# Organizational Capital, Corporate Leadership and Firm Dynamics.

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March 2018

Large unexplained differences in performance across firms
(Syverson 2004)

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

# Role of Management

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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- **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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- **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?**

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

# Search for Simple Model that Produces:

| CT +shocks | | | |
|---|---|---|---|
| | 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 | | | |
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| | Performance and CEO's behavior/type | KKS (2012), BHPS (2017) | |
| | CEO factor in fixed-effect regression | J et al (1985), BS (2003) | |
| | 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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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)

# Literature

- 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 shortermism: Von Thadden (1995)

# Plan

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

# Model: CEOs

- 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.

- 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 $p$.

- 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 $x = 1$

- 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

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

(recall bad type can destroy performance)

- Mimicking becomes unsustainable after

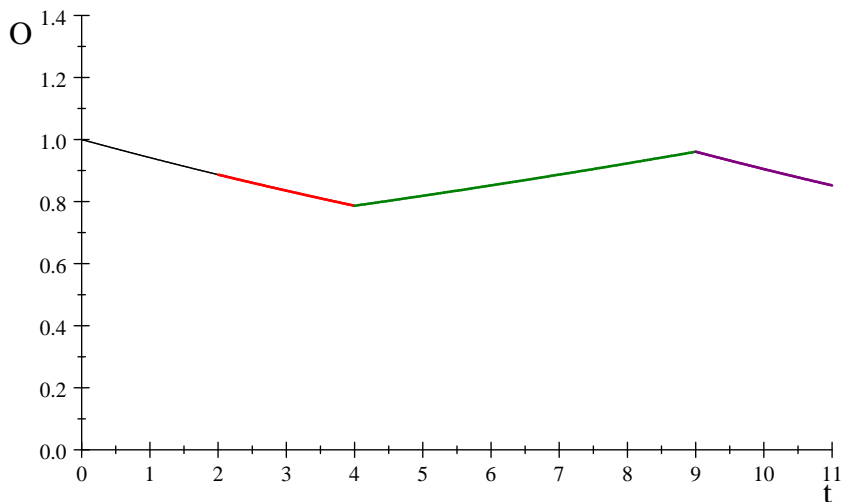$$\hat{t} = \frac{\ln(1+b)}{\theta^H}$$

## 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:*

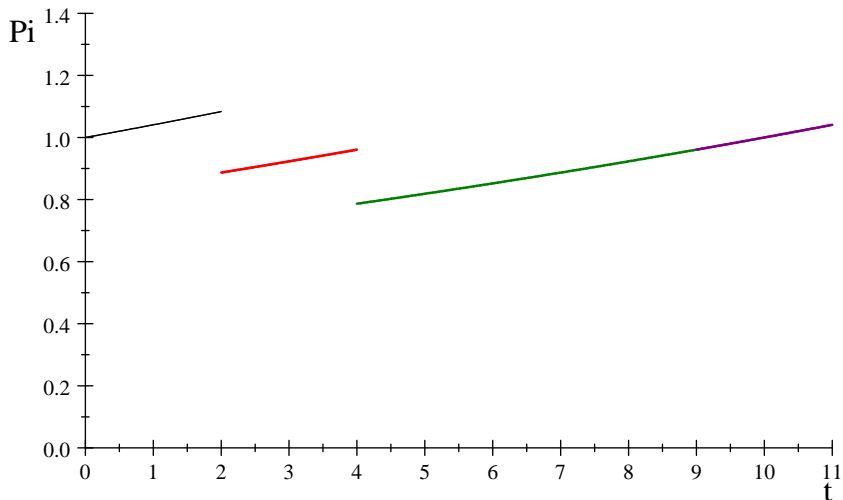$$\Omega_{\bar{t}}^L = \Omega_0 e^{-\delta \bar{t}} < \Omega_0.$$

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

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

# 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)**
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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 $\pi_0$.
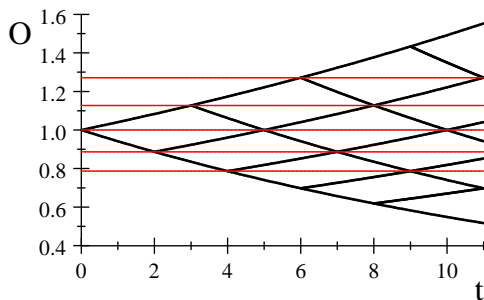
**Assumption S2**: At each moment a measure $B$ of new firms are born as spin-offs of existing firms. Spin-offs are clones of existing transitioning firms and they inherit their parent's organizational capital level.

