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The 'Drop of Honey Effect'. A Note on Chaos in Economics[a]

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a – A part of this material is developed in the chapter Ferreira, M. A. M., Filipe, J. A., Coelho, M., Pedro, M. I., "Chaos Theory in Politics: a Reflection. The 'Drop of Honey Effect", in Banerjee, S., Erçetin, S. S., Tekin, A. (Eds.), "Chaos Theory in Politics", Springer, Germany, forthcoming.

Abstract – **Relationships in non-linear systems are unstable. Considering that, chaos theory aims to understand and to explain the unpredictable aspects of nature, social life, uncertainties, nonlinearities, disorders and confusion. Small differences in initial conditions - such as those due to rounding errors in numerical computation – may perform diverging outcomes tracking to systems' chaotic behaviour. In these circumstances, long-term predictions become impossible in general. A brilliant metaphor on this is the so-called butterfly effect, about the way how the "flapping of the wings of a butterfly" may cause huge phenomena either they are physical, atmospheric or social. In this work, the drop of honey effect metaphor is proposed for representing this kind of butterfly effect for chaos in social phenomena, in particular in economics and politics**.

Keywords - *Chaos, Drop of Honey Effect, Economics, Politics.*

1. Introduction

Small differences in initial conditions may cause diverging outcomes in systems and, sometimes, cause a chaotic behaviour. In these circumstances, long-term predictions become impossible. This happens even though these systems are deterministic, meaning that their future behaviour is mainly determined by their initial conditions, with no random elements involved. The deterministic nature of these systems does not make them predictable.

The chaos theory results from natural scientists' discoveries in the area of non-linear dynamics. The importance of related models has increased in the last decades, by studying the temporal evolution of non-linear systems. Considering that relationships in non-linear systems are unstable, chaos theory aims to understand and to explain this kind of unpredictable aspects. This represents a disarray connection, but basically it involves much more than that.

The relevance of this kind of theories has been well recognized to explain social phenomena and has permitted new advances in their study. Chaos theory has been applied, particularly in the context of economics or politics, for example. This paper aims to make a short reflection on chaos theory in terms of the interpretation of social aspects, considering a new concept that characterizes this kind of effects: the "drop of honey effect" from the marvellous tale written by the Armenian poet Hovanés Tumanian (1869-1923).

2. Chaos and Social Systems

The understanding of inherently nonlinear phenomena present in social systems (in particular in the political or in economic systems, studied in this paper) shows that it is possible to use mathematical models in the analysis of the social environment and socio-economic and political issues. Moreover, when this does not happen, some kind of qualitative analysis is yet possible to perform by following the ideas of chaos theory.

In the study of social phenomena, the scientific object is by definition far different from the one in natural sciences. As I Font and Régis (2006) say, citing Prigogine and Nicolis (1989), social and political scientists find out that "a high degree of unpredictability of the future is the essence of the human adventure". Some studies and research projects have assumed, in the two last decennia, that chaos theory concepts and tools are inherently part of the properties of the political science. Many studies deal with this subject by analysing situations of sensitivity to initial conditions, considering bifurcations, or entropy, for example, and use the chaos' vocabulary to describe political behaviours

and phenomena, for instance (see I Font and Régis, 2006).

3. The Tale

In order to introduce the concept "The Drop of Honey Effect", it is interesting to present a free version of Tumanian's tale that supports the concept and its use as a metaphor for the chaotic behaviour in social systems.

On a warm afternoon, on the second floor of a splendid palace that overlooked the market place of the city, sat a king and his minister. While the king was eating some puffed rice on honey, he looked over his land with satisfaction. What a prosperous city he ruled. What a magnificent city.

As he was daydreaming, a little drop of honey dripped from his puffed rice onto the window ledge.

The minister was about to call a servant to wipe up the honey, when the king waved a hand to stop him. "Don't bother, it's only a little drop of honey, it's not our problem."

The minister watched the drop of honey slowly trickle down the window ledge and land on the street below.

Soon, a buzzing fly landed on the sweet drop of honey.

A nearby lizard shot out its long tongue and caught the fly.

The lizard was taken by surprise when a cat leapt on it.

The cat was pounced on by its worst enemy the dog that had broken free from its chain.

Meeowing and barking erupted from the street below the King and his minister. The minister was about to call a servant to go and deal with the brawling cat and dog when the king said, "Relax, the cat and dog belong to the market people. We shouldn't interfere. It's not our problem."

The cat's owner was horrified to see her cat being attacked by the big bully of a dog and started whacking the dog with her broom. The dog's owner was horrified to see her dog being attacked by the big bully of a cat and started whacking the cat with her broom.

Soon, people started coming out from their stalls and houses to see what all the screaming and shouting was about. Seeing their friend's cat being attacked, they joined in berating the dog and its owner. Others, seeing their friend's dog being attacked by the cat, also joined in. Very quickly, the shouting became violent and a fight broke out in the street.

