Corporate Culture

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Prescott & Visscher Organization Capital

Organization capital

Prescott & Visscher 1980 develop an interesting model of the firm as a depository of knowledge.
Methodological interest, but also applied interest. They try to explain the following phenomena:

- there seems to be in most industries constant returns to scale:
  - firms of different sizes coexist;
  - there is no correlation between the size of firms and their profitability.
- costs of adjustments are independent from the size of the firm, as witnessed by the fact that their rate of growth seems to be independent of their size (Gibrat's law).

Main methodological point

- Prescott & Vissher try to explain these facts by assuming that the firm owns a certain amount of information.
- This information is a part of its capital stock,
- but cannot be bought . . .
- only produced while producing output.
- If the firm grows too fast, it does not accumulates enough information capital, and costs are high.

Model

We concentrate on the model where information capital is information on the employees.

- There are different kinds types of tasks that need to be done.
- Employees have different comparative advantages in these tasks.
- One can only learn about this comparative advantage through observation

More precisely

- there are three types of jobs to be done:
  - job 1, where productivity does not depend on type θ of agent, but where the type of the agent can be learned;
  - job 2, in which the employees with a low θ are more efficient;
  - job 3, in which the employees with a high θ are more efficient.
- In order to produce q units of output, the firm needs
  - $\phi_1 q$ employees in job 1;
  - ϕq employees in each of job 2 and 3.

Cost of production

The total cost of production is

$$C(q) = cq + \bar{\theta}_2 q - \bar{\theta}_3 q,$$

where $\bar{\theta}_i$ is the average θ of the employees in job i.
The technology has constant returns to scale.

Career paths

Employees spend n periods in job 1 and then are promoted to job 2 or 3.

- Each period when employees work in job 1, the firm a signal equal to $\theta + \varepsilon$,
  - where ε normally distributed with mean 0, and independent from each other and from θ.

$\Longrightarrow$ promote to job 2 the employees with negative mean of observations, to job 3 those with positive mean (we assume continuum of employees).

Steady state growth

- Let

$$\zeta = \frac{1}{\text{rate of growth}} < 1,$$

- and y_t the number of employees who are in their t^{th} period within the firm:

$$y_t = \zeta^{t-1} y_1.$$

- The proportion of employees who are in job 2 or 3 is

$$\frac{y_{n+1} + \cdots + y_t + \dots}{y_1 + \cdots + y_n + \dots} = \frac{\zeta^n + \cdots + \zeta^t + \dots}{1 + \cdots + \zeta^{n-1} + \dots} = \zeta^n.$$

$\Longrightarrow$ $\zeta^n = \dfrac{2\phi}{2\phi + \phi_1}.$

Rate of growth and cost

$$\zeta^n = \frac{2\phi}{2\phi + \phi_1}$$

- If $n \nearrow$, then $\zeta \nearrow$ and the rate of growth $\searrow$. The firm must sacrifice the quality of its information to increase its growth rate.
- The unit cost is

$$c - \frac{.8}{\pi} + \frac{.8}{\pi + n}.$$

$\Longrightarrow$ Cost decreases when n increases, therefore the cost increases when the rate of growth increases.

Lessons

- rapid growth has a cost;
- similarly, rapid changes in types of products or environments would have costs;
- there is some value in having stable employees.
- it would be interesting to extend this to a theory of decrease in the size of a firm (for declining industries).

Rest of paper

- equilibrium model;
- other interpretations;
- empirical consequences.

Crémer
On going organizations

On going organizations

Crémer (*Quarterly Journal of Economics*, 1986)

- Received theory: cooperation is feasible
  - with credible threats;
  - in infinitely repeated games.
- paper shows that it is sufficient for the organization to have an infinite life.

An example

- Organization has 30 employees
- Their utility is represented by the following table:

Util. of agents	Number of workers who work hard		
	≤ 18	19	≥ 20
cooperate	0	0.4	0.8
don't cooperate	0.5	0.9	1.3

- In static model, it is a dominant strategy not to cooperate.

