

**The impact of narratives on opinions:  
Evidence regarding negative externalities**

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**Abstract**

Fairness opinions have implications for acceptable economic action. To determine the aspects of an economic transaction which might impact fairness beliefs in the context of a negative environmental externality, we use a factorial vignette experimental design to randomize seven framing- and narrative-elements within five separate scenarios that describe such a transaction. On average, only 21 percent of participants rate the action of an externality-generating entity as fair. More importantly, we explore whether the framing of the welfare transfer inherent to externalities impacts fairness ratings. Of the framings used, only a passive framing, characterizing external costs as mere byproducts of economic activity, is found to impact fairness opinions. The scenario used to introduce the externality is also impactful, as is the type of firm that is generating the external cost, the availability of substitutes in production or consumption, and whether the externality is produced by a firm or a consumer. Further, participants who are pro-market, believe that people have the right to dominate the environment, have a bachelor's degree, have taken two or more economics courses, and identify as politically authoritarian believe the actions of the entity are fairer than do their counterparts.

**Keywords:** Externality, Fairness, Vignettes, External Costs, Framing

**JEL Codes:**

**Declarations of interest:** none

**Acknowledgements:** We wish to thank Jeremy Budner and Rachel Dentler for their research assistance.

## 1. Introduction

The Atomic Age marks the dawn of the Anthropocene, an unofficial, contested epoch characterized by existential ecological and environmental threats caused largely by human activity. Proposed solutions to these threats often necessitate widespread collective action. Voluminous research across multiple disciplines attempts to understand these threats and explore how to increase individuals' willingness to act collectively to avoid catastrophe.

One commonality among many anthropogenic existential threats is that they involve external costs: costs generated by the activities of one entity that are largely, or completely, borne by other entities, or bystanders. For example, every time a gallon of gasoline is burned in an internal combustion engine an external cost is produced: 19 pounds of carbon dioxide are emitted (U.S. Environmental Protection Agency, 2018). In 2021, individuals in the U.S. collectively burned 135 billion gallons of gasoline, generating over 2.5 trillion pounds of carbon dioxide, the primary greenhouse gas (U.S. Energy Information Administration, 2022). To put a finer point on it, every time an individual drives a vehicle that is powered by an internal combustion engine there is a *welfare transfer*; the drivers' well-being is enhanced by the utility they obtain from being transported from point A to point B, and the bystanders' well-being is diminished by the disutility they experience from global climate change as well as negative health consequences from other tailpipe emissions (e.g., NO<sub>x</sub>, CO). Willingness to engage in and attitudes toward these welfare transfers have implications for the ability to address the related collective action problems.

Conceptual frames, the way we talk about topics such as environmental impacts and environmentalism, have implications for environmental behavior (Lakoff 2010). In this paper, we explore whether the framing and narration of this welfare transfer, which is embedded in transactions that involve negative externalities, influence individuals' beliefs about the fairness of such transactions. Beliefs about fairness are important to the study of economic behavior because, as Kahneman, Knetsch, and Thaler (hereafter KKT) (1986a) empirically determine, these "community standards of fairness" constrain economic behavior, placing guardrails on the profits to which firms are seen to be entitled. In related work published in the same year, KKT (1986b, page S299) posit that: "Perhaps the most important lesson learned from these studies is that the rules of fairness cannot be inferred either from conventional economic principles or from intuition and

introspection.” Thus, an empirical investigation regarding individuals’ fairness beliefs about transaction that involve negative externality is warranted and is an initial step in investigating whether fairness concerns impact individuals’ willingness to engage in transactions that impose costs on others.

Our empirical investigation builds on the use of vignettes to study fairness concerns as implemented by KKT and from the urgings of Schiller that narratives matter and should be studied systematically: “The field of economics should be expanded to include serious quantitative study of changing popular narratives (Schiller 2017, page 967)” To examine the impact of framing and narratives on fairness beliefs in the context of negative externalities, we conduct two factorial vignette experiments. In the first, we develop five scenarios that present transactions that involve negative externalities. We consider seven framing- and narrative-elements that might impact participants’ fairness beliefs. Most importantly, we explore whether the framing of the welfare transfer impacts ratings of fairness. We also explore six other narrative elements that are meant to reflect aspects of transactions that could vary. Each participant encounters one vignette permutation of each of the five scenarios. After reading the scenario and answering a comprehension check question, they rate the fairness of the entity’s actions.

We find that, on average, participants believe the actions of the entity generating the external cost to be not fair; in fact, just 21 percent of participants rated the action as fair. The welfare analysis framing does not have a significant impact on fairness beliefs except when the welfare transfer is framed as a byproduct and the vignettes are encountered before completion of a market attitude and NEP scale survey. In contrast, the scenario does matter. Relative to a context-free scenario, three scenarios in which the entity generating the externality is a firm are found to be less fair and the one scenario in which the entity is a consumer is found to be fairer, on average. This pattern is also replicated in the context-free scenario; vignettes featuring an externality-generating firm are deemed less fair than those featuring an externality-generating consumer.

Additional framing- and narrative-elements that affect fairness ratings include the type of firm that is generating the external cost and whether substitutes (in production or consumption) are readily available. Further, a range of attitudinal and sociodemographic identities are associated with fairness ratings. Participants who are promarket, who believe that people have the right to dominate the environment, have a bachelor’s degree,

have taken two or more economics courses, or identify as politically authoritarian tend to believe the actions of the externality-generating entity are fairer.

To confirm that the low average fairness ratings observed in Experiment 1 are driven by the information participants received about the presence of the external costs, we implement a second, simplified vignette study. Specifically, we use a 2-by-2 factorial design, randomizing the scenario (paper production, or consumer detergent use) and whether information about the external costs is explicitly presented (no cost information provided, or cost information provided). We find that when participants are explicitly informed about the presence of external costs, they rate the entity's actions as not fair, on average. In contrast, when participants are not informed about these costs, they rate the entity's actions as fair, on average.

## 2. Background

In Section 2.1, we present a welfare analysis of a transaction that involves a negative externality, focusing on the welfare transfer that is generated by transactions in the presence of negative externalities. In Section 2.2, we provide a brief overview of the integration of fairness concerns in economic models. In Section 2.3, we discuss the use of vignettes for studying fairness.

### *2.1. Welfare Analysis of Negative Externalities*

Figure 1a presents a standard supply-and-demand diagram that highlights the welfare loss bystanders experience as the result of an external cost. Specifically, the marginal external cost to bystanders is represented by the red vertical double-headed arrow, which is the height difference between the marginal social cost (MSC) and marginal private cost (MPC) curves. Absent intervention, market participants, who are assumed to be self-interested, will trade as long as the marginal private benefit (MPB) is greater than the MPC. Thus, the number of trades is the market quantity (QM), which results in a total external cost to bystanders of the purple region ACDF.

The red region BCD in Figure 1b represents the deadweight loss (DWL): the loss of societal surplus from the market activity (with the negative externality). Importantly, the total external cost highlighted in Figure 1a (region ACDF) comprises both the DWL and the purple region ABDF; the latter is part of the total external cost, but not the DWL. To understand why this is the case, notice that market activity increases the welfare of

market participants by the sum of the consumer and produce surplus, region GDF. Thus, the region ABDF is both a gain in welfare for market participants and a loss in welfare for bystanders. From a societal standpoint, this is a “wash,” and not DWL. Rather, the region ABDF is the welfare transfer (from bystanders to market participants) introduced in Section 1.

Lastly, it is worth noting that even if the government intervenes to maximize the societal surplus by limiting number of transactions to the social optimum quantity (QSO)—transaction for which the marginal social benefit (MSB) is greater than the MSC—there is still a welfare transfer (region ABEF in Figure 1d); we explore how welfare transfers are described in some of the best-selling principles of microeconomics textbooks in Section 3.1.1.1.

<Figure 1a, 1b, 1c, and 1d approximately here>

## ***2.2. Fairness Concerns in Economic Models***

The transfer of well-being from a bystander to an economic actor violates common notions of fairness as expressed in the economic literature. But it is unclear whether people consider the fairness of the welfare transfers that arise out of transactions that impose costs on others. Or the extent to which the economics discipline, in general, tends to consider these fairness concerns in the modelling of economic behavior. KKT (1986b) assert that economic models have traditionally ignored fairness concerns because the discipline is founded on an assumption that the interaction of autonomous, self-interested agents will achieve the common good. Fairness concerns are orthogonal to this assumption because fairness would imply that “some legal opportunities for gain are not exploited (1986b, S286).”

Although traditional models are characterized by a “nonfairness assumption”, fairness concerns have been found to explain economic behaviors and outcomes across a range of contexts, including sticky prices and wages (Benjamin 2015), consumer backlash to price rationing (Kahneman, Knetsch, and Thaler 1986a; 1986b), and a willingness to punish unfair actors at personal cost (see any of a number of papers on the ultimatum game or costly punishment). Fehr & Schmidt (1999) assert that the inclusion of fairness concerns in economic models is necessary to explain the mixed results of cooperative and competitive games and seemingly inconsistent findings achieved using experimental

methods. In addition, the authors suggest that cooperative outcomes are sensitive to the distribution of fair-minded individuals in the population. Fairness concerns have also been identified in the excuses people make to achieve the freedom to behave in their own self-interest. Research on moral wiggle room finds empirical evidence that people will engage in costly behaviors to avoid appearing, to themselves and others, to be unfair (Dana, Weber, and Kuang 2007). This finding suggests that self- and social-image concerns, in addition to profit and direct utility motives, play an important role in the actions taken by individuals and firms (e.g., “green-washing” and corporate social responsibility initiatives).

Recent theoretical work attempts to explicitly introduce the fairness concerns of customers into models of the pricing behavior of firms (Eyster, Madarász, and Michailat 2021), by addressing the gap between what manager’s say they consider when adjusting prices (e.g., customer backlash in response to price increases they feel are unfair) and models of price rigidity. Most of the work examining fairness in the context of economic behaviors has focused on fairness in bilateral and multilateral bargaining, such as in the determination of effort and wages. However, fairness concerns are relevant beyond their application to negotiation. Of most relevance to the current work, the environmental justice movement centers on issues of fairness in its mission to address unequal impacts of climate change and environmental degradation, and exposure to toxic chemicals and noxious land use (Banzhaf, Ma, and Timmins 2019). This includes also work that assesses the fairness of *solutions* to environmental threats (Maestre-Andres, Drews, and van den Bergh 2019).

### ***2.3. Using Vignettes to Assess Fairness***

Methods for assessing fairness attitudes and concerns generally fall into two broad categories – the use of economic games or the use of vignettes<sup>1</sup>. Economic games typically involve the elicitation of revealed preferences through the splitting of an endowment such

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<sup>1</sup> “A word-picture, a brief verbal outline of a scenario, or a short story about hypothetical characters in a particular situation, to which research participants or interviewees are asked to respond. Vignettes are used in various areas of psychological research including studies related to attribution theory, and they are also used to elicit opinions, attitudes, beliefs, or judgements.” vignette. *Oxford Reference*. Retrieved 23 Jan. 2023, from <https://www.oxfordreference.com/view/10.1093/oi/authority.20110803115835486>.

as in a dictator or ultimatum game, while vignettes elicit fairness ratings in response to a narrative describing a specific situation.

