

# Organizational Capital, Corporate Leadership and Firm Dynamics.

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# What are we trying to understand?

Large unexplained differences in performance across firms  
(Syverson 2004)

Possibly due to management and/or managers  
(Gibbons-Henderson 2013)

## Three perspectives on role of management on firm performance

- 1 Contingency theory
- 2 Organization-centric empirical approach
- 3 Leader-centric empirical approach

# 1. Contingency Theory (CT)

- Often unspoken, default perspective of economists
- Managers and managerial practices are production factors that firms can purchase
- Firm choose them optimally keeping into account costs and benefits.
  - Lucas (1978): exogenous supply of managers of different qualities
  - Milgrom-Roberts (1995)
  - Tervio (2008), Gabaix and Landier (2008)
  - Garicano and Rossi-Hansberg (2006)
  - Can include dynamics, synergies, general equilibrium effects, etc.

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  - Can include dynamics, synergies, general equilibrium effects, etc.
- **Prediction: Two identical firms use same practices/CEO quality (or the difference is uncorrelated with profit).**

## 2. Organization-centric empirical approach (OC)

- Companies in the same industry/region choose highly different management practices
- Practices are systematically correlated with performance
  - Ichniowski et al. (1997), Bloom Van Reenen (2007)
  - Robust to firm-level FE (Bloom et al 2016), rich datasets (Bender et al 2016), experiment (Bloom et al 2011)

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  - Robust to firm-level FE (Bloom et al 2016), rich datasets (Bender et al 2016), experiment (Bloom et al 2011)
- **Question: Why don't all similar firms adopt the set of optimal practices?**
  - **Hidden, unspecified costs, but what are they?**
  - **Suboptimal firm decisions, but why?**

### 3. Leader-centric empirical approach (LC)

- Popular belief that CEOs play a big role: companies thrive or flounder because of charisma, vision, behavior, etc
- Evidence that CEO identity/characteristics/behavior accounts for performance/profit
  - Sudden death of CEOs: Johnson et al 1985
  - FE of CEO: Bertrand-Schoar (2002)
  - Gender of successors: Bennedsen et al (2007)
  - Psychological traits: Kaplan et al (2012)
  - Behavior: Bandiera et al (2016)



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  - Behavior: Bandiera et al (2016)
- **Question 1: (Same as for OC): Why don't all similar firms hire similar CEOs that behave in the same way?**
- **Question 2: Any connection between OC and LC?**

# Research Question

- Is there a theoretical framework that can reconcile these three approaches?
- Minimal deviation from standard production theory

# Search for Simple Model that Produces:

CT <sub>+shocks</sub>	Persistent performance differences	H (1992), EP (1995), S (2011)	
	Right-tail power law	Gabaix (2009), Luttmer (1995)	
	CEO-firm assortative matching	Tervio (2008), GL (2008)	

OC	Practices and performance: correlation	ISP (1997), BVR (2007)	
	Practices and performance: causal/panel	BEMMR(2013), BSVR(2016)	
	Practices and governance	BVR (2007)	

LC	Performance and CEO's behavior/type	KKS (2012), BHPS (2017)	
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	CEO behavior/type and governance	Shleifer-Vishny (1997)	

New	New predictions connecting CT, OC, and LC?		
	...		
	...		

# Key Ingredient I: Organizational Capital

- 1 Production factor that affects firm performance
- 2 Slow-moving asset
- 3 Difficult to observe/quantify
- 4 Has to be produced in-house with the active participation of the CEO.

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- 1 Production factor that affects firm performance
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  - 3 Difficult to observe/quantify
  - 4 Has to be produced in-house with the active participation of the CEO.
- Could be: management practices, corporate culture, relational contracts, firm capabilities, organization capital. Empirics: **management practices**.
  - Re (3), 45% within-firm score correlation (Bloom et al 2016)
  - (4) is inspired by management lit (eg Drucker 1967, Kotter 2001)
    - Schein (2010): “Leadership is the source of the beliefs and values of employees, and shapes the organizational culture of the firm, which ultimately determines its success or failure.”

