

A Theory of Whistleblower Rewards

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ABSTRACT

To enforce the law, the government must learn about violations of the law. One way of obtaining such information is by employing police officers and investigators. An alternative way is by rewarding whistleblowers. In this paper I consider two basic questions relating to whistleblower rewards. First, what is the optimal size of whistleblower rewards? Second, how should we choose between employing police officers and rewarding whistleblowers? I develop a model that highlights two features of the whistleblowing context: whistleblowers bear a personal cost, and a reward may encourage false reports. I find that there is a nonmonotonic relationship between the personal cost to whistleblowers and the optimal reward, and between the risk of a false report and the optimal reward. Furthermore, offering a whistleblower reward dominates the employment of police officers and investigators when the risk of a false report is small.

1. INTRODUCTION

To enforce the law the government must know, at least in some cases, when the law is violated. Since Becker (1968), a central assumption in the literature on the public enforcement of law is that information about violations of the law can be obtained only by investing real resources in the employment of police officers and investigators.¹ Violations of the law, however, are almost always known to nonviolators, such as employees, neighbors, or family members of the violator. Therefore, an alternative

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1. See Becker (1968, p. 174): "The more that is spent on policemen, court personnel, and specialized equipment, the easier it is to discover offenses and convict offenders."

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way of obtaining information on such violations is simply to pay those people a whistleblower reward for reporting this information.

A central advantage of obtaining information on violations of the law from whistleblowers rather than from police officers and investigators is that the employment of police officers and investigators consumes real resources, whereas whistleblower rewards are mere wealth transfers. Despite this advantage, relative to the use of police officers and investigators, whistleblower rewards seem to be infrequently used. Still, their use has been increasing in recent years.

To illustrate, in 2006 the Internal Revenue Service (IRS) made fundamental changes to its informant awards program. Under the new law the payment of rewards to whistleblowers is no longer discretionary, and rewards were increased to 15–30 percent of the collected proceeds. In 2010, the Dodd-Frank Act directed the Securities and Exchange Commission (SEC) to reward individuals who provide original information that leads to successful enforcement actions resulting in monetary sanctions. Rewards were set to equal 10–30 percent of the monetary sanctions collected, and an Investor Protection Fund was established to fund those rewards (15 U.S.C. sec. 78u-6). In 2012 the IRS awarded \$104 million to a whistleblower for divulging schemes used by UBS to encourage American citizens to evade taxes. In 2013 the SEC paid \$14 million to a whistleblower for reporting a Chicago-based scheme to defraud foreign investors seeking US residency.

Despite the increased reliance on whistleblower rewards, we know little about their desirability and design. In this paper I address two basic questions regarding the use of whistleblower rewards. First, what is the optimal size of whistleblower rewards? Second, when rewards are set optimally, how should we choose between employing police officers and rewarding whistleblowers?

To address these questions, I develop a simple stylized model with an employer and an employee. The employer decides whether to violate the law. The employee may blow the whistle on the employer's violation of the law, to obtain a reward. Though the model uses the employer-employee relationship for concreteness, it can easily be applied to other settings.

Two important features of the whistleblowing context are captured in the model. First, the employee bears a personal cost when blowing the whistle. This captures the idea that whistleblowers bear a personal cost, because of social ostracism, a psychological toll, or due to a reduction in their future employment prospects. Second, the employee may falsely re-

port a violation of the law by the employer, and this false report has some chance of succeeding. This captures the idea that whistleblower rewards may tempt people to make false reports of violations of the law, which they may be able to support because of their relationship with the person they are reporting.

With this basic setup I analyze the optimal, social-welfare-maximizing, whistleblower reward. First, I show that there is a nonmonotonic relationship between the personal cost to whistleblowers and the size of the optimal reward. The reason is that, as the personal cost of whistleblowing increases, a higher reward is required to induce reports and maintain deterrence. However, when the personal cost to whistleblowers is very high, it is desirable to provide no whistleblower reward. Though this means the law will be violated, the high social cost of whistleblowing will be avoided.

Second, I show that there is a nonmonotonic relationship between the risk of false report and the size of the optimal reward. This is because, as the risk of a false report increases, the relative benefit to the employer from not violating the law decreases. To induce the employer not to violate the law the relative cost of violating the law must be increased. This can be achieved by increasing the reward for whistleblowing, which increases the risk of a violation being reported. However, when the risk of a false report is sufficiently high, the reward that is required to deter the employer is so high that it is very likely to induce a false report. In such a case it is therefore desirable to provide no whistleblower reward. Though this means that the law will be violated, the social cost of a false report will be avoided.

How should we choose between employing police officers and rewarding whistleblowers? I show that, when the risk of a false report is sufficiently small, whistleblowing dominates policing as a law enforcement strategy. The reason for this is that, as the risk of a false report decreases, false reports are less likely to be made, which means that the social cost of the optimal whistleblower reward, which deters the employer from violating the law, is reduced. Accordingly, as the risk of a false report tends to zero, so does the social cost of rewarding whistleblowers. By contrast, the employment of police officers and investigators always involves a social cost.

The law and economics literature has devoted much attention to the question whether laws should be enforced by a public authority or by private competitive firms that are paid for performance (Becker and Stigler 1974; Landes and Posner 1975; Polinsky 1980). This paper, by contrast,

assumes the public enforcement of law and asks when the public authority should employ whistleblower rewards as an alternative to the employment of police officers and investigators.²

The costs and benefits of rewarding whistleblowers have been analyzed informally by Howse and Daniels (1995) and Ferziger and Currell (1999), who discuss a long list of issues relating to the design of whistleblower programs and the effect of whistleblower rewards. Others have compared a court-centric mechanism for rewarding whistleblowers to an agency-centric mechanism (Casey and Niblett 2014; Engstrom 2014). Different mechanisms designed to promote whistleblowing are also compared by Feldman and Lobel (2010), who use experimental surveys to examine the outcomes of antiretaliation protection, duty-to-report requirements, liability fines, and monetary incentives. Dyck, Morse, and Zingales (2010) investigate empirically who blows the whistle on corporate fraud using data on all reported fraud cases in large U.S. companies between 1996 and 2004. They find that corporate fraud is often reported by employees and the media, who are driven by ease of access to information, and by monetary and reputational incentives.

Formally, Heyes and Kapur (2009) analyze a model of whistleblower policy in which, unlike in this paper, whistleblowers are not rewarded. They present three behavioral theories as to why whistleblowers report violations of the law, despite it being against their self-interest (conscious cleaning, social welfare maximizing, and cost imposing). For each theory they consider the determination of two policy variables: the responsiveness of the enforcement agency to whistleblowers and the size of the sanction for violating the law.³ Outside economics there is an extensive literature on whistleblowing in the areas of sociology, psychology, business,

2. In their survey of the literature on public enforcement of law, Polinsky and Shavell (2007) mention the possibility of rewarding private parties for supplying information on violations of the law, but discuss it only in the context of law enforcement by private competitive firms. Therefore, the difficulties they note with such a scheme have to do with the private nature of law enforcement and not with the use of a reward in and of itself.

3. There is a literature in industrial organization which examines the role of policies that encourage a cartel member to inform regulators about the wrongdoing of fellow cartel members in exchange for legal immunity, noting the destabilizing effect that these policies have on collusion, but that they can also be abused and generate perverse effects (Motta and Polo 2003; Buccirossi and Spagnolo 2006; Aubert, Rey, and Kovacic 2006; Spagnolo 2008; Harrington 2008, 2013). As noted by Heyes and Kapur (2009), this is quite different than the type of program considered here, in which an employee, who is not involved in the violation of the law himself, and therefore does not reap any benefit from it, blows the whistle on an employer in return for a monetary reward.

and public administration (for surveys, see Miceli and Near 1992; Miceli, Near, and Dworkin 2008).