KKT provide compelling arguments for the use of vignettes for identifying community standards of fairness: first, they assert that “any systematic speculation about rules of fairness inevitably involves explicit comparisons of contrasting cases (1986b, S295);” second, vignettes address economists’ inability to reliably intuit fairness attitudes from our economic models. For example, through a study of the fairness of cost-plus pricing, KKT identify that economists’ treatment of opportunity costs and out-of-pocket costs as equivalent complicates the integration of fairness concerns into models of economic behavior. Simply, fairness rules as conceived of by the general public appear to differ across these types of costs; raising prices due to increases in opportunity costs is generally not considered fair, whereas reacting to increasing input prices is: “A theory that assumes the equivalence of opportunity costs and out-of-pocket losses cannot do justice to these strong intuitions (1986b, S298).”

In both 1986 publications, KKT use vignettes to assess the fairness of a variety of economic contexts, mechanisms, and behaviors. Using phone interviews, participants were asked to rank the fairness of methods (auction, lottery, or queue) for distributing tickets for an upcoming popular football game from most fair to least fair (Kahneman, Knetsch, and Thaler 1986b). In another vignette in the same publication, the authors used a vignette design to determine whether cost-plus markup is considered a fair rule for determining price. The authors varied the firm type – participants received a vignette about a factory, a carpenter who works alone and sells direct to consumer, a wholesaler, or a furniture store (Kahneman, Knetsch, and Thaler 1986b).

Vignettes are an especially popular tool in psychology. For example, DeVoe and Iyengar (2010) use a vignette study to determine whether perceived fairness of an egalitarian split of a resource is affected by the type of resource being allocated – 1) money, 2) credit card reward points, 3) vacation days, or 4) boxes of chocolate. The scenario asks participants to imagine a situation in which a manager is given the authority to split a bonus between ten employees within a division that has been responsible for the company’s successful year, but who have contributed unequally to this success. The manager decides to split the bonus equally among the ten employees and participants rate the fairness of the egalitarian resource split on a scale from 1 – extremely unfair to 9 – extremely fair. The

authors find that participants rate an equal split as less fair when the resource being allocated is a medium of exchange (money or credit card reward points) than when it is an in-kind transfer. Additional recent economically-relevant uses of vignettes include the assessment of the fairness of judicial decisions in seminal law and economics cases (Chavanne 2020) and perceptions of the fairness of price increases in the context of the COVID-19 pandemic (Chavanne et al. 2022).

KKT identify three determinants of fairness: the reference transaction (what is the situation being compared to), the outcomes to the economic agents involved in the transaction, and the context of the firm’s behavior. The factors within our vignettes which are varied and randomized address each of these three determinants. For example, to account for a reference transaction, we randomize whether the entity has been engaging in this action for a while rather than being a new action. We also consider that if intention does matter to perceptions of fairness (Falk, Fehr, and Fischbacher 2008), then the ability to avoid producing the externality would be likely to affect fairness attitudes. The outcomes of the economic agents and the context of their behaviors are addressed in a number of ways, including varying the agent creating the externality (e.g., firm or consumer), the details of the scenario used, the number of bystanders affected, and the framing used to describe the welfare transfer. For example, we vary the words/phrases used to describe the welfare transfer, using either a “taking” frame (steal, expropriate) or a more passive “byproduct” frame. The factorial vignette design and the components randomized are explained in greater detail in Section 3.

### **3. Experimental Design**

We conduct two factorial vignette experiments (Gutfleisch 2022). For each, participants—Amazon Mechanical Turk workers—are recruited via CloudResearch (<https://www.cloudresearch.com/>); we restrict participation to individuals within the U.S. and use only CloudResearch “Approved Participants” for the study. The experiments are administered using Qualtrics. The first experiment (Experiment 1) is conducted during the summer of 2021 and includes 1,200 participants; the Qualtrics survey took approximately 16 minutes to complete, on average, and the average payment is \$3.55 with a minimum (maximum) payment of \$1.50 (\$4.00). The second experiment (Experiment 2) is conducted during the spring of 2022 and includes 1,200 participants; the survey took approximately 10 minutes to complete, on average, and the average payment is \$1.75 with

a minimum (maximum) payment of \$0.50 (\$2.00). Columns 1 and 2 of Table 1 present the participants' demographic characteristics in Experiments 1 and 2, respectively. Participants are more likely to be male and have a bachelor's degree than the general U.S. population. The experiments are approved by the Santa Clara University and Skidmore College institutional review boards and pre-registered on the AEA RCT Registry (AEARCTR-0008002).

<Table 1 approximately here>

### ***3.1. Experiment 1***

In brief, the experimental protocol is as follows (additional details provided below).

- Informed consent
- Survey block A
  - Participants encounter five vignettes in which an entity's actions generate an external cost
  - For each vignette, participants:
    - are instructed to read the vignette
    - answer a comprehension-check question (payment=\$0.50 for correct answer)
    - are instructed to read the vignette again
    - rate the fairness of the entity's actions
    - are informed the government acts to ameliorate the externality
    - rate the fairness of the government's actions
- Survey block B
  - Sub-block B1: Participants complete a market-attitudes scale
  - Sub-block B2: Participants complete the New Ecological Paradigm (NEP) scale
- Participants complete a questionnaire with additional attitudinal and demographic items

The order of survey blocks A and B are randomized by participant to test for order effects; the order of survey sub-blocks B1 and B2 are also randomized by participant to control for order effects.

#### ***3.1.1. Survey Block A***

There are five vignettes each based on a different scenario. The first, denoted the “Context-Free” scenario, describes an entity that is engaging in an activity that negatively influences bystander well-being. We discuss this scenario and the associated factorial vignette design in section 3.1.1.1. The other four scenarios, each based on a real-life situation, and the associated vignette factorial designs are discussed in section 3.1.1.2. The comprehension-check questions, the response scale for the fairness questions, and the order in which the vignettes are presented are discussed in section 3.1.1.3. Lastly, the addition to each scenario of a government that attempts to ameliorate the externality is discussed in section 3.1.1.4.

### *3.1.1.1. Context-free scenario*

The language of the context-free scenario is designed to reflect the language used to describe negative externalities in best-selling “principles of microeconomics” textbooks. For example, Mankiw (2021; page 188; bold italics added) states “An externality arises when a person engages in an activity that *influences* the well-being of a bystander but neither pays nor received compensation for that effect.” Further, “... buyers and sellers *do not take into account* the external effects of their actions when deciding how much to demand or supply.” Krugman and Wells (2018; page 460; bold italics added) define an external cost as “... an uncompensated cost that an individual or firm *imposes* on others.” Lastly, Frank, Bernanke, Antonovics, & Heffetz (2022; page 217; bold italics added) explain that externalities “... are activities that generate costs or benefits that *accrue* to people not directly involved in those activities. These effects are generally *unintended*.” Attempting to reflect this language, the kernel of the scenario’s first sentence states that an entity engages in an activity “that negatively influences” bystander well-being.

Our primary research question concerns the framing of one component of the welfare analysis: how the transfer of well-being from the bystander to the entity generating the external cost is represented. Thus, we vary the explicitness with which we inform participants of this transfer, from forgoing a framing statement (“Control”) to describing the transfer as a “byproduct” (“Treatment 1”) of the entity’s actions—building on the phrase “do not take into account” in Mankiw (2022) and the use of the word “unintended” in Frank and Bernanke (2022)—to describing the transfer in ever stronger

terms, e.g., the entity achieves a better outcome by “reducing” (“Treatment 2”), “expropriating” (“Treatment 3”), or “stealing” (“Treatment 4”) bystander well-being.<sup>2</sup>

The remaining sentences of the vignette elaborate on other elements of the transaction, explicating the type of entity that is causing the external cost (e.g., “Consumer,” “Local business,” “Multinational corporation,” or “Public utility”), the number of bystanders that are affected (e.g., “A bystander,” “A few bystanders,” or “Many bystanders”), the type of well-being that is impacted, whether the external cost is avoidable, whether the entity considers the external cost in decision-making. These elements are meant to reflect elements of a transaction that can vary and may impact opinions regarding the fairness of the entity’s actions. In total, the factorial vignette design includes seven frame- and narrative-elements. Column 1 of Panel A of Table 2 presents all the factorial-design elements. Figures 2a and 2b present two vignette permutations with the frame- and narrative-elements underlined. There are 5,760 vignette permutations, of which each participant encounters one.

<Table 2 approximately here>

<Figures 2a and 2b approximately here>

### *3.1.1.2. Four additional scenarios*

We develop four additional scenarios each based on a real-life situation. The “Laos banana production” scenario discusses a remote village in Laos where a foreign-owned company cultivates bananas—a pesticide-intensive process—fouling the local river and precluding village residents from making a living fishing. The “Wisconsin paper mills” scenario discusses the lower Fox River, which is contaminated with chemicals used in paper production and has become unusable. The “Ohio electricity production” scenario discusses producing electricity using dirty coal and the resultant acid rain that damages the Northeastern ecosystem. The “Consumer detergent use” scenario discusses the use of laundry detergent that contains phosphates, which can cause algal blooms in local waterways, thereby inhibiting their use.

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<sup>2</sup> As we were concerned that some participants might not know the definition of expropriate, when participants “moused-over” the word “expropriate” the definition appeared.

Again, we employ a factorial vignette design. Columns 2-5 of Panel A of Table 1 present all the factorial-design elements. Not all frame- and narrative-elements from the context-free scenario are appropriate with the additional scenarios. For example, the type of entity generating the external cost is stated in each; thus, we do not vary this element. Where appropriate we attempt to use the same frame- and narrative-elements in the additional scenarios as in the context-free scenario. Figures 3a, 3b, 3c, and 3d present one vignette permutation of each of the additional scenarios with the frame- and narrative-elements underlined. The number of vignette permutations ranges from 60 for the Ohio electricity production scenario to 540 for the Wisconsin paper mills scenario. Each participant encounters a single permutation of each scenario.

<Figures 3a, 3b, 3c, and 3d approximately here>

### *3.1.1.3. Experimental procedures*

After participants complete the informed consent, they encounter one random vignette permutation of each scenario. Participants always encounter the context-free vignette first followed by the four other vignettes in random order; this ensures that each participant rates the fairness of the context-free vignette absent the potentially confounding effects of the context included in the other vignettes.

For each vignette, participants follow the same procedure. First, they are instructed to carefully read the vignette and answer a comprehension-check question. They are informed they will receive a \$0.50 bonus payment for correctly answering. The comprehension-check question is displayed below the vignette on the same screen so participants can refer to the vignette while answering. The questions are straightforward, recall questions and included to ensure that participants are paying attention. Participants are not informed whether they answer the question correctly.

Second, participants are instructed to re-read the vignette and answer the following (the instructions explicitly state that “there is no one right answer”): “Please rate the action of <the entity> on a scale from Very Unfair (1) to Very Fair (7)” using a slider. The slider has three legends “Very Unfair” above the “1,” “Neither Fair, nor Unfair” above the “4,” and “Very Fair” above the “7.” The fairness rating is displayed above the slider as participants adjust their answer; only integer ratings are allowed. Once participants are satisfied with their rating, they push the “→” button to proceed.

