Managing Resource (Mis)Allocation

Xavier Giroud
Columbia, NBER, and CEPR

Gregor Matvos
Kellogg and NBER

Amit Seru
Stanford and NBER

Rui Silva
NOVA and CEPR

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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 to ensure that no confidential information is disclosed.

Introduction

- Well-known fact: large differences in productivity across plants in the U.S. and around the world
  - Suggests that resources are not allocated efficiently
- This misallocation lowers aggregate productivity (Hsieh and Klenow, QJE 2009)
- There are two broad mechanisms that determine the allocation of resources in the economy
  - **Across firms** in the markets
  - Across divisions and across plants **within firms**

Large literature (e.g., Hsieh and Klenow, 2009)

This paper

- This distinction between the two is important because they are subject to different distortions

Introduction

- Resource allocation **across firms** is distorted due to:
  - Taxes, subsidies, regulations, capital market imperfections (e.g., collateral constraints).
- Resource allocation **within firms** is distorted due to:
  - Internal politics, within-firm lobbying, and managerial incentives.
- According to McKinsey, the proper allocation of resources within the firm is a key challenge and hence one of the primary tasks of management:
  - McKinsey defines strategy at the corporate level as "*primarily about deciding what businesses to be in, how to exploit potential synergies across business units, and* ***how to allocate resources across businesses***."

Introduction

- In the U.S., about 88% of output being produced in multi-unit firms (Bernard and Jensen 2007), which frequently span several industries.
  - Hence, the misallocation of resources within firms is likely to substantially affect aggregate productivity.

Key question: how much TFP is being lost due to the misallocation of resources within firms?

This paper

- Build a model of resource misallocation in the spirit of Hsieh and Klenov (2009).
  - Key difference: focus on within-firm distortions.
- Run counterfactuals using plant-level data from the U.S. Census Bureau.

Overview of Main Findings

- We find substantial differences in capital and labor productivity both across and within firms.
  - In counterfactuals, we estimate that removing all distortions (both across and within firms) would yield an increase in aggregate TFP by **42%.**
  - Within-firm distortions account for approximately **30%** of the overall TFP gains (i.e., 13 out of the 42%).
    - This indicates within-firm distortions give rise to large productivity losses in the aggregate!

- Arguably, a counterfactual in which all efficiencies are removed is not a realistic one!
  - But… we might be able to improve management practices.

Overview of Main Findings

- If management is indeed about "*how to allocate resources*" internally, as McKinsey claims, then better managed firms should excel at allocating resources.
- We use data from the Management and Organizational Practices Survey (MOPS) of the U.S. Census Bureau, which provides information on the quality of management practices.
  - Find that firms with better management practices exhibit lower degrees of resource misallocation across their plants and divisions.
  - In counterfactual exercises we estimate that adopting better management practices (such as those of the best managed firms in the economy) would reduce the TFP losses from resource misallocation within firms by 7-17% (i.e., 3-7 of the 42%).
    - Highlights the importance of good management in the internal allocation of resources.

Related Literature

- Aggregate implications of misallocation
  - E.g., Restuccia and Rogerson, 2008; Hsieh and Klenow, 2009; Bartelsman, Haltiwanger, and Scarpetta, 2013.
  - Deviate from this literature by focusing on misallocation within firms.
- Resource allocation within internal capital markets (ICM)
  - E.g., Rajan, Servaes, and Zingales, 2000; Ozbas and Scharfstein, 2010; Matvos and Seru, 2014; Seru, 2014; Giroud and Mueller, 2015; Matvos, Seru, and Silva, 2018; Silva, 2021; Dai, Giroud, Jiang, and Wang, 2023.
  - We quantify the aggregate TFP losses due to misallocations in ICM.
- Management practices
  - E.g., Bloom et al., 2019, 2022 on the link between management practices and productivity.
  - We identify a novel channel through which management practices benefit productivity, namely by reducing the within-firm misallocation of resources.

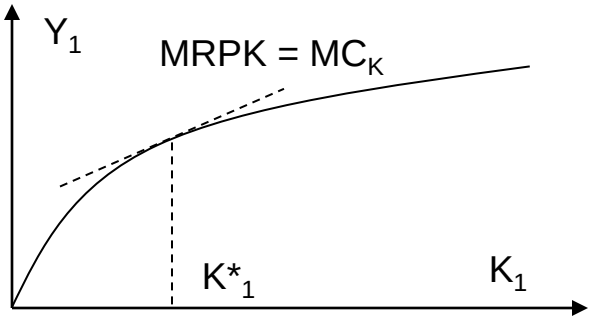
Agenda

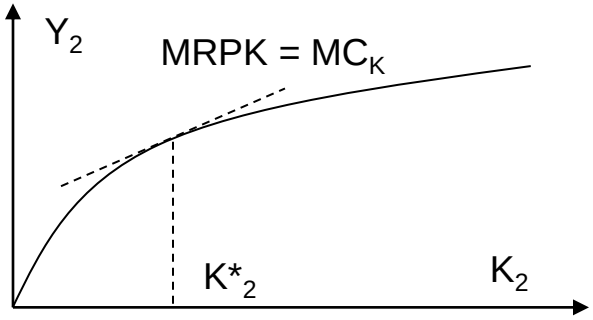
- Model
  - Intuition
  - Formal model
- Data
  - Data sources and variable definitions
  - Validation of distortion metrics
  - Management practices
- Counterfactuals
- Conclusion

Main Idea

Plant 1
$Y_1 = F_1(K_1)$

Plant 2
$Y_2 = F_2(K_2)$



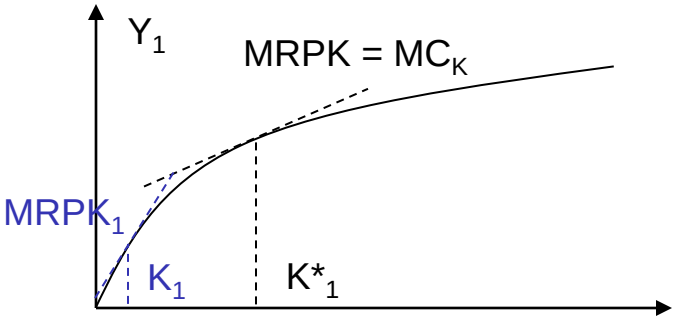


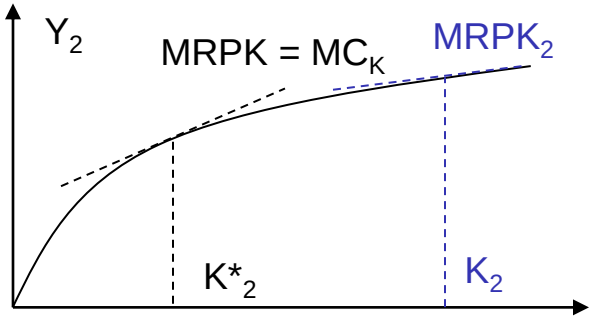
- Efficient allocation: equalize MRPK across all plants
  - $\sigma(\text{MRPK}) = 0$