The worried minister turned to the King but his only comment was, "Not our problem. Here, have some more puffed rice and honey." The king and his adviser ate as they watched the fray below.

Soon the police were called in to break up the fight, but the people were so angry, each side convinced that they were right, (right about what, they couldn't remember). They started attacking the policemen. The fight rapidly broke out into a full-scale riot.

The king eyed the minister and said, "I know what you are thinking, but the army will handle it. Besides, this is not our problem."

The riot swiftly escalated into a civil war with looting and destruction all over the city. Buildings were set alight and by nightfall, the magnificent city was reduced to a pile of smoking ashes. The king and his minister stood spellbound rooted to the spot where they had been watching all day. Their mouths were hanging open in horror.

"Oh…" said the king quietly, "maybe the little drop of honey WAS our problem." (freely adapted).

4. Occurrence of Chaos in the Economy

In economics (and in politics), chaos may be found in many situations.

Simple facts, since immemorial times, with no visible significant consequences at first sight, would register considerable impacts.

Such kind of situations goes on occurring in our time for a lot of socio-political contexts around the world. The recent "Arabian Spring" is an example of how the "butterfly effect" can be found when causing a wide spread regional political reform in the political regimes of some countries in that geographical area. The "flapping of the butterfly wings" may be represented by the immolation by fire of a Tunisian salesman that was the starting point for the regime change in Tunisia first and then the contagion to Egypt and Libya. The consequences would be seen as well in Syria where a civil war is yet in course. The "butterfly effect" could also be named as the "drop of honey effect", which is very suggestive for socio-political events. Instability in this region traditionally has huge consequences in economic area at world

level, once their raw materials are strongly demanded worldwide.

Presenting another example and considering the political situation in Greece in May 2012, a new stage came to be studied for Greek, European and World economy. The political status quo was broken in Greece: a new party took an advantage that it had never had. In fact an emergent crisis in Greece was severely felt after the Greece-Troika agreement. Throughout this Program, Greece has to respect an austerity program in order to put national budgeting at acceptable levels and is complied to obey the agreement that is conducting Greek people to severe self well being sacrificing. This situation led Greeks to vote in favour of a new situation in the first round elections. Although the second round kept the status quo in the political situation, the truth is that this could become an entire new situation that could impose a new socio-economic condition to European Union and to the World that could threat the world economic stability. The possible bankruptcy in Greece was tormenting world leaders; a new status quo was being prepared for Europe with considerable implications for the whole world. This scenario was adjusted after the second round elections, but the alert was there.

Anyway, the direct economic impact of Greek situation is felt in international financial markets and had immediate strong economic implications, first felt in the Euro zone economy and then spread worldwide.

5. Conclusions

Historically, there are a lot of simple facts, considered insignificant in the moment but that would have big consequences. In fact in a completely unexpected way, they would have huge impacts that could not be guessed at the very initial moment. They are good illustrations of situations for which the output is not directly proportional to the input.

The case of the Tunisian salesman working as the starting point for the regime change in Tunisia first and then the contagion to Egypt and Libya, and then to Syria, is shown in the paper.

The “Arabian Spring” was presented in this work as an example of the way how the “butterfly effect” can be found when causing a wide spread regional political reform in the political regimes of some countries in that geographical area. Consequent and significant economic changes in the system of these countries got inevitable.

The “drop of honey effect” may be represented by the immolation by fire of a Tunisian salesman.

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References

[1] Bergé, P., Y. Pomeau, C. V. (1984), Order within chaos. New York: John Wiley.

[2] Berliner, L. M. (1992), Statistics, Probability and Chaos. Statistical Science, 7 (1), 69-122.

[3] Bjorndal, T. (1987), Production economics and optimal stock size in a North Atlantic fishery. Scandinavian Journal of Economics, 89 (2), 145-164.

[4] Bjorndal, T. and Conrad, J. (1987), The dynamics of an open access fishery. Canadian Journal of Economics, 20(1), 74-85.

[5] Campbell, D. K., Mayer-Kress, G. (1997), Chaos and politics: Applications of nonlinear dynamics to socio-political issues. In Grebogi, C. and Yorke, J. A., The Impact of Chaos on Science and Society. United Nations University Press.

[6] Capra, F. (1996), The web of life: a new scientific understanding of living systems. New York : Anchor Books.

[7] Clark, C. W. (1974), Possible effects of schooling on the dynamics of exploited fish populations. Journal du Conseil Internatinal pour L'Exploration de la Mer, 36 (1), 7-14.

[8] Farazmand, A. (2003), Chaos and transformation theories: A theoretical analysis with implications for organization theory and public management. Public Organization, 3 (4), 339-372 December.

