Whistleblowing and competition*

Konstantinos Ioannidis†

March 19, 2025

Abstract

Whistleblowing, i.e. the act of reporting illegal actions of an organisation by an employee, is an important tool to uncover corporate fraud. Previous experimental literature studied firms independently of each other. We hypothesise that competition between firms for market revenue provides strategic and non-strategic motives to decrease whistleblowing and increase lawbreaking. In an experiment, we use treatments with and without competition and find an insignificant reduction in whistleblowing and a marginal increase in lawbreaking under competition. We also find evidence that behaviour correlates with beliefs, but it does not correlate with morality judgements.

Keywords: Whistleblowing, Corporate fraud, Competition, Experiment
JEL Codes: D91, C92, D01, D83

1 Introduction

Corporate fraud presents a pressing concern for various stakeholders, impacting the economy, society, and eroding public trust in the financial system. Despite its substantial welfare costs, only a third of all corporate fraud cases are ever detected (Dyck et al., 2023). Whistleblowing emerges as a vital tool to expose and deter fraudulent activities within organisations (Leder-Luis, 2023). Whistleblowing entails reporting illegal or unethical behaviour by employees of a firm, leading to a conflict between moral responsibility and loyalty to the firm (Mesmer-Magnus and Viswesvaran, 2005; Waytz et al., 2013; Dungan et al., 2019). Consequently, the study of whistleblowing behaviour and its determinants has garnered significant academic interest and policy relevance in the field of economics.

Examining whistleblowing empirically is inherently complex and faces identification and measurement challenges, as only detected fraud and blown whistles can be observed.[1] To

*Financial support from the Research Priority Area Behavioral Economics of the University of Amsterdam is gratefully acknowledged. I am grateful to the University of Birmingham and the University of Cambridge for providing access to their experimental laboratories. All data and code can be found at `https://github.com/KonstantinosIoannidis/Whistleblowing`. The author would like to thank participants at the 10th annual conference "Contests: Theory and Evidence", the 2023 ESA World meeting and the BUE-EBEL 3rd Annual International Conference in Behavioural & Experimental Economics for their valuable feedback on earlier stages of this paper. An earlier version of this paper was included in my PhD dissertation (Ioannidis, 2024).

†University of Cambridge. Corresponding e-mail: ioannidis.a.konstantinos@gmail.com

[1]Whistleblowing has also been examined from a theoretical perspective (see for instance Heyes and Kapur (2009) and Givati (2016).

address these issues, researchers have increasingly adopted experimental approaches to study whistleblowing. The experimental literature is primarily motivated by providing empirical evidence for emerging whistleblowing laws that safeguard whistleblowers from retaliation or offer financial incentives for uncovering fraud.[2] A common limitation in existing studies is that they focus on the behaviour of experimental firms in isolation, overlooking industries where firms impact each other's revenues. Competitive pressures may provide strategic incentives undermining whistleblowing and facilitating lawbreaking, as well as erode moral values. Thus, the primary goal of our paper is to fill this gap by examining whistleblowing and lawbreaking in a competitive setting. The second goal of our paper is to study whether beliefs about the frequency of and judgements about the appropriateness of whistleblowing and lawbreaking moderate the effect of competition on unethical behaviour (i.e., breaking the law and not blowing the whistle).

Our experiment builds upon the whistleblowing game introduced by Butler et al. (2020). In this game, managers are provided with the chance to break the law which can yield personal gains for themselves and their employees, but at the detriment of other participants who act as members of the public. Employees, on the other hand, are not victims of the manager's unlawful conduct but rather benefit from it. They are given the choice to report their manager's wrongdoing, which incurs a cost for the employee and results in an automatic monetary penalty imposed on the manager. Our treatments vary whether firms operate independently or compete for market revenue. We predict that competition will decrease whistleblowing and increase lawbreaking.

We also employ a post-experiment incentivised survey eliciting beliefs about the frequency of whistleblowing and lawbreaking, and appropriateness ratings of such actions. We conjecture that the direct effect of competition on whistleblowing and lawbreaking will be mediated by the indirect effect of beliefs and judgements on behaviour.

Overall, we find little evidence that competition affects unethical behaviour. We find an insignificant decrease on whistleblowing and a marginally significant increase in lawbreaking under competition. Having found a null treatment effect, there is no scope for beliefs and morality judgements to mediate the effect. Thus, we reformulate the second goal of our paper to investigate whether beliefs and morality judgements are correlated with whistleblowing and lawbreaking behaviour, and whether competition affects them. We find that beliefs significantly correlate with behaviour, whereas morality judgements do so less strongly. We also find that competition moves beliefs in the direction of observed behaviour whereas morality judgements are not significantly affected by competition.

Our paper contributes to the existing experimental literature on whistleblowing within firms, which has primarily focused on identifying financial factors that encourage individuals to blow the whistle. Prior studies have highlighted the positive impact of incentives such as monetary rewards (Breuer, 2013; Schmolke and Utikal, 2018; Butler et al., 2020), protection from dismissal (Wallmeier, 2019; Mechtenberg et al., 2020), and the threat of fines for non-reporting (Schmolke and Utikal, 2018). Our research sheds light on a previously overlooked aspect – the potentially negative effect of competition on whistleblowing. If competition does decrease whistleblowing,

[2]Examples of such laws include the Public Interest Disclosure Act in the United Kingdom (1998), the Dodd-Frank Act in the United States (2010), and the more recent EU Whistleblower Protection Directive in the European Union (2019).

then the existing literature's conclusions should be seen as upper bounds on the prevalence of whistleblowing. However, our findings suggest that competition has a minimal effect on whistleblowing.

Experimental work has also studied non-pecuniary motivations of whistleblowers. Bartuli et al. (2016) investigated personality factors and attitudes, and found that employees who score higher in the Honesty-Humility factor, who are more altruistic, and are more aware of ethical issues are more likely to blow the whistle. Antinyan et al. (2020) found that higher trust in the government and institutions also increases the likelihood to blow the whistle. Motivated by the fact that whistleblowers are sometimes seen as heroes and sometimes as snitches, Butler et al. (2020) provide experimental evidence that the expected social approval or disapproval of whistleblowers by the public affects their behaviour. We contribute to this literature by studying how beliefs and morality judgements are used to justify not blowing the whistle and breaking the law.

Relevant to our study is also a well established literature on whistleblowing between firms in the context of cartels. Since cartels by definition involve multiple firms, competition between firms is always present. The rich experimental literature has provided evidence that various forms of leniency programs on cartel reporting, such as offering financial rewards (Apesteguia et al., 2007; Hinloopen and Soetevent, 2008; Bigoni et al., 2012) or providing full or partial amnesty (Bigoni et al., 2015; Feltovich and Hamaguchi, 2018) to whistleblowing firms who report a cartel, are effective against cartel formation and price fixing, and promote cartel discovery.[3] Notably, (Hamaguchi et al., 2009) vary the level of competition between firms by comparing cartels of two or of seven firms, and find that competition increases the effectiveness of leniency programs as cartels are less sustainable among seven firms.

Finally, our study is closely related to the broader literature exploring the effect of competition on unethical behaviour. Previous research has operationalised competition through competitive payment schemes (Schwieren and Weichselbaumer, 2010; Gill et al., 2013; Savikhin and Sheremeta, 2013; Cartwright and Menezes, 2014; Buser and Dreber, 2016; Schurr and Ritov, 2016; Vadera and Pathki, 2021) or market-based settings (Falk and Szech, 2013; Bartling et al., 2015, 2019, 2023; Ziegler et al., 2020). A recent meta-analysis by Huber et al. (2023) examines 45 experimental designs and reports a small overall effect of competition on morality. The general consensus is that competition tends to lead to more unethical behaviour. Our experimental design aligns more closely with the competitive payment schemes, and our results reveal that competition leads to a small insignificant increase of unethical behaviour.

The remaining of the paper is organised as follows. Section 2 provides a detailed presentation of the whistleblowing game, the experimental design, our predictions, and the implementation. All results are presented in Section 3. We end the paper with Section 4 which interprets the results, and suggests areas for future research.

