

A Service of



Leibniz-Informationszentrum Wirtschaft Leibniz Information Centre for Economics

Bartling, Björn; Valero, Vanessa; Weber, Roberto A.

Working Paper The causal effect of income on market social responsibility

Working Paper, No. 299

Provided in Cooperation with: Department of Economics, University of Zurich

Suggested Citation: Bartling, Björn; Valero, Vanessa; Weber, Roberto A. (2024) : The causal effect of income on market social responsibility, Working Paper, No. 299, University of Zurich, Department of Economics, Zurich, https://doi.org/10.5167/uzh-153744

This Version is available at: https://hdl.handle.net/10419/306552

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



WWW.ECONSTOR.EU



University of Zurich

Department of Economics

Working Paper Series

ISSN 1664-7041 (print) ISSN 1664-705X (online)

Working Paper No. 299

The Causal Effect of Income on Market Social Responsibility

Björn Bartling, Vanessa Valero and Roberto A. Weber

Revised version, August 2024

The Causal Effect of Income on Market Social Responsibility

Björn Bartling University of Zurich Vanessa Valero Institut Mines-Télécom Business School Roberto A. Weber University of Zurich

August 31, 2024*

We investigate the relationship between consumers' income and socially responsible consumption that mitigates negative externalities. We conduct laboratory and online market experiments in which firms and consumers can exchange products that differ in the degree to which they diminish negative external impacts at the expense of higher production costs. Our treatments exogenously vary consumers' income. Across all three experiments, higher income causes an increase in the quantity of socially responsible products purchased and at least slightly increases the share of such products as part of total consumption. However, increases in total consumption resulting from higher income can increase negative externalities.

JEL Classification: C92, D31, D62, M14

Keywords: Negative externalities, social and environmental responsibility, income effects, market experiments

^{*} Bartling: Department of Economics, University of Zurich, Blümlisalpstrasse 10, 8006 Zurich, Switzerland, bjoern.bartling@econ.uzh.ch; Valero: Institut Mines-Télécom Business School (ITM-BS), 9 Rue Charles Fourier 91000 Évry-Courcouronnes, France, vanessa.valero@imt-bs.eu; Weber: Department of Economics, University of Zurich, roberto.weber@econ.uzh.ch. We are grateful for support from the Swiss National Science Foundation (grant number 100018_165943) and for helpful comments from Lei Li, from participants at several seminars and conferences, and from six referees and the editor. Leyi Tu provided excellent research assistance for Study 3. The studies in this paper were granted exempt status by the Human Subjects Committee of the Faculty of Economics, Business Administration, and Information Technology at the University of Zurich. The authors state that they have no conflict of interest and obtain no direct material benefit from the research reported in this manuscript.

1 Introduction

Negative externalities resulting from market activity—such as environmental damage and pollution—often create serious problems. Public authorities may fail to correct for market failures, for instance, due to lobbying, regulatory capture or other limitations inherent to political processes. As a result, concerns for positive social impact among market actors present a potentially valuable way to mitigate negative externalities (Bénabou and Tirole, 2010). However, voluntarily mitigating externalities is costly, as the production costs and prices of socially and environmental responsible products are typically higher than those of comparable conventional products. Thus, understanding factors that influence responsible market behavior—and that can, therefore, be employed to increase such behavior—can be valuable for policy and welfare.¹

One potentially important factor in this regard is whether increased income leads individuals to engage in more socially responsible consumption that mitigates negative externalities. If this is the case, economic growth might yield more responsible societies in which market actors voluntarily internalize their market impacts to a greater extent and reduce the resulting social and environmental harm. Consistent with this possibility, several scholars argue for a positive relationship between income and behavior that produces more positive societal impacts. Shleifer (2004) hypothesizes that as "societies grow richer, their willingness to pay for ethical behavior [...] increases as well" (p. 418). Similarly, Bénabou and Tirole (2010) argue that "social responsibility is likely to be a normal good" (p. 1). However, we know of no empirical evidence supporting these conjectures by cleanly establishing a causal, positive relationship between income and socially responsible market behavior. In this paper, we test the hypotheses that increased income positively impacts the consumption of socially responsible products and reduces negative externalities from market exchange.