There is a small informal literature on paying witnesses. Posner (1999) discusses expert witnesses who are paid by parties, noting the risk that they may mislead judges and juries, but concluding that this risk is low since expert witnesses are repeat players and therefore have a financial interest in preserving a reputation for being honest, and because they must satisfy the methodological standards in their field and be subject to intense scrutiny by the opposing party. Friedman and Kontorovich (2011) argue that fact witnesses should be paid, since this will increase the number of people actually witnessing an event. Though they acknowledge the risk that such payments may lead to increased incentive for perjury, they argue that the incentives to perjury may already be high under the current regime, where the primary producers of testimonial evidence are interested parties, and therefore witness payment could reduce the proportion of perjured testimonies. Furthermore, they argue that, unlike expert witnesses, fact witnesses do not need to curry client favor since they are not repeat players, and that the increase in the number of people witnessing an event due to the payment may reduce the likelihood of perjury. Levmore and Porat (2012) discuss the prohibition on monetary payments to witnesses, noting that such payments may induce false testimonies, but arguing that the most useful explanation for this prohibition is that monetary payments give witnesses monopoly power.

The paper proceeds as follows. Section 2 provides an overview of the different whistleblower laws in the United States, showing a trend toward an increased reliance on whistleblowing as a law enforcement strategy. Section 3 develops the model and analyzes the optimal whistleblower reward and its determinants. Section 4 analyzes the choice between employing police officers and rewarding whistleblowers as law enforcement strategies. Section 5 extends the analysis in the paper, and considers the joint employment of whistleblower rewards and police officers, a sanction for unsuccessful whistleblower reports, the employer bribing the employee not to report a violation of the law he witnessed, and the payment of a whistleblower reward in an equilibrium in which the employer is deterred. Section 6 offers three concrete policy implications of the model, and Section 7 concludes.

2. WHISTLEBLOWER LAWS

In recent years, more and more whistleblower laws that protect and reward whistleblowers have been adopted. These laws, and the whistleblower programs they establish, represent a major development in law enforcement.

In 2006 the IRS made fundamental changes to its informant awards program. Before these changes, awards to whistleblowers were discretionary, and their maximum level was set at 15 percent of the collected proceeds or \$10 million. Under the new law, the payment of rewards to whistleblowers is no longer discretionary, rewards were increased to 15–30 percent of the collected proceeds, and whistleblowers were given appeal rights. The IRS was required to establish the Whistleblower Office, which reports to the IRS commissioner on the implementation of the program (26 U.S.C. 7623[b]). In the years 2009–13 the IRS paid \$211 million to whistleblowers, and the information provided by these whistleblower led to the collection of \$1.7 billion in unpaid taxes and penalties (IRS 2013).

In 2010, the Dodd-Frank Act directed the SEC to reward individuals who provide original information that leads to successful enforcement actions resulting in monetary sanctions over \$1 million. Rewards were set to equal 10–30 percent of the monetary sanctions collected, and an Investor Protection Fund was established to fund those rewards (15 U.S.C. 78u-6). In the time that has passed since the establishment of the SEC whistleblower program in 2011, the SEC has paid \$16.9 million to whistleblowers. In September 2014, the SEC authorized a new whistleblower award of more than \$30 million (SEC 2013, 2014).

The Dodd-Frank Act also created the Commodity Futures Trading Commission (CFTC) whistleblower program, essentially identical to the SEC's program (7 U.S.C. 26). In May 2014, the CFTC announced that it will make its first award to a whistleblower, who will receive approximately \$240,000 for providing information about violations of the Commodity Exchange Act of 2010 (CFTC 2014).

Some whistleblower laws let the courts determine the appropriate payment to whistleblowers. For example, the Act to Prevent Pollution from Ships, which imposes fines for such cases of pollution, allows the court to award up to one-half of the fine to a person giving information leading to conviction (33 U.S.C. 1908). In 2007 a New York-based oil tanker company that illegally dumped sludge and waste oil into the ocean in several states was ordered to pay \$37 million in fines and penalties, including

\$437,500 to each of 12 crew members who blew the whistle on the company (Department of Justice 2007).

Though somewhat different, the False Claims Act rewards individuals who provide information on fraud that was committed against the government (31 U.S.C. 3730). Under this law, the whistleblower must initiate litigation against the defrauder, and the government may decide whether to take over the litigation. Whistleblowers are entitled to 25–30 percent of the recovery if they proceeded with the litigation or 15–25 percent if the government takes over the litigation. In December 2014 it was announced that four whistleblowers will collect more than \$170 million for bringing a False Claims Act lawsuit against Bank of America for mortgage fraud, which was taken over by the government (Rexrode and Martin 2014).

Other whistleblower laws do not offer whistleblowers a financial reward, but protect whistleblowers from retaliation by employers. Such protection is intended to encourage whistleblowers to provide information to law enforcement agencies, as the risk of retaliation is usually one of the main concerns whistleblowers have when contemplating whether to report a violation of the law. More than 20 whistleblower statutes protect employees who report violations of various workplace safety, airline, commercial motor carrier, consumer product, environmental, financial reform, food safety, health insurance reform, motor vehicle safety, nuclear, pipeline, public transportation agency, railroad, maritime, and securities laws.⁴ These laws prevent employers from retaliating against

4. Workplace safety (Occupational Safety and Health Act, 29 U.S.C. 660, 11[c]; Asbestos Hazard Emergency Response Act, 15 U.S.C. 2651), airlines (Wendell H. Ford Aviation Investment and Reform Act for the 21st Century, 49 U.S.C. 42121), commercial motor carriers (International Safe Container Act, 46 U.S.C. 80507; Moving Ahead for Progress in the 21st Century Act, 49 U.S.C. 30171; Surface Transportation Assistance Act, 49 U.S.C. 31105), consumer products (Consumer Product Safety Improvement Act, 15 U.S.C. 2087; Toxic Substances Control Act, 15 U.S.C. 2622), the environment (Clean Air Act, 42 U.S.C. 7622; Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9610; Federal Water Pollution Control Act, 33 U.S.C. 1367; Safe Drinking Water Act, 42 U.S.C. 300j-9[i]; Solid Waste Disposal Act, 42 U.S.C. 6971), financial reform (Consumer Financial Protection Act of 2010, 12 U.S.C. 5567), food safety (FDA Food Safety Modernization Act, 21 U.S.C. 399d), health insurance reform (Affordable Care Act, 29 U.S.C. 218C), motor vehicle safety (Moving Ahead for Progress in the 21st Century Act, 49 U.S.C. 30171), nuclear energy (Energy Reorganization Act, 42 U.S.C. 5851), pipelines (Pipeline Safety Improvement Act, 49 U.S.C. 60129), public transportation agencies (National Transit Systems Security Act, 6 U.S.C. 1142), railroads (Federal Railroad Safety Act, 49 U.S.C. 20109), maritime activities (Seaman's Protection Act, 46 U.S.C. 2114), and securities (Sarbanes-Oxley Act, 18 U.S.C.A. 1514A).

whistleblower employees by laying off employees or taking such actions as demoting, denying overtime or promotion, disciplining, denying benefits, intimidating, and reducing pay or hours.

In addition to these federal whistleblower laws, there are also state whistleblower laws that protect public employees who blow the whistle on violations of state or federal laws, waste, fraud, and abuse. The organization Public Employees for Environmental Responsibility (PEER) rates each state's whistleblower laws by looking into three broad components: coverage (What employee speech does the law protect? What topics are covered or excluded?), usability (To whom must the employee make a disclosure for protections to apply? How useful is the statute in covering the range of possible employee interactions?), and strength (What remedies are available to aggrieved whistleblowers? How is the law enforced?). A 100-point scale was developed in which each of the three components accounts for 33 points. A 1-point bonus is awarded when a state is required to notify employees about their legal rights.