# Key Ingredient II: Contracting Frictions

## 1 *Ex ante governance*

- CEOs have types: some are better at producing organizational capital
- imperfect CEO screening

## 2 *Ex post governance*

- board observes performance perfectly but not CEO behavior or organizational capital
- board cannot use super high-power incentive schemes (the kind that would make bad CEOs resign as soon as they are hired)

- Steady state firm distribution with idiosyncratic firm-level shocks
  - Hopenhayn (1992), Erikson and Pakes (1995)
  - Bloom, Sadun and Van Reenen (2016)
- Micro-founded models of performance differences
  - Chassang (2010), Li, Matouschek, Powell (2017), Halac and Prat (2016), Board, Meyer-ter-Vehn, and Sadzik (2017), Powell (2016), Gibbons, Licalzi and Warglien (2017).
- Corporate leadership:
  - Bolton et al. (2012), Hermalin (2013), Rahmandad, Repenning, Henderson (forthcoming)
- Political economy: Jones-Olken (2005), Besley-Persson (2017)
- Managerial shorttermism: Von Thadden (1995)

- ① One firm dynamics (easy part)
- ② Steady state for a mass of firms (tough part)
- ③ Predictions
- ④ Extension to CEOs who can work for multiple firms



- Once hired they choose one of two behaviors:
  - $x = 0$ : devote their time to boost short-term profit
  - $x = 1$ : devote their time to growing the firm's organizational capital  $\Omega$
  - E.g. monitoring operations directly vs creating an accountability system
- Some CEOs are better at growing  $\Omega$ .
- Firm owners can fire managers at any time (replaced by new draw).
- All managers must retire after time  $T$  (replaced by new draw)
- CEOs only care about job tenure.

# Model Firm Performance and Organizational Capital

- Continuous time  $t$
- Flow profit/performance at  $t$

$$\pi_t = (1 + b(1 - x)) \Omega_t,$$

- $\Omega_t$ : organizational capital (think 'management practices')
- $b$ : effectiveness of the short-term boost.
- The CEO can always destroy performance
- Could be

$$\pi_t = (1 + b(1 - x)) \Omega_t K_t^a L_t^b - F,$$

with  $a + b < 1$ .

- Dynamics

$$\dot{\Omega}_t = (\theta x - \delta) \Omega_t,$$

- $\delta$  is the depreciation rate of org capital
- $\theta$  represents the CEO's relative managerial skill.
- Two types of CEOs:  $\theta^H > \theta^L$
- Probability of good CEO is  $p$ .

# Model: Owner's Objective

- Maximize long-term profit

$$\int_0^{\infty} e^{-\rho t} \pi_t dt$$

- Assume that behavior 1 is optimal for both CEO types ( $\theta_L$  large enough compared to  $b$ )
- If the owner observed the CEO type she would always hire the high type and instruct him to choose  $x = 1$

# Model: Governance and CEO market

- Owner observes performance directly
- Owner observes org capital with delay  $R$
- The owner (board) appoints the CEO and she can fire him whenever she wants
- CEOs only work for one firm, must retire after time  $T$  (anyone who is fired is unemployable)
- Wage is fixed.

# Naive Behavior

- New CEO is hired and behaves optimally:  $x = 1$
- Org capital growth

$$\dot{\Omega}_t = (\theta - \delta) \Omega_t,$$

(faster for  $\theta^H$  than for  $\theta^L$ )

- Performance

$$\pi_t = \Omega_t,$$

- Performance growth rate

$$\frac{\dot{\pi}_t}{\pi_t} = \theta - \delta$$

- The low type would immediately be spotted and fired

# Bad CEOs Behaving Badly

- Suppose the low type CEO chooses the short-term behavior
- Org capital depreciates but she can mimick the performance of the high CEO for a while

$$\begin{aligned}\pi_t^H &= \Omega_t^H = \Omega_0 e^{(\theta^H - \delta)t}; && \text{(good type)} \\ \pi_t^L &= (1 + b) \Omega_t^L = (1 + b) \Omega_0 e^{-\delta t} && \text{(bad type)}\end{aligned}$$

