

Contract Check-List

- When designing a contract, keep in mind:
 - Who are the parties?
 - What are their objectives?
 - What constraints are they facing?
 - Who knows/observe what
 - Who is bearing the risk of the transaction?
 - What is the cost of failure?

Lesson 3

Organizing Production with Contracts

The Poultry Processing Industry

- Approximately 90% of trade in the poultry industry is organized via contracts.
 - Why? Design attributes!
 - Tyson Food (USA) was the leading innovator in contractual organization (since late 1990's)
 - Nowadays almost all poultry processors use contracts

What we will learn from this example

- New technology may need new form of coordination
 - Designing an efficient contract is as important as choosing a leading technology
- Contracts can be used to manage complex problems
 - Simultaneity
 - Moral hazard
 - Risk sharing

A New Technology

- In 1990's a new technology emerged in poultry processing with HUGE economies of scale.
 - Very large processing plants are possible, driving average cost of production down
- Such plants are expensive and need input supply that is:
 - High volume
 - Steady supply
 - 'Standard' supply (poultry size and weight)

The Problem

- Chicken and broilers are costly to transport
 - Supply must be ‘reasonably’ local
- In order to buy the new plant the processor needed a large and reliable local production.
- A large and reliable local production makes sense *only if* there is a large processing plant on site.
 - *A typical simultaneity problem*

What Are the Farmers' Major Concerns?

- Building the poultry-house was perceived as a 'non-negligible' risk. A large share of personal wealth is required to finance the investment.
- Bankruptcy
 - What if the plant will not open?
 - What if I cannot cover production costs?
 - What if I cannot recover the large capital investment?
- Risk and production volatility
 - Too many factors beyond control
 - How can I manage risk?

The Farmers' Point of View

- Would you invest a sizable amount of money on the promise that the processor will open a processing plant?
- Consider:
 - Is the processor's commitment credible?
 - The hold-up problem

The Hold-Up Problem

- Consider a specific asset (say a large poultry housing facility)
 - A ‘specific asset’ is an asset whose value is much greater in a given use than in the next-best alternative (if the transaction fails, the investor loses a large share of the investment)
- The investor might be forced to accept an *ex-post* worsening in the contract condition

The Hold-Up Problem

- Assume that a farmer invests €200,000 in a poultry-housing facility. The salvage value of the housing is €50,000.
- If the transaction with the poultry processor fails (for whatever reason) the farmer loses €150,000.
- Assume that the counterpart can renegotiate the terms of the contract with a loss for the farmer of €80,000. What can the farmer do?

The Processor's Point of View

- In order to solve the synchronization problem, the processor must offer a credible commitment to:
 - Open the facility
 - Do not renegotiate the contract

What is a Credible Commitment?

- Can we believe someone's word?
 - Repeated vs. one-shot games
- A commitment is credible if:
 - Honoring the commitment is profitable
 - Deviating (renegotiating) is impossible or implies non-negligible profit loss: $\pi_D < \pi_H$
- A commitment is credible if it is in the subject's best interest to honor it

How to Solve the Simultaneity Problem?

- The Processor must offer a credible commitment
 - The processing plant is a specific asset
 - If the plant is built, the processor will need input
- Ask farmer to build the housing after the construction of the processing plant has begun
 - Need to offer farmers a ‘good deal’

How to Solve the Hold-Up Problem

- Credible commitment:
 - The processor must lose money if the contract is renegotiated (if the contract terms are worsened ‘too much’)
- Reduce the asset specificity
 - Buyback (not the case)
 - Co-financing: the processor gives guarantee for part of the mortgage. If contracts are renegotiated and the farmer cannot pay the mortgage, the processor will lose money.
- The processor has a clear interest in NOT driving farmers to bankruptcy.

Standardization

- Need for a standardized product
 - Processing
 - Consumer demand
- Processors needs that the farmers delivers animals of the 'agreed upon' size and weight
 - Feed control
 - Genetic control

Processor's Problem

- Make sure that the right size and weight are delivered
- Transaction failure is costly.
 - Denial of delivery of out-of-standard product is costly
 - Assembly line stops
 - Delivery to supermarkets fails
 - Large inventory is required
 - Potential for litigation

Solving the Standardization Problem

- Farmers must achieve higher profits when they deliver the agreed quality than otherwise.
 - Self-enforcing contract: it is in the farmer's best interest to fulfill the obligation
- Critical issues
 - Input use (genetics, feedstuff)
 - Poultryhouse management (heating, antibiotics, etc.)

Input Use

- Farmers might use lower quality input or sub-optimal feeding strategies.
 - Delivery denial is costly
 - Processor's cost is large if low quality input are used
- Penalty (price-reduction)
 - Unobservable random effects
- Production contract
 - Input are supplied by processor

Poultry-House Management

- A typical Moral Hazard problem. Low quality may depend on:
 - Unobservable random variables (chill, diseases, etc.)
 - Unobservable shirking
 - Need to disentangle the two effects
- An efficient incentive system punishes shirking and insures against random shocks
 - The processor is less risk adverse than the farmer

Poultry-House Management

- Solution concept:
 - Random events are systemic (affect many farmers)
 - Shirking is an individual behavior
- Solution: **Relative Compensation**
 1. Set a performance indicator (PI)
 2. Rank farmers according the PI
 3. The best farmer obtains the highest price, the second best a lower price and so on.
- Compensation (price per pound) depends on the ranking, not on the absolute value of the PI

An Example of Relative Compensation

- $PI = \alpha - \beta \times DR - (1 - \beta) \times \Sigma(w_i - TW)^2$
 - α : base
 - DR: death rate of animals
 - w_i : actual weight of animal i
 - TW: target weight
 - β : weight
- Price = X / Rank
 - X : base price (best price)
 - Rank

An Example of Relative Compensation

- Assume that a sudden drop in temperature increases the death rate of animals (PI↓)
- PI decreases for all farmers
 $dPI/dDR = \beta$
- The rank changes only if farmers react to the temperature drop with different efficiency
 - f.e. they fail to adjust the heating

Relative Compensation

- Ensure farmers against systemic shocks
 - Farmers might be more keen to enter the contract
- Leave farmers fully responsible for their action
 - Incentive compatible
 - Self-enforcing

Lessons from Production Contracts

- New technology may require new organization solutions.
 - The new slaughterhouses could not be built if the spot market was the only coordination device
- Coordination requires a good understanding of agents' incentives
 - The processor designed a contract taking care of farmers' concerns
- Self-enforcing contracts
 - Farmers maximize profits when they act according the processor's instructions.
 - Farmers want to maximize effort.