Main Idea – Misallocation

Plant 1
$Y_1 = F_1(K_1)$

Plant 2
$Y_2 = F_2(K_2)$

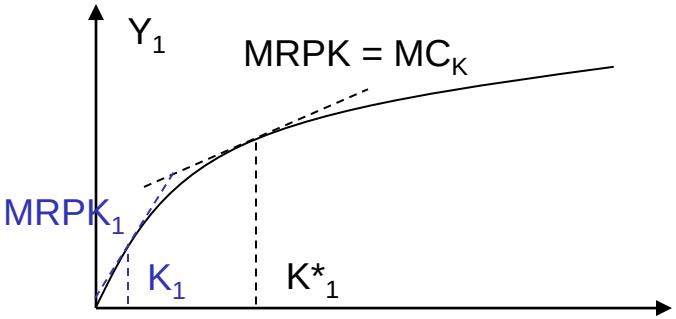


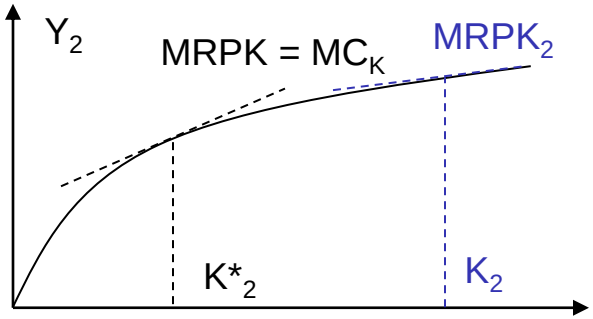


- Misallocation: $MRPK_1 \neq MRPK_2$
  - $\sigma(MRPK) \neq 0$

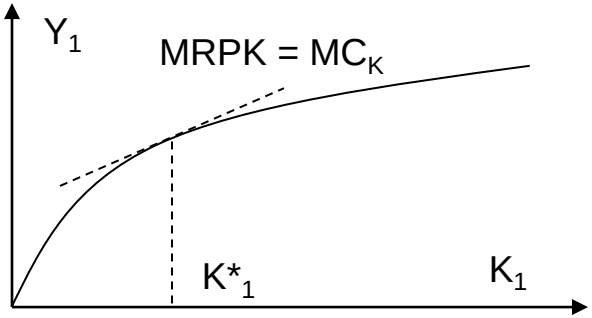
Counterfactuals

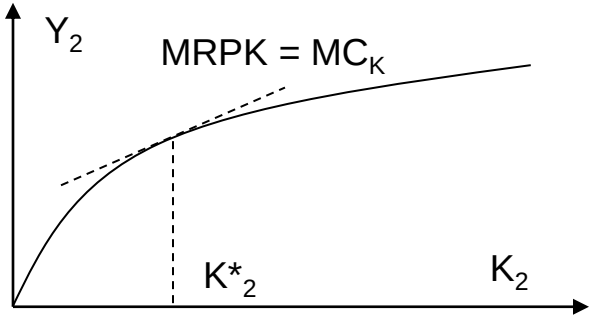
- Actual data:





- Counterfactual: reallocate to equalize marginal revenue products





- By how much would aggregate TFP increase?

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Production and Output

Each plant i in sector s,owned by firm f, produces output according to a Cobb-Douglas production function using capital and labor with industry-specific factor shares α_s

$$Y_{fsi} = A_{fsi} K_{fsi}^{\alpha_s} L_{fsi}^{1-\alpha_s} \tag{1}$$

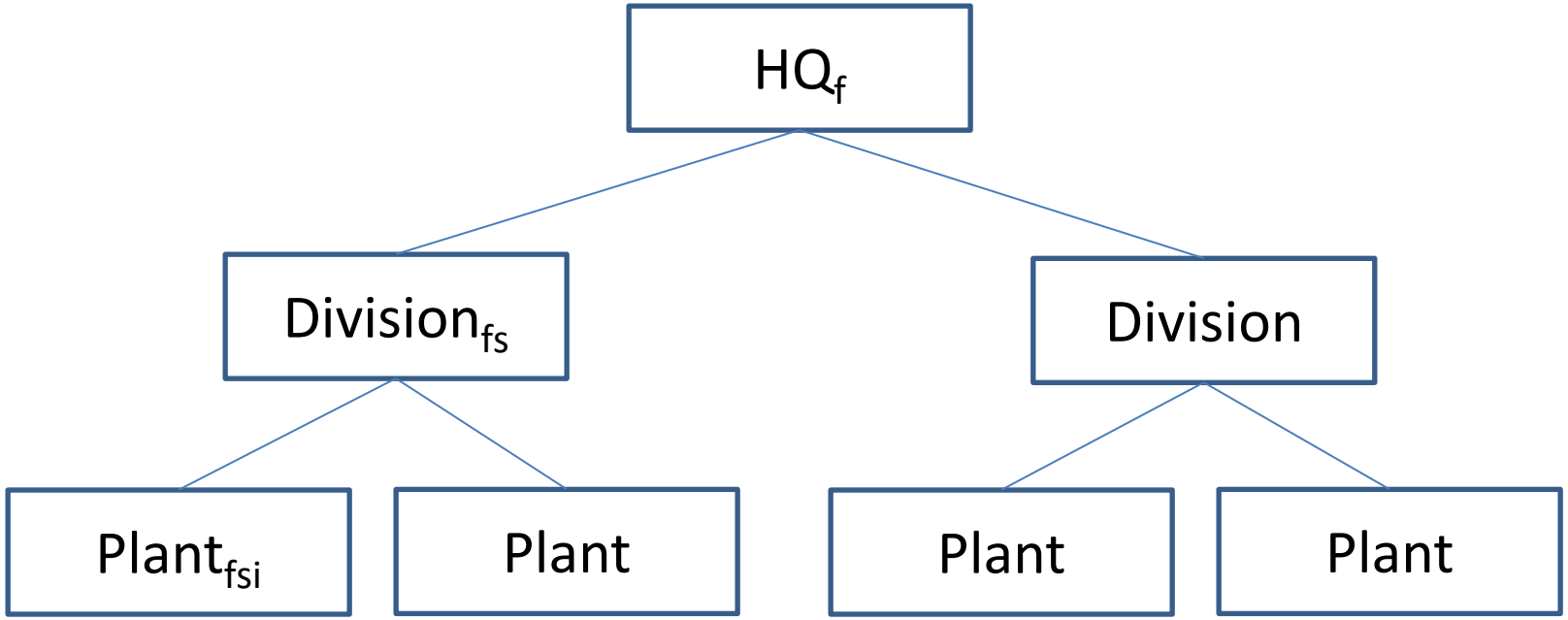
Plants are price takers in the input markets, and input prices can differ across sectors. We denote the wage per unit of labor by w_s, and the rental rate of capital by r_s. Sector output Y_s is a constant elasticity of substitution (CES) aggregation of plant outputs in that sector:

$$Y_s = \left(\sum_{i=1}^{M_s} Y_{fsi}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}. \tag{2}$$

We aggregate sectoral output into a single final good Y, by combining the output of all sectors in the economy through a Cobb-Douglas production technology:

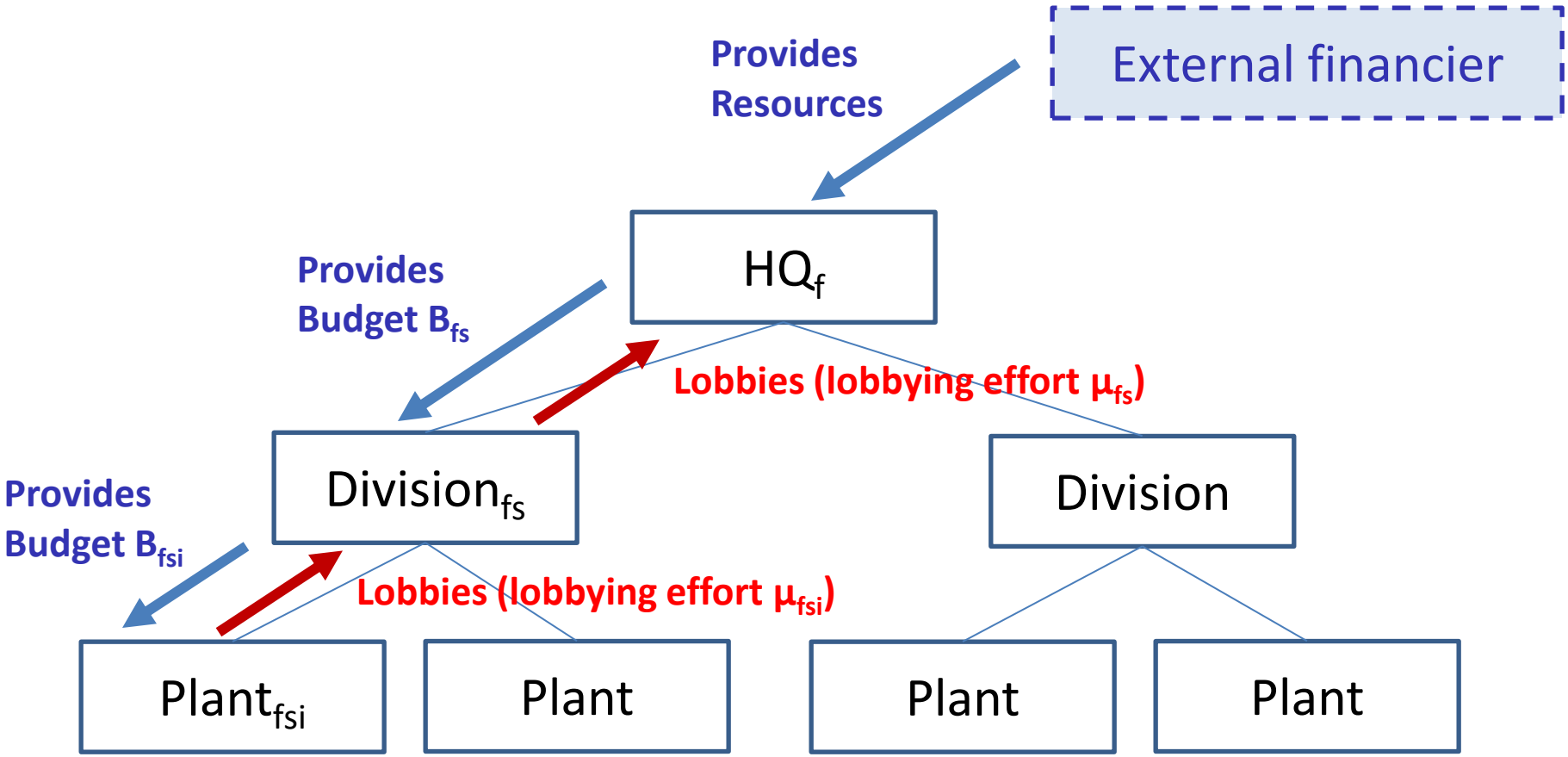
$$Y = \prod_{s=1}^{S} Y_s^{\theta_s}, \text{ where } \sum_{s=1}^{S} \theta_s = 1. \tag{3}$$

