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ARTICLE

Environmental Governance and Whistleblower Rewards: Balancing Prosocial Motivations with Monetary Incentives

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Abstract

This article examines the idea of introducing a comprehensive reward program for whistleblowing on violations of environmental laws. The common criticism that rewards for external reporting considerably discourage employees from internal reporting is unjustified. This argument overlooks both legal practices of whistleblowing and prior research on social preferences. We argue that prosocial motivations are a crucial determinant of both internal and external reporting. Prosocial individuals are predominant in society. They respond to monetary incentives for external reporting while maintaining their commitment to internal reporting driven by prosocial motives. By combining a vignette-based survey and a measurement of social value orientation, we find that the effect size of prosociality on the likelihood of whistleblowing is comparable to, or greater than, the effect sizes of established predictors like demographic and contextual variables. We also find that the discouragement effect is less pronounced for prosocial individuals than for proself individuals. Based on these findings, we discuss how to design legal frameworks that balance the discouragement effect and the incentive effect of whistleblower rewards.

Keywords: whistleblower rewards; environmental governance; prosocial motivation; social value orientation (SVO); internal and external reporting

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Introduction

To achieve sustainable growth globally, it is essential to ensure a harmonious coexistence between humans and the natural environment. For this purpose, nations must enforce their environmental laws effectively against offending businesses. However, environmental violations are often challenging to detect and prove in terms of causality and damage. Given the limited human and financial resources of regulatory authorities, it is difficult to prosecute these businesses, resulting in insufficient deterrence. Whistleblowers play a vital role in this context, aiding authorities in detecting illegal activities and supporting evidence gathering. While many countries have enacted whistleblower protection laws to shield them from retaliatory actions by malefactors or corporations, these alone may not sufficiently promote whistleblowing. We propose that national authorities should consider introducing a comprehensive or omnibus reward system for whistleblowers of environmental law violations, a measure not yet adopted by any country.[1]

The idea of offering monetary rewards for whistleblowing on corporate misconduct has been implemented in a few countries, including the United States, Canada, and South Korea. Surprisingly, even in the United States, where the whistleblower reward system is most extensively used, rewards are provided only for reporting limited categories of environmental violations. While the US Securities and Exchange Commission's (US SEC) whistleblower reward program under the Dodd-Frank Act, introduced in 2011, has been successful, there is no valid reason for not extending such rewards to environmental law violations.[2] Given that a damaged environment cannot be easily restored and that the social harm from environmental offenses potentially can surpass that of securities violations, it is crucial to consider rewards in the environmental domain as well.

Yet many countries are resistant to offering rewards to whistleblowers, with much of this resistance rooted in the concern that rewards for external reporting to authorities may substantially discourage employees from internal reporting within organizations (Financial Conduct Authority and the Bank of England Prudential Regulation Authority 2014; Japanese House of Representatives 2020). Specifically, the introduction of rewards might lead employees to bypass internal reporting within their organizations and report directly to authorities to claim a reward. Internal control systems in businesses are sustained primarily by employees' non-monetary motivations for internal reporting. Introducing financial incentives for external reporting may reduce internal reporting tips and thereby undermine corporate governance. This is the result of a change in the personal benefit of internal reporting versus external reporting for potential whistleblowers, a "relative price effect" in economics. In this article, we call it the "discouragement effect" of external whistleblower rewards on internal reporting. Such a critique, however, overlooks the legal practices concerning whistleblowing and the decades of research in psychology and behavioral economics on social preferences that has been done.

[1] Although the comprehensive reward system envisaged in this article is somewhat different, there have been movements toward the introduction of environmental whistleblower rewards in China. See the website of the State Council of the People's Republic of China, April 27, 2020, https://web.archive.org/web/20240709023646/https://www.gov.cn/xinwen/2020-04/27/content_5506465.htm.

[2] Dodd-Frank Act, 15 USCA § 78u-6 (2020).

From the perspective of legal practice, it is crucial to recognize that internal reporting can be done immediately upon witnessing violations, whereas external reporting requires stricter standards of proof and is more time-consuming in preparation. Whistleblowers, on the one hand, could prevent corporate misconduct early through internal reporting and consequently lose the necessity and opportunity to claim a reward through external reporting. This may lead whistleblowers to choose to forgo timely internal reporting in pursuit of a reward for external reporting. On the other hand, if they opt solely for external reporting, the stringent standards for external reporting mean that, while they prepare their case, the harm from corporate malfeasance may grow. In other words, choosing not to report internally in a timely manner can compromise social interests.

So, how might people act when faced with this dilemma between personal and social interests? Research in the fields of psychology and behavioral economics on social value orientation (SVO)—a measure of social preferences indicating the extent to which individuals consider the welfare of others—has revealed that the majority of people hold prosocial preferences in society. Such individuals do not solely seek to maximize their own interests; they also consider the welfare of others significantly, suggesting that financial incentives for external reporting may not invariably result in the discouragement effect on internal reporting. In situations where social preferences, or SVO, come to the forefront, basing legal policy discussions on the assumption that individuals solely aim to maximize their payoffs can lead to erroneous conclusions. As Rebecca Hollander-Blumoff (2017) discusses, we must explicitly incorporate SVO into legal studies to avoid making such errors.

Considering this backdrop, we argue that designing a whistleblower reward system, taking into account heterogeneous social preferences, can enhance incentives for external reporting while mitigating the discouragement effect on internal reporting. This study posits three hypotheses: (1) that individuals with higher prosociality or prosocial tendencies are more likely to report corporate misconduct internally or externally; (2) that modest monetary rewards for external reporting to authorities sufficiently increase the likelihood of such reporting; and (3) that the discouragement effect is less pronounced for those with higher levels of prosociality than for those with lower levels. To test these hypotheses, the study employed a vignette-based survey targeting US adults and combined it with an SVO measurement. One of the distinct features of our survey was that it questioned participants about their perceptions of the threshold levels for both the incentive and discouragement effects of monetary rewards. Such research is unprecedented and significantly advances our understanding of this topic.

We presented participants with a vignette where they imagined themselves as an employee who discovered an automobile company selling cars that illicitly emit environmentally harmful gases. We inquired how likely they would be to report this to internal entities (internal reporting) and to an enforcement authority (external reporting). Given the differing standards of proof required for internal versus external reporting, we assumed that, while internal reporting can be immediate, gathering evidence for external reporting might take up to a month. Then, to examine the incentive effect and the discouragement effect of whistleblower rewards, we asked participants about the two monetary thresholds. One is the threshold that would motivate them to report externally if an enforcement authority has a reward program for external whistleblowing. The other is the threshold that would discourage

them from reporting internally if it means that, by stopping the misconduct internally, they would miss out on the potential reward for external reporting.

The results aligned with our hypotheses. First, more prosocial participants were more likely to report internally and externally. When we classified participants into two groups according to the traditional SVO categorization, 87 percent of prosocial and 72.7 percent of individualistic participants indicated they would likely engage in internal reporting. For external reporting, the proportions were 80.6 percent and 63.6 percent, respectively. The effect sizes of prosociality on reporting intentions were similar to, or larger than, the effect sizes of many known predictors like gender, age, and closeness with wrongdoers. Second, modest monetary rewards did elevate sufficiently the likelihood of external reporting. Specifically, 73 percent of participants who would not report externally without a reward would be willing to do so for a $200,000 reward. Third, the discouragement effect from monetary incentives was smaller for prosocial participants than for individualistic participants. For example, 61.1 percent of prosocial and 45.5 percent of individualistic participants responded that they would always engage in internal reporting even if rewards were offered for external reporting. This preference held even if opting for internal reporting first meant that they could not receive a reward for external reporting.

Drawing on these findings, we conclude that nations aiming to strengthen environmental governance should consider introducing a comprehensive reward system for reporting environmental violations to enforcement authorities. While excessively high rewards could lead to the discouragement effect on internal reporting, laws can be crafted to balance the social benefits and costs of monetary incentives. This can be achieved by setting an appropriate reward amount and taking some measures to mitigate the discouragement effect. Specifically, companies can strengthen their internal control systems by (1) establishing a trustworthy internal investigation system; (2) strictly enforcing anti-retaliation policies; and (3) creating an internal reporting system that guarantees anonymity. Governments can encourage companies to develop robust internal control systems by imposing criminal sanctions on employers who retaliate against whistleblowers or by shifting the burden of proof for such retaliation from whistleblowers to employers. By combining these measures and adopting a holistic approach, it is possible to mitigate the discouragement effect.

As a note on the overall focus of this article, many of our discussions on social preferences and whistleblowing apply not only to environmental crimes but also to other types of crimes. Ideally, introducing a comprehensive whistleblower reward system that provides rewards for various crimes is desirable. However, considering the current state of whistleblower laws in many countries, it seems challenging to implement such a system immediately. On the other hand, in current legal policy discussions, whistleblower rewards that focus on environmental governance are often debated due to the growing international concern for the environment (Reeves 2024). Therefore, focusing on an in-depth analysis of environmental whistleblower rewards will likely have a greater impact on actual legal policies than attempting to cover as many types of crimes as possible.[3]

[3] Indeed, previous research has shown that crime characteristics, such as the visibility of negative externalities, influence whistleblowing (Butler, Serra, and Spagnolo 2020). Since it is challenging to explore legal designs for various types of crimes in depth within the limited space of this article, we focus specifically on environmental crimes.

We present the literature review first, followed by a description of our theory and hypotheses. Then, we detail our methodology for hypothesis testing and present the results. The article concludes with an exploration of policy implications.

Literature review

We first review the literature on whistleblower legislation and reward policies to understand why analyzing the discouragement effect of whistleblower rewards is necessary. Next, we examine the literature on SVO to comprehend why investigating whether SVO is a determinant of whistleblowing is essential. Finally, we review the literature on predictors of whistleblowing and their effect sizes to determine how large the effect of SVO must be to warrant consideration in the formulation of legal policies.

