Strategic Realignment, Flexibility, and Firm Scope

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ORGANIZATIONAL ECONOMICS

BRANCH I—Firm Scope
BRANCH II--Authority and Delegation

SYNTHESIS BETWEEN I AND II
COORDINATION AND INTEGRATION

KEY LINK = ASSET REDEPLOYMENT
ASSET REDEPLOYMENT = FLEXIBILITY

"Only when the need to make unprogrammed adaptations is introduced does the market versus internal organization issue become engaging."

Williamson, O. (1971). "The Vertical Integration of Production: Market Failure Considerations." *American Economic Review,* 61, (May), 112-123.

- Strategic Management
  - --Resource Based View (RBV)
  - --Competitive Analyisis

- Organizational Economics
  - Boundaries of the Firm (TCE, PRT)
  - Internal Organization
    - Authority/Delegation
    - Centralization/Decentralization

- Mergers: Vertical or Horizontal Integration

- Realignment:
  - Diversification (product/market)
  - Divestiture (disinvestment)

- Adaptation: Resource Redeployment
  - Favorable states—positive shocks
  - Adverse states---negative shocks

- Organizational inertia vs. proactive change
  - Internal agency conflicts

- Do mergers promote inertia or proactive change?
- How are these choices affected by uncertainty?
- How are these choices affected by adaptation capabilities or flexibility?
- How are these choices affected by internal agency conflicts?

INTERNAL CAPITAL MARKETS

- Diversification Premium & Discount
- (Scharfstein and Stein, 2000)

REDEPLOYABILITY

- Redeployment Surplus as Synergy
- Integration activates potential for redeployment

Firm F—Airline fleet owner

Firm G---O&M: pilot, crew, maintenance

Incentives to invest under stand-alone

Incentives to invest under integration

Scale of investment—TCE, PRT

Flexibility of investment---?

Mergers and Strategic Shifts

Mailath, G.J., Nocke, V., Postlewaite, A. (2005). "Business Strategy, Human Capital and Managerial Incentives." *Journal of Economics and Management Strategy,* 13(4)

Strategic shift (new product/market) in F causes cannibalization of demand on G.

Under independent operation, external effect does not affect strategic choice

Under integration, negative externality must be internalized as a cost of realignment. *Added cost of realignment*

Mergers and Strategic Shifts

- Fulghieri, P., and Hodrick, L.S. (2006). Synergies and Internal Agency Conflicts: the Double-Edged Sword of Mergers, *Journal of Economics and Management Strategy*, 15 (3)

Strategic realignment equals divestiture of F

Divestiture = resource redeployment

Under integration, total synergies from F must be internalized as cost of divestiture

Added cost of realignment

Outline

- The Basic Model
- Simultaneous Investment by CEO and Manager
- Sequential Investment: Bounded Rationality and Binary Options
- Sequential Investment: Forward-Looking Coasian Bargaining

THE BASIC MODEL

- Endogenous Externalities
- Uncertainty and Flexibility determine trade-offs between Firm Scope and Strategy

Two Firms: F and G

DECISION LEVELS

- Board of Directors decides on:
  - Merger versus Stand Alone
  - Status Quo versus Realignment
- CEO and Manager decide on:
  - Inertial Investment in Flexibility
  - Proactive Investment in Flexibility

- Tactical Flexibility θ_S and θ_R

- Agency Conflict between CEO and Manager

- Strategic Flexibility = Value of Option to Switch

- $$\begin{aligned}\Omega(\theta_S,\theta_R) &= -\Gamma(\theta_S,\theta_R)\\ &= p\,\alpha_R + \theta_R(1-p)\,\alpha_R + \theta_R(\omega_R - \varphi_R)\\ &\quad - p\alpha_S - \theta_S(1-p)\alpha_S - \theta_S(\omega_S - \varphi_S)\end{aligned}$$

Two production units F and G

In unit F, board must decide between:

(i) project/strategy S Status Quo

(ii) project/strategy R Realignment

- Manager invests in inertial flexibility θ_S
- CEO invests in proactive flexibility θ_R

