Game Theory for Strategic Advantage

15.025

Alessandro Bonatti
MIT Sloan
Today’s Learning Goals

1. How to manage long-run relationships

2. What makes a good reputation sustainable?

3. The economics of relational contracts
Toyota & Johnson Controls Inc

• Why isn’t Toyota vertically integrating the design and production of its car seats?

• What protects the small suppliers from Toyota’s bargaining power, in the absence of a written contract? How can the parties trust each other?

• If demand is strong, and the need for a second assembly line comes up, should Toyota give the business of both assembly lines to JCI?
The Problem

- Car seats are a non-trivial part of the car.
- Toyota has the internal know-how to design them.
- Toyota can develop expertise in producing them.
- Why isn’t Toyota vertically integrating that part of its business?

- What are the pros and cons of the way using outside suppliers relative to vertical integration?
Outsourcing?

Pros
• High-powered incentives
• Suppliers can exploit economies of scope

Cons
• Transaction costs
• Required negotiations ➔ lower flexibility
• Hold-up: renegotiation risk after highly specific investments
Managing Suppliers

• Toyota has many subcontractors (no one is key)
• Each subcontractor depends on Toyota’s orders
• Standard Toyota practices: double-sourcing, low prices, incentives for cost reduction
• Toyota demands flexibility (!)
• (Very few explicit contracts and formal guarantees)
  • Why does this work?
Reputation

- Reputation for treating subcontractors (harshly, but) fairly
- Good knowledge about suppliers’ costs
- Anticipate production / design problems
- JC’s holdup mitigated by
  - Relative stakes
  - Double-sourcing
- What about Toyota’s holdup risk?
Necessary Condition

reward – punishment > temptation
Basic Model: Trust Game

Supplier

Trust

Not

Toyota

Honor

Hold-up

(B,C)

(A,B)

(C,A)
Reputation for Fairness

• Use repeated interaction
• Supplier’s strategy: trust Toyota as long as you have not been held-up in the past
  – NPV of Honor = B today & forever \(=B+B/r\)
  – NPV of Hold-up = A today & C forever \(=A+C/r\)
• If \(A-B < (B-C)/r\), then Toyota wants to Honor

• Toyota wants to preserve its *reputation for fairness*
• Where does reputation come from?
“We are what we repeatedly do. Excellence, then, is not an act, but a habit.”

Aristotle, *Nichomachean Ethics*
Toyota & Suppliers

• Established a reputation for fairness – How?

• Annual price reviews to adjust for input cost changes
• Toyota may hold all the bargaining power, but...

• Toyota organized the Blue-Grass Automotive Manufacturers’ Association, with 20 select suppliers as members, to provide training and consulting
• Toyota promotes open communication between its subcontractors
Group Punishment

Defection payoff

Cooperation payoff = C

Individual punishment payoff = P

Group punishment payoff = P

time
Game with Suppliers’ Association

Supplier

Toyota

Trust

Not

Hold-up

Honor

(A,B)

(B,C)

(C,x)

x < B ?

A vs. this supplier

C vs. everyone else
Johnson Controls, Inc. – Automotive Systems Group
The Georgetown, Kentucky Plants

• 1991: Toyota prepares to produce new Camry
• Due to start in March 1992
• New rear seats for wagon version (77 varieties!)
• JCI asked to make prototype seats
• Feb. 1992: no purchase order, no formal assurance
  JCI will get the actual contract
• Major production-line reorganization required
• Go ahead?
Johnson Controls, Inc. – Automotive Systems Group
The Georgetown, Kentucky Plants

• Toyota prepares to produce new Camry in 1992
• New rear seats for wagon version (77 varieties!)
• JCI asked to make prototype seats
• Feb. 1992: no purchase order, no formal assurance JCI will get the actual contract
• Major production-line reorganization required

• This is an opportunity for Toyota to confirm itself!
Aftermath

• Soon after the case ends, a significant decision was looming for Toyota.
• TMM decided to add a second production line to the Georgetown plant.
• (This was to produce Avalons, not the station wagons.)
• Toyota’s policy: double-sourcing all major subassembly categories.

• If Toyota adhered to that policy, JC would NOT get the contract for this second line.
Key Decision

• But JC wanted the business!
  – JC is a model Toyota subcontractor.
  – Toyota should make an exception for them.
  – Moreover, Toyota would find no one in the US who could do the job nearly as well.

• *Should Toyota give the business of the second assembly line to JC?*
Growing Relationships?

Defection payoff = D

Cooperation payoff = C

Punishment payoff = P

Cooperation easier in growing relationships
Permanent Shocks

Defection payoff = D

Cooperation payoff = C

Punishment payoff = P

Know when to quit (but also when to start)
Transitory Fluctuations

$\text{Defection payoff = D}$

$\text{Cooperation payoff = C}$

$\text{Punishment payoff = P}$

Greatest threat at extreme temptation

$\Rightarrow$ Lower $E[\text{NPV}]$ of cooperation
Summarizing Toyota-JCI

- Relational contract allows **Toyota** to maintain both flexibility and high-powered incentives.

- Hidden costs of relational contracting:
  1. **Toyota must remain knowledgeable** about suppliers’ margins.
  2. **Constraints on flexibility:** clarity needed to preserve its *reputation for toughness* → hard for Toyota to make exceptions.
Takeaways

Relational contracts require:

1. Common understanding of what’s fair
2. Violations must be detectable
3. Punishments need to be strong and credible
15.025 Game Theory for Strategic Advantage
Spring 2015

For information about citing these materials or our Terms of Use, visit: http://ocw.mit.edu/terms.