#### 3.1.1.4. Addition of a government to each vignette

After rating the fairness of the entity’s actions, participants are informed that the government takes an action to ameliorate the externality: implement a tax on the activity, require adoption of a technology that reduces the external cost, or prohibit the activity. We also examine the impact varying the framing of the social-welfare impact of the government’s action from forgoing a framing statement to stating that “the benefit to society as a whole is maximized” to stating that “the benefit to society as a whole is maximized. However, external costs still exist, and the bystander's well-being remains lower—and the well-being of the entity generating the externality remains higher—than they would be if the external costs were not present.” Columns 1-5 of Panel B of Table 1 present all the factorial-design elements for the government’s action. After reading about the government intervention, participants are asked the following item: “Please rate the action of government on a scale from Very Unfair (1) to Very Fair (7);” participants respond using the same slider as described in section 3.1.1.3.<sup>3</sup>

#### 3.1.2. Survey Block B

##### 3.1.2.1. Survey sub-block B1: market-attitudes scale

To measure participants’ market attitudes, we use a short version of the multidimensional market-attitudes scale developed in Goff, Ifcher, Zarghamee, Reents, & Wade (2022); an earlier version of which is presented in Goff & Noblet (2018). We include 12 items from the scale that are most strongly related to four of the five factors; each of these factors has an  $\alpha \geq 0.80$  (the fifth factor, *Anodyne*, has an  $\alpha = 0.52$  and was excluded). The order of the items is randomized by participant. Appendix A presents the text of each item. The factors include: (i) *Efficient*, which corresponds to the belief that markets efficiently allocate resources; (ii) *Harmless*, which corresponds to the belief that markets do not cause harm (e.g., that they do not give rise to greed, inequality, or environmental abuse); (iii) *Unregulated*, which corresponds to the belief that markets should be unregulated; and (iv) *Fair*, which corresponds to the belief that markets provide equal opportunities and just outcomes. Participants are assigned a value for each factor equal to the mean of their

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<sup>3</sup> Participants are also asked the following item: “Please rate the fairness of this situation, with the government intervention in place, on a scale from Very Unfair (1) to Very Fair (7).” The responses to this item are similar to the responses to the item about the fairness of the government’s actions; so, we do not report on the responses to this item for ease of presentation.

responses to the items included in the factor; response-scales are reverse coded as appropriate to make higher values indicative of more pro-market attitudes. We also calculate a general market-attitude index, *overall*, equal to the mean of the participant's four factor scores. For the analysis, we create a "pro-market" indicator variable that equals one if the *overall* score  $\geq 3$  (range = 1-5) and zero otherwise.

### 3.1.2.2. Survey sub-block B2: NEP scale

The New Ecological Paradigm (NEP) scale intends to measure pro-ecological worldview (Dunlap & Van Liere, 1978; Cordano, Welcomer, & Scherer, 2003). We include an 8 items short version. The order of the items is randomized by participant. Appendix B presents the text of each item. There are two subscales: *NEP Balance*, in which a higher score is indicative of the belief that the natural world is fragile, and humans play a role in environmental degradation; and *NEP Dominate*, in which a higher score is indicative of human's right to dominate natural world. For the analysis, we create a NEP Balance indicator variable that equals one if the *NEP Balance* score  $\geq 3$  (range = 1-5) and zero otherwise; and a NEP Dominate indicator variable that equals one if the *NEP Dominate* score  $\geq 3$  (range = 1-5) and zero otherwise.

### 3.1.3. Questionnaire and Payments

After survey blocks A and B, participants complete a questionnaire that includes items regarding gender, age, race, religion, political views (from progressive to conservative & from libertarian to authoritarian), estimated household income, employment status, education, and number of economic or business courses completed. Participants receive a \$1.50 base payment as well as a bonus payment, up to \$2.50 if they answer the five comprehension questions correctly. Payments are implemented via Amazon Mechanical Turk using CloudResearch.<sup>4</sup>

## 3.2. Experiment 2

The primary purpose of Experiment 2 is to determine whether participants in Experiment 1 found the actions of the entities to be unfair due to being explicitly informed about the external costs associated with the entities' actions. To answer this question, we develop four vignettes based on simplified versions of two scenarios: the Wisconsin paper mills and

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<sup>4</sup> A preview of the survey can be found at: <insert link – blinded for review>.

the consumer detergent use scenarios. The factorial design varies only one element beyond the scenario: whether the external costs are explicitly stated in the vignette.

The two vignette permutations based on the first scenario start with: “Paper production is water intensive; pulp making/processing and paper/paper board manufacturing all require large amounts of water. For this reason, paper companies often locate their paper production facilities along rivers.” The first permutation ends there, while the second continues: “Some paper production uses chlorine dioxide to whiten paper and prevent yellowing. This chemical often ends up in nearby bodies of water, posing serious risk to human health and the ecosystem.”

The two vignette permutations based on the second scenario always start with: “Modern laundry detergents contain a variety of ingredients chosen to remove dirt, lift stains, and eliminate odors.” The first permutation ends there, while the second continues: “Some detergents contain phosphates to soften hard water and to enhance cleaning power. These phosphates often build up in nearby bodies of water, causing toxic algal blooms and posing serious risk to human health and the ecosystem.” Each participant encounters a single random vignette permutation.

The experimental protocol, e.g., the instructions and the fairness prompt and response scale, for Experiment 2 are similar to those in Experiment 1 with the following exceptions: participants encounter only one random vignette permutation, the base payment is \$0.50, and the bonus payment for correctly answering the comprehension-check question is \$1.50.<sup>5</sup>

#### 4. Results

Participants found the actions of the entity generating the negative externality to be not fair, on average: the mean fairness scores is 2.601 (SD = 1.897), the median is 2, and interquartile range is 1-4 (recall that scores from 1-3 are “Unfair,” 4 is “Neither Fair nor

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<sup>5</sup> A few additional items were added to the Experiment-2 protocol to investigate research questions that are beyond the scope of the current paper; these items will be discussed in a future paper. They include an open-ended item: “In your own words, how would you define “fair”?”, four vignettes from Kahneman et al. (1986a), and a voluntary contribution item; participants who correctly answer the comprehension-check question are offered the opportunity to donate a portion of their bonus payment, in \$0.25 increments, to an environmental charity. A preview of the survey can be found at: <insert link – blinded for review>.

Unfair,” and 5-7 are “Fair”).<sup>6</sup> Figure 4 illustrates the distribution of the fairness scores. As the distribution is skewed right and the scale is ordinal, it useful to consider a second, related dependent variable: the “fair” indicator variable (=1 if the fair score is 5-7 and 0 otherwise). 21.1 percent (SD = 0.408) of participants found the action of the entity to be fair.

<Figure 4 approximately here>

#### ***4.1. Impact of Welfare-Analysis Framing***

One of the primary research questions is whether the welfare-analysis framing impacts participants’ opinions regarding the fairness of the entities’ actions. Column 1 of Panel A of Table 3 presents the mean fairness scores by welfare-analysis framing; Panel B presents analogous results using the fair indicator variable as the dependent variable. The byproduct frame is found to be the fairest.

To determine if the byproduct treatment is significantly fairer than other welfare-analysis frames, we regress the fairness score (and the fair indicator variable) on an indicator variable for each frame, using no (control) frame as the reference category; throughout the analysis of Experiment 1, robust standard errors are calculated by clustering the observations by participant. All of the coefficients, including the coefficient on the byproduct frame are insignificant (see Column 1 of Panels A and B of Table 4). However, before concluding that the welfare-analysis framing had no impact, we repeat the above analysis separately for participants who encounter the vignettes before (“vignettes first”) and after (“vignettes second”) the market-attitude and NEP scales; again, we tested for order effects by randomizing the order that participants encounter survey blocks A and B.

For participants who encounter the vignettes first, the coefficients on the byproduct frame is positive and statistically significant using the fairness score ( $b = 0.262$ ,  $se = 0.124$ ,  $p = 0.034$ ) and positive and marginally significant using the fair indicator variable ( $b = 0.048$ ,  $se = 0.027$ ,  $p = 0.074$ ; see Column 2 of Panels A and B of Table 4), indicating that the byproduct frame increases participants’ fairness score when the vignettes are encounter first. Further, the magnitude of the effect is meaningful, increasing the fairness score by

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<sup>6</sup> Observations for which a participant did not correctly answer the comprehension-check question are dropped from all analyses. In Experiment 1, 82.2 percent (4,875 of 5,930) of comprehension-check questions are answered correctly; in Experiment 2, 93.6% (1,111 of 1,187) of comprehension-check questions are answered correctly.

approximately 10 percent compared to the mean fairness score ( $= 0.262 / 2.597$ ) and increasing the percent of participants that found the vignette to be fair by approximately 23 percent ( $= 0.048 / 0.211$ ). Comparing all the treatment frames to each other, participants found the vignettes to be significantly fairer with the byproduct frame than with the reduce (T2) and steal (T4) frames using the fairness score as the dependent variable (see Tests 1 and 3 of Column 2 of Panel A of Table 4). None of the other welfare-analysis frames have a statistically significant impact.

<Table 4 approximately here>

For those who encounter the vignettes second, there are no significant effects of the welfare-analysis frames (see Column 3 of Panels A and B of Table 4). Thus, there appear to be order effects. That is, answering the market-attitude and NEP scale appear to eliminate all welfare-analysis framing effects. To confirm this is the case, we interact a vignettes-second indicator variable with the treatment indicator variables. Indeed, the coefficient on the interaction term between the vignettes-second and byproduct-frame are negative and marginally significant (see Column 4 of Panel A and B of Table 4), indicating that receiving the vignettes second eliminates the byproduct framing effect.

#### ***4.2. Impact of Scenarios***

To explore the impact of the five scenarios, we regress the fairness score on an indicator variable for each scenario and welfare-analysis frame, using the context-free scenario (S1) and the control frame as the reference categories. We also regress the fairness scores on an interaction term between the scenario and welfare-analysis indicator variables to examine if the byproduct treatment effect is driven by a subset of scenarios.

We find strong evidence of scenario effects (see Table 5): the coefficient on the Loas banana production (S2), Wisconsin paper mills (S3), and the Ohio electricity production (S4) scenarios are each negative and statistically significant in the vignettes first subsample, the vignettes second subsample, and the pooled sample (in the pooled sample; S2:  $b = -0.632$ ,  $se = 0.054$ ,  $p = 0.000$ ; S3:  $b = -0.439$ ,  $se = 0.054$ ,  $p = 0.000$ ; S4:  $b = -0.498$ ,  $se = 0.059$ ,  $p = 0.000$ ); and the coefficient on the consumer detergent use (S5) scenario is positive and statistically significant in all samples (in the pooled sample; S5:  $b = 0.313$ ,  $se = 0.059$ ,  $p = 0.000$ ). This indicates that relative to the context-free scenario, S2-S4 are found to be less fair and S5 is found to be fairer. It is worth noting that in S2-

S4 the entity creating the external cost is a firm and in S5 it is a consumer. Further, the magnitudes of the scenario effects are substantial. For example, the Loas banana production scenario reduces the fairness score by over 20 percent compared to the mean pooled fairness score ( $= -0.632 / 2.601$ ).

<Table 5 approximately here>

The coefficients on T1-T4 are similar with the scenario indicator variables included in the analysis as when not. Further, we find that the impact of the byproduct treatment (T1) is only significant in the Wisconsin paper mills (S3) scenario ( $b = 0.873$ ,  $se = 0.385$ ,  $p = 0.024$ ); it is positive and insignificant for the Ohio electricity production (S4) and the Consumer detergent use (S5) scenarios (see Column 1 of Panel A of Table 5; for concision we only report the interaction coefficients for T2).

### ***4.3. Additional Frame- and Narrative Elements***

To explore the impact of the six other frame- and narrative-elements (in addition to the welfare-analysis framing), we estimate six regressions, one for each element. Specifically, we regress the fairness score on an indicator variable for each possible category of a frame- and narrative-element as well as a scenario and the welfare-analysis frame indicator variable. As not all frame- and narrative-elements are used with each scenario, Table 6 indicates which scenarios are included in each regression.