Whistleblower legislation and reward policies

Reviewing prior research on the role of whistleblowing in law enforcement and its promotion through rewards, Ioannis Kampourakis (2021) argued that whistleblowers serve as regulatory intermediaries, resolving the information asymmetry between regulators and regulated organizations and influencing the compliance culture of these organizations. Kampourakis also notes that whistleblowing, traditionally used in uncovering tax and securities violations, can be effectively applied in broader areas like environmental and human rights violations. Emily Becker (2014) argued for increased utilization of whistleblowing in detecting environmental violations in the United States, noting that current laws provide insufficient protection to whistleblowers and that enhancing protection alone will not sufficiently incentivize them. Becker proposes a reform that aligns with our suggestion to pay a portion of fines collected from violators as rewards to whistleblowers, thereby improving their incentives.

Regarding whistleblower rewards, theoretical studies exist analyzing the incentives they provide to whistleblowers and their deterrent effect on crime. Yehonatan Givati (2016) demonstrated using a formal model that, when the risk of false reporting is low, awarding rewards to whistleblowers is a more efficient method of law enforcement than allocating a budget to increase enforcement officers. Paolo Buccirossi, Giovanni Immordino, and Giancarlo Spagnolo (2021) showed, also using a formal model, that, for successful reward policies, balancing the reward amount, sanctions for false reporting, and accuracy of court judgments is crucial.

As these studies indicate, whistleblower rewards do not always lead to crime deterrence and can entail side effects like false reporting. Indeed, there are strong reservations about the idea of rewards, with concerns about lack of evidence supporting their effectiveness or the potential increase in malicious whistleblowing (Business Roundtable 2010; Financial Conduct Authority and the Bank of England Prudential Regulation Authority 2014). However, Theo Nyreröd and Giancarlo Spagnolo (2021) demonstrated that many of these negative views are not based on empirical evidence. Data from existing US reward policies show that, when properly designed, whistleblower rewards can enhance the quality and quantity of whistleblowing and increase deterrence, with minimal concerns over false claims.

Justin Evans and colleagues (2021), through interviews with whistleblowers and their counsels in the Dodd-Frank whistleblower program in the United States, revealed that anonymity, protection from retaliation, and rewards constitute fundamental incentives for whistleblowers.

Focusing on the impact of whistleblower rewards on the intention or likelihood of internal and external reporting, we must distinguish between the discouragement effect on internal reporting and the motivation crowding-out effect on external reporting (Frey and Jegen 2001). The former effect, which is a relative price effect in economics, refers to how rewarding external reporting will increase its relative benefits over internal reporting, thereby potentially inhibiting internal reporting. The latter effect refers to how rewarding external reporting may weaken the intrinsic motivation for it, consequently inhibiting external reporting. Concerns about the discouragement effect on internal reporting continue to be a strong basis for rejecting the introduction of whistleblower rewards in many jurisdictions, yet empirical research on this subject is scarce (Financial Conduct Authority and the Bank of England Prudential Regulation Authority 2014; Japanese House of Representatives 2020). Therefore, our analysis focuses on this effect. Leslie Berger, Stephen Perreault, and James Wainberg (2017) discovered through survey experiments that rewards for external reporting might influence the likelihood of internal reporting. Although their study is pioneering on this topic, their study did not consider the differences in the standards of proof between internal and external reporting, and it suggests further research on the discouragement effect. In response, we utilized a vignette that assumed differing standards of proofs for internal and external reporting to analyze this issue.

In contrast, there is an abundance of prior research on the motivation crowding-out effect, with divided conclusions about its existence. Although studies completed by Yuval Feldman and Orly Lobel (2010), Feldman and Oren Perez (2012), and Berger, Perreault, and Wainberg (2017) have confirmed the presence of this effect under certain conditions, they also have proposed solutions. Therefore, the motivation crowding-out effect is less problematic, and we place it outside the scope of our analysis. A notable recent empirical study is the one conducted by Conny Wollbrant, Mikael Knutsson, and Peter Martinsson (2022). They used data on recycling activities to find that the relationship between monetary rewards and prosocial behavior could be S-shaped, suggesting that the strongest effect of motivation crowding out, leading to a decrease in prosocial behavior, occurs in the intermediate range where rewards are neither too low nor too high. While these results cannot be directly applied to the context of whistleblowing, the fact that modest reward amounts could potentially promote prosocial behavior is important for legal design. We take this fact into account in constructing our hypotheses.

In summary, while prior research proposes whistleblower rewards for external reporting of environmental violations, there are few studies examining concrete legal designs. Moreover, concerns about the discouragement effect on internal reporting continue to impede the adoption of reward policies, with few studies empirically or experimentally examining this effect. In this context, our study contributes to the literature by empirically examining the discouragement effect through a vignette-based survey and proposing specific designs for environmental whistleblower rewards.

SVO and its predictive power

Social preferences constitute a multidimensional concept characterized by several aspects, like SVO and social mindfulness (Van Doesum et al. 2021). Among these dimensions, SVO stands out due to its extensive research history (Messick and McClintock 1968; Murphy and Ackermann 2014). The advantages of SVO, such as ease of measurement and comparability of effect sizes, make it a suitable variable for representing social preferences in this study. The concept of SVO emerged from a series of studies intended to address the shortcomings of game theory. John Von Neumann and Oskar Morgenstern (1944) laid the foundations of game theory, enabling the analysis of interactions among people through formal models. However, these analyses often relied on the strong assumption that individuals pursue self-interest exclusively. Consequently, other researchers explored situations where individuals also consider the interests of others. Specifically, David Messick and Charles McClintock (1968) developed the so-called decomposed games in which an individual chooses how to allocate resources between themselves and the other person. This led to a series of studies influenced by their work, analyzing social preferences and solidifying the concept of SVO.

Recent studies, such as those by Ryan Murphy, Kurt Ackermann, and Michel Handgraaf (2011), have provided methods for measuring an individual's prosociality, or the extent to which they consider the welfare of others, as a one-dimensional continuous variable. However, earlier research has treated prosociality not as a continuous variable but, rather, as a discrete categorical variable. In particular, numerous prior studies categorize people based on SVO into two main groups: prosocial and proself individuals (De Cremer and Van Lange 2001). Proself individuals primarily focus on their interests, while prosocial individuals consider not only their welfare but also that of others. Some studies further subdivide these categories. A common method of subdivision classifies people into three categories: prosocial, individualistic, and competitive (Murphy and Ackermann 2014). Assuming a scenario with two individuals, a prosocial individual aims to maximize the total payoffs for both themself and the other person, while an individualistic individual focuses on maximizing their payoff, and a competitive individual strives to maximize the difference between their payoff and that of the other person.

The literature on this topic has revealed that SVO serves as a predictor for various types of behavior, including volunteering, donating, tax compliance, and pro-environmental actions. Regarding volunteer behavior, Charles McClintock and Scott Allison (1989) analyzed whether SVO could predict the unpaid cooperation of American college students in a psychology project. They discovered that prosocial students dedicated more time to cooperation than individualistic and competitive students. Paul Van Lange, Michaéla Schippers, and Daniel Balliet (2011) examined the likelihood of Dutch university students volunteering in psychological experiments and found that prosocial students were more likely to participate in these experiments than the other types of students.

In the context of donation behavior, Van Lange and colleagues (2007) scrutinized the donating habits of people in the Netherlands. They revealed that prosocial individuals engaged more frequently in donation activities, including supporting organizations for the poor and sick, than individualistic and competitive individuals.

Shibly Shahrier, Koji Kotani, and Makoto Kakinaka (2017) demonstrated that, in Bangladesh, prosocial individuals donated more money to humanitarian activities than other types of students. Moreover, prior research using experimental designs has discovered that SVO predicts various behaviors, including tax compliance (D'Attoma, Volintiru, and Malézieux 2020) and pro-environmental actions (Cameron, Brown, and Chapman 1998).

In short, SVO is a concept representing the extent to which individuals are prosocial, and the literature has established it as a robust predictor of prosocial behaviors closely related to social interests. Although prosocial motivations are a major driver of whistleblowing behavior (Kesselheim, Studdert, and Mello 2010), the extent to which SVO affects whistleblowing activities has not yet been investigated. Exploring this aspect is crucial when considering rewards for environmental whistleblowers. As will be explained, if SVO is a primary determinant of whistleblowing, individuals with a higher level of SVO should be less susceptible to the discouragement effect of rewards. This fact becomes a significant consideration in the design of reward policies. Thus, this study contributes to the literature by empirically examining whether and to what extent SVO affects internal and external reporting activities.

Predictors of whistleblowing and their effect sizes

We are interested not only in whether SVO is a determinant of whistleblowing but also in its effect sizes. The extent to which SVO should be considered in the design of whistleblower legislation depends on the size of its impact. To assess the effect sizes of SVO, having several comparative references is beneficial; hence, we review the literature on predictors of whistleblowing and their effect sizes. A well-known caveat in reviewing whistleblowing studies is the discrepancy between the intention and behavior of whistleblowing. Data on actual whistleblowing behavior is challenging to obtain for various reasons, including the need to protect the anonymity of whistleblowers. Therefore, many studies, including ours, analyze the determinants of whistleblowing intentions using hypothetical scenarios.

In this regard, Sebastian Oelrich (2021) found no difference in the conclusions about whether independent variables affect dependent variables between intention and behavior, but there are differences in the effect sizes of certain types of independent variables. More specifically, there is little difference in the effect sizes of demographic variables of whistleblowers, such as age and gender. In contrast, the effect sizes of contextual variables, such as the threat of retaliation and compliance measures, are greater in absolute values when using behavior as the dependent variable than when using intention. Therefore, as Oelrich suggested, as long as we interpret the effect sizes cautiously considering this aspect, using intention data instead of behavior data does not seem to have significant drawbacks.

