

# Who's Got the Power? Decentralization from Headquarters to Plant Managers

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**Disclaimer:** Any opinions and conclusions expressed herein are those of the authors and do not necessarily represent the views of the U.S. Census Bureau. All results have been reviewed by the Census Bureau to ensure that no confidential information is disclosed (CBDRB-FY19-CMS-7477; CBDRB-FY19-CMS-7478).

Who holds decision rights in a firm?



# Who holds decision rights in a firm?

- Longstanding debate over centralization vs decentralization
  - E.g., coordination (Lange, 1936) vs local information (Hayek, 1945)
- Active academic literature on delegation of decision rights within firms
- Increasing consolidation of plants into large firms raises questions about trends in decision-relevant concentration
- Partnership with Census provides unrivaled insight into this question
  - Scope: large sample of manufacturing plants
  - Detail: longitudinal data on plant characteristics

# Summary of Results

- Decentralization seems to have **increased** from 2005 to 2015
  - Consistent with Blundell et al 2016 & anecdotes
- The propensity to decentralize decisions is **dispersed** across plants
  - Around 50% of variation within same firm
- Some types of plants are **more likely** to be decentralized
  - Large plants, exporting plants, “auxillary” plants...
- Decentralized establishments seem to be **dynamically successful**
  - Faster employment growth
  - Less exit

# Literature

- Systematic information on decision-making has generally been sparse
  - Organization charts (e.g. Rajan and Wulf, 2006)
  - Smaller surveys or case-studies (see Aghion et al., 2014)
- Theoretical literature emphasize role of local vs global information in decisions
  - see Gibbons et al., 2013 and Garicano and Rayo, 2016
- Empirical literature focuses on three topics
  - Description: Rajan and Wulf (2006), Blundell et al. (2016)
  - Determinants: Acemoglu et al. (2007), Guadalupe and Wulf (2010), Bloom et al. (2012), McElheran (2014), Katayama et al. (2016)
  - Effects: Caroli and Van Reenen (2001), Bresnahan et al. (2002), Aghion et al. (2017)

# Data

- MOPS

- Contemporaneous survey data from 2010 and 2015
- Recall survey data from 2005 and 2010
- Organizational questions
- Supplemental plant details

- ASM/CMF

- Plant inputs, outputs from 2005, 2010, and 2014
- Additional data on other plants in same firm from 2007, 2012

- LBD

- Longitudinal survival, employment growth measures
- Additional historic/firm-level data (size, age)

# Decentralization questions from MOPS

1. Where were decisions on **hiring permanent full-time employees** made?
2. Where were decisions to **give an employee a pay increase of at least 10%** made?
3. Where were decisions on **new product introductions** made?
4. Where were **product pricing** decisions made?
5. Where were **advertising decisions** for products made?
6. What was the dollar amount that could be used to **purchase a fixed/capital asset** at this establishment without prior authorization from headquarters?