Methodologically, we employ the control afforded by experimental contexts to establish causal relationships. Ideally, one would be able to answer our motivating question using actual consumption data. However, this is challenging for many reasons, many of which can be addressed in carefully controlled experiments. For example, our experiments exogenously manipulate income in the form of money available to consumers, while outside the laboratory variation in

¹ Laboratory studies on socially responsible market behavior include Rode et al. (2008), Bartling et al. (2015, 2024), Kirchler et al. (2015), Pigors and Rockenbach (2016), Irlenbusch and Saxler (2019), Sutter et al., (2020), Danz et al. (2022), Engelmann et al. (2024), and Ziegler et al. (2024); Hainmueller et al. (2015) report the results of a field experiment. Dufwenberg, et al. (2011) and Dewatripont and Tirole (2024) provide theoretical treatments.

income is related to many social and individual factors—including time-varying tastes, improvements in education and changes in technology and regulations—that may influence the degree to which individuals or societies limit the negative external impacts of their market activity.² In addition, in more natural markets it is difficult to identify goods that differ in the degree to which they yield negative external impacts while controlling for real or perceived quality, social status, marketing and other important factors potentially driving consumption behavior. Our experimental environments allow us to compare the market shares of product types that are identical in every aspect, except for their negative external impacts and their production costs. Of course, results from artificial experimental settings naturally raise concerns about external validity. But the challenges with alternative feasible approaches highlight the, at least complementary, value of producing clean experimental evidence on the causal relationship between income and consumer social responsibility.

We report three experimental studies that investigate the extent to which an increase in consumer income leads to an increase in the consumption of products that mitigate negative external impacts. Our guiding research questions are (i) does the quantity of socially responsible products exchanged in a market increase with income and (ii) does increased income yield a reduction in the negative external impacts from consumption? To address these questions, our studies employ designs in which consumers participate in market experiments and make choices with varying levels of laboratory income. Our studies investigate behavior in varying populations and employ different kinds of designs to address our primary research question.

In our first study, subjects in a laboratory experiment conducted in Switzerland play one of three roles: consumers, sellers or third parties. Sellers set prices and select the degree of negative externalities produced by their products, with products that mitigate more of the negative externality costing more to produce. Products differ only in the externality they produce and in their production costs, with more responsible products being more expensive but having identical material value for consumers. Consumers observe product offers and select one from the available options. Any resulting negative externality from a consumer's purchase decision affects the passive third parties. This reflects, for example, situations in which the types of products consumed

² Indeed, such interactions may underlie the non-linear relationship between per-capita income and environmental impacts, referred to as the "Environmental Kuznets Curve" (Grossman and Krueger, 1995; Andreoni and Levinson 2001; Harbaugh et al. 2002; Israel and Levinson 2014), though the robustness of such a non-linear impact is itself not uncontroversial due to the challenges of empirically establishing such a relationship (Stern, 2004).

by individuals in middle- to high-income countries result in pollution and environmental degradation mainly impacting lower-income countries, but where there exist costlier alternatives that mitigate such external impacts.³ Our design focuses primarily on consumers, providing them with greater market power and thereby reflecting their potential role as drivers of firms' willingness to offer more socially responsible products (as demonstrated by Aghion, et al., 2023). Our primary measures of concern for external impacts are the quantities of socially responsible products purchased and the total loss imposed on third parties. Using this design, we study the impact of exogenously increasing consumers' incomes on socially responsible behavior.

In our first study, we find that increasing incomes lead consumers to substitute toward more socially responsible product types and away from more harmful products. This effect is small for moderate income increases and only large in magnitude and statistically significant when the income increases are substantial. The increase in consumption of responsible products translates into fewer negative externalities with higher income. Our main finding thus indicates that some negative external impacts of consumption activity can be mitigated as societies experience economic growth.

Our first study also investigates how the *distribution* of income affects the relationship between income and responsible consumption, considering that income gains are often concentrated in small subsets of a country's population (see, e.g., Alvaredo et al. 2013). Prior research finds that inequality within a group can negatively affect pro-social behaviors directed toward other group members, such as cooperation (see the reviews in Yang and Konrath, 2023; Xu and Marandola, 2023). However, it is an open question whether inequality can similarly influence socially responsible market behavior, where externalities influence outsiders uninvolved with the market activity. We provide some evidence that consumers purchase fewer socially responsible products in the presence of income inequality, consistent with earlier evidence that inequality has small negative effects on pro-sociality (Yang and Konrath, 2023), but lack of power does not allow us to precisely estimate these effects.

Study 2 investigates the robustness of our main finding that income growth causes an increase in socially responsible consumption, replicating the design of our first study but changing two features. First, we vary the nature of the externality: it is no longer imposed on laboratory

³ Examples include palm oil, whose production threatens rainforests but where costlier synthetic alternatives exist (Saragosa, 2020) and environmental damage associated with low-cost disposal of limited-use products (Yeung, 2019).

subjects but instead on a charity. Second, in an additional condition we increase not only consumers' incomes but also those of firms. These design features address the potential concern that our earlier results are driven by inequality aversion among laboratory subjects, which would question the external validity of the findings. Study 2 replicates our main finding that increasing consumers' incomes increases responsible consumption, both when only consumers' incomes are increased and when all market actors' incomes are increased.