The results indicate that participants found the vignettes to be significantly fairer when the entity generating the external cost is a consumer or a multinational corporation, as compared to a local business ( $b = 0.511$ ,  $se = 0.167$ ,  $p = 0.002$ ,  $b = 0.356$ ,  $se = 0.176$ ,  $p = 0.043$ , respectively; see Column 2 of Table 6); and marginally significantly less fair when there are a few substitutes are available, compare to none ( $b = -0.213$ ,  $se = 0.121$ ,  $p = 0.079$ ; see Column 5 of Table 6). Other elements do not impact fairness scores.

<Table 6 approximately here>

### ***4.4. Government***

Now we examine the participants opinions regarding the fairness of the government's actions. Overall, they found them to be fair: the mean fairness scores is 5.187 (SD = 1.639; see Table 7), the median is 6, and interquartile range is 5-6. Figure 5 illustrates the fairness score distribution. As the distribution is skewed left and the scale is ordinal, it

useful to consider a second independent variable at times: “fair” indicator variable (=1 if fair score is 5-7 and otherwise =0). 75.1 percent (SD = 0.433) of participants found the action of the government to be fair. Comparing the fairness scores for the government’s actions to actions of the entity, we find that the fairness scores for the former are statistically significantly greater than those for the latter (e.g., 5.187 versus 2.601,  $p = 0.000$  for the pooled sample).

<Figure 5 approximately here>

<Table 7 approximately here>

We also examine whether the fairness scores are impacted by the framing- and narrative-elements related to the government. We estimate two regressions, one for each element. Specifically, we regress the fairness score on an indicator variable for each possible category of the element. We find that the type of government intervention impacts the fairness score: taxing the activity decreases the fairness score by 0.541 (se = 0.054,  $p = 0.000$ ) compared to requiring the adoption of a technology to ameliorate the external cost (see Column 1 of Panel A of Table 8); there is no significant difference between prohibiting the activity and requiring the adoption of a technology. Further, we find that the societal benefits framing matters: while informing participants that societal benefits are maximized significantly increases the fairness score by 0.176 (se = 0.059,  $p = 0.003$ ), informing them that societal benefits are maximized *but* the external costs still exist decreases the fairness score by 0.738 (se = 0.067,  $p = 0.000$ ), compared to no framing (see Column 2 of Panel A of Table).

<Table 8 approximately here>

#### ***4.5. Market-Attitudes Scale, NEP Scales, and Demographics***

We investigate whether a variety of participant attitudes and identities, including participants’ market attitudes, environmental attitudes, and demographic characteristics, are associated with their opinions regarding the fairness of an entity’s and government’s actions in the context of negative environmental externalities. Specifically, we regress the fairness scores on an indicator variable for being promarket, NEP Balance, and NEP Dominate; and then separately, we regress the fairness scores on participants’ demographic characteristics including being female, having at least a bachelor’s degree, being unemployed, having self-report household income above \$50,000, having taken two

or more economics courses, being politically progressive, and being politically authoritarian; in each regression, robust standard errors are calculated by clustering the observations by participant.

Participants who are promarket, and those with high NEP Dominate and NEP Balance scores found the actions of the entity to be significantly fairer (see Column 1 of Table 9). For example, being promarket is associated with a fairness score increase of 0.552 (se = 0.076,  $p = 0.000$ ) and NEP Dominate with an increase of 1.814 (se = 0.103,  $p = 0.000$ ); the latter is an increase of almost 70 percent in the fairness score compared to the mean fairness score (= 1.814 / 2.601). Further, we find that being a college graduate, having taken at least two economics classes, and being authoritarian are each significantly associated with finding the entity's actions as fairer; in contrast, being female, having income above \$50,000 per year, and being progressive are each significantly associated with believing the actions of the entity are less fair (see Column 2 of Table 9).

In terms of the association with beliefs about the fairness of the government's actions, being NEP Balance, progressive, and authoritarian are each significantly associated believing the actions of the government are fairer; none of the other characteristics are associated with one's beliefs about the fairness of the government's action (see Columns 1 and 2 of Panel B of Table 9).

<Table 9 approximately here>

#### **4.6. Experiment 2**

Experiment 2 is designed to determine whether informing participants of the external costs associated with an entity's action causes participants to find the entity's actions to be not fair. Table 10 presents the mean fairness scores by whether participants are informed of the external costs and the scenario. The results indicate that when participants are not informed about the external costs, they rate the entity's actions as fair, on average: mean fairness score is 4.908 (SD = 1.411); in contrast, when participants are informed of the external costs, they rate the entity's actions as no fair, on average: mean fairness score is 3.158 (SD = 1.570).

<Table 10 approximately here>

We regress the fairness scores on indicator variables for being informed of the external cost and being in the detergent use scenario. We find that the coefficient on being informed of the external costs is large, negative, and statistically significant ( $b = -1.758$ ,  $se = -0.089$ ,  $p = 0.000$ ; see Column 1 of Panel A of Table 11). This indicates that being informed of the external costs reduces the fairness score by over 40 percent relative to the mean fairness score ( $= -1.758 / 4.018$ ). The coefficient on detergent use is positive and statistically significant, indicating that, on average, participants find the detergent use scenario to be fairer, compared the paper production scenario. This echoes the results from Experiment 1, in which external costs generated by consumers are found to be fairer than external costs generated by firms.

<Table 11 approximately here>

To determine if there are interactions between informing participants of the external costs and the scenario, we include an interaction term between the two indicator variables.

There are significant interaction effects: informing participants of the external cost reduces participants' fairness score by significant more in paper production scenario than in the detergent use scenario. Though, informing participants of the external costs significantly decreases fairness scores in both scenarios: in the detergent use scenario it reduces it by 1.299 points ( $se = 0.120$ ,  $p = 0.000$ ; see post-estimation test in Column 2 of Panel A of Table 11) and in the paper production scenario it reduces it by 2.552 points ( $se = 0.121$ ,  $p = 0.000$ ; see Column 2 of Panel A of Table 11).

Lastly, we check for order effects by fully interacting a vignettes second indicator variable with the covariates in Column 2 of Panel A of Table 11. There is some evidence of order effects, as the coefficient on the interaction between the detergent use scenario and vignettes second indicator variable is statistically significant and the coefficient on the interaction between being informed of the external cost and vignettes second indicator variable is marginally statistically significant.

## 5. Discussion and Conclusions

Economic models of negative externalities demonstrate that even when a socially optimal quantity of an externality-generating good or service is exchanged in the market, welfare is transferred from a bystander to the economic agents involved in the transaction. We set out to determine whether this welfare transfer is considered to be “fair” and whether the

narrative used to describe the generation of the externality might affect fairness opinions. Using a factorial vignettes experiment, we find that many details of a vignette describing a negative environmental externality affect how fair people believe the actions of the imposing party to be.

In general, we find that participants believe that externality-generation is unfair (2.601, on average, where less than 4 is considered to be unfair) and that being asked to explicitly consider market and environmental attitudes prior to viewing the vignettes interferes with the evaluation of the scenario.

We also find that relative to a context-free scenario, the three real-world scenarios in which a firm generates an externality (S2-S4) are found to be less fair than comparable context-free scenarios. This suggests that the specificity of a narrative contributes to fairness opinions. In contrast, the real-world scenario in which the externality is generated by a consumer receives higher fairness ratings than the comparable context-free scenario. This finding demonstrates a bias towards the favorable evaluation of consumer behavior. Individuals are particularly critical of local businesses, suggesting that, using the terminology of KKT, the acceptable deviation from the reference profit is smaller for local firms than it is for multinational firms, while individuals allow for a larger departure from the reference transaction for consumers.

In general, participants find the interventions of a government as fair when externalities are present. However, acceptance of government action is not constant across interventions. Participants are particularly critical of taxation, a finding which confirms prior work (Maestre-Andres, Drews, and van den Bergh 2019) and common beliefs and speculation about public attitudes.

Overall, we find that a variety of participant identities are associated with fairness ratings. For example, participants who identify as promarket or believe humans are meant to dominate over the environment rate an externality-generating entity's actions as fairer, on average. College graduates, those who have taken at least two economics courses, and those who identify as politically authoritarian find the entity's actions to be fairer. This contrasts with those who identify as female, have incomes above \$50,000 per year, identity as progressive – these groups find externality generation to be less fair.

When a passive frame is used to describe the welfare transfer from a bystander to the economic actors, the entity's actions are rated as fairer. This suggests that beyond the overall story we tell, the narrative, the characterization of the intentionality of the externality generation may also be important. Finally, the results of Experiment 2

demonstrate that at least part of the effect we find is due to information about the presence of externality-generation. Participants who are explicitly educated about the presence of an externality rate the actions of the entity as less fair, on average.

Fehr & Schmidt (1999) suggest that the distribution of fair-minded individuals can have important implications for the likelihood of achieving cooperative outcomes. This suggests that studying people's fairness beliefs, and the distribution thereof, in the context of externalities is important. Our work systematically studies fairness in the context of environmental externalities and finds that people, on average, believe the resultant welfare transfer to be unfair.

However, it is important to note that in the current work, participants are passive observers of a situation, rather than direct market participants; they do not have a stake in the creation or resolution of the externality. In in-progress work with framing- and narrative-elements revised based on lessons-learned from the efficacy of the elements used in the current study, participants engage in market transactions with the potential to generate a real external cost for a bystander. Through the study of revealed preferences with actual stakes, we examine whether fairness concerns constrain individuals' externality-generating actions. We also extend this work to determine whether people are willing to constrain the actions of others in ways that are inconsistent with their choices for self.

The study of fairness attitudes and the actions these attitudes either prohibit or allow is important. For example, these fairness attitudes can affect individuals' preferences for government programs and interventions and charitable giving (Muller and Renes 2021). Finding ways to talk about externalities in a way that is compelling could be used to increase individuals' willingness to pay to avoid transactions that impose costs on others. Doing so will determine the success with which we will be able to address ongoing and future environmental and ecological anthropogenic threats.

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## **Appendices:**

### Appendix A: Market attitude scale items

Below is the text of the market attitude scale items. A Likert response scale is used.

1. In my opinion, market systems reward people fairly for their productivity and hard work.
2. In my opinion, market systems encourage unethical business behavior.
3. In my opinion, market systems lead to quality-improvements and technical advances in products and services.
4. In my opinion, market systems provide opportunities and incentives for success.
5. In my opinion, market systems encourage greed and excessive materialism.
6. In my opinion, market systems allow equal access to work opportunities.
7. In my opinion, market systems encourage abuse of the environment.
8. In my opinion, market systems encourage innovation and entrepreneurship.
9. In my opinion, it is never acceptable for the government to intervene in markets.
10. In my opinion, government regulation of business usually does more harm than good.
11. In my opinion, market systems provide employment opportunities for all who desire to work.
12. In my opinion, the market rules and regulations the government sets are necessary to protect citizens and the environment.

## Appendix B: NEP scale items

Below is the text of the NEP scale items. A Likert response scale is used.

1. Humans have the right to modify the natural environment to suit their needs.
2. When humans interfere with nature it often produces disastrous consequences.
3. Humans are seriously abusing the environment.
4. Plants and animals exist primarily to be used by humans.
5. The so-called "ecological crisis" facing humankind has been greatly exaggerated.
6. Humans were meant to rule over the rest of nature.
7. The balance of nature is very delicate and easily upset.
8. If things continue on their present course, we will soon experience a major ecological catastrophe.