The most renowned study on the effect sizes of predictors of whistleblowing is the meta-analysis on whistleblowing studies conducted by Jessica Mesmer-Magnus and Chockalingam Viswesvaran (2005). According to their study, for demographic variables of whistleblowers, age has an effect size of $r = 0.19$ ($d = 0.39$), gender has $r = -0.05$ ($d = -0.1$), and organizational tenure has $r = 0.02$ ($d = 0.04$) on whistleblowing intention. Here, r represents the sample-size weighted mean

observed correlation that they reported, and d represents Cohen's *d* converted from r following the method described by John Ruscio (2008). In absolute terms, d is approximately twice the value of r. For contextual variables, organizational climate for whistleblowing has an effect size of r = 0.28 (d = 0.58), the threat of retaliation has r = −0.27 (d = −0.56), and supervisor support has r = 0.28 (d = 0.58) on whistleblowing intention. As a recent meta-analysis, Dimitrios Batolas, Sonja Perkovic, and Panagiotis Mitkidis (2023) discovered that psychological closeness between potential whistleblowers and wrongdoers has an effect size of r = −0.22 (d = −0.46) and hierarchical closeness has r = 0.17 (d = 0.34) on whistleblowing intention. These effect sizes of predictors of whistleblowing provide helpful information for assessing the effect sizes of SVO on whistleblowing intentions in our study. If the effect sizes of SVO are non-negligible compared to those of these predictors, it is meaningful to consider SVO in the design of whistleblower legislation.

Theory and hypotheses

Building on the literature review, we present our theory and hypotheses. Since our theory is predicated on an understanding of environmental governance and law, we first overview these concepts before constructing specific hypotheses.

Environmental whistleblower laws

For sustainable growth, it is essential to appropriately design a system comprising rules, policies, and institutions that protect the natural environment, known as environmental governance (Lemos and Agrawal 2006). Within the realm of environmental governance, focusing on the role of law reveals that countries around the world have ratified various international environmental agreements in different environmental fields, such as the United Nations Convention on the Law of the Sea, the Basel Convention, the Convention on Biological Diversity, and the Paris Agreement, and have also developed domestic environmental laws.[4] Among the various functions of environmental law, the role of deterring environmental crimes is becoming increasingly important. For instance, the scale of environmental crimes, such as the illegal disposal of chemicals and the illicit harvesting and trafficking of timber, minerals, animals, and fish, has now risen to become the fourth largest among crimes in the world, recording growth rates of two to three times that of the world economy (Nellemann et al. 2016). To curb the surge in environmental crimes, governments in many countries have implemented legal policies that include harsher imprisonment and fines for environmental offenses and have expanded the definition of such crimes. For example, the European Union plans to amend its Environmental Crime Directive to strengthen criminal sanctions against corporations and individuals and increase the types of crimes designated as environmental crimes (European Commission 2023).[5]

[4] United Nations Convention on the Law of the Sea, 1982, 1833 UNTS 3; Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1989, 1673 UNTS 126; Convention on Biological Diversity, 1992, 1760 UNTS 79; Paris Agreement on Climate Change, 2015, 3156 UNTS 79.

[5] Council Directive (EU) on the Protection of the Environment through Criminal Law, (2024) OJ L1203.

However, environmental crimes are extremely challenging to address due to the difficulty in detecting illegal activities and proving causation and damage. Even if countries amend their laws to impose stricter penalties or expand the types of criminalized activities, such amendments will not be successful unless authorities can effectively investigate and prosecute these offenses. To enhance the investigative and prosecutorial capabilities of regulatory authorities, regulators need to address the information asymmetry between the regulated entities and authorities (Iwasaki 2018). Whistleblowers, who are often well versed in the insider information of regulated entities such as businesses, can aid authorities in detecting types of crimes that are difficult for enforcement officers to uncover through regular investigations. Since environmental crimes are often carried out in an organized manner, it is challenging for authorities to detect them without the cooperation of whistleblowers.

Many instances of environmental crimes have come to light through whistleblowing. For example, criminal activities on vessels in the open sea, such as those known only to a limited number of employees like engineers, are often brought to the attention of US authorities primarily through whistleblower information. Most of the recent cases of ship pollution have been detected in this way (*Whistleblower Network News* 2019). A notable case involved Princess Cruise Lines, which was reported by one of its engineers for illegally dumping oily waste, violating the Act to Prevent Pollution from Ships. In 2016, the company agreed to pay a criminal fine of forty million dollars in a settlement with US authorities (US Department of Justice 2016).[6] Another notable case involved air pollution by Hyundai Construction Equipment Americas and Hyundai Heavy Industries. They violated Title II of the Clean Air Act by selling heavy construction vehicles equipped with diesel engines that did not meet emission standards.[7] This case came to light through a whistleblower, and, in 2019, both companies agreed to pay a civil fine of forty-seven million dollars in a settlement with US authorities (US Department of Justice 2019).

As these cases illustrate, the power of whistleblowers is substantial. This reality signifies that whistleblowers pose a threat to perpetrators of misconduct. In cases of organized crime, most whistleblowers face various forms of retaliation from the wrongdoers, including dismissal and harassment. To address this issue, over the past thirty years, many countries have enacted whistleblower protection laws to safeguard whistleblowers from retaliation (Iwasaki 2020b). These laws typically prohibit employers from taking adverse actions like dismissal or pay cuts against employees who engage in whistleblowing activities that meet the legal requirements stipulated by the laws. However, in most cases, the legal protection provided by whistleblower protection laws is insufficient, and whistleblowers often face unexpected misfortunes such as divorce or suicide triggered by the retaliation from the wrongdoers, leading to disruptions in their life plans (Sullivan 2012). Consequently, to guarantee the post-disclosure welfare of whistleblowers and to provide sufficient incentives for whistleblowing, some countries, including the United States, Canada, and South Korea, have established whistleblower reward programs in addition to whistleblower protection laws (Iwasaki 2020b). These countries have implemented policies that

[6] Act to Prevent Pollution from Ships, 33 USC §§1908 (2010).
[7] Clean Air Act, 42 USC § 7413 (2010).

provide financial rewards to individuals who report certain types of crimes to the authorities.

The United States has been the most active in utilizing whistleblower reward programs for crime detection and currently has multiple such programs in place. Among these, the one with the oldest history is the False Claims Act, established in 1863 to address fraud by defense contractors during the Civil War.[8] This law, having undergone several amendments over the years, now regulates various forms of false claims, including fraudulent claims for medical reimbursements by health-care providers under public medical insurance programs and false reporting of quality by defense contractors. A notable feature of the False Claims Act is its qui tam provision, which allows whistleblowers, such as individuals or organizations with evidence of fraud against federal government programs or contracts, to sue the perpetrators on behalf of the US government.[9] If the government recovers damages, the whistleblower is entitled to receive between 15 percent and 30 percent of the proceeds, depending on whether the government chooses to intervene in the lawsuit.

One of the newer, yet highly successful, whistleblower reward programs in the United States is the US SEC's Whistleblower Program, established under the Dodd-Frank Act in 2011.[10] This program rewards whistleblowers who report securities law violations to the US SEC. If a whistleblower's information leads to the collection of monetary sanctions exceeding one million dollars from violators, the whistleblower can receive between 10 percent and 30 percent of the collected sanctions as a reward.[11] To date, this program has awarded approximately $1.2 billion to 249 individuals (US SEC 2022). Under this program, employees are not required to report internally in order to be eligible for a reward, even if they work for companies with internal compliance processes (US SEC 2024). If an employee reports internally and then reports to the US SEC within 120 days, the US SEC considers the report to have been made on the date of the internal report. Additionally, if the company conducts an investigation based on the employee's internal report and reports the findings to the US SEC, the employee benefits from all the information revealed during the company's investigation. Furthermore, the fact that the employee reported internally may be considered when determining the appropriate amount of the reward.

Regarding this legal design, some commentators have expressed the concern that, if employees do not lose the opportunity to receive rewards for external reporting or if the reward amount is not reduced when they report internally, then the discouragement effect is negligible (Vega 2012, 512). But if employees report internally and the compliance team prevents the crime at its early stage, they may lose the opportunity to receive a reward. Additionally, due to requirements such as the threshold of corporate sanctions needing to exceed one million dollars or a certain percentage of corporate sanctions being awarded as a reward, employees may wait for the damage caused by the crime to escalate before reporting internally. Despite these concerns, data on actual whistleblowers shows that most reward recipients reported internally first, even though internal reporting is not a

[8] False Claims Act, 31 USC §§ 3730 (2015).
[9] False Claims Act.
[10] Dodd-Frank Act.
[11] Securities Whistleblower Incentives and Protections, 17 CFR §§ 240.21F-5 (2020).

requirement for a reward (US SEC 2021, 24). Although this fact only partially negates the commentators' concerns, it necessitates further scrutiny of their arguments.

