Clubs with entrapment
by Avinash Dixit

-> Adoption of new technologies or institutions often have network effects or positive externalities. But we often hear later, less enthusiastic participants claim that they were trapped.

- European Monetary Union: (EMU) : a good exemple.

  -> main benefit of joigning is the reduction in transaction costs of trade and investment.

  -> mean benefit of staying out is the ability to conduct independent monetary and exchange rate policies to counter domestic shoks.

=> But once the project has reached a certain size, it may become more attractive to join, and too costly to stay out.

- These situations have two important features:

  -> people differ in their relative valuations of convenience and privacy.

  -> As more people use the technology, for any person the benefit of joining this club of users increases, as does the inconvenience of staying out.

I. Relation to literature

-> Theories of clubs and standars = collective action games.

↳ the key question is to find the optimum and equilibrium size of clubs.

- Joseph Farrell and Garth Saloner (1985):

They studies the question of whether an efficient new technology or standard will be adopted as an outcome of individual voluntary choice.

- W. Brian Arthur (1989):

Asks whether and how an inefficient old technology can persist as a locked-in equilibrium.

- Nicholas Economides (1996):

Looks at firms' choice or technologies or standards that are not compatible with those of other firms when each has network effects for its users.

For Dixit → the network is a voluntary association of the users t without any involvement of firms.

→ his focus is on when a new technology may get adopted even though it is worse in the aggregate or for a large proportion of the population.

→ The preferences are grounded in firmer cost-benefit calculation so welfare comparisons can be made.

II. The simplest model

N players (people, countries ...) → $i = 1, 2, \dots, N$

Two actions → IN: forming or joining a club or adopting new technology.

→ OUT: staying at or status quo for technology and standard.

If n others choose IN, the payoff to person i is:

$S(i,n)$ if i chooses OUT

$B(i,n)$ if i chooses IN making the total of IN-choosers $(n+1)$

$n = 0, 1, \dots, (N-1)$

(1) As $i \nearrow$, $S \nearrow$ and $B \searrow$ ⇒ the players are ranked by increasing order of reluctance to join.

(2) As $n \nearrow$, $S \searrow$ and $B \nearrow$ ⇒ the larger the club is the worse it is for each player to stay out.

⇒ there are network effects in both the status quo and the new club.

We will work with special exemple:

(3) $S(i,n) = \sigma i - \tau n$

(4) $B(i,n) = \beta + \gamma n - \delta i$

→ Two key assumptions generate the result that everyone joins a club which several members may continue to dislike

(5) $\beta > \delta + \sigma$

(6) $\gamma + \tau \geq \delta + \sigma$

$B(1,0) > S(1,0)$

$\rightarrow$ (6) $\Rightarrow$ the net work effect of adding a new member is at least as strong as the marginal decrease in personal enthusiasm for the club.

For $n = i-1$:

$\forall i$: (7) $B(i, i-1) - S(i, i-1) = [\beta - (\delta+\sigma)] + [(\gamma+\tau) - (\delta+\sigma)](i-1) > 0$

If $B(i,n) > S(i,n) \Rightarrow B(i,n') > S(i,n') \quad \forall n' > n$

these results are used for analysing equilibrium of the game. We consider it in two versions:

First consider a simultaneous-move game.

$\rightarrow$ For $i = 1$, IN is the dominant strategy because

(5) $\Rightarrow B(1,0) > S(1,0)$

(8) gives $B(1,n) > S(1,n) \quad \forall n = 1, 2, \ldots (N-1)$.

No we look only at those strategy profiles where 1 chooses IN.

Among them, a similar argument shows that

$B(2,n) > B(2,1) > S(2,1) > S(2,n) \quad \forall n = 2, 3, \ldots, (N-1)$.

$\Rightarrow$ The dominant strategy is IN.

• Now let's consider a game where initially everyone is OUT.

Player 1: is going to choose IN at one of his opportunities and never going to choose OUT at his last opportunities.

Player 2: observed P1 last move $\rightarrow$ he will also wants to finish the game IN.

And so on...

Both game have the same outcome and the payoffs are $B(i, N-1)$.

$\rightarrow$ if the new club never formed $\rightarrow S(i,0)$.

$\Rightarrow i^*$: smallest i for $B(i^*, N-1) < S(i^*, 0)$

$$\Rightarrow i^* = \mathrm{Int}\left[\frac{\beta + \gamma(N-1)}{\delta + \sigma}\right] + 1.$$

Integer part of x.

$w = [N - (i^*-1)]/N \rightarrow$ total number of members

$\Rightarrow \quad w = 1 - \dfrac{\beta + \gamma(N-1)}{(\delta+\sigma) N}$ $\Rightarrow$ if $< 0 \Rightarrow$ The club is unanimously pre[ferred to]
the status quo.

$\Rightarrow$ Could the gainers compensate the losers?

The aggregate payoff from not having a club at all exceeds that of the eventual outcome of the cascade where everyone joins, that is

$$(\omega) \quad \sum_{i=1}^{N} S(i,0) > \sum_{i=1}^{N} B(i, N-1) \quad \text{if} \quad \sigma \frac{N(N+1)}{2} > [\beta + \gamma(N-1)] N - \delta \frac{N(N+1)}{2}$$

$$\text{or} \quad (11) \quad \delta + \sigma > 2 \, \frac{\beta + \gamma(N-1)}{N+1}$$

For N large $\rightarrow \delta + \sigma > 2\gamma$ or $w > \frac{1}{2}$

$\Rightarrow$ The condition for a majority to lose is the same as that for the aggregation loss.

If the aggregate losses are positive, the losers could compensate the gainers if they could act collectively, and in exchange for the compensation extract a credible promise from the enthusiasts not to restart the process

$\Rightarrow$ Both these requirement seem problematic.

Yield $\rightarrow$ product°, Rdmt, recettes

$\rightarrow$ produire, rapporter, céder (we shall never yield).