## Tables

Table 1. Participants' demographic characteristics in Experiments 1 and 2

	<b>Experiment 1</b>	<b>Experiment 2</b>
Age	37.57	40.76
Gender		
Female	0.375	0.437
Male	0.620	0.553
Non-binary or non-conforming or prefer not to specify	0.005	0.010
Race/Ethnicity		
Asian	0.069	0.076
Black or African American	0.131	0.085
Hispanic or Latino/a	0.057	0.042
Middle Eastern or North African	0.003	0.002
Native American or Alaska Native	0.021	0.003
Native Hawaiian or Pacific Islander	0.004	0.003
White	0.761	0.720
More than one race	0.046	0.056
Prefer not to answer	0.006	0.014
Authoritarian	0.386	0.174
Progressive	0.422	0.543
Bachelor's degree or more	0.696	0.589
Two or more economics or business courses taken	0.602	0.496
Income above \$50,000	0.377	0.575
Unemployed	0.032	0.040
Observations	1,186	1,187

*Notes:* The standard deviation of age is 10.81 in Experiment 1 and 12.97 in Experiment 2.

Table 2: Frame- and narrative-elements for Experiment 1

Element	Scenario				
	Context Free Scenario (1)	Laos Banana Production Scenario (2)	Wisconsin Paper Mills Scenario (3)	Ohio Electricity Production Scenario (4)	Consumer Detergent Use Scenario (5)
<b>Panel A: Frame- and narrative-elements for vignette without government</b>					
1: Length of time the external cost existed					
A: "Recently"	A: "Recently"	A: "That have recently begun operating"	A: "Recently"	A: "Recently"	
B: "For many years"	B: "For many years"	B: "That have been operating for many years"	B: "For many years"	B: "For many years"	
2: Type of entity generating the external cost					
A: "Consumer"					
B: "Local business"					
C: "Multinational corporation"	-	-	-	-	
D: "Public utility"					
3: How many bystanders are impacted					
A: "A bystander"	A: "A local resident, Mr. Thong"	A: "A resident"			
B: "A few bystanders"	B: "A few local residents"	B: "A few local residents"	-	-	
C: "Many bystanders"	C: "Many residents"	C: "Many residents"			
4: Type of bystander well-being impacted					
A: "Recreational opportunities"		A: "Now, they can no longer swim or boat downstream"		A: "Has prevented residents from being able to swim or boat in the local lake"	
B: "Financial well-being"		B: "Now, the <bystanders> can no longer make a living from fishing"		B: "Has adversely affected the tourism industry in the area"	
C: "Health"	-	C: "Now, the contaminated water supply poses a health risk to the <bystanders>"	-	C: "Has led to high concentrations of cyanobacteria in the city's drinking water. This bacteria can cause intestinal illness, difficulty breathing, and skin rashes"	

D: "Health as well as their financial well-being and recreational opportunities"	-	-	-	-
<hr/>				
5: Cost of avoiding--or substituting for--the activity that generates the external cost				
A: "The negative influence on well-being could be avoided at no cost to the <type of entity>"	A: "No cost"	A: "No cost"	A: "No cost"	A: "There are no phosphate-free detergents sold at local stores"
B: "The negative influence on well-being could be avoided at a modest cost to the <type of entity>"	B: "A modest cost"	B: "A modest cost"	B: "A modest cost"	B: "There are a few phosphate-free detergents sold at local stores"
C: "The negative influence on well-being could be avoided at a significant cost to the <type of entity>"	C: "A significant cost"	C: "A significant cost"	C: "A significant cost"	C: "There are many phosphate-free detergents sold at local stores"
D: "There are no readily available close substitutes for the product that do not also create external costs"				
E: "There are a few readily available close substitutes for the product that do not create external costs"	-	-	-	-
F: "There are many readily available close substitutes for the product that do not create external costs"				
<hr/>				
6: Entity considers external cost in decision-making				
A: "Does not consider"				
B: "Neglects to consider"				
<hr/>				
7: Welfare-analysis framing				
A: <no frame>				
B: There are two by products of the activity, the entity generating the external cost achieves a better outcome and the	B: There are two by products of the activity, the entity generating the external cost achieves a better outcome and the	B: There are two by products of the activity, the entity generating the external cost achieves a better outcome and the	B: There are two by products of the activity, the entity generating the external cost achieves a better outcome and the	B: There are two by products of the activity, the entity generating the external cost achieves a better outcome and the

	bystanders' well-being is reduced C: The entity generating the external cost achieves a better outcome by reducing the bystanders' well-being D: The entity generating the external cost achieves a better outcome by expropriating <sup>1</sup> the bystanders' well-being. E: The entity generating the external cost achieves a better outcome by stealing the bystanders' well-being	bystanders' well-being is reduced C: The entity generating the external cost achieves a better outcome by reducing the bystanders' well-being D: The entity generating the external cost achieves a better outcome by expropriating <sup>1</sup> the bystanders' well-being. E: The entity generating the external cost achieves a better outcome by stealing the bystanders' well-being	bystanders' well-being is reduced C: The entity generating the external cost achieves a better outcome by reducing the bystanders' well-being D: The entity generating the external cost achieves a better outcome by expropriating <sup>1</sup> the bystanders' well-being. E: The entity generating the external cost achieves a better outcome by stealing the bystanders' well-being	bystanders' well-being is reduced C: The entity generating the external cost achieves a better outcome by reducing the bystanders' well-being D: The entity generating the external cost achieves a better outcome by expropriating <sup>1</sup> the bystanders' well-being. E: The entity generating the external cost achieves a better outcome by stealing the bystanders' well-being	bystanders' well-being is reduced C: The entity generating the external cost achieves a better outcome by reducing the bystanders' well-being D: The entity generating the external cost achieves a better outcome by expropriating <sup>1</sup> the bystanders' well-being. E: The entity generating the external cost achieves a better outcome by stealing the bystanders' well-being
Permutations	5,760	180	540	60	180

Panel B: Frame- and narrative-elements regarding government actions

8: Government intervention

A: "Place a tax on the product"	A: "Taxes the pesticides used in banana production"	A: "Place a tax on paper"	A: "Taxes the electricity produced by the utilities"	A: "Applies a tax to all phosphate-containing detergents"
B: "Requires the adoption of a technology that reduces some of the external costs associated with the product"	B: "Requires the firms to use a less damaging pesticide to reduce the damage to the local ecosystem"	B: "Requires that the paper companies adopt a new technology that captures some of the toxic chemicals before they are dumped into the river"	B: "Requires that utilities must install "washing" technology, which captures some of the emission from burning the dirty coal"	B: "Requires that households adopt a technology that filters some of the phosphates out of their wastewater"
C: "Prohibits the production and consumption of the product"	C: "Prohibits the use of pesticides in banana production"	C: "Prohibits the production of paper using the dirty techniques"	C: "Prohibits power generation using dirty coal"	C: "Prohibits the sale and use of phosphate-containing detergents"

9: Societal-welfare framing

A: <no frame>				
B: "After the government intervenes, the benefit to society as a whole is maximized"	B: "After the government intervenes, the benefit to society as a whole is maximized"	B: "After the government intervenes, the benefit to society as a whole is maximized"	B: "After the government intervenes, the benefit to society as a whole is maximized"	B: "After the government intervenes, the benefit to society as a whole is maximized"
C: After the government intervenes, the benefit to	C: After the government intervenes, the benefit to	C: After the government intervenes, the benefit to	C: After the government intervenes, the benefit to	C: After the government intervenes, the benefit to

	society as a whole is maximized. However, external costs still exist, and the bystander's well-being remains lower—and the well-being of the entity generating the externality remains higher—than they would be if the external costs were not present	society as a whole is maximized. However, external costs still exist, and the bystander's well-being remains lower—and the well-being of the entity generating the externality remains higher—than they would be if the external costs were not present	society as a whole is maximized. However, external costs still exist, and the bystander's well-being remains lower—and the well-being of the entity generating the externality remains higher—than they would be if the external costs were not present	society as a whole is maximized. However, external costs still exist, and the bystander's well-being remains lower—and the well-being of the entity generating the externality remains higher—than they would be if the external costs were not present	society as a whole is maximized. However, external costs still exist, and the bystander's well-being remains lower—and the well-being of the entity generating the externality remains higher—than they would be if the external costs were not present
Permutations	7	7	7	7	7

*Notes:* Elements #7B, #7C, #7D, #7E, and #9C contain elements #2 and #3. For concision, we created generic versions of elements #7B, #7C, #7D, #7E, and #9C; thus, these categories are not direct quotes as the other categories are. When element #8C is used, then element #9A is used with it, as benefits to society are not maximized when the activity in question is prohibited.

<sup>1</sup> As we were concerned that some participants might not know the definition of expropriate, when participants “moused-over” the word “expropriate” the definition appeared.

Table 3. Mean fairness by treatment

	Panel A: Dependent variable = fairness score (1-7)			Panel B: Dependent variable = fair indicator variable (=1 if fairness score between 5-7; =0 if otherwise)		
	Pooled	Vignettes first	Vignettes second	Pooled	Vignettes first	Vignettes second
	(1)	(2)	(3)	(1)	(2)	(3)
Overall	2.601 (1.897) {4,875}	2.597 (1.886) {2,417}	2.606 (1.907) {2,458}	0.211 (0.408) {4,875}	0.211 (0.408) {2,417}	0.212 (0.409) {2,458}
C: No frame	2.576 (1.890) {963}	2.541 (1.867) {464}	2.609 (0.191) {499}	0.209 (0.407) {963}	0.196 (0.397) {464}	0.220 0.415 {499}
T1: Byproduct	2.685 (1.907) {970}	2.803 (1.955) {492}	2.563 (1.852) {478}	0.223 (0.416) {970}	0.244 (0.430) {492}	0.201 0.401 {478}
T2: Reduce	2.562 (1.869) {977}	2.494 (1.832) {506}	2.635 (1.908) {471}	0.204 (0.403) {977}	0.200 (0.400) {506}	0.208 (0.406) {471}
T3: Expropriate	2.652 (1.919) {995}	2.608 (1.884) {502}	2.698 (1.956) {493}	0.218 (0.413) {995}	0.207 (0.406) {502}	0.229 (0.421) {493}
T4: Steal	2.530 (1.896) {970}	2.532 (1.884) {453}	2.606 (1.907) {517}	0.204 (0.403) {970}	0.205 (0.404) {453}	0.203 (0.403) {517}

*Notes:* Standard deviations in parenthesis. Number of observations in brackets. Observations for which a participant did not correctly answer the comprehension-check question are dropped.

