

## **Pollution control: Assessing the Variable Decay of the Pollution Stock in the Environmental Economics Analysis\***

Cornelia NEAGU

Centre for Industry and Services' Economics, Romanian Academy, Bucharest, Romania

Marius BULEARCĂ

Centre for Industry and Services' Economics, Romanian Academy, Bucharest, Romania

Cristian SIMA

Centre for Industry and Services' Economics, Romanian Academy, Bucharest, Romania

Daniel FISTUNG

Centre for Industry and Services' Economics, Romanian Academy, Bucharest, Romania

Correspondence should be addressed to: Cornelia NEAGU; [neagu\\_cornelia@yahoo.com](mailto:neagu_cornelia@yahoo.com)

\* Presented at the 41<sup>st</sup> IBIMA International Conference, 26-27 June 2023, Granada, Spain

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### **Abstract**

As announced in our previous works, this paper is part of a larger research that deals with sustainable development and environment protection in extractive industry. As such, the next papers will deal with issues related to environmental pollution. In this respect, this paper is aiming to identify if the proportionate rate of natural decay of the stock is constant while such an assumption is commonly employed in environmental economics analysis, but may not always be valid, as in many situations, one would expect that the rate of decay to depend on the size of the pollution stock or some other associated variable. Then the analysis moves on by explaining the several assumptions made about the shapes of benefit and damage functions, this time relating them to the concept of convexity of a function. After explaining what a convex function means, in the next paragraph, the paper produces some examples of why the relevant functions may not be convex, and then shows some consequences of non-convexity. The analysis continues by arguing that there are many reasons why the damage function and the abatement cost function may be non-convex and the paper draws attention to the more commonly discussed case of non-convex damages. The paper demonstrates that the reason a pollution damage function to not be of the smooth, continuously increasing form that we have assumed so far by giving one example when we introduced the ideas of threshold effects and irreversibility. And to conclude this analysis, at the end the paper argues that one reason why policy makers may fail to recognise non-convexity is to do with the way information is acquired, as we often find out about things by exploring a relevant 'local neighbourhood', and inspection of that data may suggest convexity when in fact the function is only convex over part of its range. This becomes important – and potentially dangerous – if the policy maker falsely projects the apparently convex function outside this current range.

**Keywords:** convexity and non-convexity, irreversibilities, natural decay, pollution stocks, threshold effect.