Transboundary Pollution and International Cooperation
CORRECTIONS AND SUPPLEMENTS

P. v. Mouche

April 22, 2019

Corrections:

1. *Page 246, line 2* ↓: where $r^j := \sum_{l=1}^{N} T_{jl} M^l$ and all $T_{jl} \geq 0$;
2. *Page 246, line 10* ↓: $\cdots$ of $x^j \in$
3. *Page 246, Assumption 8, replace by:* For each multi-action $\mathbf{x}^{\hat{\jmath}}$ of the other players, there exists a right (left) neighbourhood of 0 (of M^j) where the function f^j as a function of $x^j \in X^j$ is strictly increasing (strictly decreasing) and there exists a right (left) neighbourhood of 0 (of M^j) where the function $\sum_{j=1}^{N} f^j$ as a function of $x^j \in X^j$ is strictly increasing (strictly decreasing).
4. *Page 246, line 9* ↑: $\cdots$ above net benefits
5. *Page 249, Theorem 4:* In the case of uniformly distributed transboundary pollution and identical damage cost functions, $\mathbf{y} \ll \mathbf{n}$ holds.[45]
6. *Page 249, Proposition 4:* It is impossible that $\mathbf{y} \geq \mathbf{n}$; $\cdots$
7. *Page 249, line 3* ↑: least as high as that in $\mathbf{y}$. We do not know the answer.
8. *Page 250, Proposition 6:* ... satisfying $T_j \leq T_K \leq (\sum_{r=1}^{N} T_r)/N$ and $\theta^k(\mathbf{n}) \geq 0$, the
9. *Page 251, Lemma 1:* $\cdots$ has a positive average social welfare loss.
10. *Page 252, line 6* ↑: $\cdots$ net benefits is $\cdots$
11. *Page 257, concerning the proof of Proposition 8:* it may be good to note that we defined in Folmer and v. Mouche (1994) the negotiation set as the intersection as the convex hull of the set of possible payoff vectors and the set of individually rational payoff vectors. Here, however, we take the closed convex hull instead of the convex hull (which is a better way of dealing with negotiation sets). Therefore the proof there has to be adapted a little. Here are the details: first we note that the closed convex hull is nothing else than the closure of the convex hull. Next note that for two subsets A and B of $\mathbb{R}^N$ with B bounded one has $\overline{\mathrm{co}(A)} + \overline{\mathrm{co}(B)} = \overline{\mathrm{co}(A+B)}$. So we obtain

$$\sum_{k=1}^{M} {}_kH = \sum_{k=1}^{M} (\overline{\mathrm{co}({}_kU)} \cap {}_kI) \subseteq \sum_{k=1}^{M} (\overline{\mathrm{co}({}_kU)}) \cap \sum_{k=1}^{M} \cap_k I = \overline{\sum_{k=1}^{M} \mathrm{co}({}_kU)} \cap I = \overline{\mathrm{co}(U)} \cap I = H.$$

12. *Page 263, footnote 45:* That is $y^j < n^j$ for all j. And $\mathbf{y} \leq \mathbf{n}$ means $y^j \leq n^j$ for all j.
13. *Page 263, footnote 58:* See Theorem 4.3 $\cdots$
14. *Page 263, footnote 59:* $\cdots$ example, Theorem 4.3 $\cdots$

15. *Page 263, footnote 60:* $\cdots$ in (C), are $\cdots$

16. *Page 263, footnote 61:* $\cdots$ that is not a symmetric game). But it

17. *Page 265, line 1 ↓:* $\cdots$ (2000), ‘The acid rain game: A formal and mathematical rigorous analysis’. In

Comments: The answer to problem (A) on page 251 is ‘yes’. Even a more stronger result holds: consider the case where each country is sensitive to emissions from at last one country and let $\mathbf{n}$ be a Nash-equilibrium. For $r \in (0, 1)$ small enough the emission vector $(1 - r)\mathbf{n}$ is a unanimous Pareto improvement of $\mathbf{n}$. See [1] for a proof.

Further reading:

[1] (2000) Henk Folmer and Pierre von Mouche, The Acid Rain game: a Formal and Mathematically Rigorous Analysis. In: Festschrift in Honor of Karl Göran Mäler, 2000, pages 138-161. Editors: P. Dasgupta, B. Kriström and K. Löfgren. Edward Elgar, Cheltenham.

[2] (2008) Pierre von Mouche, Direct Sum Games, Lecture Notes in Management Science, Volume 1, 230–143.

[3] (2013) Henk Folmer and Pierre von Mouche, Analysing the Folk Theorem for Linked Repeated Games. In: Contributions to Game Theory and Management. Volume VI, 146-164. Editors: L. Petrosjan, N. Zenkevich. Graduate School of Management St. Petersburg. ISBN 978-5-9924-0080-9.

[4] (2015) Henk Folmer and Pierre von Mouche. Nash Equilibria of Transboundary Pollution Games. In: Handbook of Research Methods and Applications in Environmental Studies, 504–524. Edward-Elgar. Editor: M. Ruth.

If You discover more (mistakes), please let me know. I will be happy to know them.