Table 4. Welfare-analysis treatment effects

	Panel A: Dependent variable = fairness score (1-7)				Panel B: Dependent variable = fair indicator variable (=1 if fairness score between 5-7; =0 if otherwise)			
	Pooled	Vignettes		Interaction	Pooled	Vignettes		Interaction
		first	second			first	second	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
T1: Byproduct	0.108 (0.087) {0.215}	0.262 (0.124) {0.034}	-0.047 (0.123) {0.705}	0.262 (0.123) {0.034}	0.014 (0.019) {0.463}	0.048 (0.027) {0.074}	-0.020 (0.027) {0.469}	0.048 (0.027) {0.074}
T2: Reduce	-0.014 (0.087) {0.868}	-0.047 (0.125) {0.707}	0.026 (0.122) {0.834}	-0.047 (0.125) {0.707}	-0.005 (0.019) {0.789}	0.003 (0.027) {0.899}	-0.012 (0.026) {0.634}	0.003 (0.027) {0.899}
T3: Expropriate	0.076 (0.087) {0.382}	0.067 (0.124) {0.590}	0.089 (0.122) {0.469}	0.067 (0.124) {0.590}	0.009 (0.019) {0.619}	0.011 (0.028) {0.688}	0.009 (0.026) {0.735}	0.011 (0.028) {0.688}
T4: Steal	-0.046 (0.090) {0.604}	-0.009 (0.128) {0.944}	-0.081 (0.126) {0.518}	-0.009 (0.128) {0.944}	-0.005 (0.019) {0.810}	0.009 (0.028) {0.740}	-0.017 (0.026) {0.511}	0.009 (0.028) {0.740}
Vignettes second				0.068 (0.144) {0.634}				0.024 (0.031) {0.437}
T1: Byproduct * Vignette second				-0.308 (0.174) {0.077}				-0.067 (0.038) {0.076}
T2: Reduce * Vignette second				0.072 (0.174) {0.678}				-0.016 (0.038) {0.674}
T3: Expropriate * Vignette second				0.022 (0.174) {0.900}				-0.002 (0.038) {0.952}
T4: Steal * Vignette second				-0.722 (0.791) {0.687}				-0.027 (0.038) {0.488}
Constant	2.576 (0.072) {0.000}	2.541 (0.103) {0.000}	2.609 (0.100) {0.000}	2.541 (0.103) {0.000}	0.209 (0.016) {0.000}	0.196 (0.022) {0.000}	0.220 (0.022) {0.000}	0.196 (0.022) {0.000}
Observations	4,875	2,417	2,458	4,875	4,875	2,417	2,458	4,875
Test 1: T1 = T2	{0.143}	{0.007}	{0.553}	{0.007}	{0.303}	{0.085}	{0.785}	{0.085}
Test 2: T1 = T3	{0.712}	{0.117}	{0.270}	{0.117}	{0.807}	{0.176}	{0.275}	{0.175}
Test 3: T1 = T4	{0.081}	{0.034}	{0.777}	{0.034}	{0.324}	{0.164}	{0.929}	{0.164}
Test 4: T2 = T3	{0.272}	{0.328}	{0.589}	{0.328}	{0.420}	{0.769}	{0.393}	{0.769}
Test 5: T2 = T4	{0.715}	{0.755}	{0.400}	{0.755}	{0.981}	{0.831}	{0.851}	{0.831}
Test 6: T3 = T4	{0.151}	{0.527}	{0.162}	{0.527}	{0.445}	{0.942}	{0.315}	{0.942}

Notes: The no frame (control frame) is the reference category. Standard errors are in parenthesis. P-values are in brackets. Robust standard errors are calculated clustering the observations by participant. Observations for which a participant did not correctly answer the comprehension-check question are dropped.

Table 5. Treatment and scenarios effects

	Panel A: Dependent variable = fairness score (1-7)				Panel B: Dependent variable = fair indicator variable (=1 if fairness score between 5-7; =0 if otherwise)		
	Vignettes first	Vignettes second	Pooled	Vignettes first	Vignettes second	Pooled	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)
T1: Byproduct	0.289 (0.121) {0.017}	-0.053 (0.121) {0.665}	0.117 (0.086) {0.172}	-0.005 (0.272) {0.984}	0.048 (0.027) {0.070}	-0.019 (0.027) {0.480}	0.015 (0.019) {0.442}
T2: Reduce	-0.008 (0.122) {0.949}	-0.002 (0.120) {0.990}	-0.009 (0.085) {0.916}	0.000 (0.286) {1.000}	0.006 (0.027) {0.837}	-0.014 (0.026) {0.583}	-0.005 (0.019) {0.796}
T3: Expropriate	0.109 (0.123) {0.376}	0.048 (0.119) {0.687}	0.075 (0.085) {0.378}	-0.005 (0.277) {0.986}	0.014 (0.028) {0.612}	0.005 (0.026) {0.833}	0.009 (0.019) {0.631}
T4: Steal	0.000 (0.126) {1.000}	-0.083 (0.122) {0.496}	-0.042 (0.087) {0.630}	-0.018 (0.282) {0.948}	0.009 (0.028) {0.737}	0.005 (0.026) {0.507}	-0.005 (0.019) {0.811}
S2: Laos banana production	-0.643 (0.077) {0.000}	-0.619 (0.076) {0.000}	-0.632 (0.054) {0.000}	-0.451 (0.304) {0.139}	-0.093 (0.017) {0.000}	-0.069 (0.016) {0.000}	-0.081 (0.012) {0.000}
S3: Wisconsin paper mills	-0.415 (0.073) {0.000}	-0.454 (0.079) {0.000}	-0.439 (0.054) {0.000}	-0.742 (0.252) {0.003}	-0.068 (0.016) {0.000}	-0.058 (0.017) {0.000}	-0.063 (0.012) {0.000}
S4: Ohio electricity production	-0.508 (0.085) {0.000}	-0.480 (0.082) {0.000}	-0.498 (0.059) {0.000}	-0.742 (0.252) {0.003}	-0.098 (0.019) {0.000}	-0.076 (0.019) {0.000}	-0.087 (0.014) {0.000}
S5: Consumer detergent use	0.353 (0.086) {0.000}	0.281 (0.081) {0.001}	0.313 (0.059) {0.000}	0.327 (0.246) {0.185}	-0.043 (0.020) {0.032}	-0.016 (0.019) {0.403}	-0.030 (0.014) {0.030}
Interaction: T2 * S2				-0.053 (0.424) {0.900}			
Interaction: T2 * S3				0.873 (0.385) {0.024}			
Interaction: T2 * S4				0.393 (0.380) {0.302}			
Interaction: T2 * T5				0.255 (0.372) {0.494}			
Constant	2.755 (0.116) {0.000}	2.876 (0.114) {0.000}	2.821 (0.081) {0.000}	2.843 (0.201) {0.000}	0.254 (0.026) {0.000}	0.264 (0.026) {0.000}	0.260 (0.018) {0.000}
Observations	2,417	2,458	4,875	2,417	2,417	2,458	4,875
Test 1: T1 = T2	{0.008}	{0.678}	{0.128}	{0.985}	{0.096}	{0.856}	{0.291}
Test 2: T1 = T3	{0.146}	{0.409}	{0.629}	{0.998}	{0.206}	{0.345}	{0.766}
Test 3: T1 = T4	{0.023}	{0.801}	{0.070}	{0.961}	{0.158}	{0.948}	{0.309}
Test 4: T2 = T3	{0.309}	{0.668}	{0.300}	{0.986}	{0.742}	{0.426}	{0.436}
Test 5: T2 = T4	{0.948}	{0.512}	{0.700}	{0.948}	{0.889}	{0.905}	{0.987}
Test 6: T3 = T4	{0.356}	{0.271}	{0.162}	{0.961}	{0.854}	{0.378}	{0.458}

Notes: The no frame (control frame) and the context-free scenario are the reference categories. Standard errors are in parenthesis. *P*-values are in brackets. Robust standard errors are calculated clustering the observations by participant. Observations for which a participant did not correctly answer the comprehension-check question are dropped. In Column 4 of

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Panel A, we only report the interaction terms between T2 and the scenarios for the vignettes-first subsample, as T2 is the only treatment that had a significant effect and the significant effect is only present with the vignettes-first subsample; all the other interaction terms are insignificant (complete results are available upon request).

Table 6. Framing- and narrative-element effects

	Scenarios Included (Pooled)					
	S1-S5 (1)	S1 (2)	S1-S3 (3)	S1-S4 (4)	S1, S5 (5)	S1-S5 (6)
T1: Byproduct	0.117 (0.086) {0.174}	-0.058 (0.192) {0.764}	0.200 (0.116) {0.085}	0.181 (0.100) {0.071}	-0.083 (0.158) {0.599}	0.117 (0.086) {0.172}
T2: Reduce	-0.011 (0.085) {0.899}	-0.088 (0.194) {0.652}	0.051 (0.110) {0.644}	0.065 (0.096) {0.494}	-0.229 (0.164) {0.163}	-0.009 0.085 {0.918}
T3: Expropriate	0.073 (0.085) {0.394}	-0.098 (0.193) {0.612}	0.045 (0.114) {0.692}	0.136 (0.100) {0.174}	0.111 (0.162) {0.492}	0.075 (0.085) {0.379}
T4: Steal	-0.044 (0.087) {0.616}	-0.057 (0.196) {0.770}	-0.027 (0.112) {0.812}	0.023 (0.100) {0.821}	-0.114 (0.169) {0.501}	-0.043 (0.087) {0.625}
S2: Laos banana production	-0.632 (0.054) {0.000}	-	-0.633 (0.054) {0.000}	-0.531 (0.064) {0.000}	-	-0.632 (0.054) {0.000}
S3: Wisconsin paper mills	-0.438 (0.054) {0.000}	-	-0.440 (0.054) {0.000}	-0.338 (0.064) {0.000}	-	-0.439 (0.054) {0.000}
S4: Ohio electricity production	-0.498 (0.059) {0.000}	-	-	-0.397 (0.069) {0.000}	-	-0.498 (0.059) {0.000}
S5: Consumer detergent use	0.313 (0.056) {0.000}	-	-	-	-	0.313 (0.059) {0.000}
<i>Length of time the external cost existed (reference category "Recently")</i>						
For many years	0.047 (0.056) {0.406}	-	-	-	-	-
<i>Type of entity generating the external cost (reference category "Local business")</i>						
Consumer	-	0.511 (0.167) {0.002}	-	-	-	-
Multinational corporation	-	0.356 (0.176) {0.043}	-	-	-	-
Public utility	-	-0.034 (0.164) {0.836}	-	-	-	-
<i>How many bystanders impacted (reference category "A bystander")</i>						
Few bystanders	-	-	0.001 (0.086) {0.986}	-	-	-
Many bystanders	-	-	0.029 (0.084) {0.726}	-	-	-

*Cost of avoiding the activity that generates the external cost (reference category "No cost")*

Modest cost	-	-	-	0.008 (0.079) {0.922}	-	-
Significant cost	-	-	-	0.124 (0.077) {0.108}	-	-

*Availability of substitutes for the activity that generates the external cost (reference category "None")*

Few	-	-	-	-	-0.213 (0.121) {0.079}	-
Many	-	-	-	-	-0.120 (0.126) {0.343}	-

*Entity considers external cost in decision-making (reference category "Does not")*

Neglects	-	-	-	-	-	0.019 (0.054) {0.719}
Constant	2.799 (0.085) {0.000}	2.698 (0.173) {0.000}	2.785 (0.105) {0.000}	2.632 (0.105) {0.000}	3.374 (0.132) {0.000}	2.811 (0.086) {0.000}
Observations	4,875	1,031	2,996	3,652	1,223	4,875

Notes: The no frame (control frame) and the context-free scenario are the reference categories. Standard errors are in parenthesis. P-values are in brackets. Robust standard errors are calculated clustering the observations by participant. Observations for which a participant did not correctly answer the comprehension-check question are dropped. In column 4, 302 participants who completed S1 did not receive a cost element and rather received a substitution element, and thus, are not included in the column-4 specification. In column 5, 884 participants who completed S1 did not receive a substitutes element and rather received a cost element, and thus, are not included in the column-5 specification.