Influence Activities within the Firm



Plants are production units that cannot raise resources directly from the market. Firms acquire resources, allocate these resources to divisions, which in turn allocate them to plants.

Influence Activities within the Firm



Within-firm lobbying

- Lobbying is in the spirit of the models of influence activities, in which unit managers have a **preference for more resources** and lobby the higher-level unit accordingly.
  - E.g., Meyer, Milgrom, and Roberts, 1992; Milgrom, 1988; Milgrom and Roberts, 1988; Rajan, Servaes, and Zingales, 2000; Scharfstein and Stein, 2000.
- The preference for more resources can reflect
  - **empire building preferences** (e.g., if managers enjoy the power and status of managing a large unit)
  - **rent-seeking motives** (e.g., if financial compensation, perquisite consumption, or outside job opportunities are linked to the size of the unit they manage)

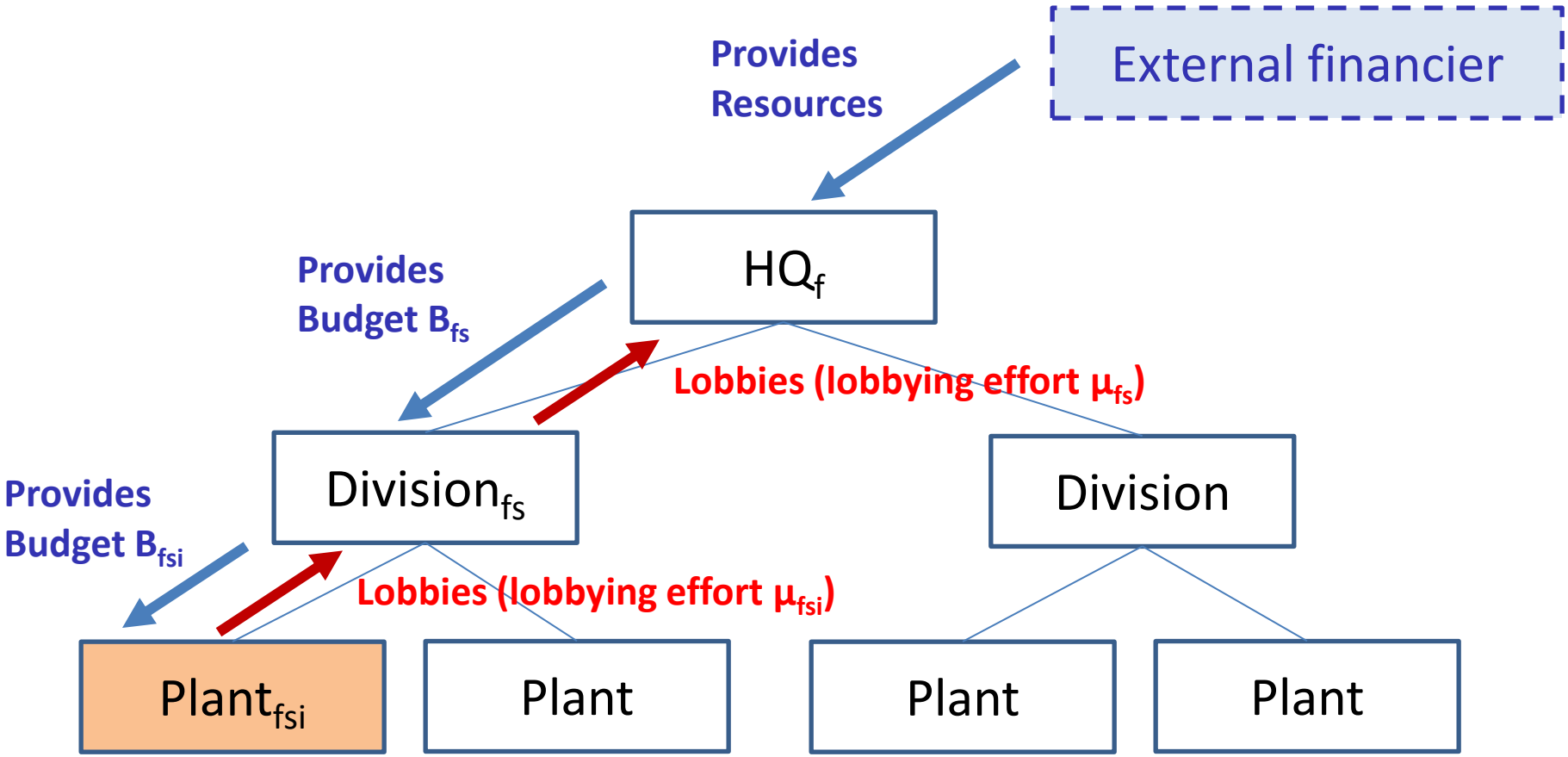
Within-firm lobbying

- Considerable empirical evidence that points toward the presence of lobbying frictions:
  - Glaser, Lopez-de Silanes, and Sautner (JF 2013): Following cash windfalls, more powerful unit managers obtain larger capital allocations for their units than would be predicted by their fundamentals.
  - Duchin and Sosyura (JF 2013): Divisional managers with better connections to the CEO (e.g., through education or prior employment) receive more generous capital allocations, which translates in overinvestment and lower performance.
  - At a broader level, several studies find that multi-segment firms tend to overinvest in segments with low investment opportunities and underinvest in those with high investment opportunities (e.g., Shin and Stulz, 1998; Rajan, Servaes, and Zingales, 2000; Ozbas and Scharfstein, 2010), consistent with the presence of within-firm distortions in the resource allocation.
  - Considerable anecdotal evidence (e.g., various McKinsey reports).
- Bottom line: **internal politics** is real and likely to lead to distortions!

Within-firm lobbying

- In the spirit of this literature, our model allows for influence activities of unit managers:
  - Plant managers have empire-building preferences and lobby divisions for bigger budgets (lobbying effort μ_{fsi}).
  - Similarly, division managers have empire-building preferences and lobby HQ for bigger budgets (lobbying effort μ_{fs}).

