Joint Dynamics of Organizational Culture, Design, and Performance

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ERINN Meeting, Washington DC, April 2017

Motivation

How do organizations and institutions shape economic performance?

- influential research in political economics on comparative development

Widely heterogenous performance of similar organizations

- applies to firms, bureaucracies, and governments

Dynamics of institutions and organizations

- standard approach focus on strategic pursuit of fixed (typically self-interested) objectives

Roadmap

1. **Background**
2. Motivating Application
3. Model
4. Final Remarks

This paper

Studies joint dynamics of organizational culture, design and performance

- develop general model with culture as endogenous values
- tool to study cultural change, alongside economic or political change.
- apply general model to four specific examples: innovation, productivity, bureaucracies, and political parties

Organizational culture applies to internalized values

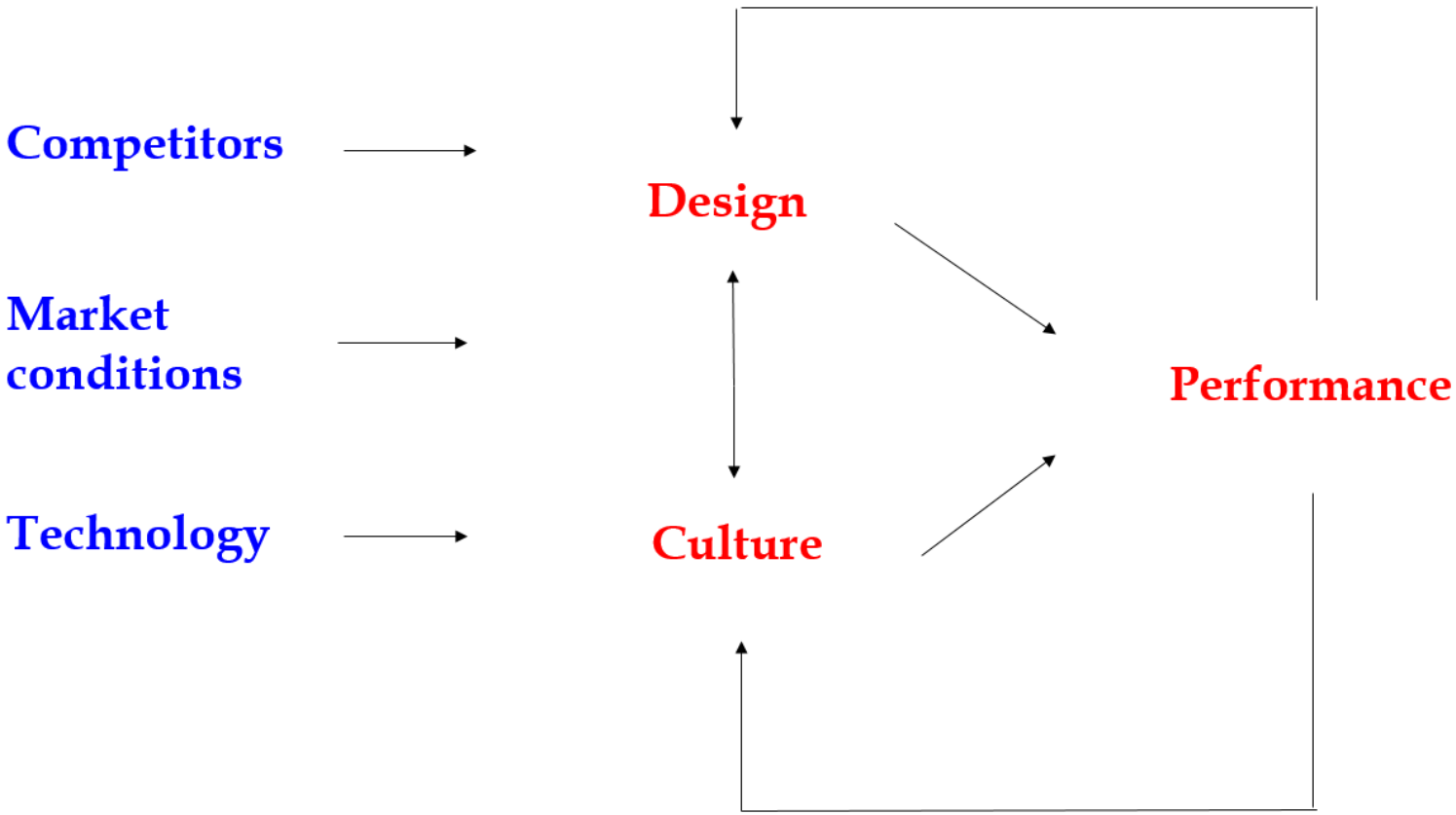
- individuals adopt tribal loyalties in organizations which affect their choices
- these are transmitted through long-serving senior employees to more junior employees
- these affect organization design and performance

