

The Hold-Up Problem

At a Theater Near You

Economic Principles of Managerial Decisions

Lessons from Last Time

- Price discrimination is a common tool to enhance profits in settings where firms have market power.
- Price discrimination can be direct or indirect:
 - Firms directly price discriminate by varying the price of the same good based on observable customer characteristics, such as student status or age.
 - Firms indirectly price discriminate by creating multiple products, each targeted at a distinct market segment.
 - When engaging in indirect price discrimination, self-competition effects must be considered.
- Optimal pricing calculations are, in general, difficult.

Mine-Mouth Plants

- *Mine-mouth* plants are coal-fired power plants that sit very near the mouth of a coal mine.
 - Mine-mouth sitings minimize transportation costs;
 - The plant can also be optimized for the coal from that mine.
- Such plants almost always own the associated mine. Why?
- What price will the mine charge for its coal?
 - The marginal value to the plant!
- But then the plant will never recoup its site-specific investments!
 - To stop this behavior, the plant often simply buys the mine.

The Hold-Up Problem

- The hold-up problem occurs when:
 - ① Some party to a transaction must make a non-contractible relationship-specific investment.
 - ② The optimal transaction can not be determined until investment is made.
- Condition 1 implies that some agent must make an investment before contracting with others.
- Condition 2 implies that contracting occurs only after a relationship-specific investment is made.
 - The investment is “sunk”—other parties may hold up the initial investor, only paying his *ex post* marginal costs.

Examples of Hold-Up Problems

- Assemblers who need specific parts:
 - A maker of a specific part could “hold up” the assembler and ask for a higher price after the assembler builds his plant.
- Workers who invest in firm-specific skills:
 - Such skills will not improve the worker’s wages, since they do not improve the worker’s outside option.
- “Software as a Service”: Large IT investments (such as HRM software) typically require continuing updates to be useful:
 - Software providers could hold up users by charging high prices for services.

Bargaining over Bulldozers

- You are the head of the heavy construction equipment division of Yutani Corporation.
- You must first choose the level of research r ; the more research done, the lower your production costs.
- Weyland Corporation will then state (having observed your investment) a take-it-or-leave-it price p at which they will buy your bulldozers.
- You will then choose your production level Q .

Solving for Production

- As usual, we solve the game backwards.
- In the last period, we solve for the quantity to produce given the price set by Weyland and our level of research r :

$$\max \left\{ pQ - \frac{Q^2}{2r} \right\}.$$

- Hence, the optimal production $Q = pr$.

Solving for Weyland's Price

- Given our production will be $Q = pr$, we can solve Weyland's problem.
- Weyland will choose the price p to maximize

$$\max \{(8 - p)pr\}.$$

- This implies Weyland will choose a price of $p = 4$.

Solving for Investment

- Finally, we solve for our first-period investment.
- Our profits are given by

$$pQ - \frac{Q^2}{2r} - r^2.$$

- Substituting in our quantity and Weyland's price, our problem becomes

$$\max \{8r - r^2\}$$

- This implies that $r = 4$, $Q = 16$, and our profit is 16.
 - Weyland's profit is $(8 - 4) \times 16 = 64$.

Contracting Early

- Was this outcome efficient?
 - No! Not only did Yutani produce too few bulldozers but Yutani invested too little in research.
- What if Weyland can commit to a price before Yutani invests?
- In that case, Yutani solves

$$\max \left\{ pQ - \frac{Q^2}{2r} - r^2 \right\}$$

- So we have that $Q = \frac{p^3}{4}$ and $r = \frac{p^2}{4}$.
- This induces Weyland to choose $p = 6$, leading to profits of 108 for Weyland and 81 for Yutani!
 - Eliminating the hold-up problem increased profits for both firms!

Merging the Firms

- Suppose that Weyland and Yutani merged to form Weyland-Yutani Corporation.
- Consider the joint profits of Yutani and Weyland:

$$(8 - p)Q + pQ - \frac{Q^2}{2r} - r^2 = 8Q - \frac{Q^2}{2r} - r^2$$

- If we optimize joint profits, the optimal $Q = 128$ and the optimal $r = 16$.
- Total profits are $256 \gg 16 + 64!$
 - By merging, the firms eliminate both the hold-up problem and the monopsonization problem.

What to Do about Hold-Up

- *Ex ante* contracting: One can write contracts before investment is performed, which specify investment, quantities, transfers and more.
 - Such contracts are difficult to write: the investment outcome or desired quantity may be uncertain, and verifying investment may be difficult.
- Merge: By merging the joint firm takes into account the costs and benefits of investment (and production) for both divisions.
 - But mergers may introduce other inefficiencies: one division is now the agent to the other's principal!
- Reputation: A firm may wish to acquire a reputation for "fair dealing" and so not hold up suppliers after they make asset-specific investments.

A Theater Near You

- Are movie exhibitors doing well? Why or why not?
- What can the movie exhibitors do to reduce the hold-up problem they face?
- Why are movie exhibitors reducing screen size and building multiplexes?

Returns to Showing Movies

- What is the ROA in the movie exhibitor business, on average?
 - $\approx 1.3\%$ —not so great.
- Why are returns so poor?
 - Due to increasing foreign revenues, cable revenues, and at-home rental revenues, movie studios no longer need movie theaters as much.
 - The movie theaters increasingly are held-up by the studios; they need the studios, but the studios do not need them.
- Is the hold-up problem getting better or worse?

Holding Up the Theaters

- How can we solve the hold-up problem here?
- Vertical integration—likely to be difficult due to antitrust history.
- Long term contracts—writing contracts is difficult in this setting:
 - Studios can produce high- or low-quality films, and who determines film quality?
 - Studios can change focus to foreign and rental audiences.
 - Exhibitors can create high- or low-quality viewing experiences.
 - Exhibitors can change prices for extras such as popcorn.
- Reputation may be our best bet.

What Can Theaters Do?

- Multiplexing:
 - Multiplexing discourages building nearby theaters, since multiplexes compete on every film.
 - These barriers to entry mean that the theater can negotiate with some monopsony power.
- Smaller screens (more generally, lower quality facilities):
 - The less asset-specific investment that is made, the less theaters can be held-up.
- Horizontal mergers:
 - May increase bargaining power, but may invite antitrust scrutiny.

Industry Outcomes

- Movie theater chains have engaged in massive consolidation to improve their bargaining power:
 - In 1994, the top 4 chains had < 25% of the market; today, they have over 50%.
- Multiplexing is now the standard.
 - And is, in general, bad for moviegoers—smaller screens, longer driving times.
- Movie theaters do not invest in the best technology.
 - For example, slow adoption of digital film.

Conclusions

- When one firm must invest in relationship-specific assets before contracting, that firm can be held-up:
 - Since the investment is sunk when bargaining occurs, recouping the investment cost is difficult.
- The hold-up problem leads to underinvestment and reduced profits for both firms.
- Solutions to the hold-up problem include vertical integration, early contracting, and building trust through repeated interaction.