[9] Ferreira, M. A. M., Menezes, R. (1992), Equações com Diferenças – Aplicações em problemas de Finanças, Economia, Sociologia e Antropologia. Sílabo. Lisboa

[10] Ferreira, M. A. M., Filipe, J. A., Coelho, M., Pedro, M. I. (2010), Fishing Policies and the Contribution of Chaos Theory for Fisheries Management. International Conference on Technology and Business Management. Proceedings.

[11] Ferreira, M. A. M., Filipe, J. A., Coelho, M., Pedro, M. I. (2011), Chaos Effect in Fisheries Management. Journal of Economics and Engineering, 2 (1), 36-43.

[12] Ferreira, M. A. M., Filipe, J. A., Coelho, M., Pedro, M. I. (2011), Modelling the Dissipative Effect of Fisheries. China-USA Business Review, 10 (11), 1110-1114.

[13] Ferreira, M. A. M., Filipe, J. A., Coelho, M., Pedro, M. I. (2013), Managing Fisheries in Light of Complexity and Chaos Theories. In Banerjee, S. (2013), Chaos and Complexity Theory for Management: Nonlinear Dynamics.

[14] Filipe, J. A. (2006), O Drama dos Recursos Comuns. Um caso de aplicação da Teoria dos Jogos aos comuns da pesca. PhD thesis. Lisboa: ISCTE.

[15] Filipe, J. A., Coelho, M., Ferreira, M. A. M. (2005), Sistemas Dinâmicos, Caos e os Comuns da Pesca. Revista de Economia Global e Gestão. N.º 2/2005. Lisboa: ISCTE.

[16] Filipe, J. A., Ferreira, M. A. M., Coelho, M. (2007), O Drama dos Recursos Comuns nas Sociedades Actuais: à procura de soluções para os Ecossistemas em perigo. Edições Sílabo. Lisboa.

[17] Filipe, J. A., Ferreira, M. A. M., Coelho, M. (2008), The Relevance of Chaos Theory to Explain Problems of Overexploitation in Fisheries. Working Paper, WP/24/2008/DE/SOCIUS. ISEG. Lisboa.

[18] Filipe, J. A., Ferreira, M. A. M., Coelho, M., Pedro, M. I. C. (2009), Complexity, Theory of Chaos and Fishing. In Porath, D. and Bayer, A., "International Suplement" special "update". FH Mainz, University of Applied Sciences. Mainz, Germany.

[19] Filipe, J. A., Ferreira, Coelho, M., Pedro, M. I., (2010), Chaos, Anti-chaos and Resources: Dealing with Complexity. Aplimat-Journal of Applied Mathematics, 3 (2), 83-90.

[20] Filipe, J. A., Ferreira, M. A. M., Coelho, M., Pedro, M. I. (2010), Managing Complexity: a Problem of Chaos in Fisheries Policy. China-USA Business Review. David Publishing Company, 9 (3).

[21] Filipe, J. A., Ferreira, M. A. M., Coelho, M., Pedro, M. I., Andrade, M. (2010), Analysing Fisheries Management through Complexity and Chaos Theories Framework, Journal of Mathematics and Technology, 1(2).

[22] Galtung, J. (1975), Entropy and the general theory of peace. Peace: Research Education Action, Essays in Peace Research, 1, Copenhagen.

[23] Geyer, R. (2003), Europeanisation, Complexity, and the British Welfare State. Paper presented to the UACES/ESRC Study Group on The Europeanisation of British Politics and Policy-Making, Department of Politics, University of Sheffield, September 19, 2003.

[24] Grabinski, M. (2004), Is There Chaos in Management or Just Chaotic Management?. Complex Systems, intelligence and Modern Technology Applications. Paris.

[25] Grabinski, M. (2008), Chaos – Limitation or Even End of Supply Chain Management. High Speed Flow of Material, Information and Capital. Istanbul.

[26] Hastings, A., Hom, C. L., Ellner, S., Turchin, P., Godfray, H. C. J. (1993), Chaos in Ecology: Is Mother Nature a Strange Attractor?, Annual Review of Ecology and Systematics, 24 (1), 1-33.

[27] I Font, J. P. P., Régis, D. (2006), Chaos Theory and its Application in Political Science. (Draft), IPSA – AISP Congress, Fukuoka.

[28] Kauffman, S. (1993), The origins of order: self-organization and selection in evolution. New York: Oxford Univ. Press.

[29] Lansing, J. S. (2003), Complex adaptive systems. Annual Review Anthropology. http://www.ic.arizona.edu/lansing/GompAdSys.pdf.

[30] Lévêque, G. (2002), Ecologia: do ecossistema à biosfera. Lisboa: Instituto Piaget.

[31] Levin, S. (2003), Complex adaptive systems: exploring the known, the unknown and the unknowable. Bulletin of the American Mathematical Society, 40.