[3]Hinloopen and Normann (2009) and Hinloopen et al. (2023) provide a comprehensive overview of experiments on leniency programs for cartel reporting.).

2 Experimental design and predictions

2.1 The baseline whistleblowing game

The whistleblowing game is based on Butler et al. (2020) and has been adapted for this study. In the game, nine participants are randomly assigned to three firms, each consisting of one manager and two employees. Additionally, six participants play the role of members of the public. The inclusion of a larger number of members of the public compared to the size of each firm aims to recreate, in a laboratory setting, the sentiment that society, which may be harmed by corporate fraud, is larger than the firm committing the fraud.

The employees are given an addition task, where they are provided with six pairs of two-digit numbers and asked to report the sum of each pair. For each correctly reported sum, they earn 20 Experimental Currency Units (ECU) as private earnings and contribute 10 ECU to the firm's surplus. They have 120 seconds to complete this task. The members of the public also engage in the same addition task, but they only earn private earnings.

The manager receives a fixed income of 120 ECU. Furthermore, they have the opportunity to double the firm's surplus by choosing one of two options. The first option involves a multiplication task, where the manager is provided with six pairs of two-digit numbers and asked to report the product of each pair. If they report at least three correct products, the firm's surplus is doubled. If they fail to do so, the surplus remains unchanged. The second option is to break the law, which automatically doubles the firm's surplus without the manager engaging in the multiplication task. However, breaking the law results in a loss of 20 ECU for each of the six members of the public. Importantly, when making their decision, the manager is unaware of the size of the surplus created by the employees. This setup prevents managers from basing their decision to break the law on the performance of their employees, ensuring comparability of manager decisions across firms. The final surplus is distributed among the firm members, with the manager keeping half of the surplus and each employee receiving a quarter.

The employees have the option to blow the whistle if their manager breaks the law. Their willingness to blow the whistle is elicited using the strategy method. At the moment of deciding to blow the whistle, the employees are unaware of whether their manager has broken the law. If the manager does break the law, one of the two employees is randomly selected, and their decision to blow the whistle is implemented. If the manager does not break the law, the employee's decision is not implemented. Blowing the whistle comes at a cost of 25 ECU for the selected employee and imposes a penalty of 70 ECU on the manager.

2.2 Treatments

Our experiment consists of two primary treatments. The Baseline treatment follows the design described in the previous subsection, where the firms operate independently of each other. As highlighted in the introduction, this design serves as our baseline comparison.

In the Competition treatment, we introduce a modification to break the independence among firms in a straightforward manner. Before redistributing the surpluses of the firms, we rank the surpluses. The firm with the largest surplus emerges as the winner of the competition and has its surplus further increased by 50%, while the each of the other two firms experience a decrease of

25% in their surpluses. In case of a tie, the winner is selected randomly with uniform probability. This treatment creates a tournament incentive structure and introduces strategic uncertainty as firm members must form beliefs about the behaviour of other firms. The competition treatment is designed to resemble industries with relatively few firms, where the decisions of each firm can significantly impact the distribution of market revenues among them.

Our design included a set of treatments which are only insightful as robustness checks if a treatment effect is established. Since we do not observe a significant treatment effect, we relegate detailed description and analysis of those additional treatments to Appendix A. In short, the additional treatments included a treatment where the winner of the competition was determined randomly, and a replication of our main two treatments in a setting whether the members of the public receive passive income instead of performing the task.

2.3 Predictions

Denoting the baseline and the competition treatments as B and C respectively, we denote the probability with which the manager breaks the law in treatment j by b^j, and the probability with which the selected employee blows the whistle in treatment j by w^j, where $j \in \{B, C\}$. We also denote by d_b^j and d_s^j respectively, the moral cost of the manager for breaking the law and the moral cost of the employee for not blowing the whistle in treatment j. Finally, we denote the expected firm surplus produced by the two employees before the manager makes any decision by S, and the probability that the manager can correctly solve the six multiplication problems by a.

In the baseline treatment, breaking the law yields the manager their fixed income and half of the doubled surplus, but their utility is reduced by the moral costs of breaking the law and by the expected punishment if the selected employee blows the whistle.

$$U_b^B = 120 + \frac{1}{2} \times 2S - 70w^B - d_b^B = 120 + S - 70w^B - d_b^B$$

Doing the multiplication task yields the fixed income and half of the surplus; the surplus may or may not be doubled depending on the manager's ability.

$$U_t^B = 120 + \frac{1}{2}\left[a \times 2S + (1-a) \times S\right] = 120 + \frac{1+a}{2}S$$

The manager weakly prefers to break the law if

$$U_b^B \geq U_t^B \Rightarrow \frac{1-a}{2}S \geq 70w^B + d_b^B \tag{1}$$

Intuitively, a manager is more likely to break the law if they are of low ability, if whistleblowing is less likely, or if their moral costs of doing so are low.

To derive the equivalent condition for the competition treatment, we further denote the probability of winning the competition if the surplus of the firm is not doubled by π_{1S}, and the probability of winning the competition if the surplus of the firm is doubled by π_{2S}. By definition we have $\pi_{2S} \geq \pi_{1S}$. Given that the surplus before the manager makes their decision

is expected to be similar between all firms,[4] and that ties are broken with uniform probability, π_{2S} can never be lower than one third. This is evident as the lowest probability of winning after having doubling the surplus is obtained in the case when all other firms also doubled their surplus, where all firms have exactly one third chance of winning. Similarly, if the surplus is not doubled, π_{1S} can never exceed one third. π_{1S} is zero if any other firm doubled their surplus and is positive only if no other firm doubled their surplus. In that case firms are tied in terms of surplus and each firm has one third chance of winning. Thus, $\pi_{2S} \geq \frac{1}{3} \geq \pi_{1S}$.

In the competition treatment, breaking the law yields the manager

$$U_b^C = 120 + \frac{1}{2} \times \left(\pi_{2S} \times \frac{3}{2} + (1 - \pi_{2S}) \times \frac{3}{4} \right) 2S - 70w^C - d_b^C = 120 + \frac{3(1 + \pi_{2S})}{4} S - 70w^C - d_b^C$$

whereas doing the multiplication task yields

$$U_t^C = 120 + \frac{1}{2} \left[a \left(\pi_{2S} \times \frac{3}{2} + (1 - \pi_{2S}) \times \frac{3}{4} \right) 2S + (1 - a) \left(\pi_{1S} \times \frac{3}{2} + (1 - \pi_{1S}) \times \frac{3}{4} \right) S \right] = 120 + \left[\frac{3a(1 + \pi_{2S})}{4} + \frac{3(1 - a)(1 + \pi_{1S})}{8} \right] S$$

The manager weakly prefers to break the law if

$$U_b^B \geq U_t^B \Rightarrow \frac{1 - a}{2} \left[\frac{3}{2} \left(\frac{1}{2} + \pi_{2S} - \frac{\pi_{1S}}{2} \right) \right] S \geq 70w^C + d_b^C \tag{2}$$

Since $\pi_{2S} \geq \frac{1}{3} \geq \pi_{1S}$, the term between brackets is necessarily weakly larger than 1. Thus, by comparing the multipliers of the surplus in Equation 1 and Equation 2, we see that the expected benefits of breaking the law are larger under competition than under baseline. Assuming that employees blow the whistle less under competition $w^C \leq w^B$, we predict that managers will break the law more frequently under competition. The tendency of managers to break the law more under competition may be further strengthened if competition reduces the moral costs of breaking the law ($d_b^C \leq d_b^B$).

Prediction 1. *The propensity of managers to break the law will be higher under competition.*

For the employee in treatment j, the expected cost of blowing the whistle is $\frac{1}{2} \times 25 \times b^j$, whereas the expected benefit is avoiding the moral costs of staying silent d_s^j. Thus under baseline the employee prefers to blow the whistle if

$$d_s^B \geq \frac{25}{2} b^B \tag{3}$$

[4]The addition task is relatively straightforward and almost all employees are expected to solve all number adding problems correctly. In fact, out of 2,016 sets of the six addition problems that the employees in our experiment worked on, they solved all six correctly in 1,888 of them (93.6%) with almost all other instances resulting in five correct. Thus, the surplus of each firm before the manager decision was roughly the same (120, 60 from each employee).