# Defining a decentralization index

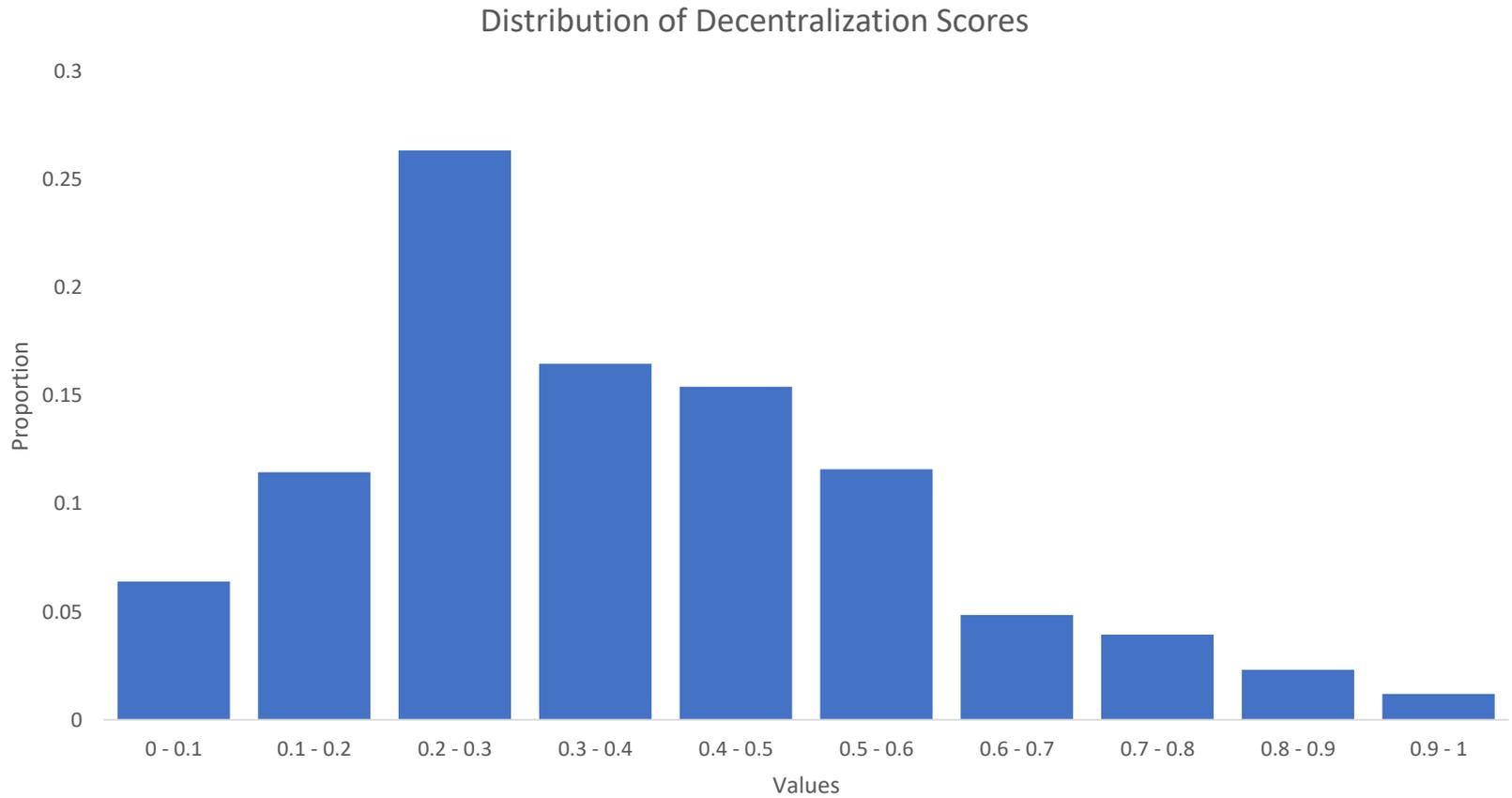
- Follow literature:

- For each component question  $j$ , define component decentralization measure  $D_{ij}$  as linear between 0 and 1
- 0 is least decentralized, 1 is most decentralized, and intermediate answers are evenly spaced:
  - For first five questions, “Both” is 0.5
  - For capital question, “10k – 100k” is 0.5
- Decentralization index is then the average of over all components (where defined):

$$DEC_i = \frac{1}{6} * \sum_j D_{ij}$$

- Equal weight over each question
- Highly correlated with first principal component