Cousin to Besley and Persson (2017)

- similar ideas applied to interplay of democratic values and democratic institutions

Basic idea

Joint dynamics of organizational culture, design and performance



Culture in economics

Many economists suspicious about cultural explanations.

- "too cheap" and "no discipline"

Corporate cultures

- belief-based norms sustain cooperation (Kreps 1990)
- different types in organizations (Hodgson 1996, Lazear 1995)
- alternative management practices (Bloom and van Reenen)

Two approaches in modeling

- culture as belief system in equilibrium play (Greif 1994)
- culture as socially determined values and preferences (Akerlof 1976, Akerlof and Kranton 2000)

Work on economic and social choices

- recent literature (Bisin and Verdier 2000, Tabellini 2008)

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Changing IBM's innovation culture

Subject of many studies:

- IBM faced difficulty in shifting from its dominant business of mainframes, to networks and personal computing

> *"IBM bringing out a personal computer would be like teaching an elephant to tap dance."*

Mills (1996) interviews with IBM management

- notes need to balance centralization and decentralization

> *"IBM's top executives attempted to manage the corporation from the top, ... in so doing exceeded their capabilities. But IBM ... requires a high degree of central coordination and direction. It needs a judicious blend of decentralized operating management and centralized strategic direction. In the 1980s, IBM's executives failed to get the mixture right." (page 81)*

- and blames culture for limited capacity to respond

> *"Is IBM the victim of a corporate culture that pushed the wrong type of executive to the top? Yes. IBM chief executives were too inbred, too steeped in the arrogance of success, and too certain of their own judgment in a time of challenge. IBM's culture contributed greatly to each shortcoming." (page 81)*

Model features

Three-tier hierarchy

- leader
- senior managers
- junior managers
- tomorrow's senior managers drawn from today's junior managers

Leader wants to adapt organization to market conditions

- but dependent on managers to make changes
- and management has its own mission-driven preferences, which embody a certain culture/ethos
- tempting to centralize key decisions tempting, but could demotivate managers

Model analysis

Culture as preferences for particular mission

- junior become members of a certain "tribe" via socialization
- membership depends (probabilistically) on perception about relative tribal payoffs
- thus membership – organizational culture – evolves with these payoffs

Leaders of IBM must decide whether to centralize:

- they know the tribal composition of workforce but not who is which
- centralization throws away local information, but guarantees adoption of a particular mission

Centralization choice affects cultural dynamics

- likelihood of manager discretion affects relative payoff of tribes
- will depend on how often each tribe is aligned with leadership

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Key features

Organizations comprise a range of divisions run by managers

- upper-tier managers care about mission
- lower-tier managers put in effort

Upper-tier managers can differ in "mission preferences"

- lower-tier managers learn their mission preferences from socialization

Leaders decide how much discretion to grant to upper-tier managers

- model allows private discretion to be valuable
- but there may be costs from non-coordination

Divisions and information

A continuum of divisions indexed by $\omega \in [0, 1]$

- design choice $\rho(\omega, \theta) \in \{0, 1\}$ for each division, where $\theta \in \{0, 1\}$ is aggregate state

States and probabilities

- at θ, $\alpha \geq \frac{1}{2}$ is the probability (share) of divisions with $\sigma(\omega, \theta) = \theta$
- $\alpha \in \left[\frac{1}{2}, 1\right]$ gauges how technology, demand, or cost aligned across divisions
- probability of $\theta = 0$ is β

Organizational design

Leader represents organization's ultimate principal(s)