Plant Manager's Optimization Problem



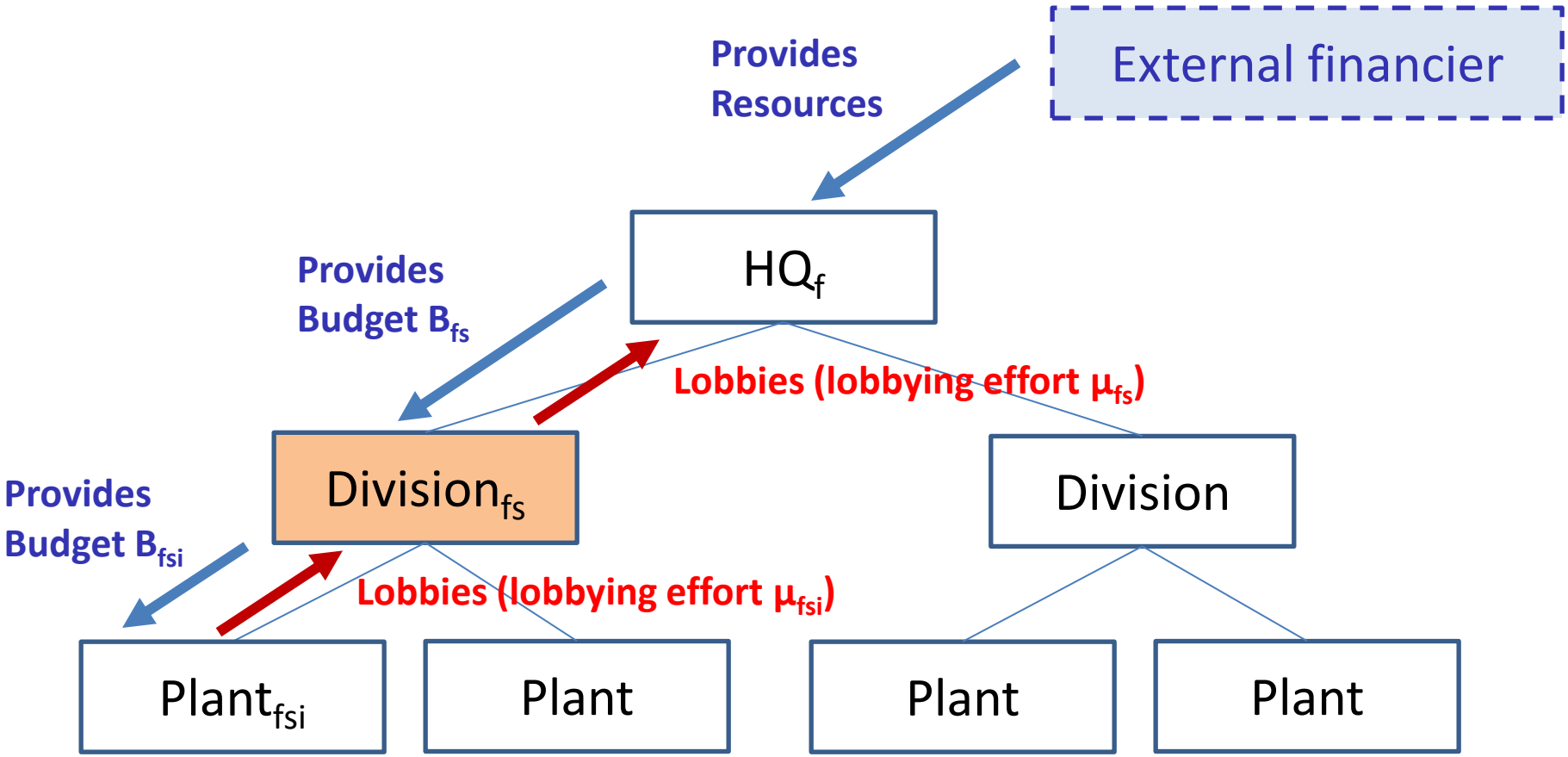
Plant Manager's Optimization Problem

- Plant manager has empire-building preferences and hence wants to maximize the size of the plant, as given by plant sales ($P_{fsi}Y_{fsi}$).
- Plant manager receives a budget from the division manager (B_{fsi}) that can be influenced by exerting lobbying effort (μ_{fsi}).
- Lobbying effort is costly with a quadratic cost function.
- Formally, the plant manager chooses the lobbying effort (μ_{fsi}) as well as the amount of capital (K_{fsi}) and labor (L_{fsi}) to employ in order to maximize plant size net of lobbying costs:

$$\max_{\{K_{fsi}, L_{fsi}, \mu_{fsi}\}} P_{fsi}Y_{fsi} - c_{fsi}\mu_{fsi}^2$$

$$s.t. \quad wL_{fsi} + rK_{fsi} = B_{fsi}.$$

Division Manager's Optimization Problem



Division Manager's Optimization Problem

- Division managers engage in two activities:
  - **Managing**: refers to the allocation of budgets to the different plants under the division manager's supervision, subject to the divisional budget constraint (B_{fs}).
  - **Lobbying**: exert lobbying effort μ_{fs} to influence the headquarters' allocative process in the division's favor.

Division Manager's Optimization Problem

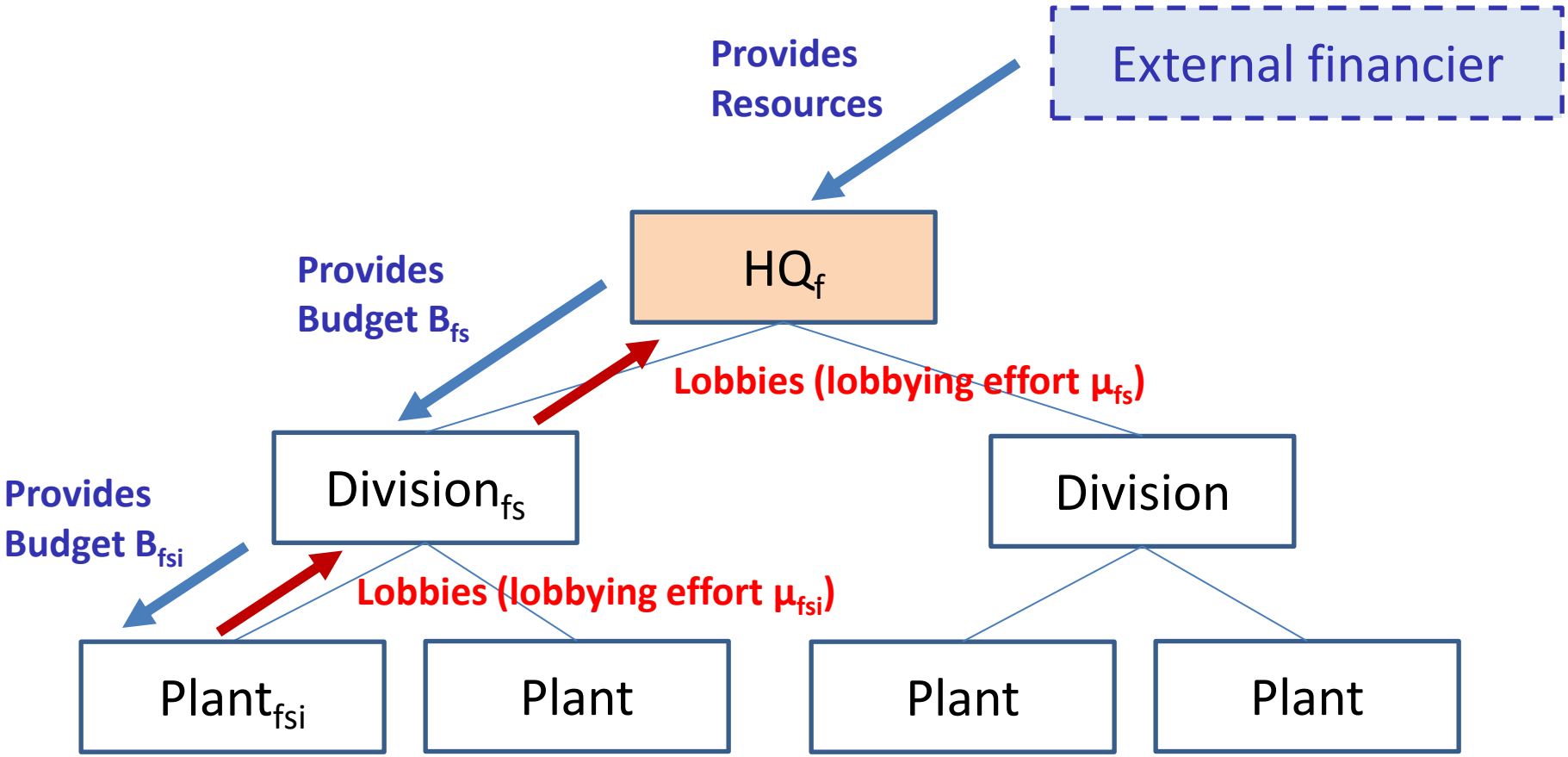
- Formally, the division manager chooses the lobbying effort (μ_{fs}) as well as the plant-level budgets (B_{fsi}, $i \in M_{fs}$) in order to maximize division size net of lobbying costs:

$$\left\{ \max_{\mu_{fs},\ B_{fsi}} \right\} \sum_{i \in M_{fs}} \left[(1 + \mu_{fsi}) P_{fsi} Y_{fsi} \right] - c_{fs} \mu_{fs}^2$$

$$s.t. \quad \sum_{i \in M_{fs}} B_{fsi} = B_{fs}.$$

- Note that **the division managers' optimization problem is distorted by the lobbying of the plant managers**.
  - The higher the lobbying effort of a given plant (μ_{fsi}), the larger the weight that the division manager places on that plant in maximizing the division's size.

HQ's Optimization Problem



HQ's Optimization Problem

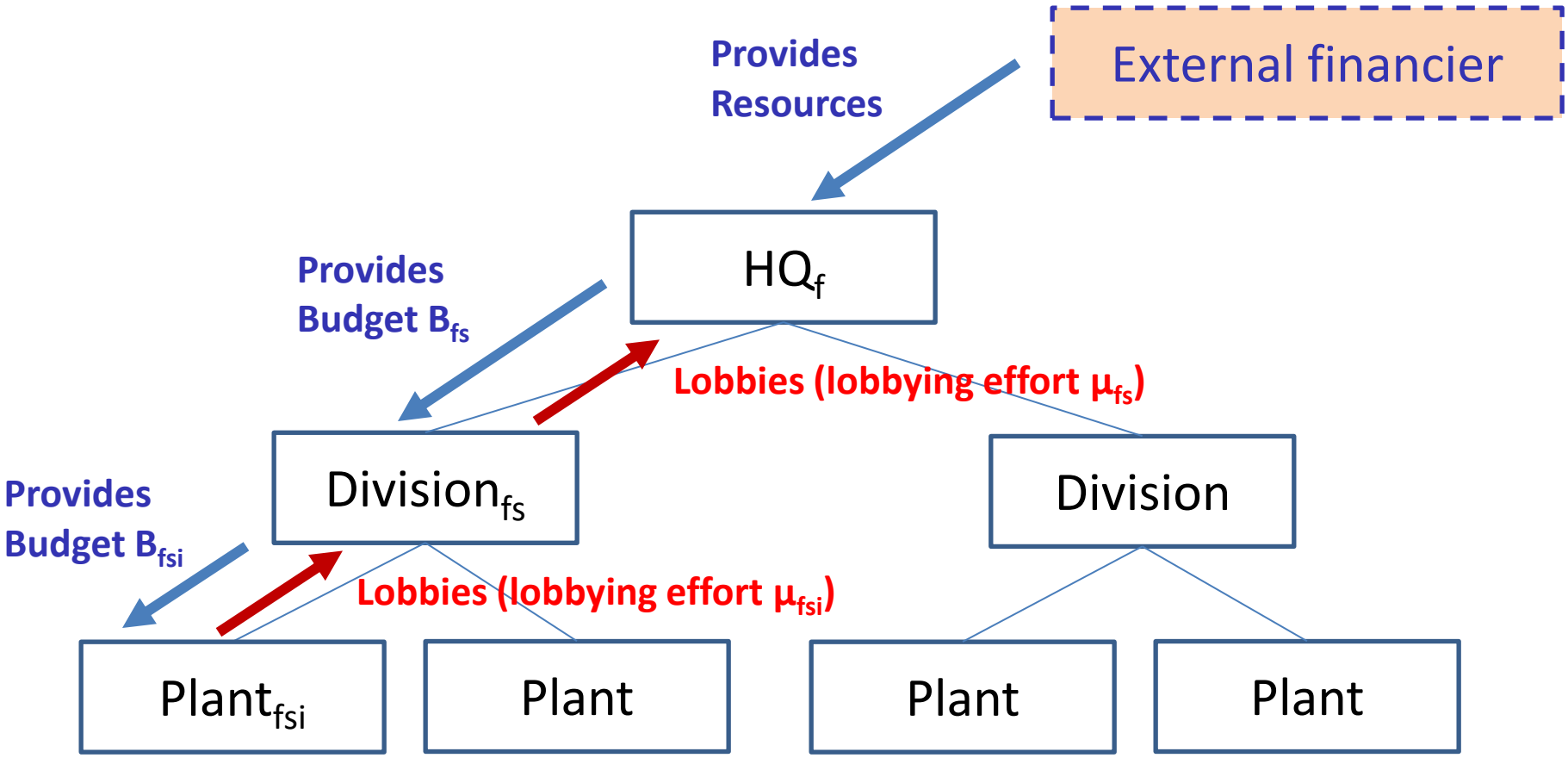
- We assume that, like other managers, the CEO also has empire building preferences.
- The main job of the CEO is to allocate resources across divisions.
- Formally, the CEO chooses the divisional budgets (B_{fs}, $s \in M_f$) in order to maximize firm size (sales) subject to the budget constraint set by the external financier:

$$\max_{\{B_{fs}\}} \sum_{s \epsilon M_f} \left[(1 + \mu_{fs}) \sum_{i \epsilon M_{fs}} P_{fsi} Y_{fsi} \right] s.t. \sum_{s \epsilon M_f} B_{fs} = B_f .$$

- Similar to the way the lobbying of plant managers distorts the optimization problem of the division manager, the lobbying of the division managers (μ_{fs}) distorts the CEO's optimization problem.

External Financier

- The last set of agents in our model are external financiers.



External Financier

- Unlike managers (who maximize size), we assume that capital markets allocate budgets with the goal of **maximizing profits**.
- That is, they choose the firm budgets (B_f) in order to maximize firm profits subject to their own budget constraint:

$$\max_{\{B_f\}} (1+\tau_{fY}) \sum_{s \epsilon M_f} \sum_{i \epsilon M_{fs}} [P_{fsi} Y_{fsi} - wL_{fsi} + rK_{fsi}]$$

$$s.t. \sum_f B_f = B.$$

- Note that the financiers allocate resources to firms subject to across-firm distortions τ_{fY} (e.g., in the form of taxes and subsidies that vary by firm).
  - These are the across-firm distortions studied in Hsieh and Klenow (2009).

Summary of Optimization Problems

- External financiers:

$$\max_{\{B_f\}} (1+\tau_{fY}) \sum_{s \epsilon M_f} \sum_{i \epsilon M_{fs}} [P_{fsi} Y_{fsi} - wL_{fsi} + rK_{fsi}]$$

$$s.t. \sum_f B_f = B.$$

- CEO (HQ): $\max_{\{B_{fs}\}} \sum_{s \epsilon M_f} \left[(1+\mu_{fs}) \sum_{i \epsilon M_{fs}} P_{fsi} Y_{fsi}\right]$ $s.t. \sum_{s \epsilon M_f} B_{fs} = B_f.$

- Division managers:

$$\left\{ \begin{array}{c} \max \\ \mu_{fs},\ B_{fsi} \\ s.t. \end{array} \right\} \quad \begin{array}{c} \sum_{i \epsilon M_{fs}} [(1+\mu_{fsi}) P_{fsi} Y_{fsi}] - c_{fs} \mu_{fs}^2 \\ \sum_{i \epsilon M_{fs}} B_{fsi} = B_{fs}. \end{array}$$

- Plant managers:

$$\left\{ \begin{array}{c} \max \\ K_{fsi}, L_{fsi}, \mu_{fsi} \\ s.t. \end{array} \right\} \quad \begin{array}{c} P_{fsi} Y_{fsi} - c_{fsi} \mu_{fsi}^2 \\ wL_{fsi} + rK_{fsi} = B_{fsi}. \end{array}$$

