15.356
Trading and revealing information

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Agenda

1. Why people freely reveal their innovations to manufacturers – and other users
2. Informal information *trading*
Know-How Trading Patterns Among Steel Minimills

For more information on this study and its results, see:

Steel minimills are far from mini in size and effect!

For more information, see:

Firms can increase the **amount** of information they possess by trading:

<table>
<thead>
<tr>
<th>Situation</th>
<th>Pre-Trade</th>
<th>Situation</th>
<th>Post-Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm A</td>
<td>Unit A</td>
<td>Unit B</td>
<td>+ Unit A</td>
</tr>
<tr>
<td>Firm B</td>
<td>Unit B</td>
<td>Unit A</td>
<td>+ Unit B</td>
</tr>
</tbody>
</table>
Information trading can pay under SOME conditions

Consider the Total Profit (also sometimes called "rent") that a proprietary "unit" of know-how yields to a firm exclusively possessing it as made up of two parts:

$$\text{Total Profit} = \text{Profit} + \Delta \text{Profit}$$

**Profit** = the portion of Total Profit which a firm expects after trading the unit of knowhow to another firm. (Both firms then possess the traded knowhow.)

$$\Delta \text{Profit}$$ is the extra Profit which a firm expects if it possesses the knowhow unit exclusively.

Example: ASSUME TWO FIRMS START WITH KNOW-HOW UNITS OF DIFFERENT CONTENT BUT EQUAL VALUE:

Before trade each firm has: $$\text{Total Profit} = \text{Profit} + \Delta \text{Profit}$$

After trade each firm has: $$\text{Total Profit} = 2 \text{ (Profit)}$$

Therefore trading pays only when $$\text{Profit} > \Delta \text{Profit}$$
KNOW-HOW TRADING AS A “PRISONER'S DILEMMA”

Assume as before that two firms have one unit of unique proprietary know-how each. Assume also that each firm's unit, although different, has an identical Profit and ∆Profit associated with it.

Then, pre trade, each firm has: Total Profit = Profit + ∆Profit.
After a cooperative trade, R, each firm has: R = 2 Profit

All four possible outcomes of a single play of this game are:

- T = 2 Profit + ∆Profit
- P = Profit + ∆Profit
- R = 2 Profit
- S = Profit.

A Prisoner's Dilemma exists if T > R > P > S and 2R > T+S (A strategy of continuing cooperation has been shown empirically to pay best over many plays of a Prisoner's Dilemma game.)

Therefore, know-how trading pays
(conditions for a Prisoner's Dilemma are met)
if Profit > ∆Profit but not if Profit < ∆Profit
FIRMS THAT DO TRADE HAVE AN ADVANTAGE OVER NON-TRADERS

Assume firms A and B trade $ research results with low competitive value but that Firm C does not trade

<table>
<thead>
<tr>
<th>Firm</th>
<th>Situation Pre-Trade</th>
<th>Situation Post-Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm A</td>
<td>low unit + high unit</td>
<td>low + low + high</td>
</tr>
<tr>
<td>Firm B</td>
<td>low unit + high unit</td>
<td>low + low + high</td>
</tr>
<tr>
<td>Firm C (non-trader)</td>
<td>low unit + high unit</td>
<td>low + high</td>
</tr>
</tbody>
</table>
Information trading examples

(1) Oil Geologists trade easily reproducible know-how;
    Profit > Δ Profit

    Unless it involves an upcoming oil leasing competition;
    Profit < Δ Profit

(2) Aerospace engineers trade easily reproducible know-how;
    Profit > Δ Profit

    Unless it bears on a competition for an important contract;
    Profit < Δ Profit
How Frequent is Know-how Trading?

Minimill Personnel Sample:

The results of this study can be found in:

Oil Scouts Trade "Black Box" Information Only

<table>
<thead>
<tr>
<th>Firm A</th>
<th>Type of Information</th>
<th>Firm B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geologist</td>
<td>Data Analysis</td>
<td>Geologist</td>
</tr>
<tr>
<td></td>
<td>Know-how</td>
<td></td>
</tr>
<tr>
<td>Scout</td>
<td>Oil Well Logs</td>
<td>Scout</td>
</tr>
<tr>
<td></td>
<td>Oil Well Cores</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seismic Data</td>
<td></td>
</tr>
</tbody>
</table>

When Scouts can be used, Oil Companies tend to force their use. Hypothesized advantages:

- Specialists have better networks, are better traders;
- Collects IOU's in one place, minimizing # outstanding, and time they are outstanding.
Some Rules of Oil Scout Behavior
(As per Scouting Association codes of ethics)

- "A scout must represent only one company...".

- "The information a scout obtains should be invariably first transmitted to the employer."

- "A member may not dispose of information without the consent of the employer."

- "Scouts should never knowingly dispense information of an untrue or doubtful character".

Source: 1988 Houston Oil Scouts Association Code of Ethics