

How to compare and measure different levels of law enforcement: Observing differences in legislation is not enough

Ronit Levine-Schnur^{a,1}

le Polain de Waroux et al. (1) argue for a correlation between lower deforestation regulation enforcement and agricultural companies' land investments decisions. Two methods are used: a statistical model, where index schemes for level of regulation and enforcement are introduced; and interviews with agricultural companies. The authors fail to address a discrepancy between the results of these methods. Although, according to the model, the coefficient for enforcement is significant and negative, companies' self-reports deemphasize the importance of enforcement to a level of only 1% of reported attributes.

A number of explanations can be offered for this gap. First, companies may purposively downplay the significance of differences in levels of enforcement. For example, companies may not want to convey the message that they obey the law only if it's enforced in fact. If true, then maybe this is an example that stands to weaken the value of self-reported associations more generally.

Alternatively, agricultural companies may not be aware of the extent to which different levels of enforcement affect their investment decisions. Under this explanation, investors' decisions are affected by considerations that are not universally available to them. If this is the case, then increases in levels of enforcement as suggested by the authors might not lead to the expected policy outcome.

More importantly, this discrepancy raises the question whether the variable of enforcement index was properly produced. Enforcement is measured by risk and monitoring indexes. The latter reflects the detection of land cover changes either by state institutions or by nongovernmental organizations. However, monitoring

on its own—especially if led by nonstate actors—might not be accounted for when measuring different levels of governmental enforcement. The more relevant question relates to the interaction between monitoring and in-fact enforcement (risk index). That is, the two indexes should be regarded as dependent on each other. For example, high levels of monitoring but low levels of enforcement might convey a strong message of governmental indifference to deforestation.

Furthermore, the risk index was measured based on sanctions for illegal logging according to the legislation. There could be value in analyzing the symbolic effect of the black letter law, whether enforced or not. However, the assumption that the different schemes of fines on the books are correlated with differences in the enforcement of these sanctions is not supported (cf. ref. 2). Often it is the case that such penalties represent the maximum and not the mandatory outcome of illegal activity (3). There is no necessary consistent comparative correlation between differences in the maximum fines permitted by law and the levels of actual enforcement (4). This calls for further studies.

This interpretation of the discrepancy stands, therefore, for the limited value of the enforcement index as it was calculated here. A more precise way to establish an enforcement index would be to identify the correlation between illegal logging and the actual fines imposed in a certain jurisdiction at a given time. Out-of-budget expenses for enforcement could also be measured and compared with incomes from fines. Media reports could exemplify the visibility of enforcement means and assist in analyzing the effect this might have on investment decisions, etc.

- 1 le Polain de Waroux Y, Garrett RD, Heilmayr R, Lambin EF (2016) Land-use policies and corporate investments in agriculture in the Gran Chaco and Chiquitano. *Proc Natl Acad Sci USA* 113(15):4021–4026.
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^aFaculty of Law, Centre for Ethics, and Munk School of Global Affairs, University of Toronto, Toronto, ON, Canada M5S 1H8

Author contributions: R.L.-S. wrote the paper.

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¹Email: ronit.levine@mail.huji.ac.il.