Figure 1 presents the mean state law PEER score, as well as the standard deviation of these scores, for all 50 states. As one can see, the mean PEER score has increased in recent years, while the standard deviation has decreased. This means that states have broadened and improved the legal protections for whistleblowers, on average, and have converged on this broadened and improved level of protection.

Despite the increased reliance on whistleblower rewards as a law enforcement strategy in recent years, little attention has been paid to the questions of their desirability and their design. What is the optimal size of whistleblower rewards? And how should we choose between employing police officers and rewarding whistleblowers? These questions are addressed in this paper.

3. OPTIMAL WHISTLEBLOWER REWARD

3.1. The Model

Consider a simple model with an employer and an employee. The employment relationship generates a social surplus of w . For simplicity I assume that the employer gets the whole surplus from the relationship.

In the first stage of the model the employer decides whether to violate the law. The employer obtains a benefit b from this violation, and causes a social harm of h . Assume that $b < h$, which means that violating

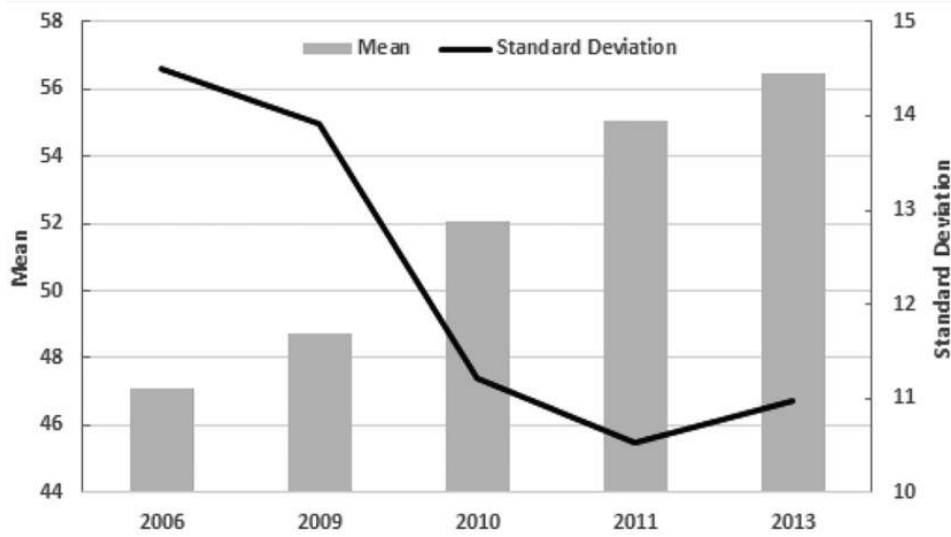


Figure 1. Public Employees for Environmental Responsibility scores for state whistleblowers laws.

the law is socially undesirable. To illustrate, an employer has to decide whether to dump waste into a river, which saves him the cost of proper disposal but generates a social harm greater than the savings. Or an employer has to decide whether to evade taxes, which saves him their cost but prevents the provision of a public good that generates a social benefit greater than the cost of the taxes to the employer.

In the second stage of the model, if the employer violated the law, the employee may report this violation. This true report succeeds with probability $\tau \in [0, 1]$. This captures the idea that a report of a violation of the law may not always lead to a sanction, because the law enforcement agency may not be convinced by the evidence provided by the employee. If the employer did not violate the law, the employee may falsely report a violation of the law, by fabricating evidence against the employer. This false report succeeds with probability $\phi \in [0, 1]$. This captures the idea that a whistleblower reward may tempt people to make false reports of violations of the law, which they may be able to support because of their relationship with the person they are reporting. The risk of false reports driven by the desire to obtain rewards is well noted by policy makers and those active in the area of whistleblowing.⁵ Assume that $\tau > \phi$; that is,

5. A UK report by Public Concern at Work (Whistleblowing Commission 2013, p. 14) concludes against the payment of rewards to whistleblowers, because, among other reasons, it “could lead to false or delayed reporting.” Similarly, following the adoption of whistleblower incentives in the Dodd-Frank financial reform act, the *Financial Times*

the probability of a successful report of a violation of the law is higher when the law was indeed violated than when the law was not violated.

The parameter ϕ should be viewed as representing the circumstances of each case. In certain circumstances it is harder to make a false report, while in other circumstances it is easier. The ease of making a successful false report can be a function of the relationship between the person reporting and the person being reported or the type of crime that is being reported. For example, a person may find it easier to fabricate evidence against a spouse than against an employer, and it may be easier for an accountant to fabricate evidence of tax evasion by a client than evidence of drug use.

If the government is provided with information on a violation of the law by the employer, it imposes a monetary sanction s on the employer and provides a reward R to the employee for providing the information. Assume that the sanction is large enough that $b < s$; that is, the benefit the employer derives from violating the law is smaller than the sanction for the violation. If this was not the case, then it would never be possible to deter the employer from violating the law. Assume also that the sanction is large enough that $R < s$, which guarantees that the employer and the employee cannot gain by intentionally violating the law and sharing the reward, since violating the law and reporting the violation generate a net loss to their joint utility. Lastly, assume that the employer cannot pay the employee not to report a violation of the law. Such a contract is illegal and therefore will not be enforced by a court.⁶

The employee bears a personal cost c when reporting a violation of the law by the employer. This cost can be the result of social ostracism, diminished prospects for future employment, or a physical and psychological toll on health resulting from whistleblowing.⁷ Assume that $c \sim$

(Eaglesham and Masters 2010, p. 13) noted that “the scale of the potential pay-outs could generate rogue tip-offs by disaffected employees.” With respect to the same reform, the *Washington Post* (Hilzenrath 2010, p. A17) quotes David Hirschmann, president of the US Chamber of Commerce Center for Capital Markets Competitiveness, saying, “Instead of allowing companies to identify and fix problems, we are just creating a lottery.” A report by the law firm DLA Piper (Employment Group 2013, p. 6) on whistleblowing notes the risk of “malicious or unfounded allegations” against employers. And Howse and Daniels (1995, p. 526) note that “corporations are vulnerable to false claims made by opportunistic whistleblowers.”

6. I relax this assumption in Section 5.3.

7. An article in the *New England Journal of Medicine* notes that whistleblowing had substantial and long-lasting effects. Many whistleblowers were subjected to various pressures (such as direct intimidation, ostracism by coworkers, loss of employment, and

$U[0, C]$; that is, the employee's personal cost of reporting a violation of the law is distributed uniformly between 0 and C . This captures the idea that some employees are more willing to "tell" on their employers, while others are less willing to do so, either because of a different psychological or physical cost, a different level of social ostracism they expect to face, or because the importance of not developing a reputation as a "tattletale" for their future employment prospects varies among employees. While the employee knows his c , the employer knows only the distribution of c . The higher the parameter C , the higher the personal cost the employee is likely to face when reporting a violation of the law.

3.2. Analysis

To analyze the model I proceed by backward induction, starting from the second stage of the model. In that stage the employee has to decide whether to report a violation of the law by the employer. This true report succeeds with probability τ , in which case the employee receives the reward. Therefore, the employee will report a violation of the law only if the personal cost of reporting it is lower than the expected reward he will receive, that is, only if $c < \tau R$.

If the employer did not violate the law then the employee has to decide whether to falsely report a violation of the law by the employer. This false report succeeds with probability ϕ , in which case the employee receives the reward. Thus, the employee will falsely report a violation of the law only if the personal cost of doing so is lower than the expected reward he will receive, that is, only if $c < \phi R$.

