COURNOT EQUILIBRIUM IN CASE OF (-1)-CONCAVE PRICE FUNCTION

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Abstract. We consider a class of homogeneous Cournot oligopolies with (-1)-concave price function. We show some useful properties of the revenue function in case of (-1)-concave price function and prove the existence of an equilibrium in the continuous and non-differentiable case. A simple proof of an equilibrium uniqueness result in the smooth case with (-1)/N-concave (N-number of the firms in the market) price function is provided.

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Key words. Cournot games, generalized concavity, price function, pure-strategy Nash equilibrium.

REFERENCES

- R. Amir, Cournot oligopoly and the theory of supermodular games, Games Econom. Behav., 15 (1996), 132–148.
- S.P. Anderson and R. Renault, Efficiency and surplus bounds in Cournot competition, J. Econom. Theory, 113 (2003), 253-264.
- [3] H. Debreu, A social equilibrium existence theorem, Proc. Natl. Acad. Sci. USA, 38 (1952), 886–893.
- [4] R. Deneckere and D. Kovenock, Direct demand-based Cournot existence and uniqueness conditions, Purdue University, mimeo, 1999.
- [5] C. Ewerhart, Cournot games with biconcave demand, Games Econom. Behav., 85 (2014), 37–47.
- K. Fan, Fixed point and minimax theorems in locally convex topological linear spaces, Proc. Natl. Acad. Sci. USA, 38 (1952), 121–126.
- [7] I.L. Glicksberg, A further generalization of the Kakutani fixed point theorem with application to Nash equilibrium points, Proc. Amer. Math. Soc., 38 (1952), 170-174.
- [8] F.H. Murphy, H. D. Sherali and A.L. Soyster, A mathematical programming approach for determining oligopolistic market equilibrium, Math. Program., 24 (1982), 92–106.
- [9] P. von Mouche and F. Quartieri, On the uniqueness of Cournot equilibrium in case of concave integrated price flexibility, J. Global Optim., 57 (2013), 707–718.
- [10] P. von Mouche and F. Quartieri, Cournot equilibrium uniqueness in case of concave industry revenue: a simple proof, Economics Bulletin, 35 (2015), 1299–1305.

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