

# **Designing incentive systems for risk-informed regulation**

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One problem in implementing risk-informed regulation has to do with asymmetries in information between regulators and licensees. A possible solution is to provide incentives (e.g., more lenient standards) if violations (e.g., risk levels above some specified standard) are disclosed voluntarily by regulated firms, rather than being discovered through the regulator's monitoring efforts. In this thesis, we adapt game-theoretic work in regulatory economics (where firms are usually viewed as being either compliant or non-compliant) to apply to the case of risk-informed regulation (where firms can be described by continuously varying risk levels). In particular, we attempt to optimize the regulator's payoff using nested optimization, in which the licensee chooses which information to disclose to the regulator, given the regulator's announced enforcement strategy. We derive equilibrium solutions for this type of self-reporting mechanism under different model formulations, and discuss the conditions under which these solutions are better than a traditional direct-monitoring regulatory scheme. We expect that the results of this work will offer new insight into the strengths and limitations for risk-informed regulation of accident and environmental risks.