Agency Conflict: CEO vs Manager

Manager prefers Status Quo

(Entrenchment)

Invests in Inertial Flexibility θ_S

CEO prefers Realignment

Invests in Proactive Flexibility θ_R

1.-Board of directors of F and G decide between Stand Alone and Merger

2.- CEO of F selects proactive flexibility investment θ_S and manager of F selects inertial flexibility investment

3.- Expected payoffs computed

4.- Board chooses Status Quo or Realignment Strategy

5.- Uncertainties realized, payoffs distributed

- Simultaneous Investment and Uniform Prior Beliefs
- Sequential Investment, Bounded Rationality and Binary Options
- Sequential Investment: Forward-Looking Coasian Bargaining

- Two Divisions: F and G
- STAND ALONE

    Value under Status Quo: $V_F(S)$

    Value under Realignment: $V_F(R)$

        Realign if $V_F(R\ ) > V_F(S)$
- INTEGRATED

    Value under Status Quo: $V_F(S)$

    Value under Realignment: $V_F(R)$

        Realign if

$$V_F(R) + \eta_R \geq V_F(S) + \eta_S$$

$$V_F(R) + \eta_R \geq V_F(S) + \eta_S$$

$$V_F(R) + \eta_R - \eta_S \geq V_F(S)$$

Strategic synergy premium

$$\Delta\eta = \eta_R - \eta_S$$

$$V_F(R) + \Delta\eta \geq V_F(S)$$

Externality from Merger: Example-1

Mailath, Nocke and Postlewaite (2005)

Realignment = strategic shift in F causing cannibalization of demand in G.

Externality

under realignment $\eta_R = -\eta$,

under status quo $\eta_S = 0$,

Strategic synergy premiun $\Delta\eta = -\eta$.

Externality from Merger: Example-2

Fulghieri and Hodrick (2006)

Realignment = divestiture/spin-off

Externality

under realignment $\eta_R = 0$

under status quo $\eta_S = -\eta$

Strategic synergy premiun $\Delta\eta = -\eta$.

Flexibility as Adaptation

S_g p PROBABILITY OF GOOD STATE

Ex-ante payoff α_H

S_b $1-p$ PROBABILITY OF BAD STATE

Ex-ante payoff $\alpha_L < \alpha_H$

Flexibility θ

Ex-post payoff of bad state

$W(S_{b,}, \theta) = \theta \alpha_H + (1-\theta) \alpha_L$

$W(S_{b,}, 1) = \alpha_H$

$W(S_{b,}, 0) = \alpha_L$

FLEXIBILITY = Capacity for Ex-post Resource Redeployment

Redeployment intensity—Examples

- Distribution of skills in human capital with varying absorptive capacities
- Distribution of distances in networks of agents
- Distribution of vintages in stocks of productive technologies
- Connectivity of work stations via ICT

Flexibility

θ = Fraction of Assets that are redeployable

α_H = Return in good state, Prob p

α_L = Return in bad state, Prob (1-p)

Value of Flexibility

$$V(\theta) = \theta\,(1-p)(\alpha_H - \alpha_L)$$

Switching Options

Bernanke's "Bad News Principle"

Negative and Positive Shocks

Modeling Externalities

Value of Switching Option

$$\Omega = \Omega_R - \Omega_S \geq 0$$

$$\Omega_R = V(R) + \eta_R(\theta_R)$$
$$= \pi_R(\theta_R) + \omega_R(\theta_R) - \varphi_R|\theta_R - \theta_o|$$
$$\Omega_S = V(S) + \eta_S(\theta_S)$$
$$= \pi_S(\theta_S) + \omega_S(\theta_S) - \varphi_S|\theta_S - \theta_o|$$

- ω_R ω_S redeployability coefficients
- φ_R φ_S flexibility mismatch cost

Modeling Externalities

$$\Omega = \Omega_R - \Omega_S \geq 0$$

$$\pi_R(\theta_R) + \Delta\eta(\theta_S,\theta_R) \geq \pi_S(\theta_S)$$

$$\Delta\eta(\theta_S,\theta_R) = \omega_R(\theta_R) - \varphi_R|\theta_R - \theta_o| - \omega_S(\theta_S) + \varphi_S|\theta_S - \theta_o|$$