Table 7. Mean fairness of government's actions by treatment

	Panel A: Dependent variable = fairness score (1-7)			Panel B: Dependent variable = fair indicator variable (=1 if fairness score between 5-7; =0 if otherwise)		
	Pooled	Vignettes first	Vignettes second	Pooled	Vignettes first	Vignettes second
	(1)	(2)	(3)	(1)	(2)	(3)
Average	5.187	5.164	5.210	0.751	0.748	0.753
	(1.639)	(1.654)	(1.623)	(0.433)	(0.434)	(0.431)
	{4,875}	{2,417}	{2,458}	{4,875}	{2,417}	{2,458}

Notes: Standard deviations in parenthesis. Number of observations in brackets. Observations for which a participant did not correctly answer the comprehension-check question are dropped.

Table 8. Frame- and narrative-elements effect on fairness of government actions

	Panel A: Dependent variable = fairness score (1-7)		Panel B: Dependent variable = fair indicator variable (=1 if fairness score between 5-7; =0 if otherwise)	
	(1)	(2)	(1)	(2)
	<i>Government intervention (reference category "Require the adoption of a technology")</i>			
Tax activity	-0.541	-	-0.127	-
	(0.054)		(0.015)	
	{0.000}		{0.000}	
Prohibit activity	0.052	-	0.028	-
	(0.714)		(0.017)	
	{0.469}		{0.108}	
<i>Societal-welfare framing (reference category &lt;no frame&gt;)</i>				
Societal benefits maximized	-	0.176	-	0.027
		(0.059)		(0.014)
		{0.003}		{0.063}
Societal benefits maximized, but external costs still exist	-	-0.738	-	-0.168
		(0.067)		(0.018)
		{0.000}		{0.000}
Constant	5.248	5.208	0.781	0.777
	(0.071)	(0.070)	(0.019)	(0.019)
	{0.000}	{0.000}	{0.000}	{0.000}
Observations	4,875	4,875	4,875	4,875
Welfare-analysis fixed effects	Yes	Yes	Yes	Yes
Scenario fixed effects	Yes	Yes	Yes	Yes

Notes: The no frame (control frame) is the reference category. Standard errors are in parenthesis. P-values are in brackets. Robust standard errors are calculated clustering the observations by participant. Observations for which a participant did not correctly answer the comprehension-check question are dropped.

Table 9. Correlates of fairness scores

	Panel A: Dependent variable = fairness score (1-7) of entity's action		Panel B: Dependent variable = fairness score (1-7) of government's action		Panel C: Dependent variable = fair indicator variable (=1 if fairness score between 5-7; =0 if otherwise) of entity's action		Panel D: Dependent variable = fair indicator variable (=1 if fairness score between 5-7; =0 if otherwise) of government's action	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Promarket	0.552 (0.076) {0.000}	-	-0.110 (0.083) {0.182}	-	0.110 (0.017) {0.000}	-	-0.002 (0.021) {0.934}	-
NEP dominate environment	1.814 (0.103) {0.000}	-	-0.026 (0.079) {0.743}	-	0.391 (0.023) {0.000}	-	0.046 (0.021) {0.025}	-
NEP balance environment	0.576 (0.141) {0.000}	-	0.664 (0.120) {0.000}	-	0.189 (0.031) {0.000}	-	0.186 (0.040) {0.000}	-
Female	-	-0.233 (0.084) {0.006}	-	-0.045 (0.078) {0.563}	-	-0.037 (0.018) {0.043}	-	-0.014 (0.019) {0.468}
Bachelor's degree or more	-	0.409 (0.087) {0.000}	-	-0.019 (0.091) {0.831}	-	0.093 (0.019) {0.000}	-	0.013 (0.023) {0.576}
Unemployed	-	-0.098 (0.193) {0.611}	-	-0.041 (0.216) {0.849}	-	-0.047 (0.031) {0.127}	-	-0.052 (0.053) {0.325}
Income above \$50,000	-	-0.235 (0.087) {0.007}	-	-0.048 (0.081) {0.557}	-	-0.034 (0.019) {0.073}	-	-0.012 (0.020) {0.549}
2 or more econ courses taken	-	0.347 (0.089) {0.000}	-	0.058 (0.083) {0.484}	-	0.071 (0.020) {0.000}	-	0.021 (0.021) {0.318}
Progressive	-	-0.922 (0.084) {0.000}	-	0.445 (0.081) {0.000}	-	-0.182 (0.018) {0.000}	-	0.080 (0.021) {0.000}
Authoritarian	-	1.143 (0.108) {0.000}	-	0.390 (0.081) {0.000}	-	0.269 (0.024) {0.000}	-	0.121 (0.021) {0.000}
Constant	1.204 (0.161) {0.000}	2.599 (0.119) {0.000}	4.532 (0.145) {0.000}	4.719 (0.120) {0.000}	-0.141 (0.035) {0.000}	0.182 (0.026) {0.000}	0.551 (0.040) {0.000}	0.652 (0.032) {0.000}
Observations	4,875	4,875	4,875	4,875	4,875	4,875	4,875	4,875
Welfare-analysis fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Scenario fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The no frame (control frame) is the reference category. Standard errors are in parenthesis. P-values are in brackets. Robust standard errors are calculated clustering the observations by participant. Progressive is an indicator variable that equals 1 if the participant self-reported a score < 6 on a scale from 1 = progressive to 11 = conservative. Authoritarian is an indicator variable that equals 1 if the participant self-reported a score > 6 on a scale from 1 = libertarian to 11 = authoritarian. Observations for which a participant did not correctly answer the comprehension-check question are dropped.

Table 10. Mean fairness by frame- and narrative-elements in Experiment 2

	Detergent use (1)	Paper production (2)	Average (3)
Panel A: Dependent variable = fairness score (1-7)			
Not informed about external cost	4.735 (1.315) {268}	5.076 (1.480) {278}	4.908 (1.411) {546}
Informed about external cost	3.776 (1.475) {286}	2.523 (1.406) {279}	3.158 (1.570) {565}
Average	4.240 (1.479) {554}	3.797 (1.927) {557}	4.018 (1.731) {1,111}
Panel B: Dependent variable = fair indicator variable (=1 if fairness score between 5-7; =0 if otherwise)			
Not informed about external cost	0.515 (0.501) {268}	0.691 (0.463) {278}	0.604 (0.489) {546}
Informed about external cost	0.301 (0.459) {286}	0.108 (0.310) {279}	0.205 (0.404) {565}
Average	0.404 (0.491) {554}	0.399 (0.490) {557}	0.401 (0.490) {1,111}

*Notes:* Standard deviations in parenthesis. Number of observations in brackets. Observations for which a participant did not correctly answer the comprehension-check question are dropped.

Table 11. Effects of scenario and informing participants of the external costs

	Panel A: Dependent variable = fairness score (1-7)			Panel B: Dependent variable = fair indicator variable (=1 if fairness score between 5-7; =0 if otherwise)		
		Interaction	Order effects		Interaction	Order effects
	(1)	(2)	(3)	(1)	(2)	(3)
Informed about external cost	-1.758	-2.552	-2.337	-0.399	-0.583	-0.552
	(0.089)	(0.121)	(0.171)	(0.027)	(0.037)	(0.053)
	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}
Detergent use	0.470	-0.340	-0.102	0.012	-0.176	-0.112
	(0.089)	(0.122)	(0.170)	(0.027)	(0.038)	(0.053)
	{0.000}	{0.005}	{0.550}	{0.658}	{0.000}	{0.033}
Detergent use × Informed about external cost		1.593	1.321		0.369	0.313
		(0.171)	(0.238)		(0.053)	(0.074)
		{0.000}	{0.000}		{0.000}	{0.000}
Vignettes second			0.189			0.051
			(0.170)			(0.053)
			{0.268}			{0.332}
Detergent use × Vignettes second			-0.496			-0.131
			(0.244)			(0.075)
			{0.043}			{0.082}
Cost × Vignettes second			-0.428			-0.062
			(0.241)			(0.074)
			{0.075}			{0.408}
Detergent use × Cost × Vignettes second			0.559			0.115
			(0.341)			0.106
			{0.102}			{0.275}
Constant	4.678	5.076	4.978	0.599	0.691	0.641
	(0.077)	(0.085)	(0.123)	(0.023)	(0.026)	(0.038)
	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}
Observations	1,111	1,111	1,111	1,111	1,111	1,111
<i>Post-estimation tests</i>						
Impact of informing participants of the external costs in the Detergent use scenario	-	-1.299	-	-	-0.390	
		(0.120)			(0.037)	
		{0.000}			{0.000}	

Notes: Standard errors are in parenthesis. P-values are in brackets. Robust standard errors are calculated.

Observations for which a participant did not correctly answer the comprehension-check question are dropped.

# Figures

Figure 1a. Welfare analysis of negative externality: total external cost indicated

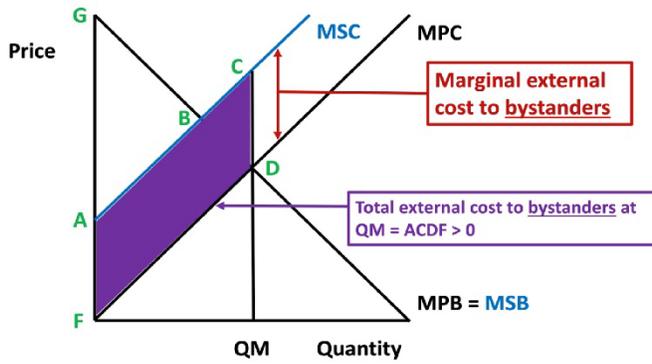


Figure 1b. Welfare analysis of negative externality: deadweight loss indicated

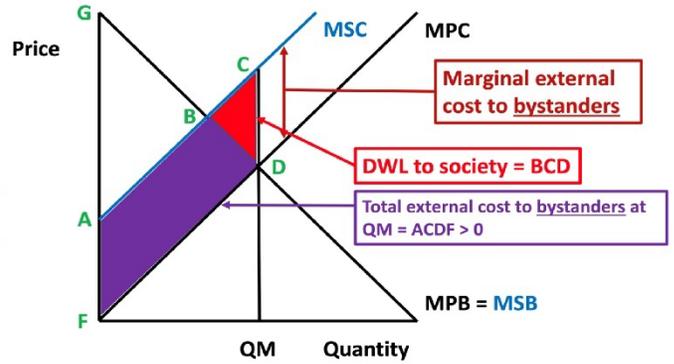


Figure 1c. Welfare analysis of negative externality: sum of consumer and producer surplus indicated

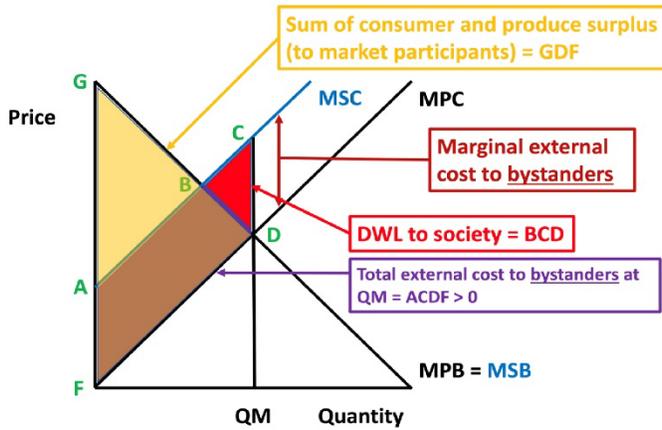


Figure 1d. Welfare analysis of negative externality: external cost that is not also deadweight loss indicated

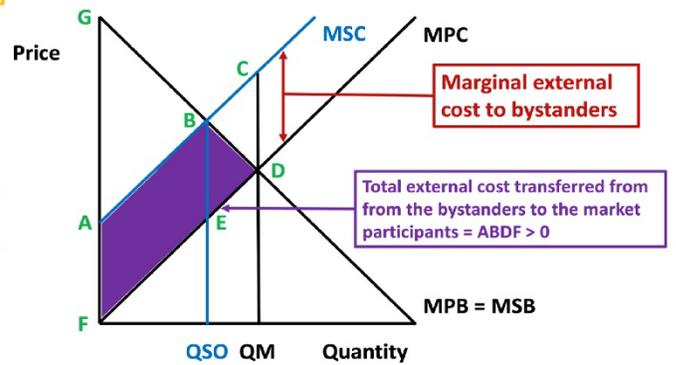


Figure 2a. First permutation of context-free scenario with frame- and narrative-elements underlined

For many years, a multinational corporation has been producing a product that negatively influences the well-being of a bystander. Specifically, the multinational corporation negatively affects the bystander's financial well-being. The negative influence on well-being could be avoided at no cost to the corporation.