Cooperation with overlapping generations: hypotheses

- Firm has an infinite life,
- the identity of agents change every year, with a young one entering and an old one exiting.

$\Longrightarrow$ Every year there is one agent who is in his/her t^{th} in the firm, for $t = 1, \ldots, 30$.

- For the time being, we assume zero discount rate.

Cooperation with overlapping generations: Strategies

- The 20 youngest employees cooperate; the 10 oldest do not.
- If in any period a ‘young agent’ does not cooperate, no more cooperation ever.

Why an equilibrium?

Util. of agents	Number of workers who work hard		
	≤ 18	19	≥ 20
cooperate	0	0.4	0.8
don’t cooperate	0.5	0.9	1.3

- Any agent who deviates looses.

Cooperation with positive discount rate

Util. of agents	Number of workers who work hard		
	≤ 18	19	≥ 20
cooperate	0	0.4	0.8
don’t cooperate	0.5	0.9	1.3

- Efficiency requires that the 10 youngest do not cooperate, and that the 20 oldest do.
- Not feasible at equilibrium, as the oldest one cannot be given incentives to cooperate.
- We can get the 9 youngest ones and the oldest one not to cooperate and all the others to cooperate if the 29$^{\text{th}}$ cooperate. He gains .1 util this period if he deviates, and looses .8 next period. We must therefore have

$$.1 \leq \delta \times .8 \iff r \geq 1/8.$$

Model with variable effort: assumptions

- n agents
- utility of agent i is

$$f\left(\sum_{j=1}^{n} x_j\right) - \alpha(x_i),$$

  with

$$f(y) - \alpha(0) > f(y + x) - \alpha(x).$$

- discount rate = 0.

Model with variable effort: results

- In any case, we will never succeed in convincing the oldest agent to cooperate.
- Let

$$y^{n-1} = \operatorname*{argmax}_{y} nf((n-1)y) - (n-1)\alpha(y),$$

  it is the optimal level of effort in $n-1$ agents cooperate.
- One can obtain the profile $(y^{n-1}, \ldots, y^{n-1}, 0)$ if

$$f((n-1)y^{n-1}) - \alpha(y^{n-1}) \geq 0.$$

Extensions

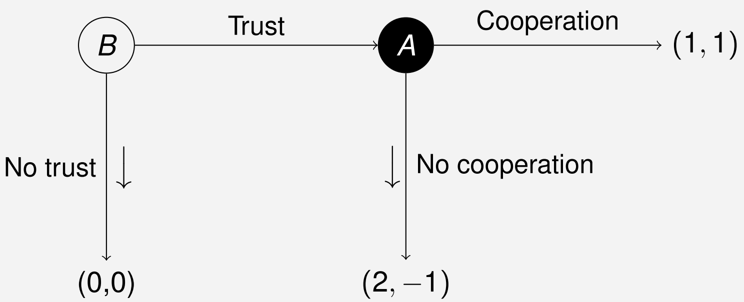
- Theory: folk theorem.
- Cooperation in games: infinite horizon and finite horizon.

Kreps
Market value of culture

Market value of corporate culture

Kreps (1986) asks himself the question: why is it that something as immaterial than corporate culture can have a market value? He answers by showing that the fact for a firm to be trustworthy, i.e. to respect its implicit promises, gives it a “good reputation”. Any new owner has incentives to maintain this good reputation in order to preserve the market value of the firm.