Assuming $\omega_R(\theta_R) = \omega_R\theta_R$, $\omega_S(\theta_S) = \omega_S\theta_S$ and $\theta_o = 0$,

Strategic synergy premium

$$\Delta\eta(\theta_S,\theta_R) = (\omega_R - \varphi_R)\theta_R - (\omega_S - \varphi_S)\theta_S$$

Expected payoff of Status Quo Strategy

$$V_F(S) = p\,\alpha_S + \theta_S(1-p)\,\alpha_S + \theta_S\,(\omega_S - \varphi_S)$$

Expected payoff of Realignment Strategy

$$V_F(R) = p\,\alpha_R + \theta_R(1-p)\,\alpha_R + \theta_R\,(\omega_R - \varphi_R)$$

θ_S , θ_R —Flexibility

= fraction that can be redeployed from low to high payoff following resolution of uncertainty

Ex-ante resource specificity is

$$\Gamma o = p\,\alpha_S - p\,\alpha_R$$

Ex-Post Resource Specificity

$$\Gamma(\theta_S,\theta_R) = \pi_S(\theta_S) - \pi_R(\theta_R)$$

$$= p\,\alpha_S + \theta_S(1-p)\,\alpha_S + \theta_S(\omega_S - \varphi_S) - p\,\alpha_R - \theta_R(1-p)\,\alpha_R - \theta_R(\omega_R - \varphi_R)$$

Value of Option to Switch

$$\Omega(\theta_S,\theta_R) = -\Gamma(\theta_S,\theta_R)$$

$$= p\,\alpha_R + \theta_R(1-p)\,\alpha_R + \theta_R(\omega_R - \varphi_R) - p\alpha_S - \theta_S(1-p)\alpha_S - \theta_S(\omega_S - \varphi_S)$$

REALIGN

If $\Gamma(\theta_{S,}\theta_R) \leq 0$ $\Omega(\theta_S,\theta_R) \geq 0$

STATUS QUO

If $\Gamma(\theta_S,\theta_R) \geq 0$ $\Omega(\theta_S,\theta_R) \leq 0$

SIMULTANEOUS INVESTMENTS
AND
UNIFORM PRIOR BELIEFS

1.- CEO and Manager have uniform prior beliefs about probability of a good state p є [0,1]

2.- Conditionally on preferences and distribution rules, θ_S and θ_R are selected.

3.- Probability p is revealed. Board of directors computes expected payoffs.

4.- Board selects between status quo S and realignment R strategies

5.- Payoffs Distributed—Distribution Rules

For each pair θ_S θ_R, there exist threshold values $\Gamma^*_o(\theta_S, \theta_R) > 0$ for ex-ante resource specificities such that:

For $\Gamma_o \geq \Gamma^*_o$ status quo S

For $\Gamma_o \leq \Gamma^*_o$ realignment R

Ex-ante resource specifcity

$\Gamma o = p\ \alpha_S \ \ - p\ \alpha_R$

Threshold Resource Specificities

DECISION RULES

Under stand-alone

If $\Gamma_o \leq \Gamma_{SA}^*(\theta_S,\theta_R)$ Realign

If $\Gamma_o \geq \Gamma_{SA}^*(\theta_S,\theta_R)$ Status Quo

Under merger

If $\Gamma_o \leq \Gamma_M^*(\theta_S,\theta_R)$ Realign

If $\Gamma_o \geq \Gamma M^*(\theta_S,\theta_R)$ Status Quo

Net synergy gap

$$S_G = \Gamma_M{}^*(\theta_S,\theta_R) - \Gamma_{SA}{}^*(\theta_S,\theta_R)$$

$$\Gamma_M{}^*(\theta_S,\theta_R) = \Gamma_{SA}{}^*(\theta_S,\theta_R) + S_G$$

Proposition

If $S_G \geq 0$ then $\Gamma_M{}^*(\theta_S,\theta_R) \geq \Gamma_{SA}{}^*(\theta_S,\theta_R)$, merger increases threshold and is *proactive*

If $S_G \leq 0$ then $\Gamma_M{}^*(\theta_S,\theta_R) \leq \Gamma_{SA}{}^*(\theta_S,\theta_R)$ merger decreases threshold and is *inertial*.