I can now move to the first stage of the model and analyze the employer's choice of action. I define the employer's expected utility from the possible actions he may undertake:

$$E[U] = \begin{cases} w + b - \tau^2 \frac{R}{C} s & \text{if law is violated} \\ w - \phi^2 \frac{R}{C} s & \text{if law is not violated.} \end{cases} \quad (1)$$

If the employer violates the law, then he obtains w from employing

blackballing) and reported that the financial consequences of whistleblowing were devastating. Financial difficulties were often associated with personal problems such as divorce, severe marital strain, or other family conflicts. Many whistleblowers reported having stress-related health problems, including shingles, psoriasis, autoimmune disorders, panic attacks, asthma, insomnia, temporomandibular joint disorder, migraines, and generalized anxiety (Kesselheim, Studdert, and Mello 2010).

the employee and b from violating the law. However, the employee will report the violation if $c < \tau R$, which occurs with probability $\tau R/C$, given the uniform distribution of c . This true report will succeed with probability τ , in which case a sanction s will be imposed on the employer.

If the employer does not violate the law, then he obtains w from employing the employee. The employee will make a false report of a violation of the law if $c < \phi R$, which occurs with probability $\phi R/C$, given the uniform distribution of c . This false report will succeed with probability ϕ , in which case a sanction s will be imposed on the employer.

The employer chooses his actions to maximize expression (1). I define \hat{R} , the size of the reward for which violating the law generates the same utility as not violating the law. Using expression (1), we get

$$\hat{R} = \frac{bC}{s(\tau^2 - \phi^2)}. \quad (2)$$

The employer violates the law if the whistleblower reward is smaller than \hat{R} and does not violate the law if the whistleblower reward is greater than \hat{R} .⁸

Figure 2 depicts the employer's expected utility from the two choices of action available to him for different values of the whistleblower reward R . The figure shows that the employer's expected utility is more sensitive to changes in the whistleblower reward when he violates the law than when he does not violate the law.

The social planner must determine the optimal reward to be awarded for blowing the whistle. The reward that should be chosen is the one that maximizes social welfare. To find this reward I first have to define expected social welfare as a function of the whistleblower reward:

$$SW = \begin{cases} w + b - b - \frac{1}{2C}(\tau R)^2 & \text{if } R < \hat{R} \\ w - \frac{1}{2C}(\phi R)^2 & \text{if } R \geq \hat{R}. \end{cases} \quad (3)$$

If the whistleblower reward is smaller than \hat{R} , the employer violates the law. The violation of the law generates a benefit of b to the employer and a harm of b . Recall that the employee will report the violation only if

8. For simplicity I assume that w is very large, so the employer's expected utility at \hat{R} is positive. Formally, this requires that $w > \phi^2 b / (\tau^2 - \phi^2)$. This is equivalent to saying that the employer's participation constraint must be met; that is, the employer's utility must be greater than his outside option, which can be normalized to equal 0.

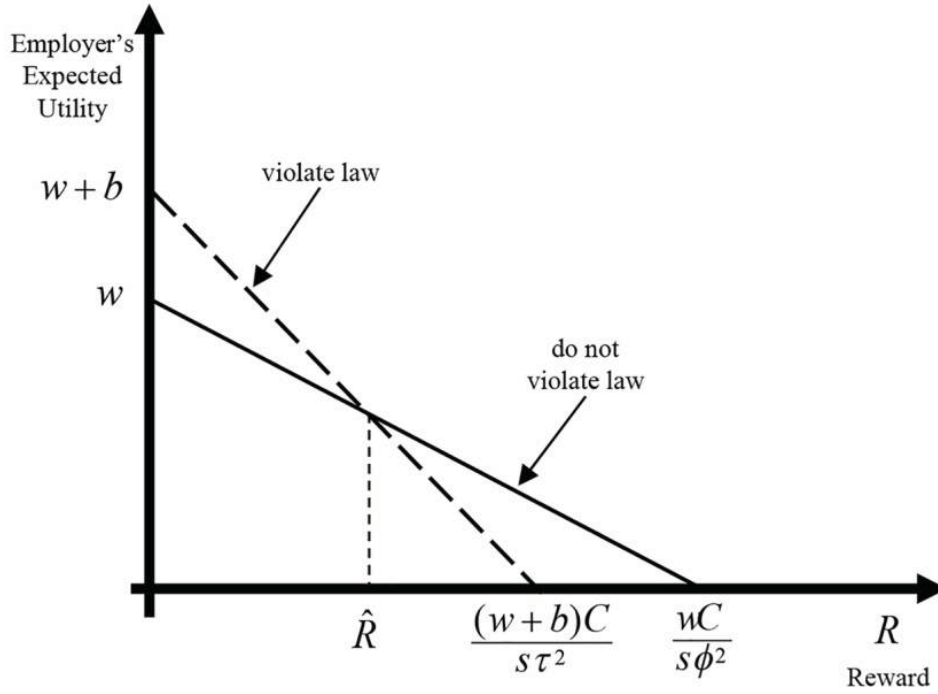


Figure 2. Employer's expected utility

$c < \tau R$, in which case the employee will bear a personal cost of c . Thus, the expected personal cost to the employee is

$$\Pr(c < \tau R)E[c \mid c < \tau R] = \frac{\tau R}{C} \frac{\tau R}{2} = \frac{1}{2C}(\tau R)^2.$$

If the whistleblower reward is greater than \hat{R} , the employer does not violate the law. Recall that the employee will falsely report a violation if $c < \phi R$, in which case the employee will bear a personal cost of c . Thus, the expected personal cost to the employee is

$$\Pr(c < \phi R)E[c \mid c < \phi R] = \frac{\phi R}{C} \frac{\phi R}{2} = \frac{1}{2C}(\phi R)^2.$$

Note that when $R < \hat{R}$ —that is, when the employer violates the law—social welfare is decreasing with R , the size of the reward. This means that social welfare is maximized when $R = 0$. Similarly, when $R \geq \hat{R}$ —that is, when the employer is deterred from violating the law—social welfare is decreasing with R , the size of the reward. This means that one would like to set R at the minimum level that still deters the employer from violating the law, which is \hat{R} . The social planner must therefore

compare social welfare when $R = \hat{R}$ to social welfare when $R = 0$. Using expression (3), social welfare is greater when $R = \hat{R}$ if

$$w - \frac{1}{2C}(\phi\hat{R})^2 \geq w + b - h. \quad (4)$$

Plugging in \hat{R} (from expression [2]), we get the following condition for offering a positive whistleblower reward:

$$h - b \geq \frac{C}{2} \left[\frac{\phi b}{s(\tau^2 - \phi^2)} \right]^2. \quad (5)$$

I can now define the optimal reward for whistleblowing:

Proposition 1. A social planner who maximizes social welfare will set the whistleblower reward R^* according to the following:

$$R^* = \begin{cases} \frac{bC}{s(\tau^2 - \phi^2)} & \text{if the condition in expression (5) holds} \\ 0 & \text{otherwise.} \end{cases} \quad (6)$$

Figure 3 illustrates the optimal whistleblower reward from expression (6) as a function of the risk of a false report. We can see that there is a nonmonotonic relationship between the risk of false report (ϕ) and the size of the optimal reward (R^*). The reason for this is that as the probability of a successful false report by the employee increases, the relative benefit to the employer from not violating the law decreases, since choosing not to violate the law has a smaller benefit in terms of reducing the risk of him being sanctioned by the government. To induce the employer to choose not to violate the law, the relative cost of violating the law must be increased. This can be achieved by increasing the whistleblower reward, which increases the likelihood of the employee reporting a violation of the law to the government. However, when the risk of a false report is sufficiently high,⁹ the reward that is required to deter the employer is so high that it is very likely to induce a false report. In such a case it is desirable to provide no whistleblower reward. Though this means that the law will be violated, the social cost of a false report will be avoided.

There is also a nonmonotonic relationship between the personal cost to whistleblowers (C) and the size of the optimal reward (R^*). As one can see from expression (6), an increase in the personal cost to whistle-

9. That is, the risk is sufficiently high when $\phi > \bar{\phi}$, where $\bar{\phi}$ is obtained from solving the condition in expression (5). Formally, $\bar{\phi} = [-b + \sqrt{b^2 + (8/C)\tau^2 s^2 (h - b)}] / [2s\sqrt{(2/C)(h - b)}]$.