Under competition, the employee prefers to blow the whistle if

$$d_s^C \geq \frac{25}{2} b^C \tag{4}$$

Given the first prediction that managers will be more likely to break the law under competition ($b^C \geq b^B$), we predict that employees will be less likely to blow the whistle under competition. This tendency may be further facilitated if under competition the moral cost of staying silent is lower ($d_s^C \leq d_s^B$).

Prediction 2. *The propensity of employees to blow the whistle will be lower under competition.*

We continue with a discussion of how beliefs about the frequency of whistleblowing and lawbreaking are expected to correlate with whistleblowing and lawbreaking behaviour. We inform our discussion based on the predictions above, but also by discussing non-pecuniary motivations.

We begin with the beliefs about the frequency of behaviour of participants in the other role, i.e., the beliefs of managers about the frequency of whistleblowing, and the beliefs of employees about the frequency of lawbreaking. From Equation 1 and Equation 2, we note that managers are more likely to break the law if they expect fewer employees to blow the whistle as this reduces the expected punishment they may receive. Similarly, from Equation 3 and Equation 4, we note that employees are more likely to blow the whistle when they expect fewer managers to break the law as this reduces the expected cost of blowing the whistle. Thus, we would expect the propensity to break the law to be negatively correlated with the perceived likelihood that employees will blow the whistle, and the propensity to blow the whistle to be negatively correlated with the perceived likelihood that managers will break the law. The effect may be even more pronounced if managers use low whistleblowing and employees use high lawbreaking as evidence that unethical behaviour is prevalent around them, allowing them to further justify their actions.[5]

Next, we look at beliefs about the behaviour of participants in the same role. From a strategic point of view, the perceived frequency of whistleblowing should not affect the decision to blow the whistle as shown in Equation 3 and Equation 4. However, employees may have non-pecuniary reasons related to the belief about the frequency of whistleblowing. More specifically, employees may use their belief that fewer employees will blow the whistle to justify their own decision to stay silent. In other words, employees may reason that staying silent is not so bad since everyone is doing it.[6] Thus, we would expect the propensity to blow the whistle to be positively correlated with the belief that other employees are blowing the whistle.

For managers in the baseline treatment, the perceived frequency of lawbreaking has no strategic effects in their behaviour as shown in Equation 1. On the contrary, in the competition

[5]This reasoning resembles a form of social weighting, a rationalisation under which people are find examples of others that are similarly or more corrupt than themselves in order to justify their own corrupt behaviour while shielding their moral identity (Ashforth and Anand, 2003).

[6]This reasoning resembles a form of denial of responsibility, a rationalisation under which people rationalise their corrupt behaviour with the belief that others in their position are also engaging in the same behaviour (Ashforth and Anand, 2003). It can also be interpreted as evidence for a preference for conformity if participants are motivated by following what others are doing (Fatas et al., 2018), or as evidence for false consensus if they project their own behaviour and expect it to be more prevalent among the general population (Aronson et al., 2016).

treatment, lawbreaking of other firms becomes relevant. While in both treatments a manager is better off by doubling the surplus, in the competition treatment doubling the surplus has the additional benefit of increasing the probability of winning the competition. However, the expected benefits of doing so are decreasing with the probability that other managers double their surplus too. To illustrate, if neither of the other managers double their surplus, then doing so increases the manager's winning probability from $\frac{1}{3}$ to 1. However, if both other managers double their surplus, then doing so only increases the manager's winning probability from 0 to $\frac{1}{3}$.[7] Since the probability of doubling the surplus is an increasing function of the probability of breaking the law, it follows that the expected benefits of breaking the law are also decreasing with the probability that other managers break the law. In short, best-responding would suggest a negative correlation between lawbreaking and the perceived frequency of lawbreaking only in the competition treatment. However, non-pecuniary motivations are also present in both treatments, and similarly to employees, managers may use the higher perceived prevalence of lawbreaking as a justification to break the law themselves.[8]

Finally, as indicated in Equation 1 and Equation 2, managers are more likely to break the law if they suffer a lower moral cost from doing so. Similarly, employees are less likely to blow the whistle if they suffer a lower moral cost from staying silent (Equation 3 and Equation 4). Thus, we expect lawbreaking to be negatively correlated with moral costs, and whistleblowing to be positively correlated with moral costs. If competition erodes morals, we would expect the moral costs to be lower under competition.

2.4 Post-experiment survey

The survey consists of several parts. In the first part, we elicit beliefs about our primary behavioural outcomes. Participants are asked to estimate the frequency of employees blowing the whistle (between 0 and 72) and the frequency of managers breaking the law (between 0 and 36) in their session. If their estimates fall within three units of the correct values, they earn 20 ECU.

Next, we elicit morality judgements by asking participants to rate the appropriateness of three actions: a manager breaking the law, an employee not blowing the whistle, and the public losing part of their earnings. Participants rate the morality of employee and manager behaviour on a Likert scale ranging from very immoral to very moral, and the acceptability of the public losing earnings on a scale from very unacceptable to very acceptable. Additionally, participants indicate their level of loyalty to their firm on a scale from not loyal at all to very loyal. We incentivise participants with the Krupka and Weber (2013) method. The participants earn 10 points for each judgement if their responses match the modal answer in their session.

In the third part, we assess participants' risk preferences using the lottery task introduced by Eckel and Grossman (2002). Participants are presented with a series of lotteries with increas-

[7] Formally, denoting the probability that another manager doubles the surplus by π, we can rewrite the winning probabilities as $\pi_{1S} = \frac{1}{3}(1-\pi)^2 = \frac{1}{3}\pi^2 - \frac{2}{3}\pi + \frac{1}{3}$ and $\pi_{2S} = \frac{1}{3}\pi^2 + \frac{1}{2}[2\pi(1-\pi)] + (1-\pi)^2 = \frac{1}{3}\pi^2 - \pi + 1$. Both probabilities are decreasing in π. Further substituting the probabilities in the multiplier of the surplus in Equation 2, we obtain the multiplier as $\frac{1-a}{8}(\pi^2 - 4\pi + 8)$, which is also decreasing in π.

[8] As for employees, this reasoning can be interpreted as evidence for denial of responsibility, preference for conformity, or false consensus.

ing expected payoffs and greater variance. Their choices are incentivised and realised by the computer. Next, we explore participants' social preferences using the Social Value Orientation method developed by Murphy et al. (2011). Participants make six decisions. In each decision, they are provided with nine pairs of payoffs for themselves and another participant, and they must select one option for each decision. Participants are informed that one decision will be randomly chosen for payment, that they will be randomly paired with another participant, and that the decision of one of the two participants will be implemented. Finally, we gather standard demographic information such as age, gender, and field of study.

2.5 Implementation

Each session consisted of exactly 15 participants. The main deviation from the original one-shot game of Butler et al. (2020) is the fact that the game was played repeatedly for twelve rounds. In the first round, all participants were randomly assigned their role. The three managers retained their role for the remaining of the experiment. This reflects the fact that managers, who on average receive high wages, face smaller variability in their income over time.[9] Employees and members of the public alternated roles in each round. Changing roles between rounds simulated the fact that employees of firms in one industry are members of the public with respect to other industries. The employees were randomly assigned to a firm. The matching ensured that employees and members of the public would not be part of the same firm in consecutive rounds.

Following the original design of Butler et al. (2020), we use a framed experiment. As can be seen in the instructions on Appendix B, the labels we used for the participant roles and the actions of the game matched the description provided here.[10] Given the nuance associated with whistleblowing, we believe providing contextual cues is necessary for our experiment. Alekseev et al. (2017) summarised existing evidence and concluded that "using evocative language either does not affect behaviour or affects it in a desirable way by evoking the desired emotional response."