- e.g., owners, ministers, or voters.
- observes θ but not $\sigma(\omega, \theta)$ and $\tau(\omega)$ (see below)

Organizational form $o(\theta) \in \{c(\theta), d(\theta)\}$ chosen by leader

- d *d*ecentralized, c *c*entralized
- when $o = c(\theta)$, leader picks same $\rho(\theta)$ for all divisions $\omega \in [0, 1]$
- when $o = d(\theta)$, each upper-tier manager picks $\rho(\omega, \theta) \in \{0, 1\}$

Overlapping generations of managers

- upper-tier manager, U, and a lower-tier manager, L in each division
- all U at t replaced in $t + 1$ by all L at t

Organizational payoff

The leader maximizes the payoff

$$\Pi\left(\lambda\left(2x-1\right)^{2}, \int \pi(\left|\rho\left(\omega,\theta\right)-\sigma\left(\omega,\theta\right)\right|,\theta)d\omega, e\right)$$

- x is the (maximum) share of divisions that choose same value of ρ
- $\pi(\left|\rho\left(\omega,\theta\right)-\sigma\left(\omega,\theta\right)\right|,\theta)$ is payoff in division ω, depending on its design choice where

$$\pi\left(1,1\right) > \pi\left(0,1\right) \text{ and } \pi\left(0,0\right) > \pi\left(1,0\right)$$

- alignment valued by leader, but differentially depending on state $\theta \in \{0,1\}$
- $e = \int e^{*}\left(\omega,\theta\right)d\omega$ equilibrium effort, will be common to all managers

Performance Π separable in three terms

- gains from coordination, alignment of project choices, and effort

Upper-tier managers

Two types $\tau(\omega) \in \{0, 1\}$

- a share μ_t has type $\tau = 0$ and (lexicographically) prefer $\rho(\omega, \theta) = \sigma(\omega, \theta)$, while $1 - \mu_t$ has type $\tau = 1$ and prefer $\rho(\omega, \theta) = 1 - \sigma(\omega, \theta)$
- μ_t captures organizational culture

Information and choices

- observes $\sigma(\omega, \theta)$, and chooses $\rho(\omega, \theta) = \sigma(\omega, \theta)[1 - \tau(\omega)] + \tau(\omega)[1 - \sigma(\omega, \theta)]$ *iff* $o(\theta) = d(\theta)$

Payoff

- $u(|\rho(\omega, \theta) - \sigma(\omega, \theta)|, \tau(\omega))e(\omega, \theta)$ where $e(\omega, \theta)$ is effort by lower-tier manager with

$$u(1, 1) = u(0, 0) = u > u(0, 1) = u(1, 0) = 0$$

- no intrinsic benefit to being $\tau = 0$ or $\tau = 1$ if each gets its preferred design.

Lower-tier managers

Invest in effort

- $e(\omega, \theta) \in [\underline{e}, \bar{e}]$, specific to organization
- effort cost $\psi(e)$ increasing and convex with $\psi(1) = 0$

Payoffs

- get share $I(|\rho(\omega, \theta - \sigma(\omega, \theta)|, \tau(\omega))e(\omega, \theta)$ of rents from upper-case managers, where first part satisfies

$$I(1,1) = I(0,0) = I > I(0,1) = I(1,0) = 0$$

- let γ be the probability that $I(|\rho(\omega, \theta) - \sigma(\omega, \theta)|, \tau(\omega)) = I$, i.e. that works for a "motivated" upper-tier manager

Optimal effort

$$e^*(\gamma) = \arg \max_{e \in [1,E]} \{\gamma I e - \psi(e)\}$$

is increasing in γ

Values

Upper-tier manager preferences

- "tribal" preferences – i.e., care about own payoff and average payoff of co-workers with same type:

$$u(\left|\rho(\omega,\theta-\sigma(\omega,\theta)\right|,\tau)e(\omega,\theta)+\int\xi(\tau(\varpi))\,u(\left|\rho(\varpi,\theta-\sigma(\varpi,\theta)\right|,\tau(\varpi))e(\varpi,\theta)d\varpi$$

where $\tau(\varpi)\in\{0,1\}$ is upper-tier manage type in division $\varpi\neq\omega$ and

$$\xi(\tau(\varpi))=\begin{cases}\xi>0 \text{ if } \tau(\varpi)=\tau(\omega)\\ 0 \text{ if } \tau(\varpi)\neq\tau(\omega)\end{cases}$$