Turning our focus to environmental law, certain laws, such as the Act to Prevent Pollution from Ships[12] and wildlife protection laws like the Lacey Act,[13] offer financial rewards to whistleblowers. For instance, the engineer who blew the whistle on Princess Cruise Lines for violating the Act to Prevent Pollution from Ships received a reward of one million dollars (*BBC News* 2017). However, many environmental laws, such as the Clean Air Act and the Clean Water Act, do not offer whistleblower rewards.[14] This imbalance in the legal treatment of whistleblowers cannot be justified legally or economically. For example, whistleblowers who report violations of the Clean Air Act related to vehicle emissions are not eligible for financial rewards. Whether ocean or air pollution, the environmental impact is significant, and there is no difference in the necessity to deter these violations. Furthermore, there is an obvious need to reward whistleblowers in either case. Therefore, even in the United States, it is possible and feasible to expand the types of environmental crimes eligible for whistleblower rewards and further improve whistleblowing in environmental governance. The Environmental Protection Agency and other federal and state agencies can impose fines and claim damages for violations under various laws.[15] By using a portion of the fines collected from violators as rewards for whistleblowers, a funding source for these rewards can be secured. This method of securing funds is consistent with the common approach used in whistleblower reward programs under laws such as the False Claims Act and the Dodd-Frank Act.[16]

As we have examined, whistleblowing is extremely effective in detecting environmental crimes and various legal violations. However, most countries have only enacted whistleblower protection laws, rejecting the idea of whistleblower rewards due to various concerns (Financial Conduct Authority and the Bank of England Prudential Regulation Authority 2014; Japanese House of Representatives 2020). Nevertheless, as prior research has shown, most concerns are not based on scientific evidence. Among the major concerns, the one that has not been sufficiently examined is the discouragement effect, as explained in the literature review. There are fundamental questions about the discouragement effect that remain unclear, such as under what conditions it occurs and the extent of its impact. The question also remains as to what level of reward is desirable to compensate whistleblowers to promote external reporting while mitigating the discouragement effect. Thus, in the following subsection, we will construct our theory and hypotheses based on previous research.

SVO and whistleblowing

The common concerns regarding the discouragement effect are not justified, considering the findings from SVO research and the legal practice of whistleblowing. Let us explain our theory. The idea of whistleblower rewards is to increase the

[12] Act to Prevent Pollution from Ships, 33 USC § 1908 (2010).
[13] Lacey Act, 16 USC § 3375(d) (2010).
[14] Clean Air Act.
[15] Clean Air Act; Clean Water Act, 33 USC § 1319 (2011).
[16] False Claims Act.

personal benefits of whistleblowing and improve the balance between the personal benefits and costs. Without monetary rewards, the motives for whistleblowing are primarily prosocial and ethical. Because the costs are usually high, whether to become a whistleblower can be a difficult decision for most employees. Whistleblowers are often forced to leave their company. A monetary reward for whistleblowing provides a safety net to compensate for the costs that this decision incurs. But monetary rewards for external whistleblowing may also discourage internal reporting. If the function of external whistleblowing is the same as the function of internal reporting, this may not be a problem. If the increase in the frequency of external whistleblowing exceeds the decrease in the frequency of internal reporting, deterrence of corporate crime may increase. In practice, however, the role of internal reporting differs from that of external whistleblowing (Iwasaki 2018). Internally, employees usually report a potential violation at an early stage. After receiving an internal report, a company's compliance department is expected to take preventive measures to stop further damage to the company and society. On the other hand, after receiving an external whistleblowing tip, enforcement agencies are expected to discover any violation and sanction wrongdoers.

The critical limitation in the sanctioning function of authorities is that the probability of individual prosecution is very low (Garrett 2015). In most cases, even if corporations are sanctioned after the detection of crimes, individual wrongdoers are not sanctioned. Thus, authorities cannot provide a sufficient threat of sanctions to deter individual wrongdoers. In the United States, for example, this reality is illustrated by the fact that most pre-trial diversion agreements require companies to implement an effective compliance program; such self-policing efforts are considered to be effective in reducing crimes (Iwasaki 2020a). The compliance departments of firms can in fact create environments in which violating laws is physically and psychologically difficult. They can establish both a robust auditing system and a strong ethical culture. Thus, external reporting is not necessarily a good substitute for internal reporting when it comes to reducing crime.

Then, do monetary rewards for external whistleblowing really discourage internal reporting to a great extent? The discussion around the discouragement effect is simplistic; when people can choose between internal and external reporting and only external reporting is rewarded, external reporting becomes relatively more attractive, leading people to choose it over internal reporting. The implicit assumption in this argument is that whistleblowers can freely choose between internal and external reporting without any constraints. However, this assumption is unrealistic when considered in light of the legal practice of whistleblowing, particularly ignoring the fact that the standards of proof differ between internal and external reporting (Iwasaki 2018). In reality, external reporting requires more time and effort than internal reporting. Enforcement authorities must allocate their limited resources to cases where specific and credible evidence has been submitted. The standard of proof applied in external reporting is higher than the standard applied in internal reporting.

These facts imply a substantial time lag between internal reporting and external reporting. While an employee is collecting enough evidence to justify external reporting, the damage to society caused by a violation may significantly increase. If employees have a high level of SVO and prosocial preferences, they might experience

an increase in their personal welfare by preventing harm to society. This means that prosocial individuals could receive non-monetary benefits by preventing crimes and avoiding losses in societal welfare. If these non-monetary benefits are sufficiently large, they may first report internally even if they thereby lose an opportunity to receive monetary rewards. If these arguments hold, monetary rewards for external reporting do not always decrease internal reporting. In fact, Aaron Kesselheim, David Studdert, and Michelle Mello (2010) have substantiated the basis of our discussion by revealing through interviews with qui tam whistleblowers that the primary motivation for whistleblowing is prosocial or ethical and that most whistleblowers initially report internally before proceeding to external reporting.

Furthermore, increasing external reporting tips through monetary rewards could even lead to an increase in internal reporting tips (Iwasaki 2018). This is because the heightened threat of external reporting may make wrongdoers and corporate compliance departments more responsive to internal reports, increasing the likelihood that internal reporting will compel wrongdoers to abandon their criminal activities. In other words, the threat of external reporting could make internal reporting more successful and increase the incentive for employees to report internally. Individual wrongdoers, upon learning of an internal report about their misconduct, may be confronted with the decision to cease their criminal activities. In many cases, the initiation of an internal investigation will alert wrongdoers that an internal report may have been made. If wrongdoers anticipate that the likelihood of external reporting, motivated by monetary rewards, is higher than before, they may hesitate to continue their criminal behavior. The increase in the threat of external reporting due to monetary rewards may also improve the responsiveness of corporate compliance departments (Wiedman and Zhu 2023). Fearing that external reporting could expose corporate scandals and damage corporate reputation, compliance departments might become more responsive to internal reports.

To summarize our discussion thus far, the argument around the discouragement effect is invalid as it overlooks the fact that the primary motivation of whistleblowers is prosocial and that there are differences in the standards of proof between internal and external reporting. Although empirically examining all aspects of our theory is not feasible, primarily due to budgetary constraints, we establish several key assumptions as testable hypotheses using data. First, a central assumption of our theory is that, regardless of the presence of monetary rewards, people engage in internal or external reporting driven by prosocial motivations. If the primary motivation of whistleblowers is prosocial, as indicated by prior research, then prosocial individuals, or those with higher levels of SVO, are more likely to engage in internal or external reporting. Therefore, we present the following testable hypotheses:

Hypothesis 1.1: SVO is associated with the intention to report internally.

Hypothesis 1.2: SVO is associated with the intention to report externally.

Another key assumption of our theory is that modest levels of monetary rewards sufficiently increase the likelihood of external reporting. If people are willing to

report externally only with high levels of monetary rewards, the sizes of the discouragement effect and motivation crowding-out could become significant. If this is the case, the social costs brought by the rewards may outweigh the social benefits. Therefore, the assumption that modest rewards can still sufficiently promote external reporting is essential. Although previous studies have found that even a modest level of reward can substantially increase the likelihood of whistleblowing (Schmolke and Utikal 2016), we further examine this point. What constitutes a "modest level" and "sufficiently" will be explained in the methodology section. We propose the following hypothesis:

Hypothesis 2 (incentive effect): modest monetary rewards for external reporting sufficiently increase the likelihood of such reporting.

Finally, the other central assumption of our theory is that prosocial individuals are less likely to be affected by the discouragement effect than proself or individualistic individuals. Therefore, we propose the following hypothesis:

Hypothesis 3 (discouragement effect): the discouragement effect is less pronounced for prosocial individuals or those with higher levels of SVO than for individualistic individuals or those with lower levels of SVO.

Prior research has shown that the majority of society consists of prosocial individuals. Thus, if not all individuals are greatly affected by the discouragement effect, and if prosocial individuals are less susceptible to the discouragement effect, this casts doubt on the validity of the claim that monetary incentives undermine a firm's internal controls. Even if some individuals are more susceptible to the discouragement effect, setting appropriate reward amounts or taking other measures can mitigate such effects. Determining the appropriate level of rewards needs to balance the extent to which rewards promote external reporting against the degree to which they inhibit internal reporting. Such balancing requires consideration of various factors, making it difficult to propose a hypothesis. Hence, as explained in the next section, we have adopted an exploratory approach without setting a prior hypothesis to investigate reasonable reward levels.

Methodology

To test our hypotheses, we adopt a methodology that combines a vignette-based survey with a measurement of SVO. The vignette and questionnaires used in this study are included in the online Appendix. As explained in the literature review section, obtaining behavioral data on whistleblowing is challenging, and while being mindful of the differences between behavioral and intention data, the analysis of intention data is valid. Since asking abstract questions about whistleblowing intentions can yield limited information, studies on whistleblowing intentions typically use vignettes based on specific crimes. In this study, we employ a vignette concerning illegal emissions, a typical environmental crime. Our analysis can be applied to environmental crimes beyond illegal emissions. Jeffrey Butler, Danila Serra, and Giancarlo Spagnolo (2020) found that, among the determinants of whistleblowing, two key factors related to the type of crime are whether negative externalities caused

by wrongdoing are perceivable by the public (visible externalities) and whether a whistleblower has the opportunity to be approved or disapproved by the public (social judgment).

According to their analysis, when negative externalities caused by wrongdoing are not visible to the public, the possibility of social judgment reduces whistleblowing. In contrast, when negative externalities are visible to the public, the possibility of social judgment either has no effect or increases whistleblowing. For example, in the case of securities crimes, such as financial misstatement, the public finds it difficult to perceive the negative externalities. However, environmental crimes generally have the common characteristic that the negative externalities they cause are relatively easy for the public to perceive compared to other types of crimes. Therefore, while it is uncertain whether our analysis can be applied to types of crime other than environmental crimes, since further research is necessary, it is likely that our analysis is applicable to environmental crimes beyond illegal emissions.