# Descriptive statistics



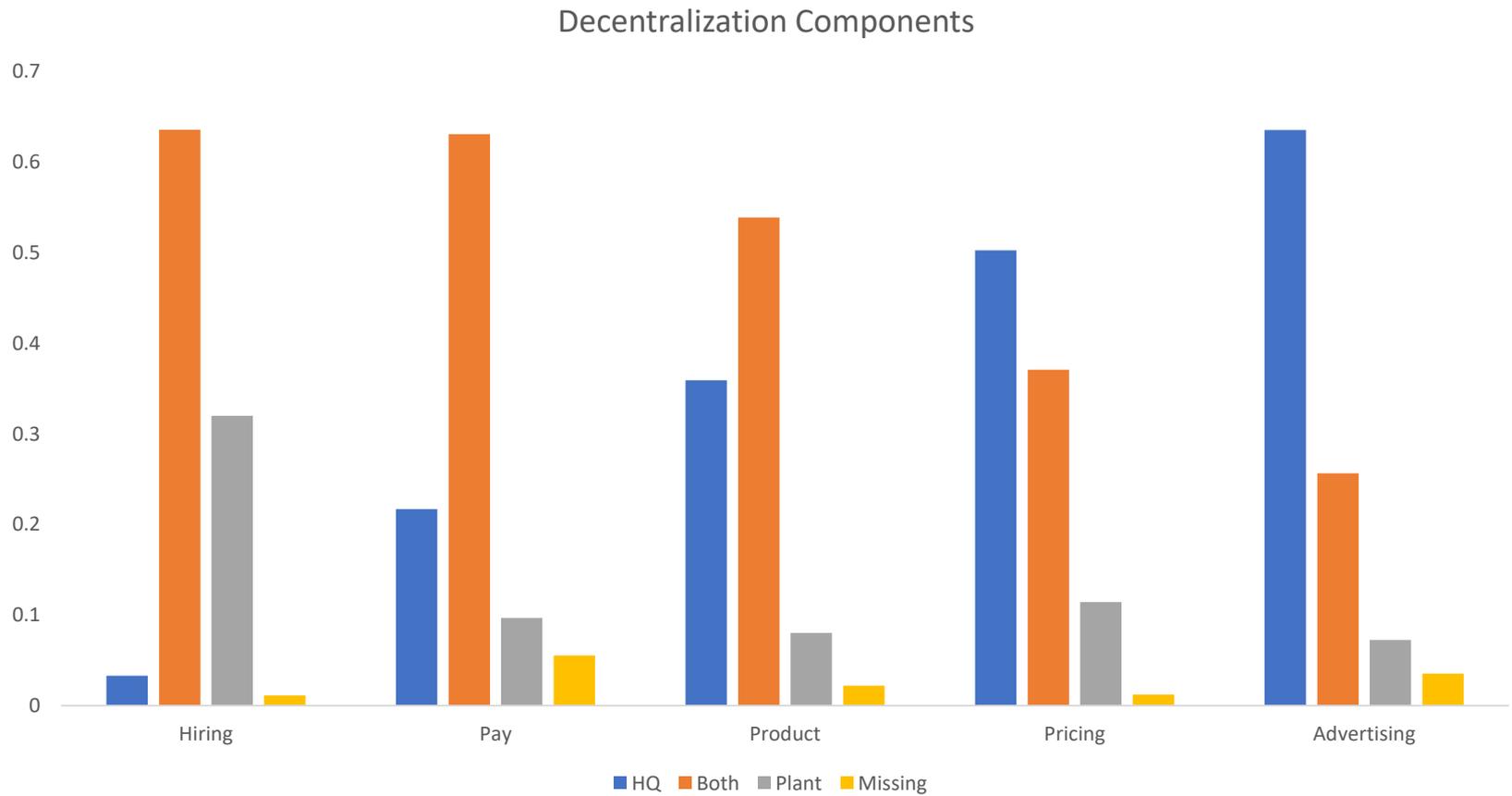
# Roughly half of the dispersion is within firms

- Back of the envelope calculation:

- Assume measurement error is roughly 20% of overall variance (from residual of regression with plant FEs and time varying controls)
- Then firms explain  $0.43/(1 - 0.20) = 47\%$  of plant-level variation in decentralization

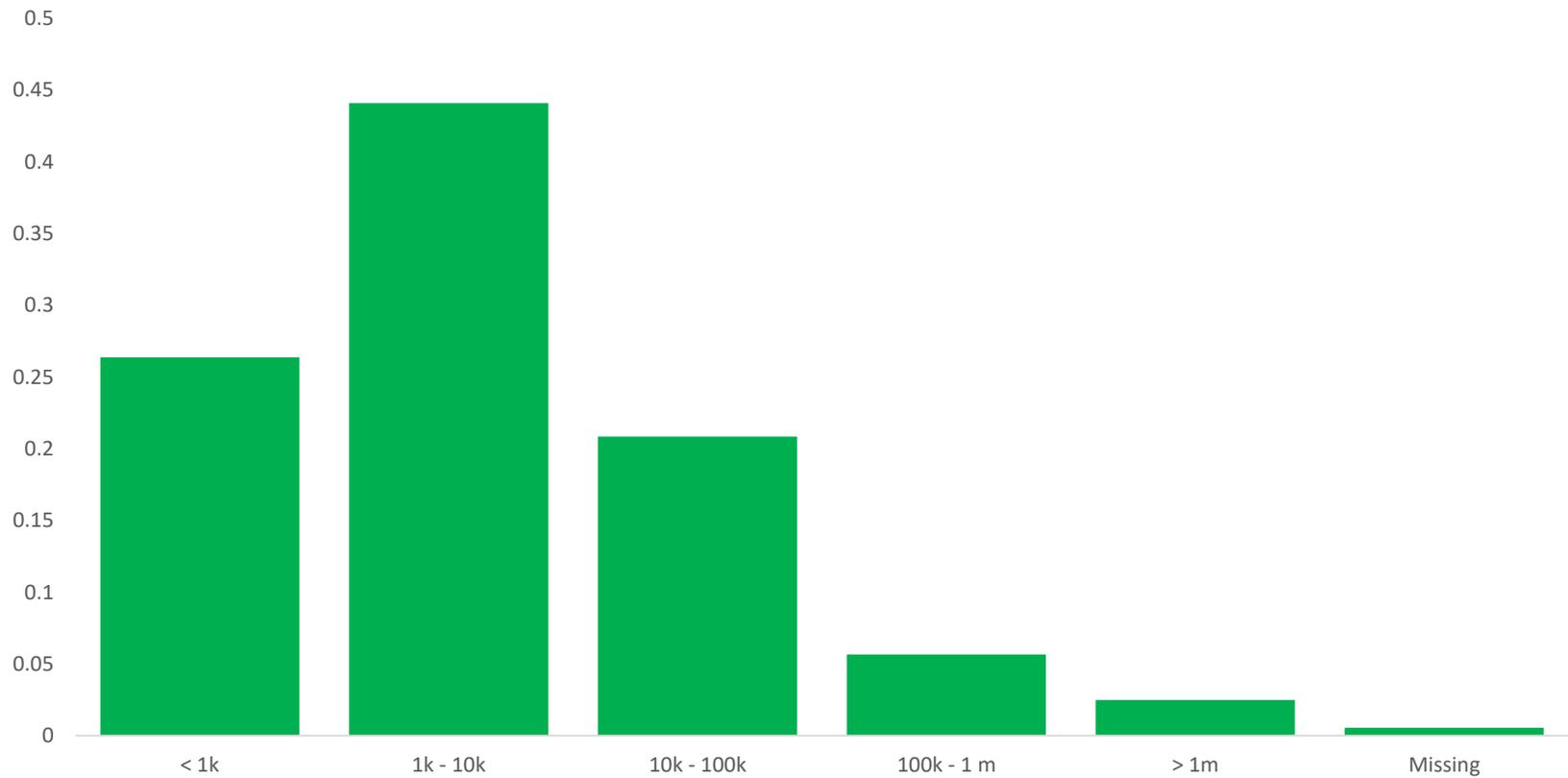
Dependent Variable:	Decentralization		
	(1)	(2)	(3)
2010	-.02396** (.00265)	-.02168** (.00236)	-.02174** (.002444)
Constant	.3725** (.002778)		
Firm FEs		Yes	Yes
State & Ind. FEs			Yes
Adj. R2	.003999	.4292	.4541
Approx. Obs	34000	34000	34000
Approx. Firms	9500	9500	9500