# Possible Performance Paths
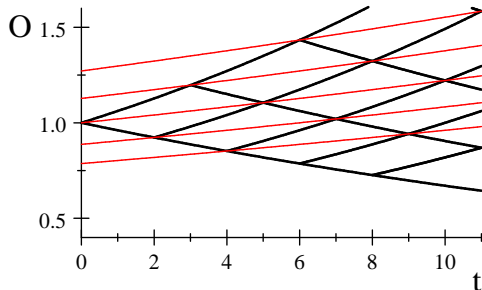


- Stochastic process: Possible performance paths of all firms born at time 0.

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

# Steady state

- **Steady State**: Distribution of firms by org capital is constant over time

- **Approach:** Characterize steady state distibution of firms with even CEO transition.
  - have performance level $\pi \in \{\pi_0, \pi_1, \pi_2, ...\}$
  - 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.

# 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.
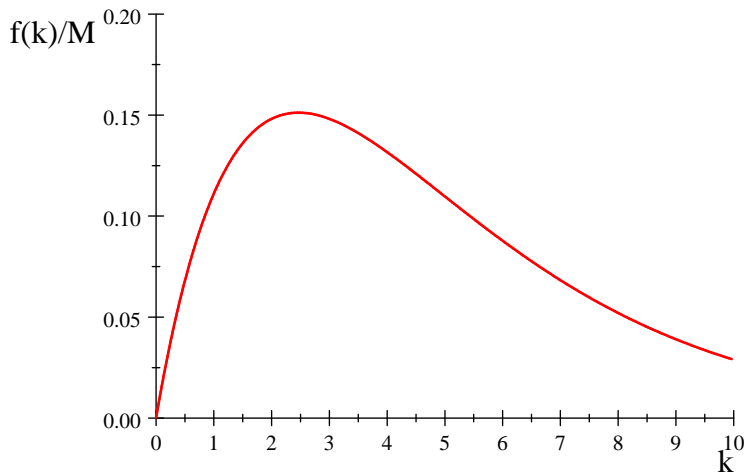
## Proposition

*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



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

1. One firm dynamics (easy part)
2. Steady state for a mass of firms (tough part)
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## Proposition (CT)

*In steady state: (i) A cross-section of otherwise identical firms exhibits different performance levels ($Var\left(\pi_{i,t}\right) > 0$); (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*

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

## Proposition (OC)

*In steady state:*
*(i) In a cross-section of firms, performance and organizational capital are positively correlated:* $Corr\left(\pi_{i,t}, \Omega_{i,t}\right) > 0$.
*(ii) In a cross-section of firms, changes in performance are positively correlated with changes in organizational capital: For any* $s > \bar{t}$,

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

*(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:*

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

# Steady state distribution
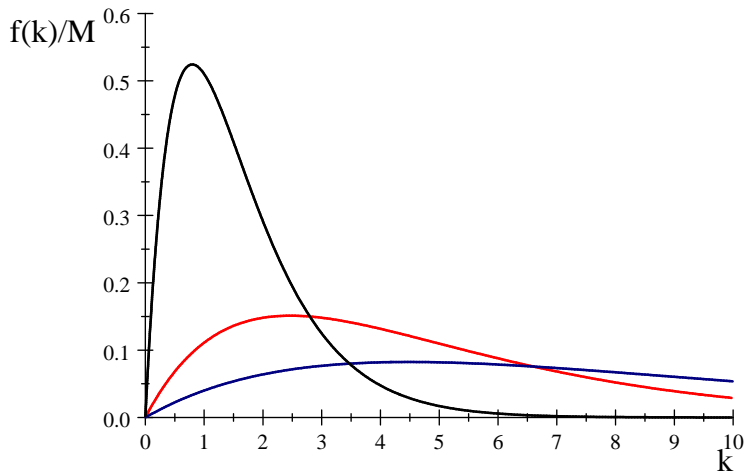


$p = 2/9$ (black), $p = 3/9$ (red) and $p = 4/9$ (blue)

## 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 ($\theta_{i,t-s} = \theta_H$ 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 proft 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 proft 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) Controling for current organizational capital $\Omega_{i,t}$, past CEO variables have no predictive value on current firm performance $\pi_{it}$.*

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| New | Practices and CEO variables | | V |
|---|---|---|---|
| | CEO effect on performance works only through practices | | V |
| | | | |
| | | | |

# 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

# Assortative Matching

**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 | | V |
| | CEO effect on performance works only through practices | | V |
| | CEO career predicted by performance/practices | | V |
| | Bertrand–Schoar underestimates causal CEO effect | | V |

- 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