Solving the Model

- In equilibrium, the share of each plant's budget allocated to capital and labor is given by the factor shares:

$$\frac{r\,K_{fsi}}{B_{fsi}} = \alpha_s \qquad K_{fsi} = \alpha_s \frac{B_{fsi}}{r}$$

$$\frac{w L_{fsi}}{B_{fsi}} = (1-\alpha_s) \qquad L_{fsi} = (1-\alpha_s)\,\frac{B_{fsi}}{w}$$

Equilibrium Budget Allocation at the Plant Level

- The share of the divisional budget that plant *fsi* receives is:

$$\frac{B_{fsi}}{B_{fs}} = \frac{(1+\mu_{fsi})P_{fsi}Y_{fsi}}{\sum_{i\epsilon M_{fs}}(1+\mu_{fsi})P_{fsi}Y_{fsi}}$$

  - Intuitively, a plant will have a larger budget if it can 1) generate more sales and if 2) the plant manager puts more effort into lobbying.
- Note that this relative allocation of resources is independent of the division-level distortions, factor prices, and factor shares. Why?
  - Plants operating in the same sector are grouped in the same division. Thus, any division-level distortion—such as a division manager's successful lobbying of HQ—affects all plants within the division.
  - Plants within the same division are subject to the same factor shares α_s, and the same factor costs w_s and r_s.

Plant-Level Distortions

- We define plant-level distortions (which we denote by τ_{fsiY}) as the deviations from the allocation that would prevail in the absence of lobbying:

$$(1+\tau_{fsiY}) = \frac{\frac{(1+\mu_{fsi})P_{fsi}Y_{fsi}}{\sum_{i\epsilon M_{fs}}(1+\mu_{fsi})P_{fsi}Y_{fsi}}}{\frac{P_{fsi}Y_{fsi}}{\sum_{i\epsilon M_{fs}}P_{fsi}Y_{fsi}}}$$

- Combining the previous two expression, we can express the plant-level distortion as:

$$(1+\tau_{fsiY}) = \frac{\frac{B_{fsi}}{P_{fsi}Y_{fsi}}}{\frac{\sum_{j\epsilon M_{fs}}B_{fsj}}{\sum_{j\epsilon M_{fs}}P_{fsj}Y_{fsj}}}$$

Plant-Level Distortions – Intuition

$$(1+\tau_{fsiY}) = \frac{\frac{B_{fsi}}{P_{fsi}Y_{fsi}}}{\frac{\sum_{j\epsilon M_{fs}} B_{fsj}}{\sum_{j\epsilon M_{fs}} P_{fsj}Y_{fsj}}}$$

- $\tau_{fsiY} > 0$: the plant receives too big of a budget given its ability to generate sales (relative to other plants in the division)
  - Misallocation (overallocation)
- $\tau_{fsiY} < 0$: the plant receives too little of a budget given its ability to generate sales (relative to other plants in the division)
  - Misallocation (underallocation)
- $\tau_{fsiY} = 0$: no misallocation

- The above expression will be used to compute $(1 + \tau_{fsiY})$ from the data (more on this later).

Division-Level Distortions

- Division-level distortions are obtained analogously:

$$(1+\tau_{fsY}) = \frac{\frac{B_{fs}}{\sum_{i \epsilon M_{fs}} P_{fsi} Y_{fsi}}}{\frac{B_f}{\sum_{s \epsilon M_{fs}} \sum_{i \epsilon M_{fs}} P_{fsi} Y_{fsi}}}$$

Aggregate Productivity

- Aggregate TFP is given by:

$$TFP = \prod_{s=1}^{S} TFP_s^{\theta_s}$$

where

$$TFP_s = \left(\sum_{i=1}^{M_s} \left[\left(\frac{A_{fsi}(1+\tau_Y)/(1+\tau_L)}{(1+\overline{\tau_Y})/(1+\overline{\tau_L})} \right)^{1-\alpha_s} \left(\frac{A_{fsi}(1+\tau_Y)}{(1+\overline{\tau_Y})} \right)^{\alpha_s} \right]^{\sigma-1} \right)^{\frac{1}{\sigma-1}}$$

across-firm distortions (as in Hsieh-Klenow)

division-level distortions (within firms)

plant-level distortions (within firms)

$$(1+\tau_Y) \equiv (1+\tau_{fY})(1+\tau_{fsY})(1+\tau_{fsiY}),$$

- In sum:
  - Our model extends the Hsieh-Klenow model with within-firm distortions and provides micro-foundations for these within-firm distortions.

Approach for counterfactuals

- The methodology we implement is as follows.
  - We first calculate the actual aggregate TFP that is observed in the data (TFP_{actual}) using the previous formula.
  - We then calculate a hypothetical counterfactual TFP that would be the result of the equilibrium allocation of resources after closing distortions across and within firms ($TFP_{counterfactual}$).
  - Finally, we divide the counterfactual TFP by the actual TFP to obtain a measure of the gain in productivity that would be achieved through reallocation of resources ($TFP_{gain} = TFP_{counterfactual} / TFP_{actual}$).

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Data Sources

- Manufacturing plant-level data:
  - Census of Manufactures (CMF) of the U.S. Census Bureau
    - Covers the full population of manufacturing plants with at least one paid employee, and is conducted every five years that ends in 2 and 7 ("Census years")
      - Our analysis uses the 1977, 1982, 1987, 1992, 1997, 2002, and 2007 CMF
    - Includes information about key plant variables such as the capital stock, employment, and shipments ("output")
    - We code divisions within the firm using the plant's industry (3-digit SIC codes until the 1992 CMF, and 4-digit NAICS codes as of the 1997 CMF)

Sample Selection

- Following common practice in the literature (e.g., Foster, Haltiwanger, and Syverson, 2008), we exclude plants whose information is imputed from administrative records rather than directly collected
- We also exclude plant-year observations for which physical capital, employment, and shipments are either zero or missing
- These criteria lead to our final sample that consists of 1,262,000 plant-year observations

Main Variables

- **Employees** (L_{fsi}) is the total number of employees at the plant.
- **Capital stock** (K_{fsi}) is defined as the average of the book value of the plant's machinery and buildings at the beginning and at the end of the year.
- **Value added** ($P_{fsi}Y_{fsi}$) is computed as shipments (adjusted for inventory changes) minus the sum of the cost of materials, cost of fuels, cost of purchased electricity, cost of resales, and cost of contract work.
- **Age** is the pseudo-age of the plant, which is computed as the number of years since the plant has coverage in the CMF.
- **Distance to HQ** is the great-circle distance between the plant's ZIP code and the ZIP code of the firm's headquarters (in miles).

Measures of Within-Firm Distortions

- To simplify the notation, we denote the plant-level distortions by $\mathbf{1 + \tau_p} \equiv 1 + \tau_{fsiY}$, and the division-level distortions by $\mathbf{1 + \tau_d} \equiv 1 + \tau_{fsY}$.

- We compute $1 + \tau_p$ using the equation from the model, with the assumption that the plant budget (B_{fsi}) is proportional to the plant's capital allocation (K_{fsi}). The expression for $1 + \tau_p$ is then:

$$(1+\tau_p) = \frac{\frac{K_{fsi}}{P_{fsi}Y_{fsi}}}{\frac{\sum_{j\epsilon M_{fs}} K_{fsj}}{\sum_{j\epsilon M_{fs}} P_{fsj}Y_{fsj}}}$$

- Division-level distortions $1 + \tau_d$ are computed analogously using K_{fs} and $P_{fs}Y_{fs}$.

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Plant and Division Power

- Our measures of plant- and division-level distortions can be interpreted as measures of **"power" within the organization**.
  - Arguably, plants (and divisions) that are able to tilt the allocation of resources in their favor are likely more powerful within the firm.
- Accordingly, one would expect our distortion metrics to be positively correlated with measures of power within the firm. We consider two such measures:
  1. Age of the plant
     - Seniority may help secure a larger share of resources.
  2. Distance to HQ
     - Arguably, proximity to headquarters makes it easier for plant managers to lobby HQ for resources.

