Prisoners' Dilemma

Two cigarette companies each have the option of advertising on television or not. Profits are

		COMPANY 2
COMPANY 1	don't advertise	advertise
don't advertise	$(50, 50)$	$(20, 60)$
advertise	$(60, 20)$	$(27, 27)$

Note that both companies are better off if they do not advertise. But that this is not a possible equilibrium for this game, because if Company 1 does not advertise, then Company 2 will do better by advertising. The only equilibrium is where they both advertise, but then each makes a profit of only 27. This is the classic **Prisoners' Dilemma**.

In 1971 the US government and the tabacco industry reached an agreement that packages would carry a warning label and advertising on television would cease. There was a reduction of advetising expenditure from $315 million in 1970 to $252 million in 1971. It came as something of a surprise to the industry that their profits rose by $91 million.

Repeated games with discounting

The presence of a discount rate and repeated play can be enough to eliminate the inefficiency inherent in the prisoners' dilemma.

Suppose each company uses a strategy:

Don't advertise as long as the other company does not advertise. But if the other company ever starts to advertise, then advertise forever.

If both companies never advertise they will each get

$$50 + \beta 50 + \beta^2 50 + \cdots = \frac{50}{1-\beta}$$

If one company defects and advertises, even just once, then it will get

$$60 + \beta 27 + \beta^2 27 + \cdots = 60 + \frac{27\beta}{1-\beta}$$

The first of these is larger if $\beta > 10/33$. Thus with a sufficiently large discount rate it is possible for there to be an equilibrium which avoids the prisoners' dilemma.

This is of course the concept which underlies the 'social contract' or golden rule: *do unto others as you would have them do unto you.*