyoming, Colorado, Idaho, Utah, Arizona, Nevada,
US8	South Atlantic	Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia
US9	West North Central	Iowa, Kansas, Minnesota, Montana, Nebraska, North Dakota, South Dakota
US10	West South Central	Arkansas, Louisiana, Oklahoma, Texas



Examples of Regional breakdown: India

IN1	Andhra Pradesh
IN2	Assam
IN3	Bihar
IN4	Chhatisgarh
IN5	Gujarat
IN6	Haryana
IN7	Jharkhand
IN8	Karnataka
IN9	Kerala
IN10	Madhya Pradesh
IN11	Maharashtra
IN12	Orrisa
IN13	Punjab
IN14	Rajasthan
IN15	Tamil Nadu
IN16	Uttar Pradesh
IN17	West Bengal



INDUSTRY MIX AND DECENTRALIZATION

Industry composition also likely to be driven by factors that determine decentralization.

Some industries are generally more decentralized (e.g. machinery and electronics) than others (e.g. apparel and food)

We generate an “industry mix” measure of decentralization:

1) Use US data to define average decentralization (D_i) by SIC2

2) In all other countries define “industry mix” decentralization as:

$$R_r = \sum D_i S_{i,r}$$

which weighs D_i by regional SIC2 employment shares ($S_{i,r}$)



“INDUSTRY MIX” DECENTRALIZATION IS ASSOCIATED WITH TRUST & RULE OF LAW

Dep Var: industry mix decentralization	(1)	(2)	(3)	(4)
Trust (in region)	0.213*** (0.051)	0.215*** (0.035)	0.211*** (0.037)	0.052 (0.073)
Rule of Law (in country)		0.051*** (0.008)	0.049*** (0.014)	
Regional GDP per capita, Skills and Population controls	No	No	Yes	Yes
Country controls	No	No	No	Yes
Number of regions	97	97	97	97

Weighting by WVS share of obs within country.
Data from regions in all countries except the US