We did not provide feedback on the decisions of the employees and managers between rounds. This design feature, together with the role switching, and the random reassignment of employees in firms between rounds, aimed at mitigating reputation effects. At the same time, we were interested in eliciting beliefs about the prevalence and appropriateness of behaviour at the end of the experiment, and the absence of feedback provided us with a cleaner measure. We did provide feedback on individual performance (the number of correct answers provided) and feedback on whether their firm won the competition (only in the competition treatment).

The experimental sessions took place between April and October of 2023. Half of the participants were recruited from the participant pool of the Birmingham Experimental Economics Laboratory at the University of Birmingham, and half from the participant pool of the Cambridge Experimental and Behavioural Economics Group at the University of Cambridge. The experiment was programmed in oTree (Chen et al., 2016) and preregistered (Ioannidis, 2023).

[9] Previous whistleblowing experiments with repeated games also had managers keeping their role for the duration of the experiment (Mechtenberg et al., 2020).

[10] Framing effects have been documented to influence behaviour in a range of environments such as public good games (Sonnemans et al., 1998; Cookson, 2000; Cartwright, 2016) and dictator games (Dreber et al., 2013; Goerg et al., 2020).

Ethical approval was obtained prior to data collection (University of Amsterdam, 2023; University of Birmingham, 2023; University of Cambridge, 2023). Informed consent was collected from all participants at the beginning of each session. Clear instructions were provided to participants on screen as well as in print, and they had to answer a series of comprehension questions correctly before making decisions.

Each treatment arm involved 120 participants across eight sessions, resulting in a total of 240 participants. The participants were on average 22.59 years old (SD = 4.45, min = 18, max = 41) and came from various fields of study (27% Social Sciences, 22% Natural and Applied Sciences, 17% Humanities, 34% Other). The gender distribution was relatively balanced, with 55% female, 42% male, and 3% non-binary gendered participants. Table A1 in the appendix provides a break down of demographic variables across all treatments and participant pools. Each participant took part in only one experimental session and received an average payment of £11.21 (SD = 1.71, min = £5.70, max = £15.5) for approximately 75 minutes, including a participation fee of £2.00.

3 Results

3.1 The effect of competition on whistleblowing and lawbreaking

Figure 1 presents an initial overview of whistleblowing and lawbreaking across our treatments. The figure shows bar graphs separately for employee whistleblowing (left) and manager lawbreaking (right).

To support each result, we conduct two sets of tests. Firstly, we aggregate observations from the eight sessions of each treatment and conduct Mann-Whitney ranksum tests. While aggregation limits us to only eight observations per treatment and may reduce statistical power, this approach ensures using truly independent observations. Importantly, any significant comparison using this conservative method offers robust evidence of a treatment effect. To further validate our ranksum tests, we employ econometric estimations of treatment effects using linear probability models, with errors clustered at the session level.[11]

We first focus on whistleblowing behaviour. 30.7% of employees blew the whistle in Baseline and 25.7% did so in Competition. The difference is insignificant (Mann-Whitney ranksum test, $z = 1.582, p = 0.1136, N = 16$). Our null result is further illustrated econometrically. We regress the decision to blow the whistle on the treatment variable, while controlling for risk, social value orientation, and demographics. The estimation reveals a small insignificant decrease of whistleblowing under competition ($b = -0.030, SE = 0.038, CI = [-0.118, 0.039], t = -0.82, p = 0.432, N = 1152$).

Result 1. *Competition results in an insignificant decrease in employee whistleblowing.*

[11] Our preregistration included a power analysis which was based on the linear probability model. We assumed that the probability of whistleblowing in the baseline treatment would be 0.23 as in Butler et al. (2020). Based on this assumption, our minimum detectable effect size with 120 participants per treatment would be 0.10, i.e., we would be able to reject the hypothesis of no difference in whistleblowing between baseline and competition if the competition decreases whistleblowing by at least 0.10. In our baseline, we observe higher whistleblowing (around 30%) than in Butler et al. (2020). This difference may be driven by the fact that our experiment was repeated whereas the original was one-shot.

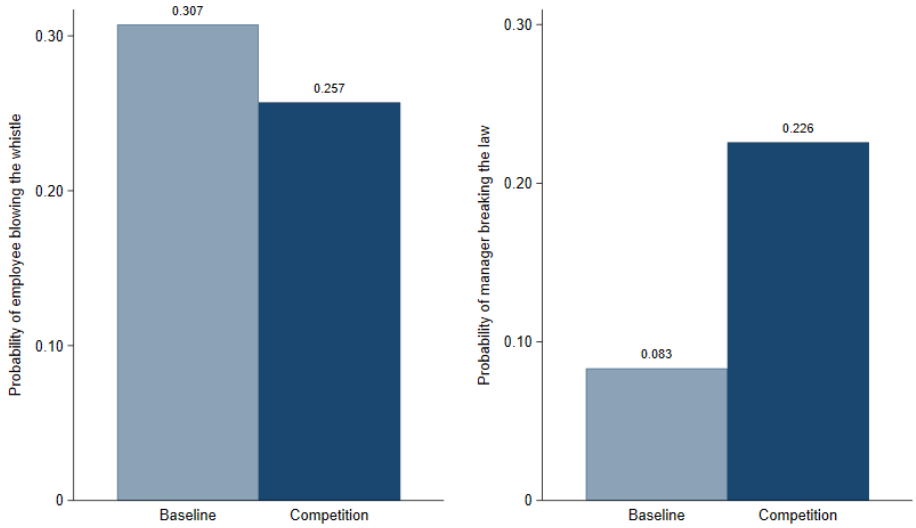


Figure 1: Whistleblowing (left) and lawbreaking (right) across treatments

Next, we analyse the lawbreaking decisions of managers. 8.3% of managers broke the law in Baseline and 22.6% in Competition. The difference is marginally significant (Mann-Whitney ranksum test, $z = 1.954, p = 0.0507, N = 16$). Our econometric estimation provides a similar picture. An analogous regression of the decision to break the law on treatment provides evidence for a marginally significant increase in lawbreaking under competition ($b = 0.146, SE = 0.070, CI = [-0.004, 0.295], t = 2.07, p = 0.056, N = 576$).

Result 2. *Competition results in a marginally significant increase in manager lawbreaking.*

3.2 The effect of beliefs and morality judgements on behaviour

This subsection aims at investigating two questions. First, we document whether beliefs about the frequency and judgements about the appropriateness of whistleblowing and lawbreaking are correlated with observed behaviour. Second, we study whether beliefs and judgements were affected by competition.

For our first question, we augment the econometric analysis from before by adding beliefs and judgements to the model. Results are shown in Table 1. The table reports estimates from linear probability models using as dependent variable the decision to blow the whistle (first two columns) and the decision to break the law (last three columns).

We find that mostly employees –and to a lesser extent also managers– respond to their beliefs about the behaviour of their counterpart in the expected direction. The probability that an employee blows the whistle is significantly negatively correlated with the expected belief about the frequency of lawbreaking (column 2), suggesting that the higher expected cost of whistleblowing associated with more frequent lawbreaking deterred employees from blowing the whistle. While not significantly so, the probability of a manager breaking the law is negatively correlated with the expected belief about the frequency of whistleblowing (column 4), suggesting that managers also break the law less when the expected punishment from doing so is higher, but the effect is weak.

	Blow the whistle		Break the law		
	(1)	(2)	(3)	(4)	(5)
Competition	-0.030	0.016	0.146*	0.043	-0.014
	(0.038)	(0.024)	(0.070)	(0.035)	(0.074)
Belief about frequency of whistleblowing		0.707***		-0.170	-0.117
		(0.046)		(0.134)	(0.158)
Belief about frequency of lawbreaking		-0.306***		0.705***	0.538*
		(0.099)		(0.222)	(0.276)
Competition*Belief about lawbreaking					0.234
					(0.341)
Appropriateness of employee staying silent		-0.238*			
		(0.124)			
Appropriateness of manager breaking the law				-0.089	-0.101
				(0.155)	(0.160)
Appropriateness of public losing earnings		-0.140*		0.401*	0.411**
		(0.075)		(0.198)	(0.192)
Loyalty to the firm		-0.130**		-0.108	-0.111
		(0.051)		(0.109)	(0.117)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	1152	1152	576	576	576

Standard errors in parentheses, clustered on matching group level.

