

The hold-up problem¹

1 Setting

- One buyer.
- One seller.
- They can trade an item at price P .
- The payoffs depend on characteristics that are unknown and can be obtained by making an investment. Formally, if the seller invests e^S , his cost of production is c_L with probability e^S and c_H with probability $1 - e^S$. If the buyer invests e^B , his willingness to pay is v_H with probability e^B and v_L with probability $1 - e^B$.
- If trade occurs, the buyer gets $v - P - \psi(e^B)$ where $\psi(\cdot)$ represents the cost of his investment.
- If trade occurs, the seller gets $P - c - \phi(e^S)$ where $\phi(\cdot)$ represents the cost of his investment.
- Suppose $c_H > v_H > c_L > v_L$

2 Efficiency

- Trade is efficient only when $v = v_H$ and $c = c_L$.
- The efficient levels of efforts are therefore solving $\max e^B e^S [v_H - c_L] - \psi(e^B) - \phi(e^S)$:

$$e^S [v_H - c_L] = \psi'(e^B)$$

$$e^B [v_H - c_L] = \phi'(e^S)$$

Differentiating (and assuming $\phi'''(\cdot) > 0$ and $\psi'''(\cdot) > 0$), we can show that the reaction functions are increasing and concave.

3 Hold up problem

- Suppose agents cannot contract on v , c and investment levels. Suppose also gains are equally divided ex post. Then, the seller maximizes $e^B e^S 0.5 [v_H - c_L] - \phi(e^S)$ and the buyer maximizes $e^B e^S 0.5 [v_H - c_L] - \psi(e^S)$. The optimal efforts are such that

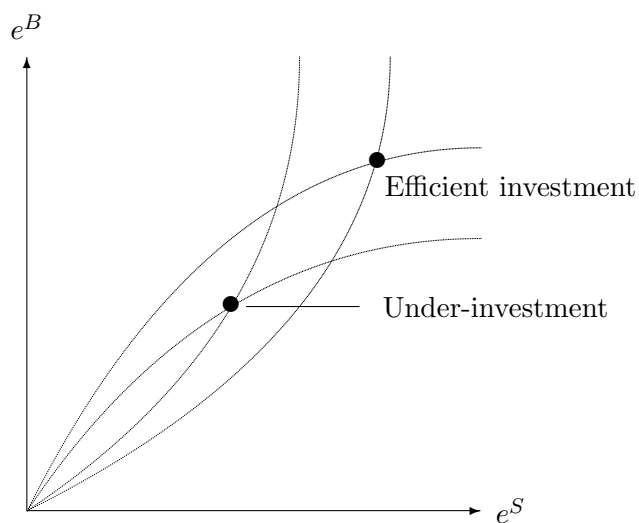
$$e^S 0.5 [v_H - c_L] = \psi'(e^B)$$

$$e^B 0.5 [v_H - c_L] = \phi'(e^S)$$

- There is under-investment.

¹This document is intended to provide only a few take-home messages. It is not a substitute for attending class and taking notes.

- How to solve the problem? depends on what exactly is contractible, what type of renegotiation can take place...



- Efficiency is obtained by cooperation, but firms cannot reach this outcome. If they agree to divide gains equally ex-post, then it is not optimal for any of them to select the efficient level of effort: each deviates to increase its own profit.
- Suppose they agree to cooperate after one of the party sinks his own investment. This party may refuse the agreement because the other party has incentives to renegotiate ex-post to increase its profit (given the first party is already indebted).
- One way to avoid the hold-up problem to merge.