Our first two studies provide evidence that increased income can produce more socially responsible consumption, measured by an increased quantity and market share of socially responsible products and reduced negative external impacts. However, they also raise questions about how one should interpret the findings more broadly. Most importantly, these studies employ a simple design in which consumers can purchase at most one product per period. While this makes the experimental context easier to explain, it does not address the potential consequences on negative external impacts of increased *total* consumption that may result from income growth. That is, in our first two studies, if consumers purchase more socially responsible products with higher income, they cannot simultaneously also purchase more harmful products. In real-world markets, however, wealthier consumers may both purchase greater quantities of socially responsible products (for example, by substituting electric vehicles for conventional cars) but may also simultaneously produce more negative external impacts (simultaneously engaging in more air travel). Our third study addresses this possibility, by using a different design in which we do not constrain consumers to buy a single unit of a product; instead, they allocate their income to purchasing bundles of responsible and harmful products. Consistent with the results of Studies 1 and 2, consumers in Study 3 purchase greater quantities of socially responsible products as their income increases, and the share of such responsible products increases slightly as a share of their total consumption. However, consumers also substantially increase their consumption of harmful products, meaning that the total size of the negative externality increases substantially with income, despite the concurrent increase in socially responsible consumption.

Our third study also has additional features that provide a broader view of how income influences socially responsible consumption. Rather than studying a student population in Switzerland, we investigate behavior among a broader set of adults in the U.S., demonstrating the robustness of the finding that socially responsible consumption increases with income across populations and with very different experimental designs. We also use a modified design in which

subjects in the role of firms cannot condition their pricing behavior or product offers on consumers' income, unlike in our first two studies, allowing us to isolate an effect of income on consumer behavior, holding constant prices and product menus.

Broadly, our results show that increased income can yield increases in socially responsible consumption. In all three studies, we observe increased quantities and shares of socially responsible consumption with increased income, though the effects are small and statistically weak in some conditions and studies. Importantly, however, Study 3 also demonstrates that even when increased income leads consumers to purchase greater quantities of socially responsible products, an increase in overall consumption can nevertheless significantly worsen the negative externalities produced by market exchange, through greater overall consumption.

The rest of the paper proceeds as follows. The next section briefly reviews related literature. Section 3 describes the design and results of our first laboratory experimental market environment, while Section 4 describes our second laboratory study using the same general approach. Section 5 describes the design of Study 3 that employs a very different approach and studies a different population. Section 6 concludes.

2 Related Literature

Existing correlational evidence supports the idea that pro-social or, more generally, moral behavior is higher among individuals with greater income. This is evident, for instance, in studies that investigate the relationship between income and charitable giving, which regularly observe that wealthier individuals donate more in absolute terms, though the question of whether they give more in relative terms remains inconclusive. For example, Andreoni (2006) finds that total charitable giving increased between 1962 and 2002 as incomes increased but giving as a share of income remained fairly stable (see also Vesterlund, 2006; Andreoni and Payne, 2013). However, it is hard to rule out that other factors, such as differential tax treatment of large and small donations, may be at least partly responsible for these relationships. A recent study by Andreoni et al. (2021) identifies 180 high-SES and 180 low-SES households and sends them letters, containing either 5 Euros or 20 Euros, intended for another recipient. Twice as many rich households (81 percent) return the envelopes as poor households (38 percent) and the result is generally robust to controlling for several household characteristics. This suggests that rich households are at least as concerned with returning money to which they are not entitled. However,

a household's status as either high- or low-SES is not exogenous and other unobserved covarying factors may influence the differential concern in returning the envelopes between the two groups.

Other, also largely correlational, evidence suggesting a negative relationship between wealth and morality is provided by social psychologists. Specifically, in a series of studies, Piff et al. (2010, 2012) examine whether upper-class individuals are more likely to exhibit unethical behavior (e.g., breaking the law, lying to get ahead, cheating in games). Somewhat contrary to the studies summarized above, their findings indicate that having more money makes people care less about others and feel more entitled to put their own interests first. However, their studies mainly rely on correlational analysis between self-reported social class and behavior, meaning that individuals with high and low social class may differ in other dimensions than income. In addition, many of the outcome measures involve hypothetical choices. Finally, recent replication attempts call into question the robustness of these findings (Jung, et al., 2023; Greitemeyer, 2023).