Plant-level power

Panel (A): Plant power

	$1+\tau_p$	$1+\tau_p$
	(1)	(2)
Log(distance to HQ)	-0.0015***	-0.0029***
	(0.0006)	(0.0008)
Age	0.0011***	0.0016***
	(0.0002)	(0.0003)
Year FE	Yes	Yes
Firm × division FE	No	Yes
R-squared	0.00	0.15
Observations	365,000	365,000

Proximity to HQ

- Can refine the analysis of proximity by using exogenous variation in the effective distance between plants and HQ stemming from the introduction of new airline routes that reduce the travel time between the two.
  - Same instrument as in Giroud (2013).

Proximity to HQ

Panel (A): Plant power

	$1+\tau_p$	$1+\tau_p$	$1+\tau_p$	$1+\tau_p$
	(1)	(2)	(3)	(4)
Log(distance to HQ)	-0.0015***	-0.0029***		
	(0.0006)	(0.0008)		
Age	0.0011***	0.0016***		
	(0.0002)	(0.0003)		
New airline route			0.0172***	0.0159**
			(0.0056)	(0.0066)
Year FE	Yes	Yes	Yes	–
Firm × division FE	No	Yes	–	–
Plant FE	No	No	Yes	Yes
MSA_{HQ} × year FE	No	No	No	Yes
MSA_{Plant} × year FE	No	No	No	Yes
R-squared	0.00	0.15	0.40	0.42
Observations	365,000	365,000	365,000	365,000

Division-level power

Panel (B): Division power

	$1+\tau_d$	$1+\tau_d$
	(1)	(2)
Log(distance to HQ, division)	-0.0042***	-0.0043***
	(0.0011)	(0.0012)
Age (division)	0.0037***	0.0043***
	(0.0006)	(0.0007)
Year FE	Yes	Yes
Firm FE	No	Yes
R-squared	0.00	0.16
Observations	103,000	103,000

Misallocation and Performance

- Another way to validate our distortion metrics is by looking at their correlation with measures of performance.
- Arguably, if what we are capturing is distortions, a higher degree of distortions should be negatively related to performance.
- To measure the severity of misallocation at the division level, we compute the **dispersion in $(1 + \tau_p)$ across all plants within the division** in three ways:
  - $\sigma\ (1 + \tau_p)$
  - $90 - 10^{th}$ Pctl. $(1 + \tau_p)$
  - $75 - 25^{th}$ Pctl. $(1 + \tau_p)$

Misallocation and Performance

- Similarly, to measure the severity of misallocation at the firm level, we compute the **dispersion in $(1 + \tau_d)$ across all divisions within the firms**:
  - $\sigma\ (1 + \tau_d)$
  - $90 - 10^{th}$ Pctl. $(1 + \tau_d)$
  - $75 - 25^{th}$ Pctl. $(1 + \tau_d)$

Misallocation and Performance

- Measure of performance at the division level:
  - Operating margin (OM) = ratio of shipments minus labor and material costs divided by shipments across all plants in the division

- Measures of performance at the firm level:
  - Operating margin (OM) = ratio of shipments minus labor and material costs divided by shipments across all of the firm's plants
  - For public firms (matched to Compustat using the Compustat bridge of the Census):
    - Return on assets (ROA) = EBITDA/Total assets
    - Tobin's Q = (MV equity + BV debt)/Total assets

Misallocation and Division Performance

	Operating margin (division level)		
	(1)	(2)	(3)
$\sigma(1+\tau_p)$	-0.053***		
	(0.002)		
90 – 10 Pctl. $(1+\tau_p)$		-0.032***	
		(0.001)	
75 – 25 Pctl. $(1+\tau_p)$			-0.034***
			(0.001)
# Plants in division	0.002***	0.001***	0.002***
	(0.000)	(0.000)	(0.000)
Year FE	Yes	Yes	Yes
R-squared	0.03	0.03	0.03
Observations	141,000	141,000	141,000

Misallocation and Firm Performance

	Public firms								
	Operating margin (firm level)			Return on assets			Tobin's Q		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\sigma(1+\tau_d)$	-0.054***			-0.017***			-0.130**		
	(0.004)			(0.004)			(0.058)		
90 − 10 Pctl. $(1+\tau_d)$		-0.041***			-0.012***			-0.081**	
		(0.002)			(0.002)			(0.033)	
75 − 25 Pctl. $(1+\tau_d)$			-0.037***			-0.010***			-0.086***
			(0.002)			(0.002)			(0.032)
# Divisions	0.005***	0.003***	0.005***	0.001***	0.001***	0.001***	-0.005**	-0.006**	-0.005**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.003)	(0.003)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.04	0.04	0.04	0.03	0.03	0.03	0.12	0.12	0.12
Observations	34,000	34,000	34,000	5,000	5,000	5,000	5,000	5,000	5,000

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- Model
  - Intuition
  - Formal model
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Management practices

- A recent literature shows that firms with better management practices achieve higher productivity (Bloom and Van Reenen, 2007; Bloom et al., 2019, 2022).
  - One potential channel is that better managed firms might do a better job at allocating resources internally.
- We obtain data from the MOPS (Management and Organizational Practices Survey) of the U.S. Census Bureau on management practices.
  - The MOPS is the first large-scale survey of management practices in the U.S.
  - It comprises 36 questions split into three sections.
  - The first section, labeled "management practices," includes 16 questions that aim to characterize management practices along the dimensions of monitoring, targets, and incentives.

MOPS

2021 MANAGEMENT AND ORGANIZATIONAL PRACTICES SURVEY

SECTION A
Management Practices

1 In 2021, what best describes what happened at this establishment when a problem in the production process arose?

Examples: Finding a quality defect in a product or a piece of machinery breaking down.

- ☐ We fixed it but did not take further action
- ☐ We fixed it and took action to make sure that it did not happen again
- ☐ We fixed it and took action to make sure that it did not happen again, and had a continuous improvement process to anticipate problems like these in advance
- ☐ No action was taken

2 In 2021, how many key performance indicators were monitored at this establishment?

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

- ☐ 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, SKIP to Question 6.)

3 During 2021, how frequently were the key performance indicators **reviewed** by **managers** at this establishment?

A manager is someone who has employees directly reporting to them, with whom they meet on a regular basis, and whose pay and promotion they may be involved with, e.g., Plant Manager, Human Resource Manager, Quality Manager.

Select all that apply

- ☐ Yearly
- ☐ Quarterly
- ☐ Monthly
- ☐ Weekly
- ☐ Daily
- ☐ Hourly or more frequently
- ☐ Never

Management practices

- Using the MOPS, Bloom et al. (2019) construct a composite index of **"structured management"** that is based on these 16 questions.
  - They also propose two subindices of **"monitoring"** and **"targets and incentives"**.

Division-level managerial quality and plant misallocation

	$\sigma(1+\tau_p)$		90 – 10 Pctl. $(1+\tau_p)$		75 – 25 Pctl. $(1+\tau_p)$	
	(1)	(2)	(3)	(4)	(5)	(6)
Structured management	-0.130***		-0.385***		-0.186***	
	(0.034)		(0.071)		(0.054)	
Monitoring		-0.070**		-0.207***		-0.086*
		(0.029)		(0.061)		(0.047)
Targets and incentives		-0.060*		-0.178**		-0.100*
		(0.033)		(0.070)		(0.053)
# Plants in division	0.001***	0.001***	0.003***	0.003***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.01	0.01	0.03	0.03	0.01	0.01
Observations	6,000	6,000	6,000	6,000	6,000	6,000

Firm-level managerial quality and divisional misallocation

	$\sigma(1+\tau_d)$		90 – 10 Pctl. $(1+\tau_d)$		75 – 25 Pctl. $(1+\tau_d)$	
	(1)	(2)	(3)	(4)	(5)	(6)
Structured management	-0.141***		-0.250***		-0.216***	
	(0.035)		(0.057)		(0.054)	
Monitoring		-0.050*		-0.089*		-0.079*
		(0.031)		(0.050)		(0.047)
Targets and incentives		-0.091***		-0.161***		-0.137**
		(0.034)		(0.056)		(0.053)
# Divisions	0.008***	0.008***	0.042***	0.043***	0.012***	0.012***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
R-squared	0.01	0.01	0.08	0.08	0.01	0.01
Observations	3,000	3,000	3,000	3,000	3,000	3,000

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Counterfactual analysis

- The methodology we implement is as follows.
  - We first calculate the actual aggregate TFP that is observed in the data (TFP_{actual}) using the TFP formula from the model.
  - We then calculate a hypothetical counterfactual TFP that would be the result of the equilibrium allocation of resources after closing distortions across and within firms ($TFP_{counterfactual}$).
  - Finally, we divide the counterfactual TFP by the actual TFP to obtain a measure of the gain in productivity that would be achieved through reallocation of resources ($TFP_{gain} = TFP_{counterfactual} / TFP_{actual}$).