The game



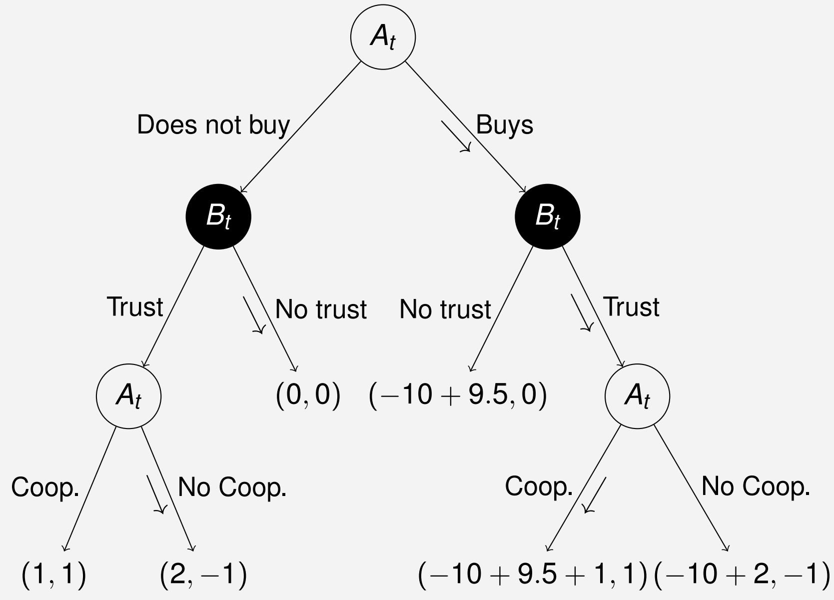
Reputation building

- From standard repeated game theory: if game played an infinite amount of time between the firm and the client, and discount rate low enough cooperation can occur.
- Kreps shows something stronger: even if the client and the owner of the firm are different at each period, there can be cooperation.

- An infinite sequence of owners of the firm, A_1, A_2, . . . , A_t, . . . ;
- an infinite sequence of clients, B_1, B_2, . . ., B_t, ...
- The first owner of the firm, A_1, creates the firm, which we will call A.
- In each period, after “playing” with B_{t-1}, A_{t-1} sells the firm to A_t.

- We are looking for an equilibrium in which the monetary value of the reputation of the firm is equal to 10
- Game in each period:
  1. A_t decides whether or not to purchase the firm from owner A_{t-1}.
  2. the consumer decides to trust or not to trust the firm
  3. the firm decides whether or not to cooperate.

⟹ We get (discount rate = 5%):



- The model capture roles of info (prices of restaurants or medical practices).
- Does not really explain why some reputations are created. Agent A_2 would be better off refusing to buy the firm from A_1 and creating new firm.
- Tadelis has built on Kreps' model and presented an analysis where the fact that reputation has value is less arbitrary
  - some agents are better at running a firm than others.
  - In each period, some owners are forced to abandon the firm; consumers cannot observe the identity of the owner.
  - ⇒ A poor quality owner has no incentives to firm with a good reputation, as he will ruin this reputation and loose his investment.

Tadelis: What is in a name?

In a 1999 *AER* paper, Steve Tadelis asks himself the question: can we give more weight to the monetary value of reputation in Kreps model, by having it be based on real elements?
The theory is built on an adverse selection model, rather than on moral hazard.

Firms provide a service, which is either successful or not. This result is not observable to agents.
In a one period model, the revenue of the firm would be

$$\gamma[P_G \times 1 + (1 - P_G) \times 0] + \beta \times 0,$$

where

- γ is the proportion of "high quality" owners;
- $\beta = 1 - \gamma$ the proportion of "low quality" owners;
- P_G the probability that a high quality firm yields a successful outcome;
- 0 the probability that a low quality firm yields a successful outcome.

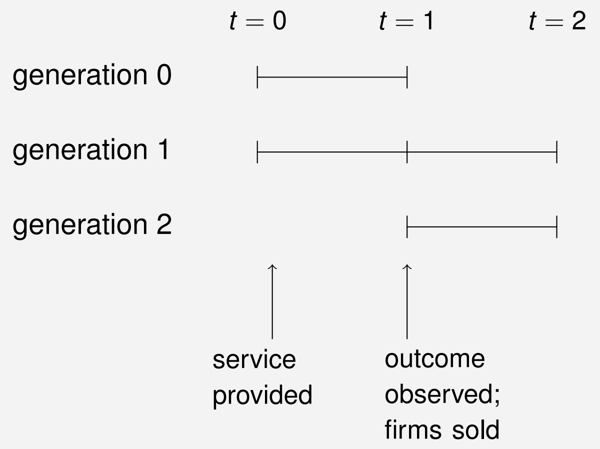
Two important points:

- The quality of the service of firm depends on the quality of its owner.
- The revenue of the firm depends on its reputation at the beginning of the period.

