Discussion of “Reputation and Product Recalls”
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The Model:

- Discrete time simplification of model.

- McDonald’s Drive Through with long (countably infinite) line of customers: Each customer pays for expected number of fries, but by the time he sees how many in bag, too late to do anything about it.

- In current period, McDonalds can’t do anything to affect the number of fries customer expects. That is an equilibrium object.

- But, if number of fries, $X = 1$, probability of public signal that McD’s ripped off customer is zero. More generally, $1 - X$ is probability of public signal that customer was cheated.
The Model:

- $X$ fries cost McDonalds $\frac{X^2}{2}$, so the marginal fry costs $X$.

- Marginal benefit is that increasing $X$ linearly lowers probability of the public signal, so optimizing condition is

  \[ X = \beta (\text{continuation value if signal does not go off} - \text{continuation value if signal does go off}) \]  

  (1)
Equilibria:

- This game has lots of equilibria.

- Boyan uses data to choose among equilibria.

- Not sure this is Kosher.

- Everyone expecting $X = 0$ if the day of the month is a prime number is an equilibrium.

- Suppose that was also what the data showed. Is it ok at that point to simply declare victory?
A Suggestion which selects “Ratchet” strategy as the unique Markov Perfect Equilibrium:

- Borrow from Phelan (JET, 2006)

- Assume behavioral type which must set $X = 1$, with Markov exogenous and hidden type switches.

  - $\epsilon$: probability that optimizing type becomes behavioral type.
  - $\delta$: probability that behavioral type becomes optimizing type.
  - $\frac{\epsilon}{\epsilon + \delta}$ long run or stationary probability of behavioral type.
A Suggestion which selects “Ratchet” equilibrium as the unique Markov Perfect Equilibrium:

- Boyan's Ratchet equilibrium misnamed. A better characterization is a Sisyphus equilibrium.

- Let $\rho_i$ be equilibrium posterior that firm is behavioral type if it has been $i$ periods since the public signal observed.

- Likewise, let $X_i$ be the equilibrium number of fries and $V_i$ be the value to the firm.
A Suggestion which selects “Ratchet” strategy as the unique Markov Perfect Equilibrium:

- Some equations:

\[ \rho_0 = \epsilon. \]

\[ V_0 = p(\epsilon + (1 - \epsilon)X_0) - \frac{X_0^2}{2} + \beta(1 - \epsilon)((1 - X_0)V_0 + X_0V_1). \]

\[ X_0 = \beta(1 - \epsilon)(V_1 - V_0). \]

\[ \ldots \]

\[ \rho_i = B(\rho_{i-1}, X_{i-1}). \]

\[ V_i = p(\rho_i + (1 - \rho_i)X_i) - \frac{X_i^2}{2} + \beta(1 - \epsilon)((1 - X_i)V_0 - X_iV_{i+1}). \]

\[ X_i = \beta(1 - \epsilon)(V_{i+1} - V_0). \]

- If we assume eventually \( \rho_i, X_i, \) and \( V_i \) converge (they do), then if you truncate \( i \), becomes \( N \) (non-linear) equations and \( N \) unknowns.
A Suggestion which selects “Ratchet” strategy as the unique Markov Perfect Equilibrium:

- A fixed point equation for $\rho$:

  $$\rho = B(\rho, X). \quad (2)$$

- Gives locus of points where if you start at reputation $\rho$, have NO public signal when one should have happened with probability $1 - X$, then reputation $\rho$ stays same.

- Happens when learning about type is exactly offset by drift toward stationary probability.