# Decentralization components



# Decentralization of investment

Distribution of Plant Capital Control



# Correlation between decisions

- Decision rights tend to be correlated
- Correlations are generally higher within decision “groups”
  - Staffing: hiring and pay
  - Sales: product choice, pricing, and advertising

	Hiring	Pay	Product	Pricing	Advertising	Capital
Hiring	1					
Pay	0.333	1				
Product	0.205	0.305	1			
Pricing	0.202	0.289	0.629	1		
Advertising	0.187	0.285	0.556	0.693	1	
Capital	0.134	0.214	0.160	0.123	0.129	1

# Correlation between decisions changes

- Within plant *changes* in decision rights also tend to be correlated
- Correlations are generally higher within decision “groups”
  - Staffing: hiring and pay
  - Sales: product choice, pricing, and advertising

	Hiring	Pay	Product	Pricing	Advertising	Capital
Hiring	1					
Pay	0.177	1				
Product	0.093	0.223	1			
Pricing	0.113	0.153	0.395	1		
Advertising	0.094	0.142	0.285	0.351	1	
Capital	0.062	0.068	0.048	0.036	0.050	1

# Decentralization is increasing over time

- Both in the cross section, and within plants
- Not explained by changes in observables
- Dampens effect of rising concentration

Dependent Variable:	Decentralization	
	(1)	(2)
2010	-.02396** (.00265)	-.01585** (.004271)
2010 Recall	.01817** (.003513)	
2005 Recall	-.007148* (.003252)	
Constant (2015)	.3725** (.002778)	
FE level		Estab.
Approx. Obs	48000	34000
Approx. Firms	12500	9500

# Who is more likely to be decentralized?

Dependent Variable:	Decentralization				
	(1)	(2)	(3)	(4)	(5)
Log(Employment)	.02204** (.001641)				
Exporter		.04999** (.00363)			
Not in main firm industry			.02752** (.004566)		
Share employees in union				-.0004548** (.00005387)	
Log(Capital/Emp.)					-.02268** (.001662)
Approx. Obs	48000	48000	48000	48000	48000
Approx. Firms	12500	12500	12500	12500	12500