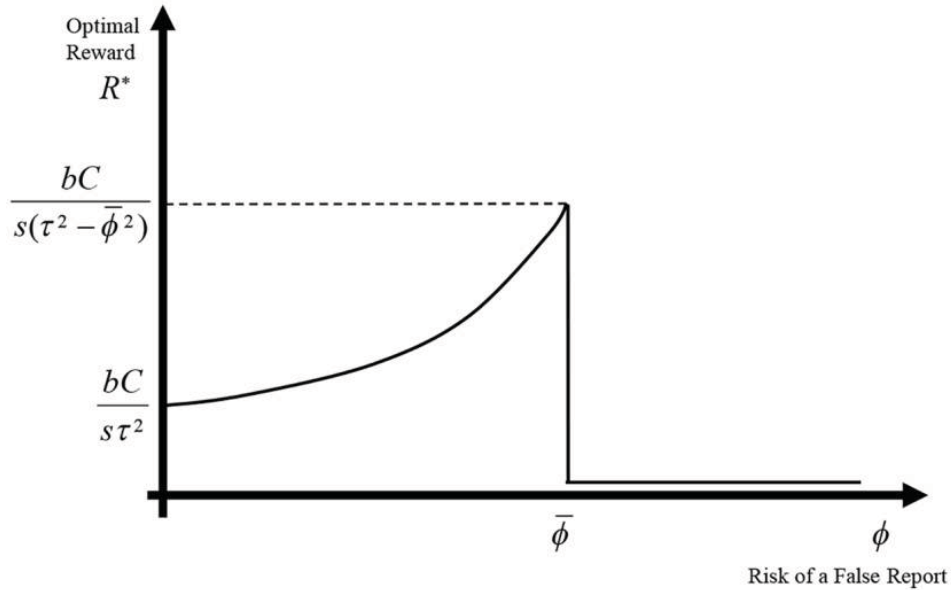


Figure 3. Optimal rewards for whistleblowers and the risk of a false report

blowers increases the optimal reward. Intuitively, a higher personal cost of whistleblowing means that a higher reward is required to induce whistleblowers to report and maintain deterrence. However, when the personal cost to whistleblowers is sufficiently high,¹⁰ the social cost of whistleblowing is so high that it is desirable to provide no whistleblower reward. Though this means that the law will be violated, the high social cost of whistleblowing will be avoided.

The optimal whistleblower reward as a function of the risk of a failed true report exhibits a similar dynamic to the one depicted in Figure 3. As one can see from expression (6), when the probability of a successful true report (τ) decreases, the optimal reward increases. The reason for this is that a decrease in the probability of a successful true report reduces the risk to the employer from violating the law. To maintain deterrence, the whistleblower reward must be increased, to increase the likelihood of the employee reporting a violation of the law to the government. However, when the probability of a successful true report is sufficiently low,¹¹ the reward that is required to deter the employer is so high that it is very

10. That is, the cost is sufficiently high when $C > \bar{C}$, where \bar{C} is obtained from solving the condition in expression (5). Formally, $\bar{C} = 2(b - b)[s(\tau^2 - \phi^2)/\phi b]^2$.

11. That is, the probability is sufficiently low when $\tau < \bar{\tau}$, where $\bar{\tau}$ is obtained from solving the condition in expression (5). Formally, $\bar{\tau} = \sqrt{\phi b / s \sqrt{(2/C)(b - b) + \phi^2}}$.

likely to induce a false report. In such a case it is desirable to provide no whistleblower reward.

Lastly, a higher sanction (s) lowers the optimal reward. Intuitively, with a higher sanction, violating the law becomes relatively more costly. Therefore, to deter the employer from violating law a lower likelihood of him being reported is sufficient, which means that a lower whistleblower reward is sufficient.

4. POLICING VERSUS WHISTLEBLOWING

Let us assume that the social harm from violating the law is large enough that it is desirable to offer a positive whistleblower reward to deter the employer from violating the law.¹² A natural alternative to rewarding whistleblowers is employing police officers and investigators to detect violations of the law. How should a social planner choose between those options?¹³

Assume that if the employer violates the law when police officers are employed, he will get caught with probability p , which reflects the police force that may detect the employer's violation of the law. The cost of using p for law enforcement is $P(p)$, where $P'(p), P''(p) > 0$; that is, the marginal cost of policing is positive and increasing. For concreteness I use a standard cost function $P(p) = \frac{1}{2}\gamma p^2$, where the parameter γ captures the cost of policing. The greater γ is, the greater the cost of policing.

If the employer is to be deterred, his benefit from violating the law has to be lower than his expected sanction when violating the law, that is $b \leq ps$. This means that the lowest level of policing which deters the employer from violating the law is

$$p^* = \frac{b}{s} \quad (7)$$

I can now express social welfare as a function of policing p :

$$SW = \begin{cases} w + b - h - \frac{1}{2}\gamma p^2 & \text{if } p < p^* \\ w - \frac{1}{2}\gamma p^2 & \text{if } p \geq p^*. \end{cases} \quad (8)$$

Intuitively, if $p < p^*$, the employer will violate the law, which generates a benefit of b to the employer and a harm of h . If $p \geq p^*$, the employer will not violate the law. The cost of policing in both cases is $\frac{1}{2}\gamma p^2$.

12. Formally, this means that the condition in expression (5) is met; that is, $b - b > (C/2)[\phi b/s(\tau^2 - \phi^2)]^2$.

13. I consider the joint use of whistleblower rewards and police officers in Section 5.1.

It is never optimal to set $p < p^*$ other than $p = 0$, since with $p \in (0, p^*)$ the employer is not deterred, and the cost of policing is borne. Similarly, it is never optimal to set $p > p^*$, since the employer is deterred just as when $p = p^*$, but a greater cost of policing is borne. For the analysis to be meaningful, I assume that the social harm from violating the law is large enough that it is desirable to employ the police to deter violations of the law.¹⁴

A social planner has to choose between rewarding whistleblowers as a law enforcement strategy and employing police officers as a law enforcement strategy. Using expressions (3) and (8), we know that expected social welfare from rewarding whistleblowers, when the reward deters a violation of the law, is greater than the expected social welfare from policing if

$$w - \frac{1}{2C}(\phi\hat{R})^2 \geq w - \frac{1}{2}\gamma p^{*2}. \quad (9)$$

Plugging in \hat{R} (from expression [2]) and p^* (from expression [7]), we get the following condition for choosing whistleblowing over policing:

$$\gamma \geq \frac{\phi^2}{(\tau^2 - \phi^2)^2} C. \quad (10)$$

I can now define the optimal law enforcement strategy:

Proposition 2. If the risk of a false report by whistleblowers (ϕ) is sufficiently small,¹⁵ then whistleblowing dominates policing.

To understand the intuition behind proposition 2, assume that there is no risk of a false report, that is, that $\phi = 0$. In such a case an optimal whistleblower reward, which deters the employer from violating the law, has no social cost at all, as false reports are never made and therefore the employee never bears a personal cost. The employment of police officers and investigators, by contrast, always involves a social cost and is therefore socially more costly. Even when the risk of a false report is relatively small but not 0, which means that some social cost will be borne when whistleblower rewards are employed, because of false reports and the personal cost that they entail, whistleblowing will still dominate policing as a law enforcement strategy.

14. Formally, this means that $h - b > \frac{1}{2}\gamma p^{*2}$.

15. The risk is sufficiently small when $\phi < (-\sqrt{C} + \sqrt{C + 4\gamma\tau^2})/2\sqrt{\gamma}$, which is obtained from solving expression (10) for ϕ .