DECENTRALIZATION & RELIGION

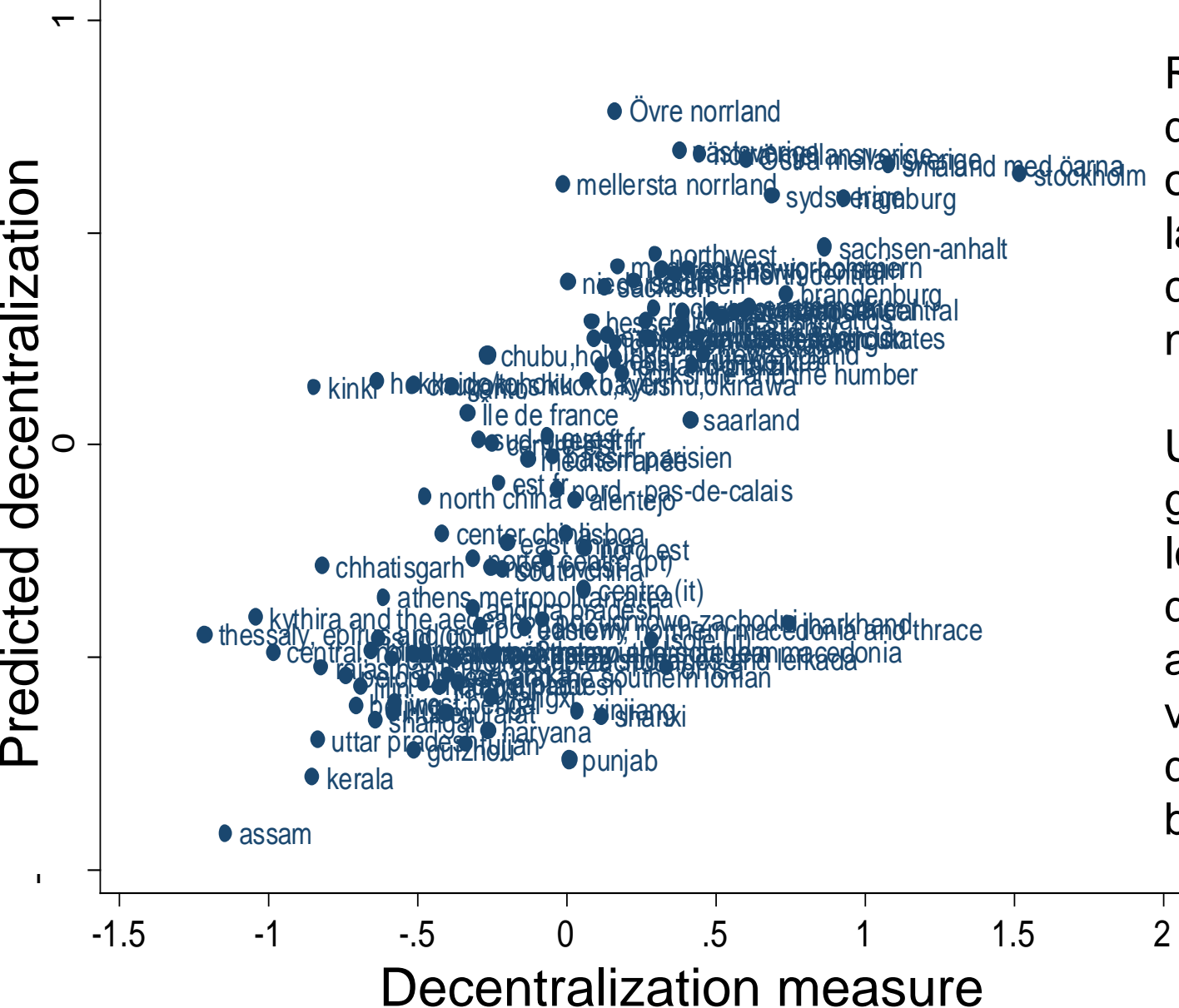
Sample:	All Firms	Multinationals	Poland, Sweden, France, UK and Germany
Estimation	OLS		IV with reformation
Hierarchical Religion (region)	-0.560*** (0.161)	-0.552*** (0.205)	-0.757*** (0.314)
Hierarchical (country of origin)			-0.368*** (0.149)
Trust (region)		0.866*** (0.305)	1.022*** (0.361)
Full set of controls	No	Yes	Yes
Country dummies	No	Yes	Yes
Regional dummies	No	No	Yes
Clustering	Region	Region	Origin Country
Observations	3549	3549	867