Vignette

The participants were presented with a hypothetical scenario in which they are an assistant manager of an automobile company monitoring the production of automobiles in the company's manufacturing plant. One day, the assistant manager finds that an emission device reducing harmful gases is not being installed on new cars, which violates relevant laws. Unless the company fixes the problem, the new models will continue to emit harmful gases. When the assistant manager reports the problem to their supervisor, the supervisor takes no action to resolve the problem. The assistant manager can immediately report the problem to the internal compliance department, which is responsible for ensuring that the company complies with the law. The evidence they have is enough to enable the internal compliance department to conduct an internal investigation. The assistant manager can also report the problem to the regulatory agency. However, because the regulatory agency's budget and resources are limited, they will need to collect more evidence to persuade the agency to begin an investigation. Collecting enough evidence to perform an effective act of external whistleblowing is likely to take four weeks, during which damages to the environment may increase. The supervisor is aware that the assistant manager may report this issue to the supervisory authorities, potentially leading to his prosecution. If the supervisor realizes that the assistant manager has blown the whistle internally or externally or both, they may suffer retaliation. The assistant manager has a spouse and two children. In this situation, the assistant manager can report the problem to either the internal compliance department or the regulatory agency, to neither, or to both.

The participants were asked to use a seven-point Likert scale (1: extremely unlikely; 2: moderately unlikely; 3: slightly unlikely; 4: neither likely nor unlikely; 5: slightly likely; 6: moderately likely; and 7: extremely likely) to indicate the extent to which they would be likely to report internally after reading the scenario. Then, those who indicated that they would report internally were asked how likely they would be to report this issue to the regulatory agency if they reported it to the internal compliance department but no internal investigation was conducted. Those who

indicated that they would not report internally were asked to what extent they would be likely to report externally to the regulatory agency.

Questions for the incentive and discouragement effects

As mentioned in the theory and hypotheses section, we are interested not only in the existence and magnitude of the incentive and discouragement effects but also in determining the appropriate amount of rewards to balance these effects. Due to budgetary constraints, we could not conduct a large-scale survey to ascertain the precise amounts, but we aimed to explore approximate figures for use as foundational data in future research. To achieve this objective, we asked questions about the threshold levels of both effects as follows.

Threshold reward for the incentive effect

After the participants had responded about the likelihoods of internal and external reporting, they were asked what level of reward would be large enough to make them willing to report the problem to the regulatory agency if a reward was introduced for external reporting. This question aimed to analyze the incentive effect and to learn the lowest reward level that would encourage most participants to report externally. Participants selected one category from nine monetary amount categories (1: $1–$49,999; 2: $50,000–$99,999; 3: $100,000–$199,999; 4: $200,000–$299,999; 5: $300,000–$399,999; 6: $400,000–$499,999; 7: $500,000–$999,999; 8: $1,000,000–$1,999,999; 9: $2,000,000 or more).

Threshold reward for the discouragement effect

The participants were also asked what level of reward would discourage them from first reporting the problem to the internal compliance department, assuming that if they first reported internally and the internal compliance department resolved the issue, they were not eligible for the reward. This question aimed to analyze the discouragement effect and to learn the lowest reward level that would discourage most participants from first reporting internally. Participants selected one option from a total of ten choices, which included the same nine amount categories presented in the question about the threshold for the incentive effect, plus an additional option, "10: I will always first report internally."

The responses to this threshold question must be interpreted with caution. When a reward policy for external reporting is introduced, as discussed in the theory and hypotheses section, wrongdoers and internal compliance departments may become more sensitive to the threat of external reporting, potentially increasing the likelihood of internal reporting successfully preventing harm. Additionally, the increased threat of external reporting might improve compliance cultures within organizations. Expressive effects of laws might lead to the spread of positive norms about whistleblowing. All these factors could increase the likelihood of internal reporting motivated by non-monetary incentives. However, it would likely take time for these effects to manifest in reality, making it difficult for our survey to capture them. Thus, the question regarding the discouragement effect is only intended to

ascertain what level of rewards would discourage what percentage of employees from internal reporting, other conditions being held constant.

Simply comparing the proportion of people who are encouraged to report externally by a specific level of rewards with the proportion of people who are discouraged from internal reporting by that level of rewards can lead to misleading results. The information we derive from the threshold responses for the discouragement effect should be noted to indicate only (1) whether the effect is as substantial as generally believed and (2) whether the effect is less likely to affect prosocial people, who make up a majority of society, compared to individualistic people. While more information is required to design a fine reward policy, gaining insights into these facts greatly advances our understanding, especially given the current limited knowledge about the discouragement effect.

SVO slider measure

Next, participants responded to questions measuring their SVO. While there are several representative methods for measuring SVO, we employed the slider measure developed by Murphy, Ackermann, and Handgraaf (2011), which has recently become the most frequently used method in psychology and behavioral economics research. The notable feature of the slider measure is that it allows treating SVO both as a traditional categorical variable and as a continuous variable. For comparison with prior research, it is convenient to treat SVO as a categorical variable, but treating it as a continuous variable is more consistent with the concept of SVO. In the slider measure, subjects are asked to choose how to allocate gains between the self and another person across six different situations. Based on their choices, an SVO score is calculated, which can be treated as a continuous variable representing the degree of prosociality. A higher SVO score means greater prosociality. Additionally, based on the SVO score, participants can be classified into four traditional categories: altruistic, prosocial, individualistic, and competitive.

The online Appendix reports the results when social preferences were measured, using the dictator game as supplementary information. Item 5 of the SVO slider measure is the dictator game (Murphy, Ackermann, and Handgraaf 2011, 779), and we used this score in our analysis. The results using the dictator game scores were remarkably similar to those obtained using the SVO slider measure in terms of statistical significance and effect size. This finding suggests that our results are robust with respect to the method of measuring social preferences. The dictator game is a long-established method for measuring social preferences, and there is an extensive body of literature on it. Some of this literature investigates the relationship between social preferences measured by the dictator game and prosocial behavior (Höglinger and Wehrli 2017). By comparing our results with those findings, readers can apply our results to other related topics.

Participants and procedures

Data were collected using Amazon Mechanical Turk (MTurk), an online crowdsourcing platform, in January 2020. The author recruited participants in the United States. Results of the power analysis indicated that a sample size of 250 was sufficient to

achieve 80 percent power, assuming a small to moderate effect size. A total of 474 individuals participated in this survey, of which 315 (66 percent) passed the comprehension and attention check questions and were therefore included in the analysis, providing a sample size that was adequate for statistical power. Participants were asked to read the vignette and answer the related questions, take the slider measure, and finally answer demographic questions. The survey was designed to take six minutes, and most participants completed the survey within this time frame. Participants were paid 0.6 US dollars.[17]

Statistical analysis

Testing Hypothesis 1

To test Hypothesis 1, we first analyze the bivariate relationship between SVO and each of the intentions of internal and external reporting without considering the influence of other variables. Each reporting intention is a variable with a seven-point Likert scale, and SVO is a categorical variable indicating that respondents belong to either a group of prosocial individuals or a group of individualistic individuals. Our testing methods include the difference of means t-test and the Mann-Whitney U test. A critical consideration in our data is that reporting intention variables do not follow a normal distribution. In this regard, the difference of means t-test assumes normality, but large sample sizes (for example, one hundred or more) can mitigate the impact of non-normality on the results (Lumley et al. 2002). Nevertheless, given that Hypothesis 1 is the most crucial hypothesis of this study, we utilize both testing methods to ensure the robustness of our results. The null hypothesis for the difference of means test is that there is no difference in the mean of each reporting intention between the prosocial and individualistic groups. Mann-Whitney U test is a nonparametric test, and the null hypothesis is that the distributions of each reporting intention are the same across the two groups.

Next, we look at the relationship between SVO and each reporting intention by controlling for the influence of other variables through regression analysis. The regression model is as follows and is estimated by ordinary least squares (OLS):

$$\mathrm{RI_i} = \alpha + \beta\ \mathrm{SVO_i} + \boldsymbol{\gamma}'\mathbf{x_i} + \boldsymbol{\delta}'\mathbf{z_i} + \varepsilon_i.$$

In this model, the dependent variable $\mathrm{RI_i}$ is either the internal or external reporting intention of individual i. The independent variable $\mathrm{SVO_i}$ is individual i's SVO score or SVO category. We follow the recommendation of Murphy, Ackermann, and Handgraaf (2011) to consider SVO as a continuous construct and use the SVO score as an independent variable. To compare our results with those of previous studies, we also estimate a model with the SVO category as an independent variable instead of the SVO score; the SVO category classifies individuals into prosocial and individualistic based on their SVO scores. The categorical SVO variable takes a value of 1 for prosocial individuals and 0 for individualistic ones.

[17] The compensation level for participants was determined by the formula that was commonly recommended for Amazon Mechanical Turk workers at the time this study was conducted. Currently, the desirable compensation level has increased. 'How to Calculate Worker Compensation for Amazon Mechanical Turk,' https://web.archive.org/web/20220811081403/https://tmalsburg.github.io/mturk-compensation.html.

The symbol $\mathbf{x}_i$ represents a vector of other independent variables. Since prior research has found that gender, age, and working years, more or less, affect reporting intentions, we use them as the independent variables. Gender is a dummy variable that is 1 for women and 0 for men, while age and working years are continuous variables. The symbol $\mathbf{z}_i$ represents a vector of control variables, which include education, income, and experience of working for a listed company. The symbol ε_i is the error term.