# Who is more likely to be decentralized?

Dependent Variable:	Decentralization			
	(1)	(2)	(3)	(4)
Log(Employment)	.02204** (.001641)	.01451** (.001854)	.01531** (.001688)	.0182** (.001661)
Exporter	.04999** (.00363)	.02367** (.00309)	.01656** (.002655)	.007643** (.002338)
Not in main firm industry	.02752** (.004566)	.03824** (.004391)	.02968** (.003799)	.01554** (.003331)
Share employees in union	-.0004548** (.00005387)	-.0004375** (.00005416)	-.0003291** (.00004731)	-.0002014** (.0000427)
Log(Capital/Emp)	-.02268** (.001662)	-.01702** (.001687)	-.01011** (.001613)	-.00586** (.00163)
Specification	Bivariate	Multivariate	Multivariate	Multivariate
FE level			Industry	Firm
Plant and Firm Controls		Yes	Yes	Yes
Approx. Obs	48000	48000	48000	48000
Approx. Firms	12500	12500	12500	12500

# Who is more likely to be decentralized?

Dependent Variable:	Decentralization				
	(1)	(2)	(3)	(4)	(5)
Structured management	.09613** (.01237)		.09451** (.01277)	.05685** (.01043)	.05309** (.01063)
Data-driven decision-making		.03642** (.008918)	.003345 (.009147)	.003488 (.007713)	.004879 (.007726)
FE level				Industry	Firm
Plant and Firm Controls				Yes	Yes
Approx. Obs	48000	48000	48000	48000	48000
Approx. Firms	12500	12500	12500	12500	12500

# How do decentralized plants perform?

- Dynamic – are decentralized plants different in their growth trajectory?
  - Focus on 2010 sample, and examine growth from 2010 to 2015
  - Control for characteristics only at baseline

$$\Delta Y_{i,2015-2010} = \beta DEC_{i,2010} + \theta X_{i,2010} + \epsilon_{it}$$

- Static – are decentralized plants different in their level of productivity?
  - Focus on shipments per worker, stack all years
  - Simple start: progressively control for inputs, characteristics
    - Ideal: production function approach

$$\log(Y_{it}/L_{it}) = \beta DEC_{it} + \theta X_{it} + \tau_t + \epsilon_{it}$$

# Decentralized plants grow more quickly

Dependent Variable:	Employment Change (DHS)				
	(1)	(2)	(3)	(4)	(5)
Decentralization	.2201** (.03657)	.1796** (.03651)	.1758** (.03637)	.1825** (.03685)	.1711** (.05301)
Log(Employment)		.06628** (.007247)	.05767** (.007696)	.09353** (.01067)	.1157** (.01356)
Structured management			.2479** (.06385)	.2038** (.06333)	.3009** (.08056)
Data-driven decision-making			.0211 (.04658)	.03024 (.04523)	.0157 (.05703)
FE level	Industry	Industry	Industry	Industry	Firm
Plant and Firm Controls				Yes	Yes
Approx. Obs	17500	17500	17500	17500	17500
Approx. Firms	6600	6600	6600	6600	6600

# Decentralized plants are less likely to exit

Dependent Variable:	Exit				
	(1)	(2)	(3)	(4)	(5)
Decentralization	-.09263** (.01544)	-.05869** (.01527)	-.05798** (.01529)	-.05242** (.01514)	-.05967** (.02151)
Log(Employment)		-.05506** (.002922)	-.05339** (.003127)	-.06643** (.004472)	-.07757** (.005863)
Structured management			-.05923* (.02632)	-.05012 (.02588)	-.08439** (.03215)
Data-driven decision-making			.0006014 (.01994)	-.005296 (.01926)	-.01411 (.02561)
FE level	Industry	Industry	Industry	Industry	Firm
Plant and Firm Controls				Yes	Yes
Approx. Obs	17500	17500	17500	17500	17500
Approx. Firms	6600	6600	6600	6600	6600

...But they may be less productive?

Dependent Variable:	Log(Shipments/Employee)			
	(1)	(2)	(3)	(4)
Decentralization	-.2675** (.0268)	-.1115** (.01765)	-.1308** (.01688)	-.07997** (.02105)
FE level	Industry	Industry	Industry	Firm
Basic Input controls		Yes	Yes	Yes
Plant and Firm Controls			Yes	Yes
Approx. Obs	48000	48000	48000	48000
Approx. Firms	14000	14000	14000	14000

# Re-cap

- Control rights are generally held by HQ or shared between HQ and plants
  - But large dispersion across plants (even within firm)
- Control rights are positively correlated across decisions
- Plants are becoming more decentralized between 2005 – 2015
- Decentralization is correlated with plant characteristics
  - E.g., large, exporting, “auxillary”, less unionized, capital-intensive...
- Potential tradeoff in performance of decentralized plants:
  - Less productive
  - Higher growth
  - More likely to survive

# Some future work

- Does decentralization make plants more productive/grow faster?
  - If so, why?
- How is decentralization determined?
  - Who are the winners and losers?
- Which decision rights matter most?