Significance levels * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Controls: Age, Gender, Study, Risk, Social Value Orientation

Table 1: The effect of beliefs and judgements on whistleblowing and lawbreaking behaviour

On the contrary, beliefs about the behaviour of participants in the same role do not follow the direction of best-responding. As discussed in the prediction section earlier, best-responding would suggest that the probability to blow the whistle would be uncorrelated with the perceived frequency of whistleblowing, whereas the probability to break the law would be negatively correlated with the perceived frequency of lawbreaking only in the competition treatment. Both for employees and for managers, non-pecuniary motivations would suggest a positive correlation. Our estimates are consistent with the latter motivation as both for employees (column 2) and for managers (column 4), we observe a significant positive correlation between their own behaviour and their stated belief about the prevalence of the same behaviour in their session. In column 5, we explicitly check if there is a negative correlation between breaking the law and belief about frequency of lawbreaking in the competition treatment by interacting the treatment dummy with the belief of lawbreaking and find no evidence of a negative correlation.[12]

Finally, we find suggestive evidence that moral costs influenced the behaviour of participants. Employees are less likely to blow the whistle when the moral cost of staying silent is lower, when they believe that the public losing part of their earnings is more morally acceptable, and when

[12]When eliciting beliefs, we asked employees to estimate the frequency of whistleblowing including their own behaviour which accounted for 6 out of 72 decisions. Similarly, for managers the elicitation included 12 out of 36 of their own decisions. Thus, our belief variable may produce biased results as it is endogenous. Repeating the analysis using modified beliefs, i.e., the originally stated beliefs after subtracting the decisions of each participant, provides qualitatively similar results.

they are more loyal to their firm. Managers are more likely to break the law if they find that the public losing part of their earnings is more morally acceptable.

Observation 1. *Whistleblowing and lawbreaking are significantly correlated with beliefs about the frequency of such behaviour, and marginally significantly correlated with morality judgements.*

Finally, we test whether competition affected beliefs and morality judgements. Table 2 presents the elicited beliefs and judgements across our treatments. For beliefs about whistleblowing and judgement of an employee who did not blow the whistle, we only consider observations from participants in the role of employee. Symmetrically, for beliefs about lawbreaking and judgement of a manager who broke the law, we only consider observations from participants in the role of manager.[13]

	Belief about frequency of whistleblowing	Belief about frequency of lawbreaking	Appropriateness of an employee staying silent	Appropriateness of a manager breaking the law	Appropriateness of the public losing earnings	Loyalty to the firm
Baseline	0.3539	0.1968	0.4688	0.3125	0.1646	0.5896
Competition	0.2804	0.3148	0.4687	0.2396	0.2042	0.6167
p-value	0.0254	0.0787	0.9045	0.1734	0.1504	0.4984
Observations	192	48	192	48	240	240

All beliefs and judgements are standardised to be between 0 and 1. The p-values are from Mann-Whitney ranksum tests.

Table 2: Beliefs and morality judgements across treatments

We observe that competition affected the elicited beliefs in the direction of the observed behaviour suggesting that our participants were roughly accurate in their estimations. Employees expected significantly less whistleblowing and managers expected marginally significantly more lawbreaking.[14] We find no evidence that moral costs were affected by competition as all appropriateness ratings are similar between treatments (columns 3-6).

Observation 2. *There is suggestive evidence that competition affected the beliefs of employees and managers, whereas morality judgements were unaffected by competition.*

4 Concluding discussion

This paper investigates the determinants of whistleblowing, focusing on conditions that pose threats to the act of whistleblowing itself. While existing literature has predominantly explored factors that facilitate whistleblowing, our study sheds light on whether a competitive environment hinders it. Given that promising policy interventions incur costs, either in terms of monetary rewards to whistleblowers or implementation of protective laws, our study can be

[13]Comparing beliefs and judgements between employees and managers, we only find that managers report higher loyalty to their firm. This can arguably be attributed to the our implementation as managers were acting as members of a firm for all twelve rounds of the whistleblowing game whereas employees were members of a firm for only six our of twelve rounds.

[14]To check for the presence of false consensus, we repeat our tests using observations from participants in a different role. We observe that managers do not expect more whistleblowing under competition ($p = 0.7645, N = 48$) and employees do not expect more lawbreaking under competition ($p = 0.990, N = 192$), suggesting that indeed participants do project to some extent their own behaviour when estimating the frequency of behaviour of participants in the same role.

interpreted as answering the question of whether policy makers should prioritise more competitive industries where whistleblowing may be less prevalent and consequently interventions may improve social welfare the most. However, we find that competition does not decrease whistleblowing significantly.

Our results further reveal that morality judgements are not heavily relied upon when deciding whether to blow the whistle or whether to break the law, whereas beliefs about the prevalence of those behaviours are. When operating in a competitive environment, we find no evidence that unethical behaviour is more acceptable, whereas we find evidence that it is perceived to be more common. Thus, our findings roughly suggest that competition does not imply that unethical behaviour per se is perceived as morally less bad, but that engaging in unethical behaviour is a lesser threat to one's image when more others are believed to behave unethically.

We end our discussion with a brief comment on the importance of generalisability and replication. Even though we had no reason to expect ex-ante different behaviour across participant pools, competition affected whistleblowing behaviour differently across the university of Birmingham and the university of Cambridge participant pools. While in both cases the level of whistleblowing in the baseline was similar, competition decreased whistleblowing in the first case whereas whistleblowing was unaffected in the latter.[15] One plausible reason for this discrepancy is statistical noise as any analysis within each participant pool has lower power and is prone to produce either false positives or false negatives. Another plausible reason is unobserved differences between the participant pools that our experiment and survey were not designed to capture. To illustrate, our framed experiment used terms such as blowing the whistle and breaking the law. It is conceivable that our framing differentially affected participants that may differ in their ethnic and cultural background, political orientation, general attitudes towards competition, or general attitudes towards cheating.

Consider as a thought experiment that two researchers had run sufficiently powered replications of our treatments using different participant pools, and behaviour within each participant pool followed the distinct patterns we comment on here. One researcher would claim that competition decreases whistleblowing, and the other researcher would claim that competition does not affect whistleblowing. With this perspective in mind, our study suggests that further research is needed to establish the conditions under which the effect (if any) of competition on whistleblowing emerges.

References

Alekseev, A., Charness, G., and Gneezy, U. (2017). Experimental methods: When and why contextual instructions are important. *Journal of Economic Behavior & Organization*, 134:48–59.

Antinyan, A., Corazzini, L., and Pavesi, F. (2020). Does trust in the government matter for whistleblowing on tax evaders? Survey and experimental evidence. *Journal of Economic Behavior & Organization*, 171:77–95.

[15] For more details on the results commented here, we refer to Appendix A.

Apesteguia, J., Dufwenberg, M., and Selten, R. (2007). Blowing the whistle. *Economic Theory*, 31(1):143–166.

Aronson, E., Wilson, T. D., and Sommers, S. R. (2016). *Social psychology*. Pearson.

Ashforth, B. E. and Anand, V. (2003). The normalization of corruption in organizations. *Research in Organizational Behavior*, 25:1–52.

Bartling, B., Fehr, E., and Özdemir, Y. (2023). Does market interaction erode moral values? *The Review of Economics and Statistics*, 105(1):226–235.

Bartling, B., Valero, V., and Weber, R. (2019). On the scope of externalities in experimental markets. *Experimental Economics*, 22(3):610–624.

Bartling, B., Weber, R. A., and Yao, L. (2015). Do markets erode social responsibility? *The Quarterly Journal of Economics*, 130(1):219–266.

Bartuli, J., Mir Djawadi, B., and Fahr, R. (2016). Business ethics in organizations: An experimental examination of whistleblowing and personality. *IZA Discussion Paper*.

Bigoni, M., Fridolfsson, S.-O., Le Coq, C., and Spagnolo, G. (2012). Fines, leniency, and rewards in antitrust. *The RAND Journal of Economics*, 43(2):368–390.