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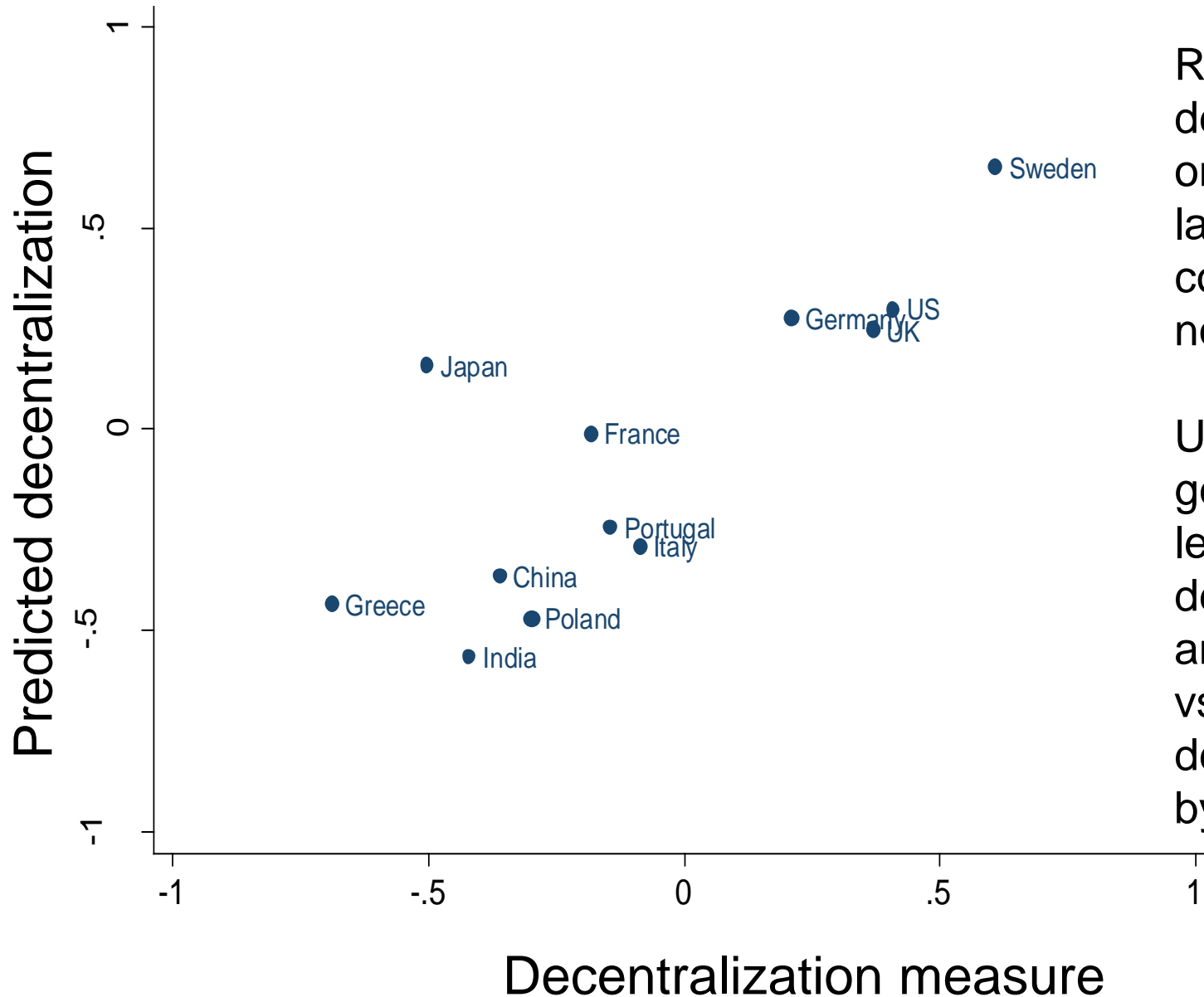
Note: Hierarchical religion is % Catholic, Christian Orthodox or Islam



OVERALL QUANTIFICATION: ACTUAL VS PREDICTED DECENTRALIZATION, BY REGION



OVERALL QUANTIFICATION: ACTUAL VS PREDICTED DECENTRALIZATION, BY REGION



Regress firm level decentralization on trust, rule of law, religion and competition (with no other controls)

Use this to generate firm level predicted decentralization, and plot predicted vs actual decentralization by country



'FISCAL DECENTRALIZATION' IS CORRELATED WITH OUR DECENTRALIZATION MEASURE



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GENERAL MODELLING FRAMEWORK

- Principal-agent
 - Principal is the Corporate Head Quarters (CHQ)
 - Agent is the plant manager
- Optimal decentralization depends on trade-off between:
 - Managers typically have better local information than CHQ
 - Manager's incentives diverge from firm's (agency problem)
- This can of course be extended in many ways – for example:
 - Need for coordination (Alonso et al. 2008)
 - Incentives to communicate
 - Multi-level agency problems with CEO and owners