(recall bad type can destroy performance)

- Mimicking becomes unsustainable after

$$\hat{t} = \frac{\ln(1 + b)}{\theta^H}$$

## Proposition

*A low-type CEO chooses behavior 0, is fired after a period  $\bar{t} = \min(\hat{t}, R)$  with  $\hat{t} = \frac{\ln(1+b)}{\theta^H}$ , and leaves a firm with worse management practices:*

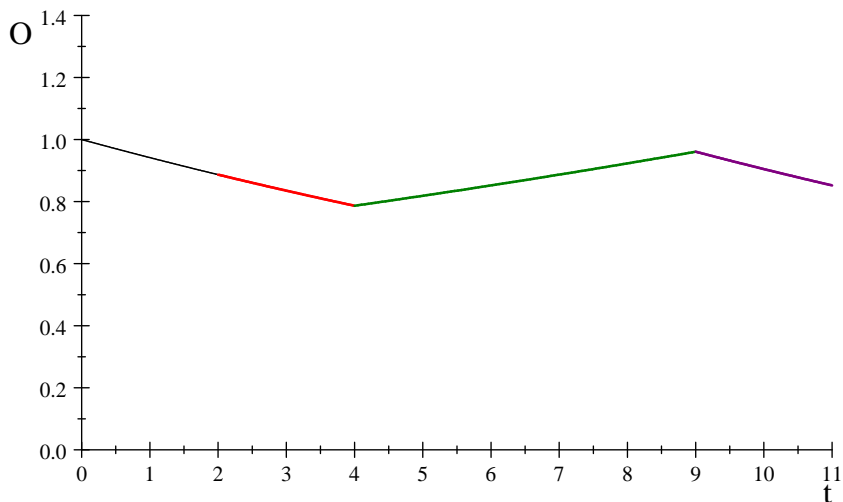
$$\Omega_{\bar{t}}^L = \Omega_0 e^{-\delta \bar{t}} < \Omega_0.$$

*A high-type CEO chooses behavior 1, serves until retirement  $T$ , and leaves a firm with better management practices:*

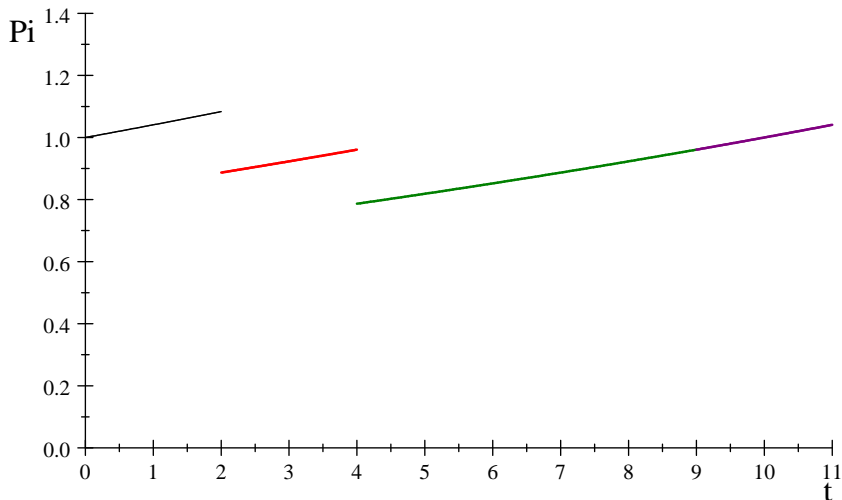
$$\Omega_T^H = \Omega_0 e^{(\theta^H - \delta)T}.$$