Bigoni, M., Fridolfsson, S.-O., Le Coq, C., and Spagnolo, G. (2015). Trust, leniency, and deterrence. *The Journal of Law, Economics, and Organization*, 31(4):663–689.

Breuer, L. (2013). Tax compliance and whistleblowing–the role of incentives. *The Bonn Journal of Economics*, 2(2):7–44.

Buser, T. and Dreber, A. (2016). The flipside of comparative payment schemes. *Management Science*, 62(9):2626–2638.

Butler, J. V., Serra, D., and Spagnolo, G. (2020). Motivating whistleblowers. *Management Science*, 66(2):605–621.

Cartwright, E. (2016). A comment on framing effects in linear public good games. *Journal of the Economic Science Association*, 2(1):73–84.

Cartwright, E. and Menezes, M. L. (2014). Cheating to win: Dishonesty and the intensity of competition. *Economics Letters*, 122(1):55–58.

Chen, D. L., Schonger, M., and Wickens, C. (2016). oTree–An open-source platform for laboratory, online, and field experiments. *Journal of Behavioral and Experimental Finance*, 9(1):88–97.

Cookson, R. (2000). Framing effects in public goods experiments. *Experimental Economics*, 3:55–79.

Dreber, A., Ellingsen, T., Johannesson, M., and Rand, D. G. (2013). Do people care about social context? Framing effects in dictator games. *Experimental Economics*, 16:349–371.

Dungan, J. A., Young, L., and Waytz, A. (2019). The power of moral concerns in predicting whistleblowing decisions. *Journal of Experimental Social Psychology*, 85:103848.

Dyck, A., Morse, A., and Zingales, L. (2023). How pervasive is corporate fraud? *Review of Accounting Studies*, pages 1–34.

Eckel, C. C. and Grossman, P. J. (2002). Sex differences and statistical stereotyping in attitudes toward financial risk. *Evolution and Human Behavior*, 23(4):281–295.

Falk, A. and Szech, N. (2013). Morals and markets. *Science*, 340(6133):707–711.

Fatas, E., Heap, S. P. H., and Arjona, D. R. (2018). Preference conformism: An experiment. *European Economic Review*, 105:71–82.

Feltovich, N. and Hamaguchi, Y. (2018). The effect of whistle-blowing incentives on collusion: An experimental study of leniency programs. *Southern Economic Journal*, 84(4):1024–1049.

Gill, D., Prowse, V., and Vlassopoulos, M. (2013). Cheating in the workplace: An experimental study of the impact of bonuses and productivity. *Journal of Economic Behavior & Organization*, 96:120–134.

Givati, Y. (2016). A theory of whistleblower rewards. *The Journal of Legal Studies*, 45(1):43–72.

Goerg, S. J., Rand, D., and Walkowitz, G. (2020). Framing effects in the prisoner's dilemma but not in the dictator game. *Journal of the Economic Science Association*, 6:1–12.

Hamaguchi, Y., Kawagoe, T., and Shibata, A. (2009). Group size effects on cartel formation and the enforcement power of leniency programs. *International Journal of Industrial Organization*, 27(2):145–165.

Heyes, A. and Kapur, S. (2009). An economic model of whistle-blower policy. *The Journal of Law, Economics, & Organization*, 25(1):157–182.

Hinloopen, J. and Normann, H.-T. (2009). *Experiments and competition policy*. Cambridge University Press.

Hinloopen, J., Onderstal, S., and Soetevent, A. (2023). Corporate leniency programs for antitrust: Past, present, and future. *Review of Industrial Organization*, 63(2):111–122.

Hinloopen, J. and Soetevent, A. R. (2008). Laboratory evidence on the effectiveness of corporate leniency programs. *The RAND Journal of Economics*, 39(2):607–616.

Huber, C., Dreber, A., Huber, J., et al. (2023). Competition and moral behavior: A meta-analysis of forty-five crowd-sourced experimental designs. *Proceedings of the National Academy of Sciences*, 120(23):1–10.

Ioannidis, K. (2023). Whistleblowing and competition. Preregistration RCT ID: AEARCTR-0011051, American Economic Association's registry for randomized controlled trials. `https://www.socialscienceregistry.org/trials/11051`.

Ioannidis, K. (2024). *Whistleblowing under competition*, Doctoral thesis Chapter 4, pages 103–128. Number 846 in Tinbergen Institute Research Series. Tinbergen Institute and Rozenberg Publishers.

Krupka, E. L. and Weber, R. A. (2013). Identifying social norms using coordination games: Why does dictator game sharing vary? *Journal of the European Economic Association*, 11(3):495–524.

Leder-Luis, J. (2023). Can whistleblowers root out public expenditure fraud? Evidence from medicare. *The Review of Economics and Statistics*, pages 1–49.

Mechtenberg, L., Muehlheusser, G., and Roider, A. (2020). Whistleblower protection: Theory and experimental evidence. *European Economic Review*, 126(1):103447.

Mesmer-Magnus, J. R. and Viswesvaran, C. (2005). Whistleblowing in organizations: An examination of correlates of whistleblowing intentions, actions, and retaliation. *Journal of Business Ethics*, 62(3):277–297.

Murphy, R. O., Ackermann, K. A., and Handgraaf, M. J. (2011). Measuring social value orientation. *Judgment and Decision Making*, 6(8):771–781.

Savikhin, A. C. and Sheremeta, R. M. (2013). Simultaneous decision-making in competitive and cooperative environments. *Economic Inquiry*, 51(2):1311–1323.

Schmolke, K. U. and Utikal, V. (2018). Whistleblowing: Incentives and situational determinants. *Available at SSRN 3198104*.

Schurr, A. and Ritov, I. (2016). Winning a competition predicts dishonest behavior. *Proceedings of the National Academy of Sciences*, 113(7):1754–1759.

Schwieren, C. and Weichselbaumer, D. (2010). Does competition enhance performance or cheating? A laboratory experiment. *Journal of Economic Psychology*, 31(3):241–253.

Sonnemans, J., Schram, A., and Offerman, T. (1998). Public good provision and public bad prevention: The effect of framing. *Journal of Economic Behavior & Organization*, 34(1):143–161.

University of Amsterdam (2023). Economics and Business Ethics Committee, Ethics Approval. Reference number: EB-953, Approved on: 30 January 2023.

University of Birmingham (2023). Humanities and Social Sciences Committee, Ethics Approval. Reference number: ERN-0894-3, Approved on: 6 March 2023.

University of Cambridge (2023). Departmental Ethics Review Group, Cambridge Judge Business School, Ethics Approval. Reference number: 23-32, Approved on: 7 September 2023.

Vadera, A. K. and Pathki, C. S. (2021). Competition and cheating: Investigating the role of moral awareness, moral identity, and moral elevation. *Journal of Organizational Behavior*, 42(8):1060–1081.

Wallmeier, N. (2019). The hidden costs of whistleblower protection. Working paper, SSRN.

Waytz, A., Dungan, J., and Young, L. (2013). The whistleblower's dilemma and the fairness–loyalty tradeoff. *Journal of Experimental Social Psychology*, 49(6):1027–1033.

Ziegler, A., Romagnoli, G., and Offerman, T. (2020). Morals in multi-unit markets. Discussion Paper No.2020-072/I, Tinbergen Institute.

Appendix A Additional treatments and exploratory results

This section serves two purposes. We first present an exploratory comparison of behaviour between the two participant pools. Next, we describe in detail the additional robustness treatments we ran and briefly present observations from those treatments.

A.1 Behaviour between participant pools

Table A1 breaks down demographic characteristics of participants in all our sessions across treatments and participant pools. Our sessions and treatments are balanced.[16]

Treatment	Participant pool	Age	Gender			Field of study			
			Male	Female	Other	Social	Natural	Humanities	Other
Baseline	Birmingham	22.4	0.38	0.57	0.05	0.22	0.20	0.10	0.48
	Cambridge	22.4	0.47	0.50	0.03	0.28	0.23	0.18	0.31
Competition	Birmingham	23.1	0.48	0.52	0.00	0.23	0.22	0.13	0.42
	Cambridge	22.5	0.33	0.63	0.04	0.33	0.23	0.25	0.19

Each row corresponds to one combination of treatment and participant pool. Each combination involves 60 participants.

