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Cooperation and Competition

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ABSTRACT

Ecology, Economy and Management require a huge interdisciplinary effort to ascertain the hidden mechanisms driving the evolution of communities and firm networks. This article shows that strategic alliances in competitive environments provoke an explosive increment of productivity and stability through a feedback mechanism promoted by cooperation, while competition causes segregation within cooperative profiles. Some further speciation and radiation mechanisms enhancing innovation, facilitated by environmental heterogeneities and specific market regulations, might explain the biodiversity of life and the high complexity of industrial and financial markets. Extinctions occur by the lack of adaptation of strongest competitors to sudden environmental stress.

Key Words: Competition. Cooperation. Strategic alliances.

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References

 J. López-Gómez and M. Molina-Meyer, Symbiosis in competitive environments, in *Variational Methods and Related Topics*, Vol. 12, pages 118–141, RIMS KYOTO 1347, Kyoto, 2003.

[2] J. López-Gómez and M. Molina-Meyer, Singular perturbations in Economy and Ecology. The effect of strategic symbiosis in random competitive environments, *Adv. Math. Sci. Appns.* **14** (2004), 87–107.

[3] J. López-Gómez and M. Molina-Meyer, Biodiversity through competition, in *Proc.* 10th IEEE International Conference on Methods and Models in Automation and Robotics (R. Kaszyński, Ed.), pages 39–44, Szczecin, 2004.