5. EXTENSIONS

5.1. Policing and Whistleblowing

In the analysis in Section 4 I assumed that the social planner has to choose between rewarding whistleblowers and employing police officers and investigators. This seems reasonable as a first-cut analysis. However, in many contexts one can reward whistleblowers in addition to employing police officers and investigators. I analyze this case, focusing on how the level of policing and the size of the reward should be determined jointly.

When police officers are employed in addition to rewarding whistleblowers, the employer's expected utility from the possible actions he may undertake is the following:

$$E[U] = \begin{cases} w + b - \tau^2 \frac{R}{C} s - ps & \text{if law is violated} \\ w - \phi^2 \frac{R}{C} s & \text{if law is not violated.} \end{cases} \quad (11)$$

Expression (11) is almost identical to expression (1), with the difference that in expression (11) when the employer violates the law, there is a probability p of being caught by the police, in which case a sanction s is imposed. For simplicity I assume that there is no overlap between violations reported by whistleblowers and violations detected by the police.

I can now define the size of the reward for which violating the law generates the same utility as not violating the law. This is the minimal reward required to deter the employer from violating the law. Using expression (11), we get

$$R = \frac{bC}{s(\tau^2 - \phi^2)} - p \frac{C}{(\tau^2 - \phi^2)}. \quad (12)$$

Comparing expressions (12) and (2), one can see that a lower reward is sufficient to deter violations of the law when police officers and investigators are employed.

I now turn to the social planner's problem. Using expression (3), and incorporating into it the cost of policing, the social planner solves the following problem:

$$\max_{R,p} w - \frac{1}{2C} (\phi R)^2 - \frac{1}{2} \gamma p^2, \quad (13)$$

subject to the constraint in equation (12). That is, the social planner maximizes social welfare subject to the constraint that the employer is de-

tered from violating the law by the reward and policing. This problem yields the following optimal levels of the whistleblower reward and policing:

$$R^* = b\gamma C \frac{\tau^2 - \phi^2}{sz} \quad \text{and} \quad p^* = bC \frac{\phi^2}{sz}, \quad (14)$$

where, for notational simplicity, I define $z = \phi^2 C + \gamma(\tau^2 - \phi^2)^2$.

Using expressions (14), I can derive a few conclusions regarding the joint determination of the optimal level of policing and the optimal size of the whistleblower reward. First, an increase in the cost of policing (γ) leads to a reduction in policing and an increase in the whistleblower reward.¹⁶ Intuitively, in the optimum, the marginal cost of the whistleblower reward and of policing are equal. As the marginal cost of policing goes up, we reduce policing and increase the whistleblower reward to equate these marginal costs once again.

Another conclusion to derive from expressions (14) is that an increase in the personal cost to whistleblowers (C) leads to an increase in the whistleblower reward and also to an increase in policing.¹⁷ Intuitively, a higher personal cost of whistleblowing means that, given the reward, whistleblowers are less likely to report a violation, which reduces deterrence. To restore deterrence, both the reward and policing are increased on the margin.

Third, an increase in the risk of a false report (ϕ) leads to an increase in policing, but the effect that it has on the reward size is unclear.¹⁸ Similarly, a decrease in the probability of a successful true report (τ) leads to a reduction in policing, but the effect that it has on the reward size is unclear.¹⁹ Finally, an increase in the size of the sanction (s) reduces both policing and the whistleblower reward.²⁰

5.2. Sanction for an Unsuccessful Report

In the model I assumed that no sanction is imposed on the employee for an unsuccessful report. This assumption reflects the actual workings of most whistleblower programs, which do not allow the imposition of sanctions for unsuccessful reports.

16. Formally, $\partial R^*/\partial \gamma > 0$ and $\partial p^*/\partial \gamma < 0$.

17. Formally, $\partial R^*/\partial C > 0$ and $\partial p^*/\partial C > 0$.

18. Formally, $\partial p^*/\partial \phi^2 > 0$ and $\text{sign}\{\partial R^*/\partial \phi^2\} = \text{sign}\{(\gamma - C)(\tau^2 - \phi^2)^2 - \phi^2 C\}$.

19. Formally, $\partial p^*/\partial \tau^2 < 0$ and $\text{sign}\{\partial p^*/\partial \tau^2\} = \text{sign}\{\phi^2 C - \gamma(\tau^2 - \phi^2)^2\}$.

20. Formally, $\partial R^*/\partial s < 0$, and $\partial p^*/\partial s < 0$.

For example, in 2013 there were 2,958 whistleblower reports to the IRS that were closed without paying a reward to the whistleblower, and in 2012 there were 2,194 reports that were similarly closed (IRS 2013). Many of these cases were closed simply because the report was found to raise “no tax issue” (IRS 2013, p. 19). Similarly, the SEC has received several thousand reports that have not led to the payment of a reward since the inception of the SEC’s whistleblower program in 2011 (SEC 2013). In all these cases no sanction was imposed for the unsuccessful report.

In some cases, however, a sanction may be imposed on a whistleblower for an unsuccessful report. For example, according to the False Claims Act, the court may award the defendant its reasonable attorney’s fees and expenses if the claim was clearly frivolous or vexatious or brought primarily for purposes of harassment (31 U.S.C. 3730[d][4]). In a recent case, the court affirmed an award of thousands of dollars in costs to a defendant in a False Claims Act case, even though the claim was not found to be frivolous (*United States v. Huron Consulting Group*, 2015 U.S. Dist. LEXIS 15977).

I now consider the introduction of a sanction for an unsuccessful report into the model. Specifically, suppose the sanction for an unsuccessful report is s' . Given this sanction, the employee will make a false report of a violation of the law only if $c < \phi R - (1 - \phi)s'$ and the employee will make a true report of a violation of the law only if $c < \tau R - (1 - \tau)s'$. Note that if we set $s' = \phi/(1 - \phi)R$, then no false report will be made but true reports will still be made. In such a case, one can show that whistleblowing dominates policing.

In some cases, however, especially when ϕ is very high, one cannot set $s' = \phi/(1 - \phi)R$, because s' is bound by the employee’s assets. In those cases one can rederive \hat{R} , the minimal reward required to deter the employer from violating the law:²¹

$$\hat{R} = \frac{bC}{s(\tau^2 - \phi^2)} + \frac{1 - (\tau + \phi)}{(\tau + \phi)} s'. \quad (15)$$

Comparing expressions (15) and (2), one can see that when $\tau + \phi < 1$, the introduction of a sanction for an unsuccessful report increases \hat{R} , but

21. The employer’s utility when violating the law, $w + b - (1/C)[\tau R - (1 - \tau)s']\tau s$, is equated with his utility when not violating the law, $w - (1/C)[\phi R - (1 - \phi)s']\phi s$, to obtain \hat{R} .

when $\tau + \phi > 1$, the introduction of a sanction for an unsuccessful report decreases \hat{R} .

Using the new expression for \hat{R} results in the following condition for choosing whistleblowing over policing:²²

$$\gamma \geq \left[\frac{\phi}{(\tau^2 - \phi^2)} \sqrt{C} - s' \frac{\tau}{(\tau + \phi)} \frac{s}{b\sqrt{C}} \right]^2. \quad (16)$$

Comparing expressions (16) and (10), one can see that introducing a sanction for an unsuccessful report increases the likelihood that whistleblowing will dominate policing as a law enforcement strategy. In other words, the introduction of a sanction for an unsuccessful report reduces the social cost involved with the employment of whistleblower rewards, which makes rewarding whistleblowers as a law enforcement strategy relatively more desirable.

5.3. Bribing Whistleblowers

In the model I assumed that the employer cannot pay the employee not to report a violation of the law. Such a contract is illegal and therefore will not be enforced by a court. Now assume that somehow such a contract can be enforced. That is, the employer can pay the employee a bribe that is conditional on the employee not reporting a violation the employee witnessed. How would this affect the analysis?