The corporation does not consider the external costs of its activity when deciding how much to produce.

*Notes:* Referring to the numbering and lettering in Column 1 of Table 1, the above includes the following elements: #1B, #2C, #3A, #4B, #5A, #6A, and #7A (no welfare-analysis frame). The order of the underlines corresponds to the element numbers; i.e., the first underline is for element #1, the second is for #2, and so on. Underlines that end with a circle continue onto the next line.

Figure 2b. Second permutation of context-free scenario with frame- and narrative-elements underlined

Recently, a consumer has been consuming a product that negatively influences the well-being of a bystander. Specifically, the consumer negatively affects the bystander's financial well-being. There are no readily available close substitutes for the product that do not also create external costs.

The consumer neglects to consider the negative impacts of their activity when deciding how much to consume. That is, the consumer increased their well-being by reducing the bystander's well-being.

*Notes:* Referring to the numbering and lettering in Column 1 of Table 1, the above includes the following elements: #1A, #2A, #3A, #4B, #5D, #6B, and #7C. The order of the underlines corresponds to the element numbers; i.e., the first underline is for element #1, the second is for #2, and so on. Underlines that end with a circle continue onto the next line.

Figure 3a: Permutation of Laos Banana Production scenario with frame- and narrative- elements underlined

A remote Laos village is situated on a river, which the community depends on for food and water. Recently, a foreign-owned company has begun planting bananas in the village—a pesticide-intensive process—and the company has begun spilling pesticides into the river. Many residents report that before the foreign firm established its business in the community they could earn between US\$4.60 and US\$14.60 per day fishing. Now there are no more fish in the river and the residents cannot earn any money. The negative effects could be avoided at no cost to the company.

The company neglects to consider the costs of its action when making its production decisions. There are two byproducts of this, the firm achieves a better outcome—increased profits—and the residents' well-being is reduced.

*Notes:* Referring to the numbering and lettering in Column 2 of Table 1, the above includes the following elements: #1A, #3C, #5A, #6B, and #7B. The order of the underlines corresponds to the element numbers; i.e., the first underline is for element #1, the second is for #3, and so on. Underlines that end with a circle continue onto the next line.

Figure 3b: Permutation of Wisconsin Paper Mills scenario with frame- and narrative- elements underlined

The Lower Fox River riverbed in Wisconsin is contaminated with toxic chemicals—including Polychlorinated Biphenyls (PCBs); these toxins are the result of paper production by 24 locally-owned paper companies that have recently begun operating along the river. The pollution adversely affects a resident who recreates on the river. Now, they can no longer swim or boat downstream. The toxic chemicals could be cleanly disposed of at a significant cost to the companies.

The firms do not consider the external costs of their actions when deciding on their production techniques.

*Notes:* Referring to the numbering and lettering in Column 3 of Table 1, the above includes the following elements: #1A, #3A, #4A, #5C, #6A, and #7A (no welfare-analysis frame). The order of the underlines corresponds to the element numbers; i.e., the first underline is for element #1, the second is for #3, and so on. Underlines that end with a circle continue onto the next line.

Figure 3c: Permutation of Ohio Electricity Production scenario with frame- and narrative- elements underlined

Recently, public utilities that have begun supplying electricity to Ohioans are generating 67 percent of the electricity using low-cost, high-sulfur (dirty) coal. When burned, dirty coal emits large quantities of toxic air pollution. This air pollution can travel hundreds of miles in the “jetstream,” a prevailing west-to-east wind. When this air pollution mixes with moisture in rain clouds, it generates “acid rain,” rain that is acidic. Acid rain—generated from burning dirty coal in Ohio—has damaged numerous rivers, lakes, and forests in the Northeast and has had negative effects on the financial well-being and health of many Northeasterners. The production and release of the toxic chemicals could be avoided at a significant cost to the public utilities.

The utilities neglect to consider the external costs when deciding to supply power using dirty production techniques.

*Notes:* Referring to the numbering and lettering in Column 4 of Table 1, the above includes the following elements: #1A, #5C, #6B, and #7A (no welfare-analysis frame). The order of the underlines corresponds to the element numbers; i.e., the first underline is for element #1, the second is for #5, and so on.

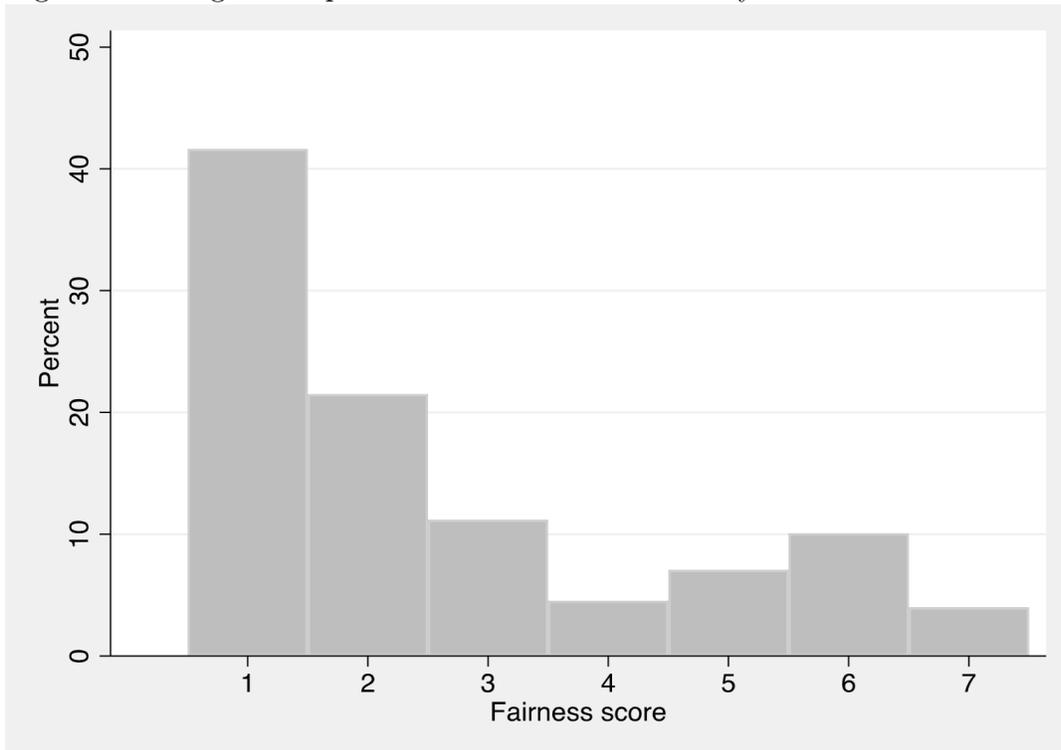
Figure 3d: Permutation of Consumer Detergent Use scenario with frame- and narrative- elements underlined

Recently, the residents of a southeastern United States town have begun using laundry detergents that contain phosphates. The phosphates have built up in local waterways, leading to a big algal bloom that has adversely affected the tourism industry in the area. There are a few phosphate-free detergents sold at local stores.

The consumers do not consider the external costs of using the phosphate-containing detergents. That is, the detergent consumers increase their well-being by *expropriating* the other residents' well-being.

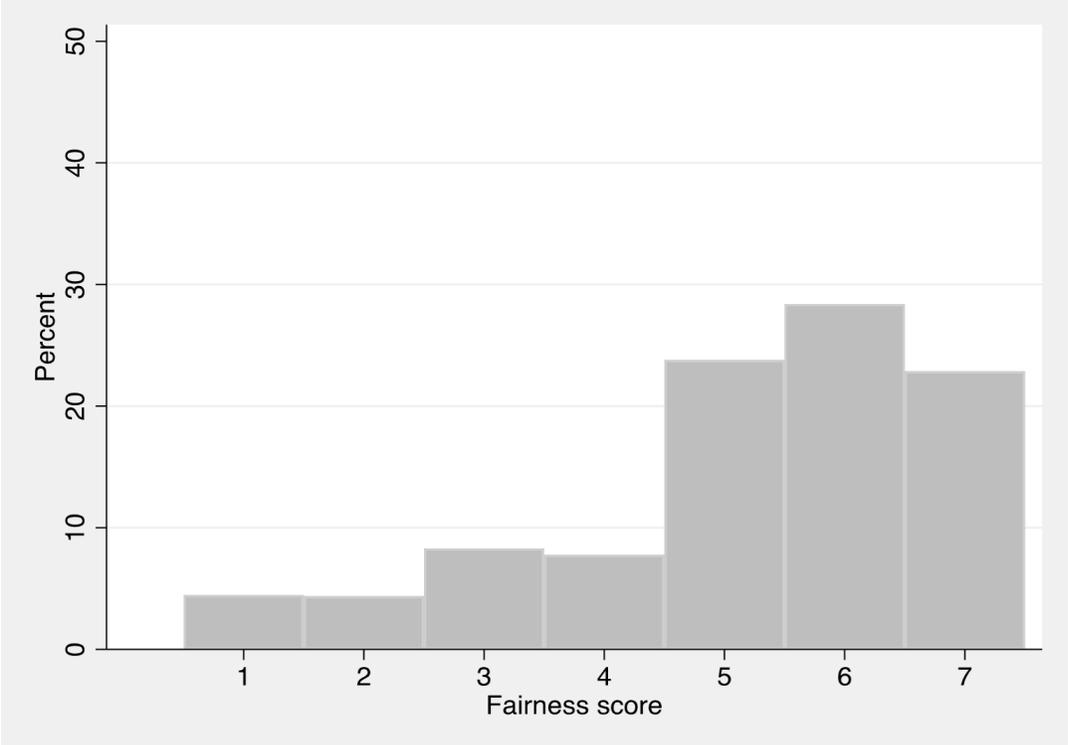
*Notes:* Referring to the numbering and lettering in Column 5 of Table 1, the above includes the following elements: #1A, #4B, #5B, #6A, and #7D. The order of the underlines corresponds to the element numbers; i.e., the first underline is for element #1, the second is for #4, and so on. Underlines that end with a circle continue onto the next line.

Figure 4. Histogram of pooled fairness scores for entity's actions



*Notes:* Observations for which a participant did not correctly answer the comprehension-check question are dropped ( $n = 4,875$ ).

Figure 5. Histogram of pooled fairness scores for government's actions



Notes: Observations for which a participant did not correctly answer the comprehension-check question are dropped (n = 4,875).