- these weights represent an *esprit de corps* in organization – i.e., you care about co-workers, if they share your own type

Timing

1. Organization enters t with generation upper-tier managers, share μ_t of which has type $\tau = 0$, and remainder has $\tau = 1$. Nature determines $\theta_t \in \{0, 1\}$, and $\sigma(\omega, \theta)$ for $\omega \in [0, 1]$. A new generation lower-tier managers enters
2. Lower-tier managers invest $e_t \in [1, E]$
3. Leader chooses organizational form $o(\theta_t) \in \{c(\theta_t), d(\theta_t)\}$
4. Each lower-tier manager randomly matched with one upper-tier manager. Lower-tier managers socialized, which determines μ_{t+1}
5. If $o(\theta_t) = c(\theta_t)$, leader chooses $\rho(\theta_t, \omega) \in \{0, 1\}$, binding for all ω
6. If $o(\theta_t) = d(\theta_t)$, upper-tier managers in each division choose $\rho_t(\theta_t, \omega) \in \{0, 1\}$
7. Payoffs realized, upper-tier managers leave and get replaced by current lower-tier managers

Centralized design

Lemma

A leader picks $\rho = \theta$

- payoff from aligned project choices is $\alpha\pi(\theta, \theta)$

Effort

- if $\theta = 0$, effort is $e^*(\mu)$, since only the μ divisions with $\tau = 0$ leaders have high payoffs for their manager in this state of the world
- if $\theta = 1$, effort is $e^*(1 - \mu)$ (for analogous reason)

Leader payoff

- always gain from coordination as $x = 1$
- may gain or lose from aligned projects depending on θ and α
- will suffer from low effort – how much depends on μ

Decentralized design

Types and outcomes

- in μ divisions with type $\tau = 0$, $\rho(\omega, \theta) = \sigma(\omega, \theta)$
- in $(1 - \mu)$ divisions with type $\tau = 1$, $\rho(\omega, \theta) = 1 - \sigma(\omega, \theta)$
- always loss from coordination since $x = \max\{\mu, 1 - \mu\} \in [0, 1]$
- effort is $e^*(1)$, as all lower-tier managers share in the rent.

Leader payoff

$$\Pi\left(\lambda(2x-1)^2, \left[\mu\pi(0, \theta) + (1-\mu)\pi(1, \theta)\right], e^*(1)\right)$$

Centralization versus decentralization

Proposition 1 *There exists* $\{\mu_L, \mu_H\}$ *with* $\mu_H > \mu_L$ *such that:*

1. $o(0) = d$ *if and only if*

$$\mu \geq \mu_H \geq \alpha$$

2. $o(1) = d$ *if and only if*

$$\mu \leq \mu_L \leq 1 - \alpha.$$

- If coordination costs are absent then $\mu_H = \alpha = 1 - \mu_L$.

Proof

Let $\theta = 0$ and define

$$\Pi\left(\lambda(2\mu_H - 1)^2, \mu_H \pi\left(0,0\right), e\right) = \Pi\left(\lambda, \alpha\pi\left(0,0\right), e\right)$$

- we must have $\mu_H \geq \alpha \geq 1/2$
- RHS is increasing in μ and part 1 follows.

Let $\theta = 1$ and define

$$\Pi\left(\lambda(1 - 2\mu_L)^2, (1 - \mu_L)\,\pi(1,1), e\right) = \Pi\left(\lambda, \alpha\pi(1,1), e\right)$$

- we must have $1 - \mu_L \geq \alpha \geq 1/2$
- RHS is decreasing in μ and part 2 follows.