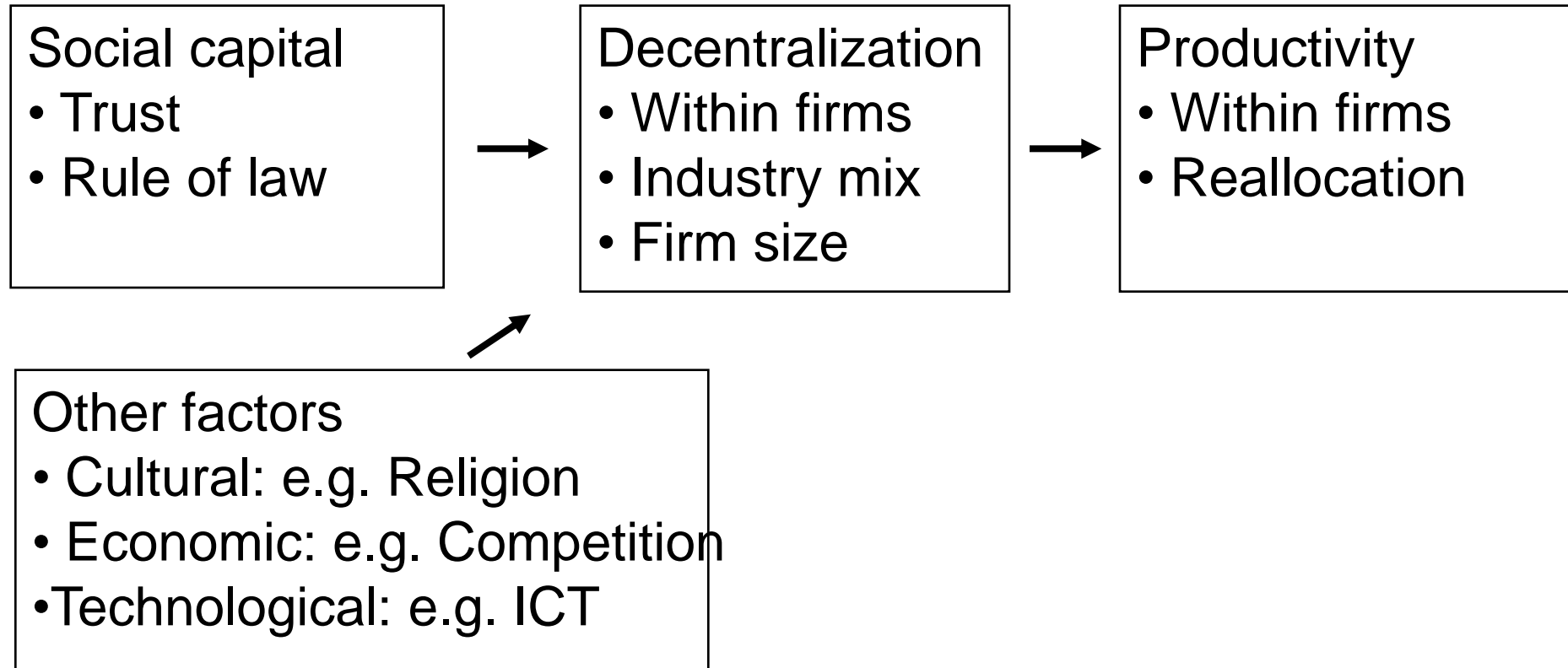


EXTERNAL VALIDATION – COUNTRY LEVEL (2/2)

- There is also a cross-country index of Fiscal Decentralization from Arzaghi and Henderson (2005, JPubE)
- Index of Fiscal Decentralization based on 9 factors including:
 - Government structure (e.g. unitary v federal)
 - Local (regional/municipal) democratization & autonomy
 - Local (regional/municipal) control over taxation and spending (education, police, transport etc.)
- Surveyed every country with >10 million people (in 1995)



ONE FRAMEWORK TO INTERPRET OUR RESULTS



DECENTRALIZATION AND RELIGION

- Religion may affect decentralization via trust
 - Putnam (1993), La Porta et al (1997), Guiso et al. (2004) argue that hierarchical religions may inhibit formation of horizontal bonds between people, lowering trust
- But religion could still play an independent role, as it could reflect preferences for autonomy:
 - *Proxy* for regional variations in preference for autonomy
 - *Cause* regional variations in preferences for autonomy



DECENTRALIZATION AND RELIGION

- Measure religion using World Values Survey
- Follow La Porta et al. (1997) in defining a “*Hierarchical religion*” variable which is % people in the region that are Catholic, Orthodox or Muslim