Formally, suppose that the employer offers the employee a bribe k not to report a violation of the law the employee witnessed. In such a case the employee would report a violation of the law only if $c < \tau R - k$, that is only if the personal cost of reporting is lower than the expected reward minus the bribe from the employer, which he will lose by reporting. Define the employer's expected utility from the possible actions he may undertake:

$$E[U] = \begin{cases} w + b - \left(1 - \frac{\tau R - k}{C}\right)k - \frac{\tau R - k}{C} \tau s & \text{if law is violated and bribe is offered} \\ w + b - \tau^2 \frac{R}{C} s & \text{if law is violated} \\ w - \phi^2 \frac{R}{C} s & \text{if law is not violated.} \end{cases} \quad (17)$$

The only difference between expression (17) and expression (1) is that

22. This is obtained by solving $w - (1/2C)[\phi\hat{R} - (1 - \phi)s']^2 \geq w - \frac{1}{2}\gamma p^{*2}$ using \hat{R} from expression (15) and p^* from expression (7).

in expression (17) another option is introduced: the employer may violate the law and offer the employee a bribe k not to report this violation. If the employer chooses this option, the employee will report the violation if $c < \tau R - k$, which occurs with probability $(\tau R - k)/C$, given the uniform distribution of c , in which case the sanction on the employer is s , and with probability $1 - [(\tau R - k)/C]$ the employee will not report the violation, in which case the employer will pay the employee the bribe k .

When thinking about how the introduction of a bribe affects the analysis, the first thing to note is that bribery is a crime. Thus, an employer's attempt to bribe the employee not to report a violation of the law the employee witnessed is a violation of the law in and of itself. This means that the employee may report this new crime to the government, as well as the original violation of the law.

I begin with the most simple case. Assume that if the employee's whistleblowing is successful, the employee can also provide hard evidence of the bribe to the government and that a false report of the bribe cannot be made. In such a case bribe offers can easily be deterred by offering a higher reward for reporting the violation of the law as well as a bribe offer²³ or by imposing a higher sanction for violating the law and bribing the employee.²⁴

Now consider the opposite case, in which the employee is unable to provide any evidence of the bribe offer to the government. In such a case, neither the reward nor the sanction can be increased because of the bribe. The employer will choose the bribe k to maximize his utility from violating the law and offering a bribe in expression (17). Solving this maximization yields the following optimal bribe:

$$k^* = \frac{1}{2}(\tau R + \tau s - C). \quad (18)$$

23. If, as before, R will be paid for reporting a violation of the law but R' will be paid for reporting the violation of the law as well as the bribe offer, the social planner can set $R' = (\tau R + k)/\tau$. Then, as can be seen from expression (17), the employer will never choose to bribe the employee, since when doing so the risk of a sanction will be identical to the risk when not offering a bribe, but the employer also has to pay k when the employee does not blow the whistle.

24. If, as before, s will be the sanction for violating the law, but s' will be the sanction for violating the law and bribing the employee, the social planner can set $s' = [\tau R/(\tau R - k)]s$. Then, as one can see from expression (17), the employer will never choose to bribe the employee, since when doing so the expected sanction will be identical to the expected sanction when not offering a bribe, but the employer also has to pay k when the employee does not blow the whistle.

Looking at expression (18), one can see that the optimal bribe, from the employer's perspective, is increasing with the size of the reward (R) and the sanction (s) and decreasing with the personal cost of whistleblowing (C). This makes intuitive sense. Moreover, an increase in the reward R by 1 unit leads to an increase in the optimal bribe by $\frac{1}{2}\tau$ of a unit. This means that the effect that an increase in the reward has on the probability of a sanction is not fully offset by an increase in the bribe. A full offset would be too costly for the employer, as it would require a very large bribe payment when the employee does not report the violation of the law. Accordingly, a higher reward still leads to a higher expected sanction.

One can plug in k^* into expression (17) and derive \hat{R} , the size of the reward for which violating the law and offering a bribe to the employee generates the same utility as not violating the law. The expression for \hat{R} does not end up being a simple one.²⁵ However, as in the basic model, the employer violates the law if the whistleblower reward is smaller than \hat{R} and he does not violate the law if the whistleblower reward is greater than \hat{R} .

A social planner chooses the reward that maximizes social welfare. In this respect nothing changes relative to the basic model. Social welfare is still captured by expression (3). This means that, as before, the social planner chooses the optimal reward by comparing social welfare when $R = \hat{R}$ to social welfare when $R = 0$. This comparison is still captured by expression (4), though now the new \hat{R} must be used.

With respect to the choice between rewarding whistleblowers and employing police officers and investigators, this comparison is still captured by expression (9), though now the new \hat{R} must be used. As before, one can show that, when the risk of a false report by whistleblowers (ϕ) is sufficiently small, then whistleblowing dominates policing.

5.4. Payment of Reward in Equilibrium

One concern that may arise with respect to the model is that when the reward is set at \hat{R} , as defined in expression (2), the employer is deterred from violating the law, yet if the employee falsely reports a violation (which occurs when $c < \phi\hat{R}$), and this false report succeeds (which occurs with probability ϕ), the employee receives the reward. In theory, since the employer is deterred, it should be recognized that the report

25. Formally, $\hat{R} = (1/\tau^2)(C\tau + s\tau^2 - 2s\phi^2 + 2\sqrt{s^2\phi^4 - Cb\tau^2 + Cs\tau^3 - s^2\tau^2\phi^2 - Cs\tau\phi^2})$.

made by the employee is a false one, and therefore the employee should not be paid.

One way to address this issue is to recognize that if no reward is paid to the employee when the reward is set at \hat{R} , the employer will not be deterred by this reward. Thus, from the social planner's perspective, it is desirable that a reward be paid when it is set at \hat{R} . One way for the social planner to commit to such policy is to have the level of the reward set by high-level policy makers, and the actual payment of the reward determined by lower-level law enforcement officials who are not aware of the mechanism used to determine the size of the reward.

Another way to address this issue is to complicate the model and consider a more realistic setting in which the social planner does not know b , the employer's benefit from violating the law. Instead, assume that b is distributed based on a cumulative distribution function $F(\cdot)$ and that the social planner knows only this distribution (the employer knows his own b). Using expression (1), define \hat{b} , the employer's benefit from violating the law for which violating the law generates the same expected utility to the employer as not violating the law. One can show that $\hat{b} = (R/C)s(\tau^2 - \phi^2)$. Using expression (3), the social planner will choose the optimal reward by solving the following problem:

$$\max_R F(\hat{b}) \left[w - \frac{1}{2C} (\phi R)^2 \right] + [1 - F(\hat{b})] \left[w + b - h - \frac{1}{2C} (\tau R)^2 \right]. \quad (19)$$

Intuitively, when $b \leq \hat{b}$, which occurs with probability $F(\hat{b})$, social welfare will be the one noted in expression (3) for the case in which the employer is deterred from violating the law. When $b > \hat{b}$, which occurs with probability $1 - F(\hat{b})$, social welfare will be the one noted in equation (3) for the case in which the employer violates the law.

This maximization yields the following first-order condition:

$$f(\hat{b}) \frac{\partial \hat{b}}{\partial R} \left[\frac{1}{2C} R^2 (\tau^2 - \phi^2) + h - b \right] = \frac{R}{C} \left[\tau^2 - F(\hat{b}) (\tau^2 - \phi^2) \right], \quad (20)$$

where $f(\cdot)$ is the density function that corresponds to $F(\cdot)$. The left-hand side of equation (20) is the social welfare gain from marginally increasing the reward, as it reflects the increased probability that the employer will be deterred, multiplied by the gain to social welfare in such a case. The right-hand side of equation (20) is the social welfare loss from marginally

increasing the reward, which is the expected increase in social cost due to the higher reward.