Rule of the market for names

1. Change of owners cannot be observed by customers;
2. At the beginning of each period firms can choose to change their names, or keep their old names;
3. $\exists$ proportion ε of firms which cannot change names.

Timing



Names will be exchanged in every equilibrium

- If no names are exchanged, a willing buyer can obtain one at a “very small” price, as generation 0 owners are always willing to sell.
- $Pr(G \mid S) = 1$ (hypothesis 3 prevents equilibria in which all firms change names after 1st period, and clients think that not changing name is bad signal) implies revenues are equal to P_G, greater than those of a new firm.
- Generation 2 agents will be willing to buy a firm.

What does an equilibrium look like?

There exist many equilibria. Tadelis describe a focal equilibrium, in which:

- A proportion P_G of good generation 2 agents buy a name (all names of successful first period firms are bought);
- Bad agents do not buy names;
- Successful generation 1 owners keep their names;
- Unsuccessful generation 1 owners change names.

Price of a good name

$$\Pr(G \mid \emptyset) = \frac{\gamma(1 - P_G)}{\gamma(1 - P_G) + \beta}$$

$$\Pr(G \mid S) = 1$$

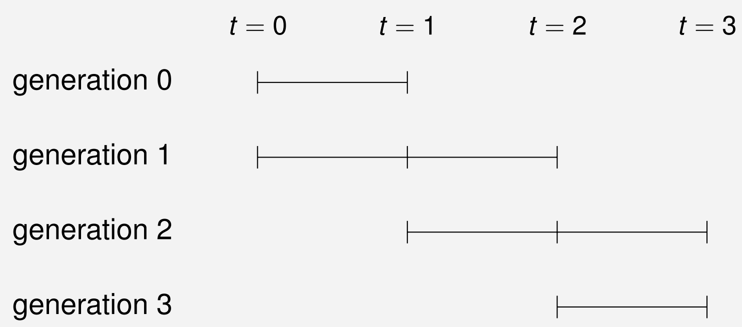
$$w(S) = P_G \qquad (w \text{ is the profit of given a signal})$$

$$w(\emptyset) = \frac{\gamma(1 - P_G)}{\gamma(1 - P_G) + \beta} P_G$$

Hence, the value of a name is

$$v(S) = w(S) - W(\emptyset) = \frac{\beta}{\gamma(1 - P_G) + \beta} P_G.$$

With three periods



There is no equilibrium in which in period 1 a) only good names are exchanged and b) they are bought only by good types.

Bad types would attach a higher value to a good name that do good types: a) they get the same revenue in period 2 and b) they are not giving up the opportunity to generate a good name from nothing.

With an infinite horizon

- Not completely solved;
- can be proved that some good names must be bought by low types.

Extension with moral hazard

In a paper in the *JPE* (2002) Tadelis expands his model to introduce moral hazard.
Quick highlights:

- Bad agents now can choose a probability of being successful, by making a costly effort;
- No change in the description of good agents;
- In the two period model,
  - no effort in second period;
  - if there were no names traded, bad agents make effort if $c'(0)$ small enough;
  - in all equilibria successful names are traded;
  - bad agents face tradeoff between building reputation and buying a name.
- In infinite horizon model, there exist no equilibrium in which a) only successful names are traded and b) they are bought only by good agents or by bad agents who intend to provide > 0 effort.

Corporate culture and coordination

Following Crémer (1993) we study the role of corporate culture as a means of coordination of different activities within the firm. Static model of communications within the firm, which stresses the importance of horizontal communications.