Specificity thresholds under merger

$\Gamma^*_M (1, 1) = \omega_R - \varphi_R - (\omega_S - \varphi_S)$

- $\Gamma^*_M (1, 0) = (p - 1)\, \alpha_S - (\omega_S - \varphi_S)$
- $\Gamma^*_M (0, 1) = (1 - p)\, \alpha_R + (\omega_R - \varphi_R)$
- $\Gamma^*_M (0, 0) = 0$
- <u>Specificity thresholds under stand-alone</u>
- $\Gamma^*_{SA} (1, 1) = 0$
- $\Gamma^*_{SA} (1, 0) = (p - 1)\, \alpha_S$
- $\Gamma^*_{SA} (0, 1) = (1 - p)\, \alpha_R$
- $\Gamma^*_{SA} (0, 0) = 0$

EXPECTED PAYOFFS FOR (0,1)

For realignment under merger

$$p\,\alpha_S + \theta_S(1-p)\,\alpha_S + \theta_S(\omega_S - \varphi_S) - p\,\alpha_R - \theta_R(1-p)\,\alpha_R - \theta_R(\omega_R - \varphi_R) \le 0$$

$$\Gamma_o = p\,\alpha_S - p\,\alpha_R \le \Gamma_M{}^*(0,1)$$

$$\Gamma^*_M(0, 1) = (1-p)\,\alpha_R + (\omega_R - \varphi_R)$$

$$p \le p^*(0,1)$$

$$p^*(0,1) = (\alpha_R + \delta_R)/\alpha_S$$

$$\delta_R = \omega_R - \varphi_R$$

Realign if $p \leq p^*(0,1)$

$p^*(0,1) = (\alpha_R + \delta_R)/\alpha_S$

$\delta_R = \omega_R - \varphi_R$

$p^*(0,1) = 1 \quad \text{if } \alpha_R + \delta_R > \alpha_S$

$p^*(0,1) = (\alpha_R + \delta_R)/\alpha_S \quad \text{if } \alpha_R + \delta_R < \alpha_S$

$p^*(0,1) = 0 \text{ if } \alpha_R + \delta_R < 0$

$p^*(0,1) = (\alpha_R + \delta_R)/\alpha_S$

$p^*(0,1) \in (0,1)$ if and only if

$$0 < \alpha_R + \delta_R < \alpha_S$$

PAYOFFS

For $p \le p^*$ $\Pi = \Pi_R = \alpha_R + \delta_R$

For $p > p^*$ $\Pi = \Pi_S = p\alpha_S$

$$\Pr[\alpha = R] = \Pr[p \leq p^*] = \min\{1, p^*\}$$

$$\Pr[\alpha = S] = \Pr[p \geq p^*] = \max\{0, 1 - p^*\}$$

$$E[\Pi\ (0,1)] = p^*\Pi_R(0,1) + (1 - p^*)\Pi_S(0,1)$$

$$E[\Pi\ (0,1)] = (\alpha_R + \delta_R)^2/\alpha_S + [\alpha_S - \alpha_R - \delta_R]\ p\ \alpha_S$$

$$\delta_R = \omega_R - \varphi_R$$

Expected Payoffs

If $p^*(0,1) \geq 1$, REALIGN

$E[\Pi\ (0,1)] = \Pi_R = \alpha_R + \delta_R$

If $p^*(0,1) \in (0,1)$, WEIGHTED AVERAGE

$E[\Pi\ (0,1)] = (\alpha_R + \delta_R)^2/\alpha_S + [\alpha_S - \alpha_R - \delta_R]p\alpha_S$