Counterfactual #1. Closing all distortions (across and within firms)

Setting $\tau_p = 0$ and $\tau_d = 0$ and $\tau_f = 0$
(closing plant-, division, and firm-level distortions)

Census year	TFP counterfactual gain		
	All plants (N = 1,262,000)	Plants of multi-unit firms (N = 365,000)	Plants of multi-division firms (N = 253,000)
1977	1.471	1.574	1.604
1982	1.489	1.609	1.654
1987	1.379	1.491	1.521
1992	1.331	1.414	1.416
1997	1.439	1.679	1.697
2002	1.438	1.640	1.597
2007	1.386	1.606	1.628
All years	1.419	1.573	1.588

Counterfactual #2. Sequential closing of distortions

Panel (A): All plants (N = 1,262,000)

	Setting $\tau_p = 0$ (closing plant-level distortions)		Setting $\tau_p = 0$ and $\tau_d = 0$ (closing plant- and division-level distortions)		Setting $\tau_p = 0$ and $\tau_d = 0$ and $\tau_f = 0$ (closing plant-, division, and firm-level distortions)	
Census year	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain
1977	1.108	0.229	1.138	0.293	1.471	1.000
1982	1.107	0.219	1.137	0.280	1.489	1.000
1987	1.093	0.245	1.112	0.296	1.379	1.000
1992	1.108	0.326	1.127	0.384	1.331	1.000
1997	1.093	0.212	1.124	0.282	1.439	1.000
2002	1.096	0.219	1.123	0.281	1.438	1.000
2007	1.099	0.256	1.122	0.316	1.386	1.000
All years	1.101	0.244	1.126	0.305	1.419	1.000

Counterfactual #2. Sequential closing of distortions

Panel (B): Plants of multi-unit firms (N = 365,000)

	Setting $\tau_p = 0$ (closing plant-level distortions)		Setting $\tau_p = 0$ and $\tau_d = 0$ (closing plant- and division-level distortions)		Setting $\tau_p = 0$ and $\tau_d = 0$ and $\tau_f = 0$ (closing plant-, division, and firm-level distortions)	
Census year	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain
1977	1.202	0.352	1.264	0.460	1.574	1.000
1982	1.207	0.340	1.279	0.458	1.609	1.000
1987	1.173	0.352	1.215	0.438	1.491	1.000
1992	1.203	0.490	1.238	0.575	1.414	1.000
1997	1.236	0.348	1.322	0.474	1.679	1.000
2002	1.233	0.364	1.303	0.473	1.640	1.000
2007	1.246	0.406	1.306	0.505	1.606	1.000
All years	1.214	0.379	1.275	0.483	1.573	1.000

Counterfactual #2. Sequential closing of distortions

Panel (C): Plants of multi-division firms (N = 253,000)

	Setting $\tau_p = 0$ (closing plant-level distortions)		Setting $\tau_p = 0$ and $\tau_d = 0$ (closing plant- and division-level distortions)		Setting $\tau_p = 0$ and $\tau_d = 0$ and $\tau_f = 0$ (closing plant-, division, and firm-level distortions)	
Census year	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain
1977	1.205	0.339	1.288	0.477	1.604	1.000
1982	1.215	0.329	1.309	0.472	1.654	1.000
1987	1.168	0.322	1.228	0.438	1.521	1.000
1992	1.197	0.474	1.252	0.606	1.416	1.000
1997	1.228	0.327	1.348	0.499	1.697	1.000
2002	1.219	0.367	1.318	0.533	1.597	1.000
2007	1.249	0.396	1.328	0.522	1.628	1.000
All years	1.212	0.365	1.296	0.507	1.588	1.000

Counterfactual #3: Management practices

- Next, we quantify the impact of improvements in management practices on overall TFP.
- We proceed in three ways.
- Specifically, in the counterfactuals, we match the level of within-firm distortions to:
  1. the distortion level corresponding to a one standard deviation improvement in structured management (based on the reduced-form estimates shown earlier);
  2. the distortion level of the best manager in the economy;
  3. the distortion level of the best manager in the respective industry.

Counterfactual #3: Management practices

	One standard deviation improvement		Matching best-managed firm		Matching best-managed firm in same industry	
Census year	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain
1977	1.033	0.070	1.086	0.183	1.080	0.170
1982	1.034	0.070	1.088	0.180	1.082	0.168
1987	1.029	0.077	1.075	0.198	1.070	0.185
1992	1.027	0.082	1.070	0.211	1.065	0.196
1997	1.028	0.064	1.073	0.166	1.068	0.155
2002	1.027	0.062	1.071	0.162	1.066	0.151
2007	1.025	0.065	1.065	0.168	1.060	0.155
All years	1.029	0.070	1.075	0.181	1.070	0.169

Counterfactual #3: Management practices

Panel (B): Plants of multi-unit firms (N = 365,000)

	One standard deviation improvement		Matching best-managed firm		Matching best-managed firm in same industry	
Census year	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain
1977	1.055	0.095	1.129	0.225	1.122	0.212
1982	1.057	0.093	1.135	0.222	1.127	0.209
1987	1.052	0.105	1.119	0.242	1.113	0.229
1992	1.048	0.115	1.108	0.262	1.103	0.250
1997	1.055	0.081	1.131	0.193	1.124	0.183
2002	1.054	0.084	1.136	0.213	1.120	0.187
2007	1.053	0.087	1.124	0.205	1.117	0.193
All years	1.053	0.094	1.126	0.223	1.118	0.209

Counterfactual #3: Management practices

Panel (C): Plants of multi-division firms (N = 253,000)

	One standard deviation improvement		Matching best-managed firm		Matching best-managed firm in same industry	
Census year	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain	TFP counterfactual gain	Gain as share of no-distortion gain
1977	1.062	0.102	1.139	0.230	1.132	0.218
1982	1.065	0.099	1.147	0.225	1.140	0.214
1987	1.059	0.113	1.129	0.248	1.123	0.236
1992	1.053	0.127	1.114	0.274	1.110	0.264
1997	1.063	0.090	1.143	0.205	1.136	0.195
2002	1.058	0.097	1.130	0.219	1.124	0.208
2007	1.060	0.095	1.135	0.214	1.128	0.204
All years	1.060	0.103	1.134	0.231	1.128	0.220

- Highlights the **importance of management practices for the allocation of resources within firms**!

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Conclusion

- Previous literature has shown that the misallocation of resources substantially lowers aggregate productivity (e.g., Restuccia and Rogerson, 2008; Hsieh and Klenow, 2009; Bartelsman, Haltiwanger, and Scarpetta, 2013)
- This paper examines how much aggregate productivity is lost because of misallocation across vs. within firms
- In counterfactuals where resources are reallocated to equalize marginal revenue products across all plants, we find an increase in aggregate productivity of 42%, out of which about **one third** is due to misallocation within firms
- Hence, **within-firm distortions—due to, e.g., influence activities or internal politics—give rise to large productivity losses in the aggregate**

Conclusion

- We further document that companies that misallocate resources internally have lower profits (OM, ROA) and lower value (Tobin's Q)

- And that the misallocation of internal resources is mitigated for firms that have more structured management practices

- In a counterfactual where firms are assigned the highest score of structured management, aggregate productivity increases substantially due to improvements in the allocation of internal resources
  - Highlights the **importance of management practices for the allocation of resources within firms**

Thank you!