FIRM DECENTRALIZATION AND PRODUCTIVITY

Dep Variable: Log(Sales)	(1)	(2)	(3)	(4)	(5)	(6)
Decentralization	0.106*** (0.015)	0.030** (0.014)	0.046** (0.021)			
Log(Employment)	0.599*** (0.022)	0.661*** (0.023)	0.704*** (0.031)	0.445*** (0.076)	0.439*** (0.074)	0.439*** (0.074)
Log(Capital)	0.404*** (0.017)	0.345*** (0.016)	0.297*** (0.022)	0.373*** (0.044)	0.388*** (0.043)	0.387*** (0.044)
Log(% employees with degree)		0.056*** (0.014)	0.049** (0.019)			
Log(IT)			0.126*** (0.024)	0.073*** (0.021)	0.071*** (0.021)	0.076*** (0.021)
Decentralization*Log(IT)			0.046*** (0.017)	0.032* (0.017)	0.035** (0.017)	
Decentralization*Log(Capital)					-0.041 (0.028)	-0.039 (0.027)
Country and Industry Controls	No	Yes	Yes	Yes	Yes	Yes
Survey Noise controls	No	Yes	Yes	Yes	Yes	Yes
Fixed effects	No	No	No	Yes	Yes	Yes
Firms	1670	1547	746	746	746	746
Observations	11659	10723	3509	3509	3509	3509
Clustering by firm						



Competition fosters decentralization

Dependent variable: Decentralization						
Import Penetration (3 years lagged)	0.156** (0.071)					
1- Lerner index (3 years lagged)		2.937*** (1.056)				
No. Competitors (0=none, 1=between 1 and 4, 2=more than 4)			0.099*** (0.038)			
Trust (in the plant's region)				0.857*** (0.303)		0.797** (0.327)
Rule of Law (country)				0.515*** (0.125)	0.292*** (0.063)	
Hierarchical religion					-0.268** (0.124)	-0.494** (0.199)
Observations	2508	3660	3600	3660	3660	3660
Industry dummies (112)	yes	yes	yes	no	no	Yes
Country dummies (12)	yes	yes	yes	no	no	Yes
Other controls (60)	yes	yes	yes	no	no	Yes



FIRM SIZE AND DECENTRALIZATION

Early work on the structure of firms argued that decentralization was critical for large firms, Penrose (1959) & Chandler (1962)

Indeed, in our data we see larger firms are more decentralized

This suggests factors that facilitate decentralization – such as trust and rule of law - should influence firm size

- Consistent with cross-country data – e.g. La Porta et al (1997)



FIRM SIZE IS IMPORTANT FOR GROWTH

Important for productivity growth as reallocation - which accounts for $\approx 3/4$ of US TFP growth - needs productive firms to grow large

Also important in development as low productivity due to lack of reallocation as too few large firms: e.g. Banerjee & Duflo, 2004; Hsieh & Klenow (2008) Pawasutipaisit & Townsend (2008)

One modeling framework is Lucas (1978) :

- Low social capital reduces scalability of managerial talent
 - Smaller firms on average
 - Lower aggregate productivity