$p^*(0,1) \leq 0$, STATUS QUO

$E[\Pi\ (0,1)] = p\alpha_S$

Distribution of Payoffs

Similarly, compute $E[\Pi\ (1,1)]$ $E[\Pi\ (1,0)]$

$E[\Pi\ (0,1)]$ $E[\Pi\ (0,0)]$

Distribution Rules:

(1)Nash Bargaining, Exogenous Threat Points

(2)Endogenous Bargaining Power β

(3) Winner-Takes-All (S or R Preference)

(4) Private Benefits Plus Pecuniary Benefits

SIMULTANEOUS INVESTMENT,

BOUNDED RATIONALITY

AND BINARY OPTIONS

Bounded Rationality

- CEO invests in flexibility $\theta_R \in \{0,1\}$ only if it switches preferred choice from S to R
- Manager invests in flexibility $\theta_R \in \{0,1\}$ only if it switches preferred choice from R to S
- Non-concave and discontinuous utility function creates hysteresis: ordering of decisions matters

- Decision rights are assumed to be assigned so that the manager chooses θ_S and the CEO chooses $\theta_{R.}$

- Equilibrium levels of investment depend on the sequence of decisions: whether the manager or the CEO moves first makes a difference on equilibrium flexibility.

- Whether inertial flexibility θ_S and proactive flexibility θ_R are *complements* or *substitutes* depends on the value of resource specificity and on the order in which the manager and the CEO make investment decisions.

Binary option:

Bounded rationality as adjustment cost

Current choice is θ_o and κ is cost of change

θ_o will change to $\theta^* = \arg\max u(\theta,\Gamma)$

if and only if

$$u(\theta^*,\Gamma) - u(\theta_o,\Gamma) > \kappa$$

- Ex-ante: first agent (M or C) makes investment decision
- Ex-interim: second agent (C or M) makes investment selection
- Ex-post: equilibrium value function determined

- Flexibility choice of first agent shifts ex-interim resource specificity and therefore choice of investment faced by the second agent.

- Ex-interim resource specificity depends on
  (a) ex-ante resource specificity and
  (b) on the flexibility level selected by the agent to move first

- The Realignment Value Function

  $\Psi i = \Lambda(\theta_R,\theta_S) - \mu_i\theta_j$, i є{M,C}, j є{S,R}, μ_i is the marginal cost of flexibility investment

- The Realignment Index Λ

  For each pair (θ_R,θ_S) the index is an integer N є {0,1} defined by:

  $\Lambda(\theta_R,\theta_S) = 0$ if $\pi_R(\theta_R) < \pi_S(\theta_S)$ and
  $\Lambda(\theta_R,\theta_S) = 1$ if $\pi_R(\theta_R) > \pi_S(\theta_S)$.

Manager moves first

If manager moves first and selects θ_S, then CEO chooses flexibility θ_R to maximize

$$V(\theta_S,\theta_R) = \Psi_C(\theta_R,\theta_S) - \Psi_C(0,\theta_S)$$

$$= \Lambda(\theta_R,\theta_S) - \Lambda(0,\theta_S) - \mu_C\theta_R + \mu_C 0$$

Four Sub-Games

(a) Sub-game G1 = (P,M): Positive resource specificity, manager invests first

(b) Sub-game G2 = (P, C): Positive resource specificity, CEO invests first

(c) Sub-game G3= (N,M): Negative resource specificity, manager invests first

(d) Sub-game G4= (N,C): Negative resource specificity, CEO invests first

MANAGER MOVES FIRST and $\Gamma o > 0$, $\Gamma o \in \Sigma+ = \{\Gamma o : 0 \leq \Gamma o \leq (1-p)\,\alpha R\}$