# A firm with a bad CEO, a bad CEO, a good CEO, a bad CEO: Organizational Capital



# A firm with a bad CEO, a bad CEO, a good CEO, a bad CEO: Performance



# Assumptions about Frictions:

- 1 No info on CEO type/behavior
  - Extension (later): CEO careers
- 2 Flat CEO wage
  - Extension (appendix): allow for compensation contingent on performance and CEO message
- 3 No info on org capital before  $R$ 
  - Extension (for someone else):  $\Omega$  stochastic process with drift and noise

- ① One firm dynamics (easy part)
- ② **Steady state for a mass of firms (tough part)**
- ③ Predictions
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# Equilibrium distribution of performance, etc

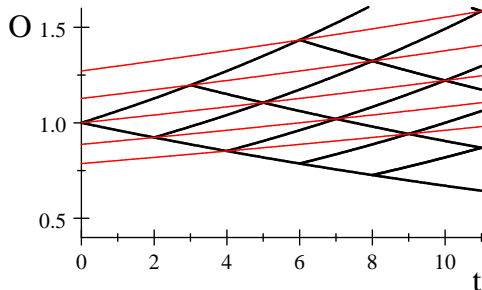
- Suppose firms follow the stochastic process described in Proposition 1
- What is the steady state distribution of firms at every level?

Birth and death process (simplest assumption yielding reasonable state state).

**Assumption S1:** A firm dies whenever its performance falls below a certain (possibly time-varying) level  $\pi_0$ .

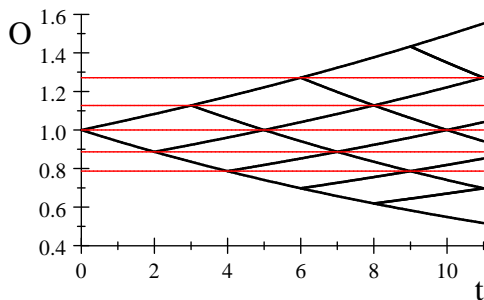
**Assumption S2:** At each moment a measure  $B$  of new firms are born as spin-offs of existing firms. Spin-offs are clones of existing transitioning firms and they inherit their parent's organizational capital level.

# Possible Performance Paths



- Stochastic process: Possible performance paths of all firms born at time 0.

# No-Trend Case



- **Working assumption for now:** The effect of a good CEO exactly undoes the effect of a bad CEO.

- **Steady State:** Distribution of firms by org capital is constant over time
- **Approach:** Characterize steady state distribution of firms with even CEO transition.
  - have performance level  $\pi \in \{\pi_0, \pi_1, \pi_2, \dots\}$
  - full steady state distribution follows immediately from this.
- **Problem:** Bad CEO has shorter tenure than good CEO
  - Solution: Use 'wave' analysis where firms move in 'periods - CEO transitions' rather than 'time', show equivalence of steady state.



- In steady state, the mass of transitioning firms at a particular level  $\pi_k$  is:

$$f(k) = \left(1 + \frac{B}{M}\right) \left[ p^2 f(k-1) + 2p(1-p)f(k) + (1-p)^2 f(k+1) \right]$$

- $p$  is the probability that a CEO is good
- $B$  is measure of new firms born every moment (exogenous)
- $M = \sum_{k=1}^{k=\infty} f(k)$  is steady state measure of firms with CEO transition.
- Non-standard recurrence equation

# Steady state reachable from below

- With a little help from friends (Prof. Sui Sun Cheng, U of Taiwan)....
- Show that a steady state "reachable from below" is possible only if

$$\frac{B}{M} = \gamma^* \equiv \frac{(1 - 2p)^2}{1 - (1 - 2p)^2}$$

- Corresponds to sequence of (unique) steady states with bounded org capital as bound goes to infinity
- Kills steady states that can only be reached if the initial distribution already has unboundedly efficient firms.