Socialization

Here use standard replicator dynamics (micro-founded model in paper)

- let $U_1(\mu)$ and $U_0(\mu)$ be expected utilities of type 1's and 0's, then

$$\begin{aligned}\mu_{t+1} - \mu_t &= \mu_t \psi \left[U_1(\mu) - \left[\mu_t U_1(\mu) + (1-\mu_t) U_0(\mu)\right]\right] \\ &= \mu_t (1-\mu_t) \psi \left[U_1(\mu) - U_0(\mu)\right] \\ &\equiv \mu_t (1-\mu_t) \psi \left[\Delta(\mu_t)\right]\end{aligned}$$

Three possible steady states: $\hat{\mu} = 1; \hat{\mu} = 0; \Delta(\hat{\mu}) = 0$.

Relative fitness

Expected Payoff difference between type $\tau = 0$ and type $\tau = 1$

- given θ, and associated $\{\gamma(\theta), \rho(\omega, \theta)\}$

$$\left[\int \{(1+\xi\mu)\, u(|\rho(\omega,\theta) - \sigma(\omega,\theta)|, 0) - [1+(1-\mu)\,\xi]\, u(|\rho(\omega,\theta) - \sigma(\omega,\theta)|, 1)\} d\omega\right] e^*(\gamma(\theta)).$$

- take expectations over different realizations of θ, given μ, and implied equilibrium choices from Proposition 1
- note that $\gamma(\theta) \in \{\mu, 1-\mu, 1\}$.

Relative fitness (cont.)

If $\theta = 0$

- leader centralizes and sets $\rho = 0$ for $\mu \leq \mu_H$, and relative fitness of $\tau = 0$ vs $\tau = 1$ tribes is

$$\delta_H(\mu) = (1 + \xi\mu)\, ue^*(\mu)$$

If $\theta = 1$

- leader centralizes and sets $\rho = 1$ if $\mu \geq \mu_L$, and relative fitness is

$$\delta_L(\mu) = -[1 + (1-\mu)\,\xi]\, ue^*(1-\mu) < 0$$

Decentralization in complementary cases

- relative fitness is

$$\hat{\delta}(\mu) = [\xi\,[2\mu - 1]\, u]\, e^*(1)$$

- increasing in μ and positive (negative) whenever $\mu \geq 1/2$ ($\mu < 1/2$).

Relative fitness – overall expectation

Putting the cases together, we have

$$\Delta(\mu) = \begin{cases} \beta\hat{\delta}(\mu) + (1-\beta)\,\delta_L(\mu) & \text{if } \mu > \mu_H \\ \beta\delta_H(\mu) + (1-\beta)\,\delta_L(\mu) & \text{if } \mu \in [\mu_L, \mu_H] \\ \beta\delta_H(\mu) + (1-\beta)\,\hat{\delta}(\mu) & \text{if } \mu < \mu_L. \end{cases}$$

- observe that

$$\beta\delta_H(\mu) + (1-\beta)\,\delta_L(\mu) = u\left[\beta(1+\xi\mu)\,e^*(\mu) - [1+(1-\mu)\,\xi](1-\beta)\,e^*(1-\mu)\right]$$

which is increasing in μ, positive at $\beta = 1$ and negative at $\beta = 0$.

- thus $\Delta_\mu(\mu) > 0$ for all $\mu \in [0,1]$
- normalize by setting $\psi = (1+\xi)\,ue^*(1)$ so that $\psi\Delta \in [-1,1]$.

Steady states

Define:

$$\beta\left(1+\xi\tilde{\mu}\left(\beta\right)\right)e^{*}\left(\tilde{\mu}\left(\beta\right)\right)=\left[1+\left(1-\tilde{\mu}\left(\beta\right)\right)\xi\right]\left(1-\beta\right)e^{*}\left(1-\tilde{\mu}\left(\beta\right)\right).$$

Proposition 2 *For large enough ξ, there are three cases*

1. *If β is close enough to one, a type-0 culture emerges in the long run (i.e., $\lim_{t\to\infty}\mu_t=1$) from any starting value μ_0*
2. *If β is close enough to zero, a type-1 culture emerges in the long run (i.e., $\lim_{t\to\infty}\mu_t=0$) from any starting value μ_0*
3. *If β is such that $\tilde{\mu}(\beta)\in[\mu_L,\mu_H]$ then if $\mu_0<\tilde{\mu}(\beta)$, a type-1 culture emerges in the long run ($\lim_{t\to\infty}\mu_t=0$), while if $\mu_0>\tilde{\mu}(\beta)$ a type-0 culture emerges in the long run ($\lim_{t\to\infty}\mu_t=1$).*

Steady states (cont.)