A definition of corporate culture

Culture is "the part of the stock of knowledge that is shared by a substantial portion of the employees of the firm, but not to the general population from which they are drawn."
Some of this knowledge will be concerned with the environment of the organization, much with its internal functioning.
More precisely, corporate culture is composed of

- a common language or coding;
- a shared knowledge of certain facts;
- a knowledge of certain established rules of behavior which I will also call "rules of action", or again "simple rules".

Communications within firms

- The firm as an information processing apparatus:
  - It receives messages from its environment, processes them and responds by a message or an action.
  - The response the result of one individual decision, of several serial decisions (*e.g.*, boss and subordinate), or concurrent decisions (committee).
- These responses are often preceded by communications within the firm, either unilateral communications or discussions, often non-hierarchical.
- Lateral communications can improve the flexibility of the firm.
- With flexible patterns of communications, employees must be able to communicate efficiently with a vast array of interlocutors.
- Changes of assignment and promotions will require the same ability.

Codes

The fact that coding helps communication is straightforward (Arrow 1974). Also

> *"Communication systems become effective when they employ a language which carry large amounts of meaning with relatively fewer symbols. Organizations find such things as blueprints, product number systems, and occupational jargons helpful in increasing the efficiency of their communication"*

Paper stresses benefits of common coding.

Shared knowledge of certain facts

> *"Every employee went through a training period. They learned about the firm, its objectives and more concretely how the product is conceived and sold (everyone spent at least eight days in a sales agency)."*

Three benefits in terms of efficiency

- Agents can predict better the reactions of the rest of the organization, and also better evaluate its capacities.
- In communications. The sender can select the information to communicate, and can also find the relevant receiver for his message.
- Allows certain things to be left unsaid.

Notice the importance of the fact that the code is common.

Knowledge of rules of actions

- Rules of social behavior: military etiquette;
- rules of internal behavior: obtain from your superior the permission to speak to his boss, return phone calls of other employees quickly . . . ;
- rules for dealings with outsiders : we only provide high quality products, there is priority to meeting customers' demands for new products (or to smooth functioning of internal operations)

These rules play in part the same role as knowledge of facts:

- predictions of what the rest of the firm will do;
- knowledge of what the receiver needs to know.

Let's build a model

Consider a team with payoff

$$\Pi(x_1, x_2; A) = A(x_1 + x_2) - \frac{B}{2}(x_1 + x_2)^2 - \frac{C}{2}(x_1 - x_2)^2.$$

(B and C are known, A is uncertain.)
Each of the two agents can observe n of a large number of random variables of the form $\eta_h = A + \zeta_h$, where the ζ_h's are *iid*, normal of mean 0.
The team chooses three subsets of H:

- H_c contains the ζ_h that both agents will observe.
- H_i, $i = 1, 2$, contains the variables that only i will observe.

Expected payoff:

$$E_{A,\tilde{\eta}_c,\tilde{\eta}_1,\tilde{\eta}_2}\left[A[x_1(\tilde{\eta}_c,\tilde{\eta}_1) + x_2(\tilde{\eta}_c,\tilde{\eta}_2)] - \frac{B}{2}[x_1(\tilde{\eta}_c,\tilde{\eta}_1) + x_2(\tilde{\eta}_c,\tilde{\eta}_1)]^2 - \frac{C}{2}[x_1(\tilde{\eta}_c,\tilde{\eta}_1) - x_2(\tilde{\eta}_c,\tilde{\eta}_1)]^2\right]$$

We solve by noticing the linearity of the decision rules and some changes of variables. Messy, but feasible.

Results

There exists $\alpha \in [0, 1]$ such that the sets H_1 and H_2 have the cardinality αn, and H_c cardinality $(1 - \alpha)n$.
The solution is obviously:

$$\begin{cases} \alpha = 1 & \text{if } B > C, \\ \alpha = 0 & \text{if } B < C. \end{cases}$$