Table A1: Demographics across participant pools for primary treatments

We summarise behaviour in Table A2, which reports whistleblowing and lawbreaking across treatments and participant pools.

	Whistleblowing		Lawbreaking	
	Baseline	Competition	Baseline	Competition
Birmingham	0.319	0.191	0.007	0.188
Cambridge	0.295	0.323	0.159	0.264
p-value	0.468	0.083	0.018	0.561
p-value	0.594	0.054	0.038	0.424

Notes on rows:

Row (3): Mann-Whitney tests between participant pools

Row (4): Linear Probability Model of participant pool coefficient.

Table A2: Whistleblowing and lawbreaking across participant pools

Observation A1. *Comparing behaviour across participant pools, we find that*

[16] Formally, we test whether demographics differ per treatment-participant pool combination. We find no evidence for differences in either age (ANOVA test, $F = 0.31, p = 0.8200, N = 240$), gender (Pearson chi-squared test, $\chi^2_6 = 6.04, p = 0.419, N = 240$) or field of study (Pearson chi-squared test, $\chi^2_9 = 15.78, p = 0.072, N = 240$).

(a) whistleblowing is similar in baseline, but under competition we observe more whistleblowing within university of Cambridge participants;

(b) lawbreaking is similar under competition, but in baseline we observe more lawbreaking within university of Cambridge participants.

Repeating the analysis from the main text, we observe that within university of Birmingham participants, competition decreased whistleblowing (Mann-Whitney: $p = 0.0209, N = 8$) and increased lawbreaking (Mann-Whitney: $p = 0.0247, N = 8$), whereas within university of Cambridge participants, competition affected neither whistleblowing (Mann-Whitney: $p = 0.7702, N = 8$) nor lawbreaking (Mann-Whitney: $p = 0.5590, N = 8$). Estimates from linear probability models within each participant pool show the same pattern.

Observation A2. *Within each participant pool, we find that*

(a) competition significantly decreased whistleblowing and increased lawbreaking within university of Birmingham participants;

(b) competition did not affect whistleblowing or lawbreaking within university of Cambridge participants;

In the next section we focus on the university of Birmingham participant pool and the robustness treatments we ran there.

A.2 Robustness treatments

In our baseline treatment firms operated independently of each other whereas in our competition treatment the firm with the largest surplus would get a 50% bonus in market revenue. In contrast, there are industries where the distribution of market revenues is less sensitive to the strategic behaviour of the firms. This can be due to factors such as the size of the industry, where many small firms have a smaller influence on aggregate market outcomes, or the presence of exogenous shocks. In our Random treatment, we incorporate such market structures. This treatment is similar to the competition treatment, with the only difference being the method used to determine the winning firm. Instead of ranking the firm surpluses, we randomly select one of the firms as the winner. It is important to note that the total amount of ECU available to the firms remains the same across treatments; the only difference lies in how it is distributed among the firms. In the random treatment, the probabilities of winning the competition are $\pi_{1S} = \pi_{2S} = \frac{1}{3}$; for these winning probabilities the multiplier of the surplus (see Equation 2) collapses to 1. Assuming that in the random treatment the moral costs of breaking the law and not blowing the whistle are higher compared to baseline, but lower compared to competition, we conjecture that lawbreaking and whistleblowing behaviour would be in between baseline and competition.

We also expand our experimental design by introducing two additional treatments, BaselineNotask and CompetitionNotask.[17] These treatments replicate the baseline and competition

[17]Hypotheses for these additional treatments (as well as for the random treatment) were not included in the preregistration. The analysis presented in this Appendix is thus entirely exploratory in nature.

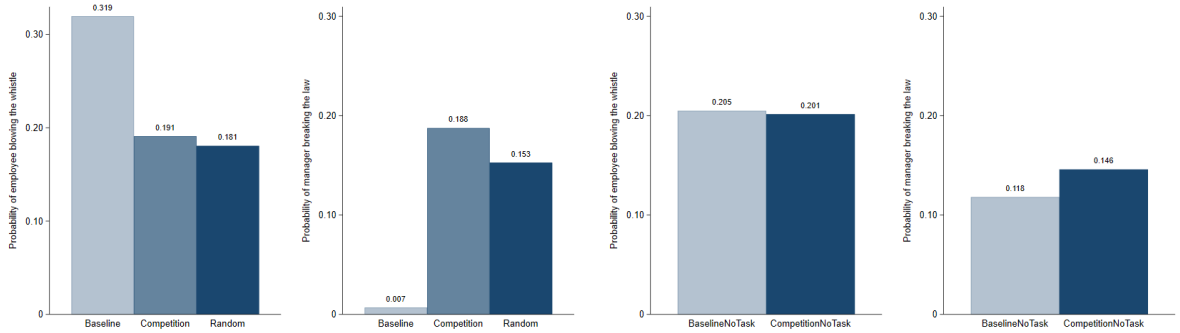
treatments with a single key difference. In our main treatments, both members of the public and employees perform the same task. However, in real-world scenarios, employees and managers of firms often hold the belief that the public, which could be negatively affected by corporate fraud, is less deserving. In our additional treatments, the members of the public receive a passive income of 140 ECU without participating in the number adding task. This modification allows us to examine how the attitudes and actions of employees and managers may vary based on their perception of the worthiness of the public's income. If the moral costs of breaking the law and not blowing the whistle are lower when the public receives passive income, then keeping the level of competition constant, we predict that the managers will be more likely to break the law and the employees will be less likely to blow the whistle in our additional treatments compared to our primary treatments.

Treatment	Age	Gender			Field of study			
		Male	Female	Other	Social	Natural	Humanities	Other
Baseline	22.4	0.38	0.57	0.05	0.22	0.20	0.10	0.48
Competition	23.1	0.48	0.52	0.00	0.23	0.22	0.13	0.42
Random	23.2	0.53	0.45	0.02	0.32	0.35	0.03	0.30
BaselineNotask	21.9	0.38	0.62	0.00	0.28	0.33	0.12	0.27
CompetitionNotask	20.8	0.27	0.72	0.01	0.33	0.30	0.17	0.20

Each row corresponds to a single treatment involving 60 participants.

Table A3: Demographics across all treatments of the university of Birmingham participant pool

Table A3 indicates that demographic characteristics from our treatments from the university of Birmingham participant pool are roughly balanced in both the three primary treatments and the two additional treatments.[18] Figure A1 presents whistleblowing behaviour and lawbreaking across all treatments. We emphasise that all results from this section are exploratory and have lower power than the results presented in the main text.



(a) When public engages in effort task (b) When public receives passive income

Figure A1: Bar graphs of whistleblowing and lawbreaking over treatments

[18] In the three primary treatments (Baseline, Competition, Random) there are no differences in either age (ANOVA test, $F = 0.52, p = 0.5956, N = 180$), gender (Pearson chi-squared test, $\chi^2_4 = 5.80, p = 0.214, N = 180$) or field of study (Pearson chi-squared test, $\chi^2_6 = 10.61, p = 0.101, N = 180$). Similarly, for the two additional treatments (BaselineNotask, CompetitionNotask) there are no differences in either age (ANOVA test, $F = 2.92, p = 0.0901, N = 120$), gender (Pearson chi-squared test, $\chi^2_2 = 2.71, p = 0.258, N = 180$) or field of study (Pearson chi-squared test, $\chi^2_3 = 1.45, p = 0.694, N = 120$).

Repeating the same analyses as in the main text, we find that when members of the public perform an effort task, competition decreases employee whistleblowing (Mann-Whitney: $p = 0.0209, N = 8$) and increases manager lawbreaking (Mann-Whitney: $p = 0.0247, N = 8$). Whether the winner of the competition is determined based on performance or randomly does not matter. When the members of the public receive passive income, competition does not decrease employee whistleblowing (Mann-Whitney: $p = 0.7674, N = 8$) or increase manager lawbreaking (Mann-Whitney: $p = 0.7715, N = 8$).