Testing Hypothesis 2

To test Hypothesis 2, we need to determine what amount can be considered a "modest" reward level. This task is extremely challenging, as it varies by country and depends on various factors. Our objective is to find out what proportion of US adults would report externally at a certain reward level, based on the vignette, which would serve as a starting point for the discussion on environmental whistleblower rewards. Thus, a rough estimate suffices. Although we strive to be objective, some subjective assessment is inevitable.

In the US SEC Whistleblower Program, it is not uncommon to take a few years from reporting to receiving a reward (US SEC 2021). Whistleblowers often face wrongful termination, and finding a new job immediately is not guaranteed. They also incur psychological costs in addition to lost benefits and earnings. Therefore, they might desire at least two to three years' worth of annual salary as compensation. For simplicity, considering that the median household income in the United States in 2020 was $67,521 (Shrider et al. 2021), we define approximately $200,000, which is three times this amount, as a "modest" level of reward. Also, given that the US SEC program awarded approximately $1.2 billion to 249 individuals, averaging about $4.8 million per person, $200,000 can be considered a modest amount (US SEC 2022).

The key point here is whether the amount generally accepted as modest is sufficient to encourage external whistleblowing. Many practitioners involved in whistleblowing consider rewards below one million dollars to be modest, so using an amount other than $200,000 as a modest amount is acceptable (see, for example, Mahany Law 2020). Among the relevant sources that provided specific amounts and evaluated them as modest, the lowest amount was $150,000 (Zuckerman Law 2023). Therefore, we believe that $200,000 is appropriate as a benchmark amount.

Next, our interest lies in whether a "modest" reward level not only has an incentive effect but also has a "sufficient" magnitude of effect. Defining what constitutes a "sufficient" effect is as challenging as defining "modest." To address this, we utilize the results of a 2011 survey conducted by the Ethics Resource Center (2012) targeting US employees. According to this survey, the proportion of participants who said they would report externally if they witnessed misconduct was about 40 percent among those whose personal financial situation was less secure compared to two years earlier but about 60 percent among those whose personal financial situation was more secure (Ethics Resource Center 2012, 15).

Based on this finding, for simplification, let us assume that in a financially secure situation, 60 percent of individuals would report witnessed misconduct. For further simplification, we assume that all individuals who answer they would not report misconduct in the vignette (scoring from 1: extremely unlikely to 4: neither likely nor

unlikely on a 7-point scale) do so due to financial insecurity. If a "modest" reward has a sufficient incentive effect to make an individual feel financially secure, then 60 percent of those who initially respond that they would not report should respond that they would report if offered a $200,000 reward.

To test Hypothesis 2, based on this reasoning, we perform a one-proportion Z test using the response data from the threshold question of the incentive effect. Specifically, we test whether the population proportion of those who would not report without a reward but would report with a $200,000 reward exceeds 60 percent.

Testing Hypothesis 3

To test Hypothesis 3, we utilize the threshold question related to the discouragement effect. Most whistleblowers in the US SEC's Whistleblower Program and False Claims Act reported internally before going external, despite not being obligated to do so (Iwasaki 2018). Therefore, we anticipate that the majority of participants in our survey would always report internally, regardless of the presence of a reward. Thus, we test whether there is a statistically significant difference in the proportion of participants who would always report internally across SVO categories using the two-proportion Z test.

Furthermore, we also validate Hypothesis 3 by analyzing the relationship between SVO and the responses to the threshold question of the discouragement effect. We conduct Mann-Whitney's U test, focusing solely on the relationship between these two variables, and regression analysis, considering the influence of other variables. We perform the regression analysis by substituting the dependent variable in the regression model for Hypothesis 1 with the variable of the responses to the threshold question.

Results

Examining the demographic data of participants, we found that 47.6 percent were women, 56.8 percent were under forty years of age, 48.3 percent held a bachelor's degree or higher, 84.5 percent had over six years of work experience, 58.4 percent had experience in publicly listed companies, and 51.8 percent had household incomes above fifty thousand dollars (see Table 1). These demographics suggest that our sample is representative of our target population, primarily comprising workers potentially encountering environmental law violations in hypothetical scenarios and opportunities for whistleblowing.

Table 2 presents the distribution of responses to reporting intentions. For internal reporting, 82.5 percent of participants responded that they would likely report (choosing between 5: slightly likely and 7: extremely likely). Regarding external reporting, 75.2 percent responded that they would likely report (choosing between 5 and 7). Among those who indicated a possibility of internal reporting, 85.4 percent also responded that they would likely report externally. For respondents who did not indicate a possibility of internal reporting (choosing between 1 and 4), 27.3 percent responded that they would likely report externally. These findings suggest that individuals likely to report internally were also likely to report externally, and

Table 1. Demographic characteristics of participants (N = 315)

	N	%
Gender		
Woman	150	47.6
Man	165	52.4
Age		
18 – 22	18	5.7
23 – 29	63	20.0
30 – 39	98	31.1
40 – 49	61	19.4
50 – 59	46	14.6
60 or more	29	9.2
Education		
Less than high school	3	1.0
High school diploma	40	12.7
Some college/No degree	70	22.2
Associate's degree	50	15.9
Bachelor's degree	109	34.6
Master's degree	39	12.4
Doctoral degree	3	1.0
Professional degree	1	0.3
Working experience		
0 – 1 years	13	4.1
2 – 5 years	36	11.4
6 – 9 years	35	11.1
10 – 19 years	95	30.2
20 – 29 years	61	19.4
30 – 39 years	45	14.3
40 or more years	30	9.5
Working experience in public companies		
Yes	184	58.4
No	131	41.6
Household income		
Less than $30,000	76	24.1
$30,000 – $39,999	42	13.3

(*Continued*)

Table 1. (*Continued*)

	N	%
$40,000 – $49,999	34	10.8
$50,000 – $59,999	32	10.2
$60,000 – $69,999	24	7.6
$70,000 – $79,999	28	8.9
$80,000 – $89,999	17	5.4
$90,000 – $99,999	8	2.5
$100,000 – $149,999	45	14.3
$150,000 or more	9	2.9

Table 2. Frequency table for reporting intentions

	Internal reporting		External reporting (pooled)		External reporting after internal reporting		External reporting without internal reporting	
	N	%	N	%	N	%	N	%
7 Extremely likely	111	35.2	118	37.5	114	43.8	4	7.3
6 Moderately likely	113	35.9	71	22.5	65	25.0	6	10.9
5 Slightly likely	36	11.4	48	15.2	43	16.5	5	9.1
4 Neither likely nor unlikely	9	2.9	20	6.3	12	4.6	8	14.5
3 Slightly unlikely	20	6.3	21	6.7	16	6.2	5	9.1
2 Moderately unlikely	16	5.1	21	6.7	6	2.3	15	27.3
1 Extremely unlikely	10	3.2	16	5.1	4	1.5	12	21.8
5 to 7	260	82.5	237	75.2	222	85.4	15	27.3
Total N	315		315		260		55	
Mean	5.63		5.37		5.83		3.24	
Standard deviation (SD)	1.62		1.83		1.44		1.95	

approximately one-quarter of those disinclined to report internally (about 5 percent of all respondents) preferred to report externally without first reporting internally.

To test Hypothesis 1 (the correlation between SVO and reporting intentions), we categorized participants based on SVO scores into traditional four groups: altruistic, prosocial, individualistic, and competitive, with the following distributions: 0 (0 percent), 216 (69 percent), 98 (31 percent), and 1 (0.3 percent) respectively. The predominance of prosocial individuals, followed by a significant presence of individualistic individuals (about 30–40 percent), and the near absence of altruistic

and competitive individuals align with prior research (Murphy, Ackermann, and Handgraaf 2011). For analytical convenience, we included one competitive individual in the individualistic group, resulting in 216 for prosocial and 99 for individualistic groups (excluding a competitive individual does not affect the conclusion).

First, we analyze the bivariate relationship. Table 3 displays the results of tests for differences in mean reporting intentions between prosocial and individualistic groups. For internal reporting, the mean for the prosocial group was 5.84, close to 6 (moderately likely), while, for the individualistic group, it was 5.17, near 5 (slightly likely). This difference was statistically significant at the 1 percent level. For external reporting data (pooled data irrespective of prior internal reporting), the mean for the prosocial group was 5.64, close to 6, and for the individualistic group, 4.79, near 5. This difference was also significant at the 1 percent level. These results are consistent with Hypothesis 1. Table 3 also presents the test results for differences in external reporting intention between the two groups within each subset of respondents: those who indicated a likelihood and those who indicated an unlikelihood of internal reporting. We omit detailed interpretations, but the findings suggest that the differences between the two SVO categories for the pooled data of external reporting mainly arise from differences within the subset of those who indicated an unlikelihood of internal reporting.

Figure 1 presents results from the Mann-Whitney U test. The top two figures show results for internal and external reporting (pooled data). In both cases, the null hypothesis that the distributions of reporting intentions are the same across the two groups was rejected at the 1 percent level. The bottom figures detail the external reporting data, subdivided into subsets of respondents likely (choosing between 5 and 7) and unlikely (choosing between 1 and 4) to report internally. In the latter subset, the null hypothesis was rejected at the 5 percent level. These results indicate alignment with Hypothesis 1. A more intuitive number might be the proportion of participants likely to report internally or externally in each SVO category. Regarding internal reporting, 87 percent of prosocial participants and 72.7 percent of individualistic participants indicated that they would likely report (choosing between 5 and 7), which was a significant difference at the 1 percent level, with $z = 3.1012$, $p < 0.001$. As for external reporting, 80.6 percent of prosocial participants and 63.6 percent of individualistic participants indicated that they would likely report (choosing between 5 and 7), a significant difference at the 1 percent level, with $z = 3.2459$, $p < 0.001$.

