***HOW REWARDing improves truthful REPORTING UNDER OVER-LAPPING MONITORING SYSTEMS***

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## Overview

How can we enhance truthful self-reporting by polluting firms in environmental regulation? We investigate the effects of two different reward schemes using laboratory experiments. Environmental regulations, such as cap-and-trade schemes and baseline-and-credit approaches, involve polluting firms, third-party verifiers and government officials in monitoring, reporting and verification activities (MRV henceforth). In order to achieve genuine reductions, two-layered monitoring systems are applied in MRV. These systems typically require firms to self-report their emissions to the officials, third-party verifiers to verify the firms’ reports, and, in addition, government officials to random check the verified reports.

However, several features of the two-layered monitoring systems may lead to untruthful reporting. First, most policy instruments allow firms to choose and pay verifiers. Repeated interactions between verifiers and firms may help to build up mutual interests that can reduce the incentive for the verifiers to detect untruthful reporting. Moreover, the verifiers face conflicting incentives: either to comply with the regulation and reveal untruthful reporting, or with a strong desire of repeated business to please the firm and conceal the problem. The latter becomes more likely in a situation where there are competitions among verifiers. Studies by Farhi et al (2013) and Duflo et al. (2013) show that conditional on job competitions, there are fraudulent information from verifiers both theoretically and empirically. Second, the probability of officials’ random check and the penalties for untruthful reporting are, in many regulations, not well specified, leading to a situation in which firms and verifiers are unable to calculate the potential loss of detection. Third, officials of regulations which span multiple jurisdictions with competing firms (e.g. emissions trading schemes over different US states, Chinese provinces or EU Member States) may relax enforcement as they may have been pressured by their polluting firms to protect economic development of their jurisdiction. Becker and Stigler (1974) suggest that rewarding successful enforcement might improve the incentives given by enforcers. By providing a financial advantage for a successful detection, the reward might promote the vigour of inspection by both the verifiers and the officials. In this paper we examine the issue of untruthful reporting while using context-free language in an experimental study where verifiers compete for their market shares. We test the effect of two reward treatments separately to incentivise successful detections. One reward treatment is on the part of verifiers, and the other is on the part of government officials. The aim of our research is to answer the question that to reward which party (verifiers or officials) will outperform the other in enhancing truthful reporting, which may provide guidance for policy makers.

## Methods

We conduct laboratory experiments to test the effect of two reward treatments. The experimental method is suitable because it allows us to isolate the effect of rewards from other confounding factors that appear in reality, such as the hidden nature of undetected untruthful reporting, attitudes toward environmental protections, etc. We formulate the experiment in an emissions trading scheme where polluting firms are required to report the amount of emissions produced and untruthful reporting is beneficial to them. Third-party verifiers are selected and paid by firms and required to verify the firms’ reports. In addition, government officials who work as a second level inspector decide whether to check the verified reports further or not. We introduce two treatments of rewards to successful detections of untruthful reporting by using fines from the firms who are detected to report untruthfully. One reward treatment is for successful verifiers and the other one is for successful government officials. Both of the treatments are compared to the baseline where no rewards are introduced. For the ease of exposition we use environmental context in the paper, however, we use context-free language in the experiment in order to exclude the influence from subjects’ environmental attitudes.

The experiment took place in November 2014 at the Australian School of Business Experimental Research Laboratory at the University of New South Wales. The experiment was programmed and conducted in zTree (Fischbacher, 2007). Upon arrival, subjects received instructions in a hard copy and were asked to answer comprehension questions online. The experiment would start when all subjects answered the questions correctly. In each treatment, 48 subjects participated; and each subject only participated once in one treatment. Sessions lasted about one hour. At the end of a session, subjects were paid according to their decisions. On average subjects earned 20 Australian Dollars, with the range from 8 to 49 dollars.

## Results

We find that both forms of rewards have a positive effect in improving truthful reporting by polluting firms. However, providing rewards on the part of officials is less efficient in enhancing the incidence of a truthful reporting outcome[[1]](#footnote-1) compared to rewarding verifiers. This is mainly because the officials tend to check more frequently when they are provided with rewards compared to the baseline. In addition, most of the checks are unnecessary since both the firms and verifiers report truthful information. As a result, the checks just increase the regulation costs. In contrast, providing rewards on the part of verifiers has a significant improvement in the truthful reporting outcome (See Figure 1). In particular, the verifiers tend to reveal untruthful reporting more frequently when they find that firms are being dishonest, and the officials tend to check significantly less frequently. The behaviour of over checking by officials in the former treatment is not in line with our prediction. Nevertheless, it implies that applying a reward policy at the top tier of an organization might lead to inefficiency in the regulation.

## Conclusions

The novelty of this study is to demonstrate the untruthful reporting problem by polluting firms where verifiers’ decisions are influenced by business competitions and their desires of increasing market shares. It also investigates the efficacy of rewards schemes under a two-layered monitoring system where two levels of inspections are implemented. Under such MRV arrangement, the honesty of verifiers and the vigour of the officials’ inspections cannot be taken for granted and they are as important as the violations of untruthful reporting that to be detected. We observe that, when positive rewards are provided for successful detections, there is an improvement in the frequency of truthful reporting by polluting firms and a higher frequency of revealing untruthful reporting problem by verifiers. However, not both reward schemes have the same effect on the officials’ behaviour. Our findings suggest that rewarding verifiers for successfully detections has a statistically significant effect on improving honest reporting by polluting firms. However, rewarding government officials leads to unnecessary checks which reduces the efficiency of the regulation. Therefore we suggest rewarding the successful detections by verifiers as an effective reward policy to improve truthful reporting in emissions trading schemes.

## References

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1. This is an outcome where firms choose truthful reporting, verifiers verify the report as satisfactory and officials do not check. [↑](#footnote-ref-1)