To obtain a closed-form solution for the optimal whistleblower reward from the first-order condition in equation (20), one needs to impose a specific structure on the distribution function $F(\cdot)$. However, even using a uniform distribution and solving for the optimal reward yields an extremely long and complex expression that is not conducive for analysis. Still, at the optimal reward resulting from the first-order condition in equation (20), there is a positive probability for the employer to violate the law. Therefore, the payment of the reward to whistleblowers with a positive probability is justified in such a setting.

6. POLICY IMPLICATIONS

The model presented in this paper is, of course, a stylized one. Nonetheless, it provides a general framework for thinking about the use and design of whistleblower programs. As with all economic models, it should not be applied mechanically, but it can serve as a useful guide to the use of whistleblower rewards as a law enforcement strategy.

One policy implication arising from the model is that, in cases where the risk of a false report is low, we should see a greater use of whistleblowing as a law enforcement strategy, as opposed to the employment of police officers and investigators. In other words, when we are relatively confident that the information provided by whistleblowers is true, whistleblowing is the economically efficient way of enforcing the law. This point has not been made before and is not well understood by policy makers.

Since there are many settings in which the risk of a false report is low, the superiority of whistleblowing as a law enforcement strategy often holds. For example, whistleblowers frequently provide information about ongoing violations of the law, such as the dumping of waste into a river or the evasion of taxes. In such cases, once the whistleblower provides the information, the violation of the law can be observed independently by law enforcement agents, and therefore the risk of a successful false report is very low. In other contexts whistleblowers provide hard evidence of the violation of the law, such as bank statements or recordings, that are very difficult to fabricate. In all these settings the risk of a false report is very low, and therefore whistleblowing should be the preferred law en-

forcement strategy. The finding that whistleblowing dominates policing when the risk of a false report is low may explain the growth in the use of whistleblowing as a law enforcement strategy in recent years, as documented in Section 2.

Another policy implication arising from the model relates to the factors that should be considered when setting the level of whistleblower rewards. Surprisingly, this question has received little attention from scholars and policy makers. According to the model (expression [6]), five factors should be considered when setting whistleblower rewards: (1) the personal benefit to the violator from violating the law, (2) the personal cost to whistleblowers, (3) the likelihood of a successful false report, (4) the likelihood of a successful true report, and (5) the size of the sanction for violating the law. An increase in the first three factors should lead to an increase in the reward, whereas an increase in the latter two factors should lead to a decrease in the reward. Most interesting is that a greater likelihood of a false report should lead, counterintuitively, to a greater, not a smaller, whistleblower reward.

As noted in Section 2, the IRS may pay a reward that ranges from 15 to 30 percent of the of the collected proceeds. In August 2014, new regulations were adopted to guide the IRS in determining the percentage of the collected proceeds that should be paid to whistleblowers in each case (26 C.F.R. 301.7623-4). These regulations include 16 factors to be considered when setting a reward, eight positive and eight negative.²⁶ In-

26. The positive factors include “(i) The whistleblower acted promptly to inform the IRS or the taxpayer of the tax noncompliance. (ii) The information provided identified an issue or transaction of a type previously unknown to the IRS. (iii) The information provided identified taxpayer behavior that the IRS was unlikely to identify or that was particularly difficult to detect through the IRS’s exercise of reasonable diligence. (iv) The information provided thoroughly presented the factual details of tax noncompliance in a clear and organized manner, particularly if the manner of the presentation saved the IRS work and resources. (v) The whistleblower . . . provided exceptional cooperation and assistance during the pendency of the action(s). (vi) The information provided identified assets of the taxpayer that could be used to pay liabilities, particularly if the assets were not otherwise known to the IRS. (vii) The information provided identified connections between transactions, or parties to transactions, that enabled the IRS to understand tax implications that might not otherwise have been understood by the IRS. (viii) The information provided had an impact on the behavior of the taxpayer, for example by causing the taxpayer to promptly correct a previously-reported improper position.” Negative factors include “(i) The whistleblower delayed informing the IRS after learning the relevant facts, particularly if the delay adversely affected the IRS’s ability to pursue an action or issue. (ii) The whistleblower contributed to the underpayment of tax or tax noncompliance identified. (iii) The whistleblower directly or indirectly profited from the underpayment of tax or tax noncompliance identified, but did not plan and initiate the actions that

terestingly, none of these 16 factors correspond to any of the five factors that should determine the level of whistleblower rewards according to the model. Similarly, since the SEC may pay anything between 10 to 30 percent of the sanctions collected as a whistleblower reward, regulations were adopted to guide the SEC in determining the whistleblower reward in each case (17 C.F.R. 240.21F-6). These regulations also fail to reflect any of the five factors that should determine the level of whistleblower rewards according to the model.²⁷ It therefore seems that an improved whistleblowing policy would consider the abovementioned five factors as central factors when determining the level of whistleblower rewards.

Lastly, many whistleblower programs do not allow for the imposition of a sanction in case of false or unsuccessful reports by whistleblowers. For example, in the case of the SEC whistleblower program, if a whistleblower willfully makes any false, fictitious, or fraudulent statement, he will not be entitled to an award (15 U.S.C. 78u-6[i]). However, there is no specific authority to impose a sanction in such a case, and certainly not in cases where the report simply failed to convince the SEC that the law was violated. Similarly, the IRS whistleblower program does not include the authority to impose a sanction for an unsuccessful report, though since information must be submitted under a penalty of perjury, in cases that reach the level of criminal perjury a penalty in theory can be imposed (26 U.S.C. 7623[b][6][C]). Based on the analysis in Section 5.2, introducing the authority to impose a sanction for unsuccessful reports to whistleblower programs would be a policy improvement. Though such a sanction may discourage true reports, and not only false ones, its overall effect is to decrease the social cost of whistleblower programs.

led to the underpayment of tax. . . . (iv) The whistleblower . . . negatively affected the IRS's ability to pursue the action, for example by disclosing the existence or scope of an enforcement activity. (v) The whistleblower . . . violated instructions provided by the IRS, particularly if the violation caused the IRS to expend additional resources. (vi) The whistleblower . . . violated the terms of a confidentiality agreement (vii) The whistleblower . . . violated the terms of a contract entered into with the IRS [concerning the disclosure of return information]. (viii) The whistleblower provided false or misleading information.”

27. One exception may be 17 C.F.R. 240.21F-6(a)(2)(vi), which considers “[a]ny unique hardships experienced by the whistleblower as a result of his or her reporting and assisting in the enforcement action.”

7. CONCLUSION

In a speech in September 2014, Attorney General Eric Holder called for thinking of ways to “encourage whistleblowers at financial firms to come forward.” He noted that under the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA), a little-known law that was recently aggressively used to develop the cases that have resulted in major settlements with JPMorgan, Citigroup, and Bank of America, “the amount an individual can receive in exchange for coming forward is capped at just \$1.6 million,” which is “unlikely to induce an employee to risk his or her lucrative career in the financial sector” (Holder 2014). Therefore, he called for “modifying the FIRREA whistleblower provision—perhaps to False Claims Act levels—to increase its incentives for individual cooperation” (Holder 2014). This call for increased whistleblower rewards is consistent with a general trend, noted in Section 2, for increased reliance on whistleblower rewards as a law enforcement strategy in recent years. Despite this trend, little attention has been paid to the questions of the desirability of whistleblower rewards and their optimal design. What is the optimal size of whistleblower rewards? And how should we choose between employing police officers and rewarding whistleblowers?

To address these questions I employ a simple stylized model that captures two important features of the whistleblowing context. First, whistleblowers bear a personal cost. Second, a whistleblower reward may encourage false reports. Using this model, I find that there is a nonmonotonic relationship between the personal cost to whistleblowers and the optimal reward and between the risk of a false report and the optimal reward. I also find that offering a whistleblower reward dominates the employment of police officers and investigators when the risk of a false report is small.

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