Regarding effect sizes, Cohen's *d* for mean difference tests was 0.42 for internal and 0.48 for external reporting. In Mann-Whitney U tests, the correlation coefficient (with values converted to Cohen's *d* in parentheses) was 0.16 ($d = 0.32$) for internal and 0.18 ($d = 0.37$) for external reporting. These effect sizes are similar to those found in prior research for variables like age ($r = 0.19$, $d = 0.39$), psychological closeness ($r = -0.22$, $d = -0.46$), and hierarchical closeness ($r = 0.17$, $d = 0.34$). SVO has comparable effect sizes to demographic and contextual variables highlighted in previous studies.

We next examine the regression results to see if the correlation between SVO and reporting intentions persists even after considering the influence of other variables (Table 4). When SVO was treated as a continuous variable, its regression coefficients were 0.021 for internal reporting and 0.028 for external reporting (equations (1) and (3)), indicating that, for every unit increase in SVO score, reflecting increased

Table 3. Tests for differences in reporting intentions between the prosocial and individualistic groups

Reporting intention	SVO type	N	Mean	SD	Diff.	p	ES	95%CI for ES	
Internal reporting	Prosocial	216	5.84	1.42	0.67	0.002	0.42	0.18	0.66
	Individualistic	99	5.17	1.92					
External reporting (pooled)	Prosocial	216	5.64	1.60	0.86	<0.001	0.48	0.24	0.72
	Individualistic	99	4.79	2.14					
External reporting after internal reporting	Prosocial	188	5.94	1.36	0.39	0.068	0.28	0.00	0.55
	Individualistic	72	5.54	1.61					
External reporting without internal reporting	Prosocial	28	3.68	1.72	0.90	0.087	0.47	–0.07	1.00
	Individualistic	27	2.78	2.10					

Notes: "Diff." shows the difference in scores between the prosocial group and individualistic group. The p-values indicate the results of a *t*-test of the null hypothesis that the underlying population means are the same. The Welch's *t*-test statistic was used when equal variances among populations could not be assumed. "ES" shows the effect sizes of differences in scores between the two groups. The Cohen's *d* was used.

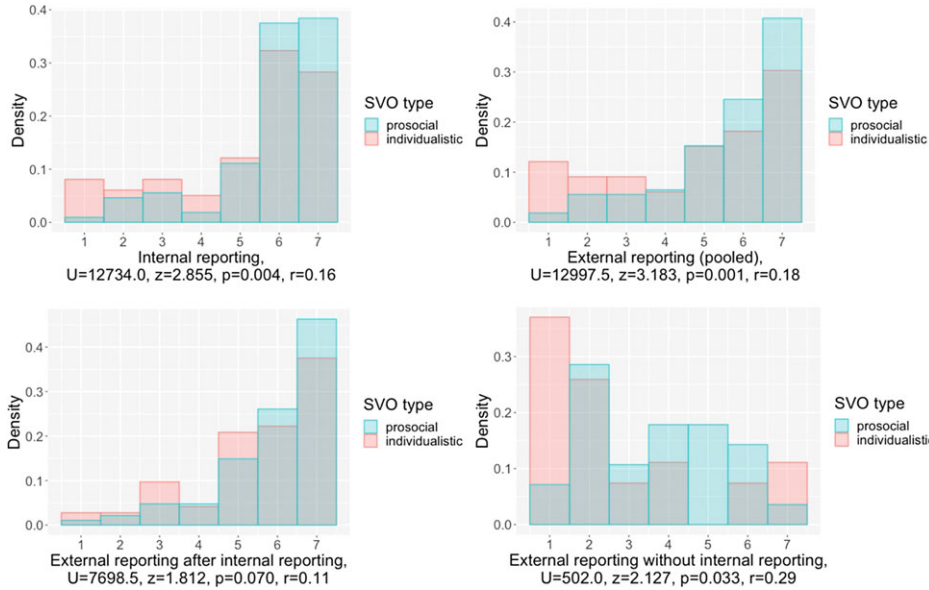

Figure 1. Mann-Whitney's U tests for reporting intentions (1: extremely unlikely; 2: moderately unlikely; 3: slightly unlikely; 4: neither likely nor unlikely; 5: slightly likely; 6: moderately likely; and 7: extremely likely).

prosociality, reporting intentions for both internal and external reporting increase by the magnitude of these coefficients, keeping other conditions constant. These coefficients were statistically significant at the 1 percent level. For SVO as a categorical variable, the regression coefficients were 0.625 for internal reporting and 0.821 for external reporting (equations (2) and (4)), meaning prosocial individuals were, on average, more inclined than individualistic individuals to report both internally and externally by the magnitude of these coefficients, with all else being constant. These coefficients too were significant at the 1 percent level. These results are consistent with Hypothesis 1.

The lower part of Table 4 reports standardized coefficients, which allow for comparison of effect sizes across variables irrespective of their measurement units. The standardized coefficient indicates how many standard deviations the dependent variable changes for a one standard deviation increase in the explanatory variable. For internal reporting, the standardized coefficients for continuous and categorical SVOs were 0.175 and 0.179, respectively; for external reporting, they were 0.204 and 0.209, respectively. This suggests the choice of SVO as a continuous or categorical variable does not significantly alter conclusions regarding its impact on reporting intentions. Using a continuous SVO in the internal reporting regression, standardized coefficients for gender, age, and working years were 0.066, 0.048, and 0.143, respectively. In the external reporting regression, they were 0.135, −0.036, and 0.102, respectively. These results indicate that, in the context of the present study, the effect sizes of SVO are similar to, or greater than, those of demographic variables. Table 4 also presents the results for external reporting, split by subsets of respondents who

Table 4. OLS regression results for reporting intentions

	Dependent variable							
	Internal reporting		External reporting (pooled)		External reporting after internal reporting		External reporting without internal reporting	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SVO (continuous)	0.021**		0.028**		0.013†		0.028	
	(0.007)		(0.008)		(0.008)		(0.018)	
SVO (categorical)		0.625**		0.821**		0.388†		1.003†
		(0.212)		(0.238)		(0.218)		(0.590)
Gender	0.215	0.197	0.493*	0.469*	0.262	0.251	0.836	0.738
	(0.192)	(0.192)	(0.210)	(0.211)	(0.187)	(0.189)	(0.723)	(0.710)
Age	0.006	0.006	–0.005	–0.005	–0.019	–0.019	0.009	0.002
	(0.014)	(0.014)	(0.019)	(0.019)	(0.019)	(0.019)	(0.059)	(0.060)
Working years	0.019	0.018	0.015	0.014	0.020	0.020	–0.027	–0.022
	(0.014)	(0.014)	(0.020)	(0.020)	(0.019)	(0.019)	(0.062)	(0.062)
Standardized coefficients								
SVO (continuous)	0.175		0.204		0.117		0.207	
SVO (categorical)		0.179		0.209		0.121		0.259
Gender	0.066	0.061	0.135	0.128	0.091	0.087	0.212	0.187
Age	0.048	0.047	–0.036	–0.037	–0.171	–0.169	0.061	0.015
Working years	0.143	0.137	0.102	0.094	0.176	0.172	–0.168	–0.137
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	315	315	315	315	260	260	55	55
Adjusted R2	0.082	0.084	0.082	0.084	0.011	0.012	0.210	0.234

Notes: ** $p < 0.01$; * $p < 0.05$; † $p < 0.1$. Robust standard errors are in parentheses.

indicated a likelihood or unlikelihood of internal reporting (equations (5) to (8)). Without delving into details, these results suggest that the effect size of SVO in the pooled data (continuous or categorical SVO) is primarily due to its larger effect in the subset of respondents who indicated an unlikelihood of internal reporting.

We proceed to test Hypothesis 2. The left half of Table 5 displays a frequency distribution table for the responses related to the threshold of the incentive effect. Among the seventy-eight participants who indicated that they would not report externally without a reward (choosing between 1 to 4 for reporting intention), fifty-seven ($22 + 22 + 13$) stated that they would report if offered a $200,000 reward, comprising 73 percent of this subset. A one-proportion Z-test with these figures shows that the proportion of individuals who would report externally with a $200,000 reward was significantly higher than 60 percent, with $z = 2.3436$, $p = 0.0096$. Therefore, this result indicates consistency with Hypothesis 2.

We further test Hypothesis 3. The right half of Table 5 reports the levels of rewards that would discourage internal reporting. It shows that 177 respondents would always report internally (Of these, 171 respondents initially indicated under the vignette conditions that they would report internally. Using this number does not alter the conclusion). Among the prosocial individuals, 61.1 percent (132 out of 216) responded that they would always report internally.[18] In contrast, among individualistic individuals, this proportion was 45.5 percent (45 out of 99). A two-proportion Z test indicated that the relevant proportion of prosocial individuals was significantly higher than that of individualistic individuals, with $z = 2.5906$, $p = 0.0048$. This result is consistent with Hypothesis 3.

Figure 2 displays the density histograms of responses regarding the thresholds for the incentive and discouragement effects. The histogram and notes on the right side show the result of Mann-Whitney U tests for testing Hypothesis 3. The result rejected the null hypothesis that the distributions of the thresholds for the discouragement effect are the same across the two SVO categories at a 1 percent significance level. This indicates alignment with Hypothesis 3. The histogram and notes on the left side are not for testing hypotheses but for exploratory purposes. The result did not reject the null hypothesis that the distributions of the thresholds for the incentive effect are the same across the two SVO categories at either 1 percent or 5 percent significance levels. This suggests that the rewards have a similar incentive effect across the two SVO categories.

Equations (3) and (4) in Table 6 present the regression analysis results with the threshold variable for the discouragement effect (the same variable used in Table 5 and Figure 2) as the dependent variable. The regression coefficient for SVO as a continuous variable was 0.053, and, for SVO as a categorical variable, it was 1.212, significant at the 1 percent and 5 percent levels, respectively. Therefore, these results show consistency with Hypothesis 3.[19] Equations (1) and (2) are for exploratory purposes, showing the regression analysis results with the threshold variable for the

[18] The distributions of responses for the threshold questions by SVO category are not reported in Table 5, but they are presented in Figure 2.