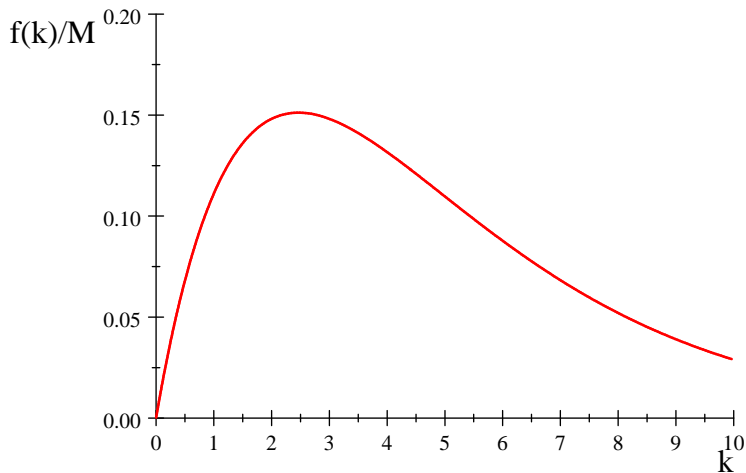
## Proposition

*In a steady state reachable from below, the measure of firms transitioning at performance level  $k$  is given by*

$$f^*(k) = c^{te} * k \left( \frac{p}{1-p} \right)^k$$

*where  $p$  is probability of a good CEO.*

# Steady State Distribution



$$p = 3/9 \text{ (red);} \quad \pi_k = \pi_0 * \left[ e^{2(\theta_H - \delta)T} \right]^k$$

- ① One firm dynamics (easy part)
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## Proposition (CT)

*In steady state: (i) A cross-section of otherwise identical firms exhibits different performance levels ( $\text{Var}(\pi_{i,t}) > 0$ ); (ii) The performance difference between any two firms is correlated over time: for any two firms  $i$  and  $j$ , and any  $s > 0$ , we have*

$$\text{Corr}(\pi_{i,t} - \pi_{j,t}, \pi_{i,t+s} - \pi_{j,t+s}) > 0$$

## Proposition (OC)

*In steady state:*

*(i) In a cross-section of firms, performance and organizational capital are positively correlated:  $\text{Corr}(\pi_{i,t}, \Omega_{i,t}) > 0$ .*

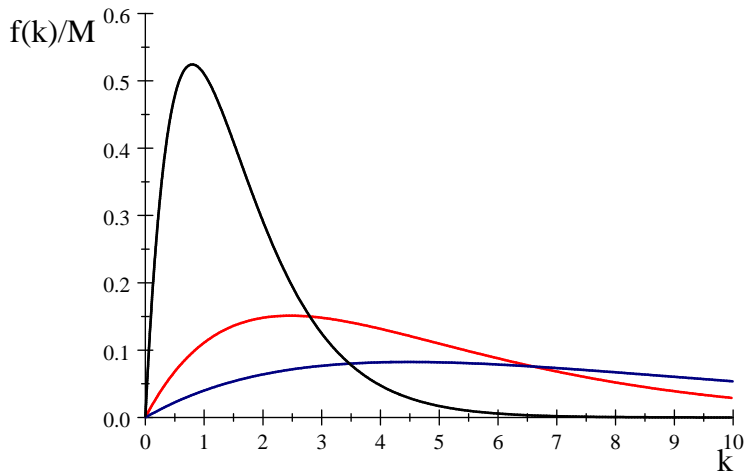
*(ii) In a cross-section of firms, changes in performance are positively correlated with changes in organizational capital: For any  $s > \bar{t}$ ,*

$$\text{Corr}(\pi_{i,t+s} - \pi_{i,t}, \Omega_{i,t+s} - \Omega_{i,t}) > 0$$

*(iii) Average performance and performance growth are increasing in the quality of ex ante and ex post corporate governance and in the availability of managerial talent:*

$$\frac{d}{dp} E(\Delta\pi) > 0, \quad \frac{d}{d\bar{t}} E(\Delta\pi) < 0, \quad \frac{d}{d\theta^H} E(\Delta\pi) > 0.$$

# Steady state distribution



$p = 2/9$  (black),  $p = 3/9$  (red) and  $p = 4/9$  (blue)



## Proposition (LC)

(a) In steady state, firm  $i$ 's current performance level  $\pi_{i,t}$  is higher when past CEOs: (i) Chose the organization-building behavior rather than the short-term profit boost ( $x_{i,t-s} = 1$  not 0); (ii) Were of the high type rather than the low type ( $\theta_{i,t-s} = \theta_H$  not  $\theta_L$ ); (iii) Had longer on-the job tenure ( $T$  not  $\bar{t}$ ).