- $\Delta\Psi_C(0/0, \Sigma+) = \Psi_C(1,0) – \Psi_C(0,0)$
  $= \Lambda(0,0) - \Lambda(0,0) – \mu_C.0 + \mu_C.0 = 0$
- $\Delta\Psi_C(1/0, \Sigma+) = \Psi_C(1,0) – \Psi_C(0,0)$
  $= \Lambda(1,0) - \Lambda(0,0) – \mu_C.1 + \mu_C.0 = 1-\mu_C$
- $\Delta\Psi_C(0/1, \Sigma+) = \Psi_C(0,1) – \Psi_C(0,1)$
  $= \Lambda(0,1) - \Lambda(0,1) – \mu_C.0 + \mu_C.0 = 0$
- $\Delta\Psi_C(1/1, \Sigma+) = \Psi_C(1,1) – \Psi_C(0,1)$
  $= \Lambda(1,1) - \Lambda(0,1) – \mu_C.1 + \mu_C.0 = -\mu_C$

- MANAGER MOVES FIRST and $\Gamma o < 0$, $\Gamma o \in \Sigma- = \{\Gamma o : -(1-p)\,\alpha S \leq \Gamma o \leq 0\}$

- $\Delta\Psi_C(0/0, \Sigma-) = \Psi_C(1,0) - \Psi_C(0,0)$
  $= \Lambda(0,0) - \Lambda(0,0) - \mu_C.0 + \mu_C.0 = 0$
- $\Delta\Psi_C(1/0, \Sigma-) = \Psi_C(1,0) - \Psi_C(0,0)$
  $= \Lambda(1,0) - \Lambda(0,0) - \mu_C.1 + \mu_C.0 = -\mu_C$
- $\Delta\Psi_C(0/1, \Sigma-) = \Psi_C(0,1) - \Psi_C(0,1)$
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- $\Delta\Psi_C(1/1, \Sigma-) = \Psi_C(1,1) - \Psi_C(0,1)$
  $= \Lambda(1,1) - \Lambda(0,1) - \mu_C.1 + \mu_C.0 = 1-\mu_C$

Proposition

Let V_C (i,j ; S) ≡ $\Delta\Psi_C$(i/j, S), i,j ϵ{0,1} and S ϵ {Σ+, Σ-}.

If S = Σ+ then the value function V_C (., S), defined on the lattice L = {(1,1), (0,0), (1,0), (0,1)} is *submodular* and investment decisions in inertial flexibility θ_S and proactive flexibility θ_R are *strategic substitutes*.

If S = Σ- then the value function V_C (., S), is *supermodular* and investment decisions in inertial flexibility θ_S and proactive flexibility θR are *strategic complements*.

Manager Moves First, Γo ≥ 0

CEO

		1	0
MANAGER	1	$-\mu_M, -\mu_C$	$-\mu_M, 0$
	0	$-1, 1-\mu_C$	0, 0

Table 3.1 Payoffs to Flexibility Investment under Positive Resource Specificity

Manager Moves First, $\Gamma o \leq 0$

CEO

MANAGER

	1	0
1	$-1 - \mu_M, 1 - \mu_C$	$- \mu_M, 0$
0	$0, - \mu_C$	0, 0

Table 3.2 Payoffs to Flexibility Investment under Negative Resource Speciificity

CEO Moves First, $\Gamma o \geq 0$

		CEO	
		1	0
MANAGER	1	$1-\mu_M, -1-\mu_C$	$-\mu_M, 0$
	0	$0, -\mu_C$	0, 0

Table 3.3 Payoffs to Flexibility Investment under Positive Resource Specificity

CEO Moves First, $\Gamma o \leq 0$

		CEO	
		1	0
MANAGER	1	$-\mu_M, \; -\mu_C$	$1 - \mu_M, \; -1$
	0	$0, -\mu_C$	0, 0

Table 3.4 Payoffs to Flexibility Investment under Negative Resource Specificity

SEQUENTIAL INVESTMENT FORWARD-LOOKING COASIAN BARGAINING

- Coasian Bargaining between CEO and Manager for Distribution of the Surplus

- Endogenous Threat Points: Solution to Bounded Rationality Model serves as Disagreement Game

Extensions

– Flexibility coordination between units F and G

– Repeated games with reputational considerations

– Payoffs with trade-offs between costs and benefits of flexibility (adaptation vs productivity)

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