[19] Using ordered logistic regression yields the same results. Given the nature of the dependent variable, we are not interested in precise estimates and thus report the more interpretable OLS results only.

Table 5. Frequency table of thresholds for incentive and discouragement effects

	Reward level that a respondent is willing to report externally				Reward level that a respondent is discouraged to report internally			
	All respondents		Respondents who would not report externally without a reward		All respondents		Respondents who would first report internally without a reward	
	N	%	N	%	N	%	N	%
1 $1–$49,999	165	52.4	22	28.2	73	23.2	44	16.9
2 $50,000–$99,999	67	21.3	22	28.2	30	9.5	21	8.1
3 $100,000–$199,999	39	12.4	13	16.7	17	5.4	11	4.2
4 $200,000–$299,999	9	2.9	2	2.6	5	1.6	5	1.9
5 $300,000–$399,999	6	1.9	4	5.1	1	0.3	1	0.4
6 $400,000–$499,999	3	1.0	1	1.3	2	0.6	2	0.8
7 $500,000–$999,999	12	3.8	4	5.1	5	1.6	3	1.2
8 $1,000,000–$1,999,999	5	1.6	3	3.8	2	0.6	1	0.4
9 $2,000,000 or more	9	2.9	7	9.0	3	1.0	1	0.4
10 I will always first report internally.	NA	NA	NA	NA	177	56.2	171	65.8
Total N	315		78		315		260	

Figure 2. Mann-Whitney's U tests for threshold questions (1: $1–$49,999; 2: $50,000–$99,999; 3: $100,000–$199,999; 4: $200,000–$299,999; 5: $300,000–$399,999; 6: $400,000–$499,999; 7: $500,000–$999,999; 8: $1,000,000–$1,999,999; 9: $2,000,000 or more; 10: I will always first report internally).

incentive effect as the dependent variable. However, the adjusted R-squared figures indicate that these regression models do not have explanatory power.

The online Appendix reports the results of the analysis of the correlation between income and the threshold variables. Our income variable is a categorical variable composed of the income categories listed in Table 1 rather than a continuous variable of income amounts. While a strict analysis is not possible, we do report some informative facts. We confirm that there is no correlation between income and the threshold for the incentive effect but that there is a correlation between income and the threshold for the discouragement effect. This finding indicates that individuals with lower incomes tend to be more discouraged from internal reporting by a low level of rewards for external reporting. Interestingly, the effect size of income on the discouragement threshold was smaller than that of SVO. This implies that SVO is extremely important in determining the discouragement effect.

Conclusion and policy implications

Our objective was to propose introducing a comprehensive reward program for environmental whistleblowing. To this end, we have confirmed through the literature review that most criticisms of general whistleblower rewards are unfounded. Among the major concerns of opponents, only the discouragement effect warrants further examination, which we have addressed theoretically and empirically. The argument that rewarding external reporting considerably reduces internal reporting stems from a lack of understanding of the legal practices in whistleblowing and research on prosociality, making it a superficial discussion. The standard of proof for external reporting is higher than for internal reporting, and the time taken to gather evidence for external reporting can exacerbate societal damages from the crime. Prosocial individuals should be inclined to report internally immediately, even at the risk of forfeiting a potential reward, to prevent further harm.

We hypothesized (1) that SVO would correlate with internal and external reporting intentions, (2) that modest monetary rewards for external reporting would sufficiently increase the likelihood of such reporting, and (3) that the discouragement effect would be less pronounced for prosocial individuals than for individualistic

Table 6. OLS regression results for reward-level responses

	Dependent variable			
	Threshold for the incentive effect		Threshold for the discouragement effect	
	(1)	(2)	(3)	(4)
SVO (continuous)	–0.016†		0.053**	
	(0.010)		(0.018)	
SVO (categorical)		–0.294		1.212*
		(0.256)		(0.510)
Gender	–0.325	–0.322	0.553	0.527
	(0.230)	(0.233)	(0.468)	(0.472)
Age	0.002	0.001	0.093*	0.093*
	(0.019)	(0.019)	(0.038)	(0.038)
Working years	0.000	0.002	–0.005	–0.007
	(0.023)	(0.023)	(0.039)	(0.040)
Standardized coefficients				
SVO (continuous)	–0.109		0.172	
SVO (categorical)		–0.069		0.138
Gender	–0.082	–0.081	0.068	0.065
Age	0.010	0.008	0.296	0.297
Working years	0.002	0.009	–0.014	–0.023
Control variables	Yes	Yes	Yes	Yes
N	315	315	315	315
Adjusted R2	–0.013	–0.021	0.084	0.074

Notes: ** $p < 0.01$; * $p < 0.05$; † $p < 0.1$. Robust standard errors are in parentheses.

individuals. We conducted an analysis by combining the vignette-based survey with the SVO slider measure. Briefly reviewing our main findings, we found, first, positive correlations between reporting intentions and SVO, similar in magnitude to correlations between reporting intentions and major demographic and contextual variables identified in prior research. For internal reporting, 87 percent of prosocial participants and 72.7 percent of individualistic participants indicated that they would report; for external reporting, the figures were 80.6 percent and 63.6 percent, respectively. Second, we also found that 73 percent of individuals who would not report externally without a reward would be willing to do so for a $200,000 reward, showing that modest rewards can sufficiently increase the likelihood of external reporting. Third, while the majority of participants were prosocial individuals (216 of 315, 69 percent), with the potential loss of a reward, 61.1 percent of prosocial participants and 45.5 percent of individualistic participants stated that they would

always report internally, indicating that the discouragement effect is less pronounced for prosocial individuals.

These results are consistent with the hypotheses, suggesting that the discouragement effect is not substantial enough to hinder the implementation of whistleblower reward programs. We did not find evidence to justify the claim that monetary incentives greatly reduce internal reporting driven by prosocial motivations, destroying corporate internal controls. However, we do not argue that the discouragement effect should be ignored in legal design. A modest reward of $200,000 provides sufficient incentive, but as indicated by the thresholds of the discouragement effect on the right side of Table 5, the same reward may discourage 29.2 percent of participants who would otherwise report internally without a reward from internal reporting. As stated in the methodology section, the threshold question for the discouragement effect does not capture the changes brought about by the reward policy on wrongdoers, internal compliance departments, compliance culture, and norms. Therefore, if these changes make internal reporting a more attractive option, the proportion of people who are discouraged is likely to decrease. But this does not mean that the discouragement effect can be ignored. What we have confirmed from our survey results is that the effect is not as substantial as is generally believed. While the discouragement effect should not be a reason to forego the introduction of rewards, some measures to mitigate it are necessary.

No panacea has yet been found to completely eliminate such discouragement effects. However, a combination of several methods can sufficiently mitigate them. The key to solving this complex issue lies in understanding the reasons why employees hesitate to make internal reports. According to the survey by the Ethics Resource Center (2012) targeting American employees, the three main reasons for not reporting internally are (1) the lack of expectation that corrective actions will be taken (59 percent), (2) the fear of retaliation (46 percent), and (3) the fear of lack of anonymity (39 percent). It is predicted that addressing these three concerns would increase the relative appeal of internal reporting compared to external reporting, which would mitigate the discouragement effect. To address these concerns, companies can take measures such as (1) establishing a trustworthy internal investigation system, (2) strict enforcement of anti-retaliation policies, and (3) creating an internal reporting system that ensures anonymity, all of which would strengthen corporate internal controls. Another strategy that companies can take is to offer original rewards for internal reporting. While such an approach may be somewhat effective, priority should be given to resolving the three earlier concerns.

Furthermore, governmental measures could include imposing criminal sanctions on employers who retaliate against whistleblowers or shifting the burden of proof for retaliation onto the employers, thereby encouraging them to establish robust internal control systems (Iwasaki 2023). Another option is to mandate internal reporting. However, this approach requires ensuring the independence, security, and effectiveness of the internal reporting system, and the assessments of these factors may vary among whistleblowers. Therefore, whistleblowers should be given discretion in choosing the reporting channel. This study advocates for introducing environmental whistleblower rewards, demonstrating that the commonly perceived side effects are less substantial than believed and can be resolved through legal design. This article provides foundational material for future discussions, but it does

not strongly advocate for a single or specific design of reward programs as further research is needed. For example, although we found modest rewards to be sufficiently incentivizing, we are not arguing against higher rewards. If the discouragement effect can be mitigated, higher rewards may be worth considering for various reasons, including securing the livelihood of whistleblowers.

For most whistleblowers, whistleblowing does not pay. Tom Mueller (2019) argues that referring to payments to whistleblowers as rewards is not accurate, suggesting that "a net present value lump sum payment for a lost career" is a more appropriate description. However, under the hypothetical scenario, participants might have failed to envision the repercussions of retaliation realistically. If they had accurately predicted the nature of such retaliation, they might have desired a larger sum of money. On the other hand, excessively high rewards could amplify the discouragement effect and other side effects of rewards. Even participants who stated that they would always report internally might alter their decision when faced with a substantial reward. Since there is no panacea for mitigating the discouragement effect, excessively large sums may likely be socially undesirable.

In any case, we need to find a balance between non-monetary motivations and monetary incentives. To this end, we have advanced the discussion on this topic by presenting fundamental theories and an approximate amount of reward as a point of departure. For national authorities, implementing environmental whistleblower rewards may not be a straightforward task. However, while whistleblowing has protected numerous environmental and social interests, whistleblower welfare has been neglected to date. Authorities must provide appropriate protection without free riding on their goodwill, which ultimately deters environmental crimes and protects our invaluable environment.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/lsi.2025.13

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