(b) In steady state, in a cross-section of firms, better governance (lower  $\bar{b}$  or higher  $R$ ) weakly increases the average behavior and type of the CEO, the tenure variance among CEOs, and average performance.

## Proposition (New)

- (a) *In steady state, the rate of growth of organizational capital  $\Omega_{i,t}$  is greater when the current CEO: (i) Chooses the organization-building behavior rather than the short-term profit boost ( $x_{i,t} = 1$  not 0); (ii) Is of the high type rather than the low type ( $\theta_{i,t} = \theta_H$  not  $\theta_L$ ); (iii) Has longer on-the job tenure ( $T$  not  $\bar{t}$ ).*
- (b) *Firm  $i$ 's current organizational capital  $\Omega_{i,t}$  is higher when past CEOs: (i) Chose the organization-building behavior rather than the short-term profit boost ( $x_{i,t-s} = 1$  not 0); (ii) Were of the high type rather than the low type ( $\theta_{i,t-s} = \theta_H$  not  $\theta_L$ ); (iii) Had longer on-the job tenure ( $T$  not  $\bar{t}$ ).*
- (c) *Controlling for current organizational capital  $\Omega_{i,t}$ , past CEO variables have no predictive value on current firm performance  $\pi_{it}$ .*

CT <sub>+shocks</sub>	Persistent performance differences	H (1992), EP (1995), S (2011)	✓
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New	Practices and CEO variables		✓
	CEO effect on performance works only through practices		✓

## Extension: CEOs Can Prove Themselves

- CEOs can now work in multiple firms
- A good CEO becomes bad with a certain probability
  - Bad CEOs remain bad
- Other firms observe performance and retention
- Competitive market for CEOs with (fixed) wage set endogenously

## Proposition

*In equilibrium better CEOs work for firms with greater organizational capital*

True under the assumption that a CEO has some proportional effect on organizational capital

- Three types of CEOs
  - Untested CEOs are hired by low-org cap (below a certain  $\bar{\Omega}$ ) firms and paid their reservation wage
  - Failed CEOs are unemployed
  - Successful CEOs are hired by high org cap firms (above  $\bar{\Omega}$ ) and paid a rent
- The CEO rent is such that firms at level  $\bar{\Omega}$  are indifferent between hiring an untested CEO or a successful one
- General Result: CEOs with a better reputation are hired firms with a greater organizational capital
- Org cap follows a Markov-chain where the “up” probability is greater above the threshold  $\bar{\Omega}$ .

## Extension: Testable implications

- 1 Firm with better performance and org capital employ CEOs with better type/behavior and higher pay
  - Extension of Tervio (2008) and Gabaix-Landier (2008)
- 2 A fixed effect regression a la Bertrand-Schoar (2003) returns a positive CEO coefficient, but it underestimates the true CEO effect
  - As firms with higher org capital hire more promising CEOs, the CEO effect is partly absorbed by the firm effect.

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New	Practices and CEO variables		✓
	CEO effect on performance works only through practices		✓
	CEO career predicted by performance/practices		✗
	Bertrand-Schoar underestimates causal CEO effect		✗



- Contributions:
  - 1 Endogenize organizational capital (practices) through a leadership story
  - 2 Links CT, OC, and LC
- Leaders or institutions?
- Other models?
- Test on firm-level panel data combining info on:
  - performance
  - management practices (or other organizational capital measures like culture, engagement, etc)
  - CEO variables