Dai16067 Μιχούλης Γεώργιος Ασκηση2

“By the usual reasoning p1 = p2 = 0 is the unique pure strategy Nash equilibrium. However, since π (p) = p is unbounded, Theorem 1 implies that for every k ∈ (0, ∞) there also exists a symmetric mixed-strategy Nash equilibrium that is atomless on [k,∞) in which each firm earns expected profits of k and prices according to the distribution function F(p) = ( 0 if p ≤ k 1 − k p if p>k over the support [k,∞). Thus, in addition to the well-known zero-profit pure strategy equilibrium, the Hotelling game also has a continuum of positive profit Nash equilibrium payoffs. In this example, market demand is perfectly inelastic and marginal cost is zero. One can show that the corresponding Cournot (quantity setting) game also has a continuum of Nash equilibrium payoffs that range from the competitive (zero profit) to the monopoly (infinite profit) level.3 One might conjecture that the positive profit equilibria will vanish if market demand is downward sloping and the corresponding Cournot equilibrium is unique. The following example shows that this conjecture is false.”

“In a Bertrand game, both players pick a price at the same time. Even though players might go for a mixed strategy, there does not always exist a equilibrium. it might for example be that strategy space is unbounded, in which case each player might pick a strategy with an infinite value. Another possibility is that the strategy space is open, i.e. each player can pick a strategy in the range [0, 100). In this case it might be that each of the players wants a strategy as close to 100 as possible. However, since the value 100 itself is out of range, the players will move closer and closer to 100 over time, but never reach an actual equilibrium. When the strategy space is discrete, it might also be possible that a number of players will not reach equilibrium. When the same game extends its rules to allow a continuous action space it might suddenly be that an equilibrium does exist. A last possibility is when the reaction functions of two or more players simply do not intersect. The intersection point of these functions always give the equilibrium, so when this point does not exists a equilibrium does not exists as well.”

D(p)/2 , αν q < ?

Β1(q) = {p: 0<=p<=1} , αν q = ?

D(p) , αν q > ?

Εξετάζουμε την αναμενόμενη απολαβή του παίκτη 1 όταν χρησιμοποιεί την ενέργεια P1, με δεδομένη τη μικτή στρατηγική F2 του παίκτη 2.

* Αν P1 < X2 τότε η απολαβή του παίκτη 1 είναι -Pi
* Αν P1 > Υ2 τότε η απολαβή του 1 είναι
* Αν Χ2  P1  Y2 τότε, με πιθανότητα F2(P1) η προσφορά του παίκτη 2 είναι μικρότερη από P1, οπότε η απολαβή του 1 είναι . Με πιθανότητα 1- F2(P1) η προσφορά του 2 είναι μεγαλύτερη από P1,

Επομένως η αναμενόμενη απολαβή του παίκτη 1 είναι:

F2(P1) + (-Pi) [1- F2(P1)]

>Επίσης η συνάρτηση (p-1)D(p) είναι αύξουσα ως προς p και αυξάνεται χωρίς όριο καθώς αυξάνεται το p. Τότε για p > c το παίγνιο έχει μια ισορροπία Nash μικτών στρατηγικών στην οποία η κάθε εταιρία χρησιμοποιεί την ίδια μικτή στρατηγική F, με F(p) = 0 και F(p) > 0 για p > p.

* p = 4
* F(p) = 0
* F(p) > 0

4 |------------------------------------------| P(max)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Εταιρία 2**    **Εταιρία 1** | **Pmin** | **P1** | **P2** | **P3** | **. . .** |
| **Pmin** | *D(Pmin)/2*  *D(Pmin)/2* | *D(Pmin) , 0* | *D(Pmin) , 0* | *D(Pmin) , 0* | **. . .** |
| **P1** | 0 , *D(Pmin)* | *D(*P1*)/2*  *D(*P1*)/2* | *D(*P1*) , 0* | *D(*P1*) , 0* | **. . .** |
| **P2** | 0 , *D(Pmin)* | 0 , *D(*P1*)* | *D(*P2*)/2*  *D(*P2*)/2* | *D(*P2*) , 0* | **. . .** |
| **P3** | 0 , *D(Pmin)* | 0 , *D(*P1*)* | 0 , *D(*P2*)* | *D(*P3*)/2*  *D(*P3*)/2* | **. . .** |
| .  .  . | **.**  **.**  **.** | **.**  **.**  **.** | **.**  **.**  **.** | **.**  **.**  **.** | **.**  **.**  **. . . . .**  **.**  **.** |

* Με κόκκινο χρώμα φαίνεται το σημείο ισορροπίας Nash με καθαρές στρατηγικές.