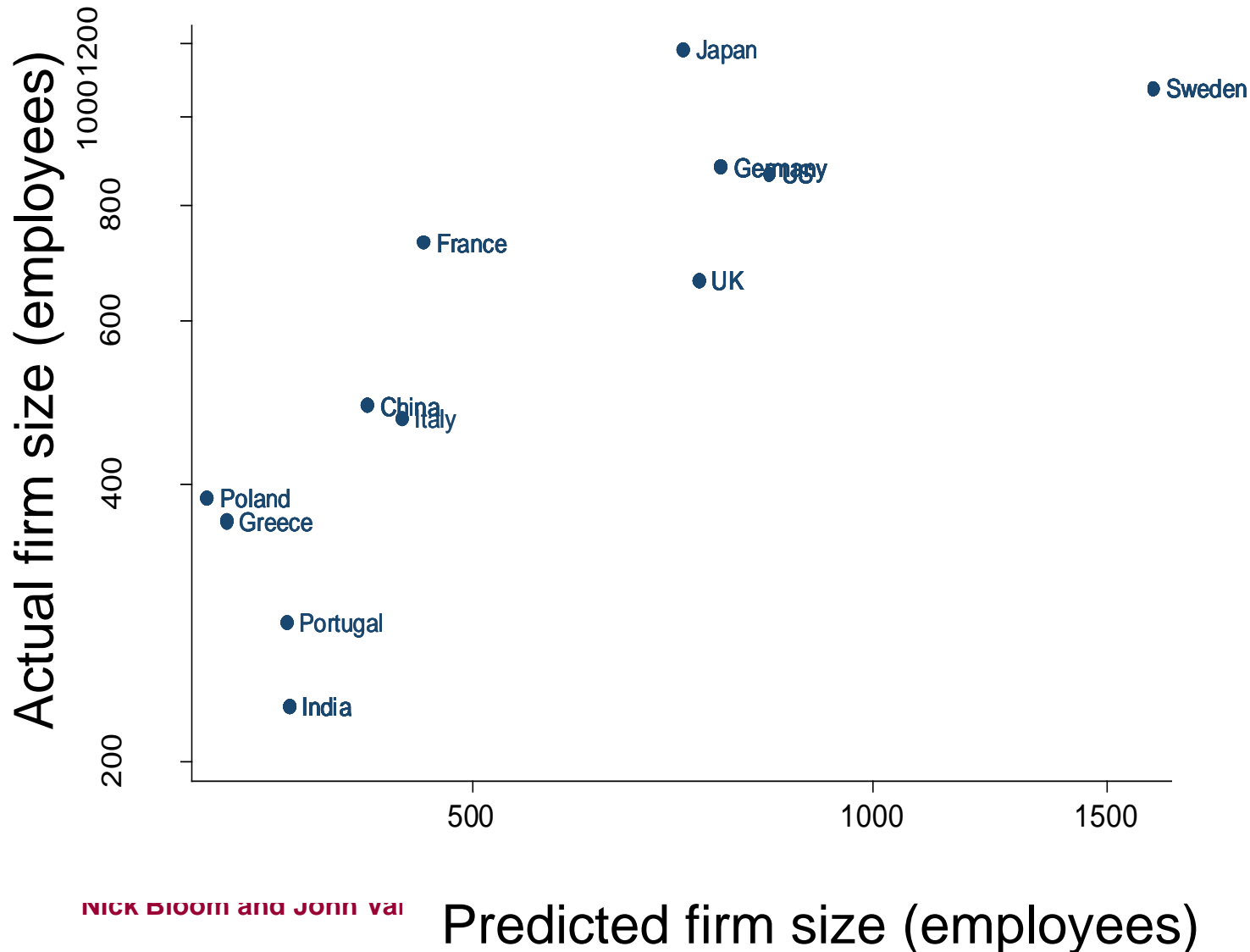
TABLE 6: FIRM SIZE AND TRUST ACROSS REGIONS

	(1)	(2)	(3)	(4)	(5)	(5)
Firm size calculated as:	Log (Mean)	Log (Mean)	Log (Mean)	Log (Mean)	Log (Mean)	Log (Median)
Sample (by employee size):	100+	100+	50+	25+	all	100+
Trust (region)	2.216*** (0.478)	1.851** (0.889)	1.713* (0.874)	1.597* (0.857)	1.540* (0.858)	0.484*** (0.158)
Rule of Law (country)	0.476*** (0.079)					0.056** (0.022)
Country Controls	No	No	Yes	Yes	Yes	Yes
Regional GDP per capita, Skills and Population	No	No	Yes	Yes	Yes	Yes
N	110	110	110	110	110	110

Weighting by WVS survey share within country. Regions with 5+ survey obs.



ACTUAL FIRM SIZE (100+ EMPLOYEE FIRMS) AGAINST PREDICTED SIZE, BY REGION



Regress firm size on trust and rule of law in region (no other controls)

Use this to generate predicted regional firm size, and plot predicted and actual average by region