What does large enough ξ mean?

- we need that

$$\xi \left[2\mu_L - 1\right] e^* \left(1\right) < -\left[1 + \left(1 - \mu_L\right) \xi\right] e^* \left(1 - \mu_L\right)$$

and

$$\xi \left[2\mu_H - 1\right] e^* \left(1\right) > \left(1 + \xi\mu_H\right) e^* \left(\mu_H\right)$$

which clearly hold if ξ is large, but fail if $\xi = 0$.

Deliverables

1. Organization culture and design correlated
2. Different cultures can coexist with common parameters
3. Dysfunctional organizational culture possible in long run
4. Organizational inertia

Illustrate with symmetric case where
$\pi(1,1) = \pi(0,0) = \pi > \pi(0,1) = \pi(1,0) = 0.$

Organization culture and design

No deterministic relation

With high (low) enough β – Case 1 (2) in Proposition 2 – we see

- a steady drift towards the dominance of one tribe of managers
- drift towards decentralization and high effort

But if $\mu = 1$ or $\mu = 0$ – and Case 3 in Proposition 2 – we see

- organization flips between o and d depending on θ
- effort is lower with centralization
- organization looks conflictual half the time.

Coexistence

Starting point determines the final outcome in Case 3

- organizations with same fundamentals can have different cultures, and therefore different organizational design patterns
- dynamic complementarity can lead to divergent outcomes due to cultural dynamics
- consistent with "change people to change culture view" and "tipping point" view of management

BUT ...

- bringing new managers effective only at right fundamentals
- management changes matter most around "critical junctures", where μ close to $\tilde{\mu}(\beta)$

Dysfunctional cultures

No presumption that best culture emerges in long run

- long-run payoffs hinge on gains from coordination, aligned project choices ($\pi(1,1)$ vs. $\pi(0,0)$)
- by Proposition 2, coordination is the same in the long-run, as $\mu \longrightarrow 1$ or $\mu \longrightarrow 0$, but effort varies with alignment
- with $\tau = 0$ culture long-run payoff is

$$\pi\left[\beta e^{*}(1) + (1-\beta)\,\underline{e}\right]$$

and with $\tau = 1$

$$\pi\left[\beta \underline{e} + (1-\beta)\, e^{*}(1)\right]$$

- then $\tau = 1$ is dysfunctional if $\beta > 1/2$

Why no organizational Coase theorem?

The friction is lack of commitment

- design choices must be incentive compatible for leader at each date t
- these choices shape cultural dynamics, which feed back to design choices
- resembles classic failures of Coase theorem in political economics
- dynamics of values creates persistence

Organizational inertia

Culture may not respond to changing fundamentals

- consider two values of $\beta \in \{\beta_L, \beta_H\}$with $\beta_H > \beta_L$,
- suppose organization has converged to $\mu = 1$ with β_H.

Will it respond to a shift to β_L?

- unresponsive to any shock such that

$$\beta_L \geq \hat{\beta} = \frac{\underline{e}}{\xi e^*(1) + \underline{e}}.$$

- so only large shocks will lead to cultural change

IBM example revisited

IBM had entrenched culture around mainframe technology ($\tau = 1$)

- functional in a world where $\beta = 1$– i.e., mainframes dominant

Problems of reform if β falls?

- even if equilibrium long-run culture shifts, change will be slow
- modest fall in β may not change cultural dynamics
- could be addressed by centralizing, but at cost of poor short-term performance (low e)

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Applications

1. Innovation (embodies IBM example)
2. Heterogeneous Firms
3. Pulic-service Delivery
4. Political Parties

Final remarks

Propose a model where organization design and culture coevolve

Key insights

- heterogenous performance for similar fundamentals
- organizations can have "critical junctures"
- no guarantee cultural dynamics yield "optimal" outcomes
- no commitment and slow-moving culture can hold back change

Future work

- develop more applications
- look at role of hiring and firing
- study selection of "transformational" leaders