We end the analysis by comparing treatments where the public performed the task with treatments where the public received passive income. Without competition, we find less whistleblowing (Mann-Whitney: $p = 0.0814, N = 8$) and more lawbreaking (Mann-Whitney: $p = 0.0172, N = 8$) when the public receives passive income compared to when they perform the task. With competition, whistleblowing and lawbreaking are not affected by whether the public receives passive income or performs the task. We also observe that the public losing part of their earnings due to manager lawbreaking is perceived as less severe when the members of the public perform a task compared to when they receive passive income (Mann-Whitney: $p = 0.0123, N = 240$). Whether the members of the public perform a task does not affect all other beliefs and morality judgements.

Observation A3. *Within university of Birmingham participants, we find that*

(a) when members of the public perform an effort task, competition decreases employee whistleblowing and increases manager lawbreaking. Whether the winner of the competition is determined based on performance or randomly does not matter;

(b) when the members of the public receive passive income, competition does not affect whistleblowing or lawbreaking;

(c) there is less whistleblowing and more lawbreaking when the public receives passive income than when they engage in the effort task;

(d) the public is perceived as less worthy of their income when they receive passive income.

Appendix B Instructions and decision screens

B.1 Welcome screen

Welcome

Welcome to this experiment. Please read the following instructions carefully. We ask that you do not communicate with other participants during the experiment. The use of mobile phones is not allowed during this experiment. If you have any questions, or need assistance of any kind, at any time, an experimenter will assist you privately. The data collected through this experiment does not include your name or any other information that would allow your identification. All the data you provide during the experiment cannot be traced back to you.

Payment

In addition to your participation fee, you may earn substantially more money from today's experiment. You will be paid privately and anonymously in cash at the end of the experimental session today. Earnings during the experiment will be denominated in Experimental Currency Units, or ECU. Each ECU is worth £0.01. The participation fee is £2.00. After the experiment finishes, you will be paid the money you earned plus your participation fee.

Duration

You will be asked to make decisions in 12 rounds.

B.2 Tasks and decisions

Employee Task

The two employees have the task of adding two numbers and report their sum. Each correct answer gives them 20 points. Additionally each correct answer by each employee generates 10 points to the firm surplus. In total, each employee will be given 6 pairs of numbers to add. Employees have 120 seconds to solve as many as they can.

Manager Decision & Task

Managers have the opportunity to double the firm surplus. Their decision is to choose how they want to try to double the surplus. They can do so in two ways:

- Do the Manager Task: In the task, managers are asked to multiply two numbers and report their product. Managers will be given 6 pairs of numbers to multiply. Managers have 120 seconds to solve as many as they can. If they give at least 3 correct answers, the firm surplus is doubled.
- Break the law: If the manager breaks the law, they skip the Manager Task and the firm surplus will be doubled automatically. However, it will also generate a loss of 20 points to each of the 6 members of the public.

Employee Decision

The employees have the option to blow the whistle if their manager broke the law. The decision to blow the whistle will be relevant ONLY if the manager broke the law. If the manager did not break the law, this decision will not be implemented. The employees will make this decision before the manager makes their decision. Each employee can decide whether they are willing to blow the whistle. Blowing the whistle will cost the selected employee 25 points, and will generate a penalty of 70 points to the manager. This penalty will be removed from the manager's earnings. One of the two employees will randomly be selected and their decision will be implemented. The decision of the other employee will not be implemented.

Members of the Public Task

The members of the public have the task of adding two numbers and report their sum. Each correct answer gives them 20 points. In total, each member of the public will be given 6 pairs of numbers to add.
Members of the public have 120 seconds to solve as many as they can.[Task treatments]
Members of the public do not make any decisions for this round.[No task treatments]

B.3 Payoff explanations

Winning firm [Not in Baseline treatment]

One of the three firms will win the competition and their surplus will be further increased by 50%. Each of the other two firms that did not win the competition will have their surplus reduced by 25%.
The winning firm will be the firm with the largest surplus. [Competition]
The winning firm will be randomly selected. [Random]

Surplus distribution

The total firm surplus will be distributed as follows: The manager keeps 50% of the surplus, and each employee will keep 25%.

Payoff explanation

- Employees:
  - Earn 20 points for each correct answer in number-adding task.
  - Earn 25% of the final firm surplus.
  - Lose 25 points if they blow the whistle and their decision is implemented.
- Managers:
  - Earn fixed income of 120 points.
  - Earn 50% of the final firm surplus.
  - Lose 70 points if they broke the law and the selected employee blew the whistle.
- Members of the public:
  - Earn 20 points for each correct answer in number-adding task. [Task treatments]
    Earn a passive income of 140 points. [No task treatments]
  - Lose 20 points for each manager that broke the law.

Paid rounds

At the end of the session, 4 rounds will be randomly selected for payment.

B.4 Survey

Estimates

Please answer the following questions. For each question, you will receive additional 20 points if your answer is within a range of 3 of the actual number. Your earnings from this task will be added to your earnings from the game.

- The managers had the choice between breaking the law and doing the multiplication task 36 times in total during the experiment. How many times do you think they broke the law?
- The employees had the choice to blow the whistle or not 72 times in total during the experiment. How many times do you think they blew the whistle?

Judgements

Please answer the following questions. For each question, you will receive additional 10 points if your answer matches the answer of the majority of the participants in today's experiment. Your earnings from this task will be added to your earnings from the game.

- How would you judge a manager who broke the law?
  (Very immoral, Immoral, No judgement, Moral, Very moral)
- How would you judge an employee who did not blow the whistle?
  (Very immoral, Immoral, No judgement, Moral, Very moral)
- How do you feel about the members of the public losing earnings because managers broke the law?
  (Very unacceptable, Unacceptable, No judgement, Acceptable, Very acceptable)
- In the rounds that you were part of a firm, how loyal did you feel to the firm?
  (Not loyal at all, Not very loyal, Neutral, Loyal, Very loyal)

Lottery task

In the following task, 6 different lotteries are presented on your screen. In each of these lotteries, both rewards A and B are equally likely, i.e. have a probability of exactly 50%. The rewards are denoted in points.

You are asked to choose exactly one of the lotteries, which subsequently will be implemented. A random generator will determine whether you win reward A or reward B, respectively. At the end of the experiment, your reward will be added to you earnings.

Reward A 50% Probability	Reward B 50% Probability	Your Choice
140	140	
120	180	
100	220	
80	260	
60	300	

Distribution task

In this task you have been randomly paired with another person, whom we will refer to as the other. This other person is someone you do not know and will remain mutually anonymous. All of your choices are completely confidential. You will be making a series of 6 decisions about allocating resources between you and this other person. For each of the following questions, please indicate the distribution you prefer most by choosing the button along the midline. You can only choose one distribution for each of the 6 questions. Your decisions will yield money for both yourself and the other person.

There are no right or wrong answers, this is all about personal preferences. One of the 6 decisions will randomly be selected and implemented. At the end of the experiment, the outcome will be added to you earnings.

You receive	85	85	85	85	85	85	85	85	85
Choose									
Other receives	85	76	68	59	50	41	33	24	15
You receive	85	87	89	91	93	94	96	98	100
Choose									
Other receives	15	19	24	28	33	37	41	46	50
You receive	50	54	58	63	68	72	76	81	85
Choose									
Other receives	100	98	96	94	93	91	89	87	85
You receive	50	54	59	63	68	72	76	81	85
Choose									
Other receives	100	89	79	68	58	47	36	26	15
You receive	100	94	88	81	75	69	63	56	50
Choose									
Other receives	50	56	63	69	75	81	88	94	100
You receive	100	98	96	94	93	91	89	87	85
Choose									
Other receives	50	54	59	63	68	72	76	81	85

Demographics

Please enter the following information.

- Please indicate your age.
- Please indicate your field of study.
  (Economics, Social Sciences, Natural Sciences, Humanities, Applied Sciences, Other)

- Please indicate your gender.
  (Male, Female, Prefer not to answer)