Relevant evidence also comes from laboratory experiments on the impact of income in dictator and public good games. For example, several studies conduct dictator games with varying stake sizes (e.g., Forsythe, et al. 1994, Cherry et al. 2002, Carpenter et al. 2005). Engel (2011) provides a meta-analysis and finds that absolute amounts shared by dictators increase substantially when stake sizes increase—a 100-percent increase in a dictator's endowment produces an increase slightly below 100 percent in the amount transferred. Thus, pro-sociality, as measured by the absolute size of transfers, increases proportionally with income, though the share of money transferred does not vary substantially (see, also, Larney, et al., 2019).

Other studies investigate the degree to which contributions to public goods are influenced by varying endowments (Anderson et al., 2008; Hargreaves Heap et al., 2016). For example, Kocher et al. (2008) find little variation in the share of an endowment that individuals contribute to public goods with higher stakes. Other studies investigate within-group variation in endowments, sometimes finding conflicting results. Buckley and Croson (2006) find that highincome group members contribute no more in absolute terms, and lower shares of their income, than those with lower endowments, while Brekke et al. (2017) find higher absolute contributions among subjects with higher endowments.

However, there are important reasons why evidence from dictator and public good games may not necessarily indicate how behavior will respond to variation in income and inequality in a market context. First, dictator games possess a clear norm to share 50 percent of the endowment (e.g., Andreoni and Bernheim 2009, Krupka and Weber 2013), which limits generalization to contexts where a strong 50/50 norm is not applicable, including product purchases by consumers. In addition, prior evidence (e.g., Franciosi, et al., 1995; Bartling et al., 2015) suggests that the strength and robustness of social concerns may differ between market and non-market contexts.

None of the above studies implements exogenous variation in income to study its impact on concern for social impact in a market context. Most closely related to our study is a working paper by Friedrichsen (2017), which studies laboratory markets with one consumer, two firms and one worker. Firms set wages for the worker and the consumer decides how much to purchase from each firm. Consumers are randomized to have either a low or high income. Social responsibility is defined as a consumer buying a larger quantity from a firm that sets a strictly higher price but also pays a strictly higher wage than from a low-wage, low-price competitor. In total, 13.8 percent of consumer choices indicate a preference for the socially responsible product. Interestingly, the paper finds that richer consumers are *less* likely to favor the socially responsible product (10.2%) than are poor consumers (17.7%). A few design features, however, suggest the need for further investigation and are addressed by our studies. First, the numbers of poor (18) and rich (19) consumers in the study are relatively low; our combined studies involve a much larger number of consumers. Second, average workers' payoffs are higher than average payoffs for firms. Hence, a socially responsible consumer concerned with equality may prefer to help firms at the expense of workers by buying more from the low-cost, low-wage firm. In our studies, the behavior we identify as socially responsible more clearly produces beneficial external impacts and reduces inequality.

3 Study 1

3.1 Experimental Design

In the experimental market that forms the basis of our first two studies, participants in the roles of "firms" and "consumers" can exchange products that differ in their external impact, with product types that impose a smaller negative externality also costing more to produce. Consumers are restricted to buy at most one unit but can decide which type of product to purchase. The experiment comprises 30 periods, with the first 10 periods ("Part I") corresponding to a baseline design that is identical across all treatments. To study the effect of an exogenous increase in income on socially responsible market behavior, our treatments introduce varying positive shocks to consumers' incomes in periods 11-30 ("Part II").

3.1.1 Baseline Market Game

Each experimental market comprises 18 participants: six firms, six consumers and six passive third parties. The participants' roles in a market are fixed across all 30 periods. In the initial 10 periods every firm, consumer and third party receives an income of 100 points. Firms and consumers can earn additional points by trading products, with products of varying types having different production costs and varying impacts on third parties.

At the beginning of a period, every firm selects a product type and a price. A product's type corresponds to the total loss it imposes on third parties when purchased, which is between 0 and 60, and a corresponding production cost. The total loss is divided equally and imposed on each of the six third parties. Table 1 shows the 11 available product types, the associated combined and individual losses for third parties and the respective production costs. A natural feature of our design is that products that impose a smaller externality also cost more to produce. Specifically, a decrease in the combined loss of six—and, therefore, a decrease of one for the loss imposed on each third party—increases the production cost by one. Our design thus captures situations where it would be efficient to avoid the external harm as the marginal cost of producing more responsibly falls short of the marginal reduction of the external harm. This corresponds to situations, for example, in which a low-cost product available to consumers in high-income countries produces pollution that primarily impacts individuals in other parts of the world, and where a production technology that can mitigate the externality is socially efficient but privately costly.

					Pro	duct ty	ypes				
Combined loss	0	6	12	18	24	30	36	42	48	54	60
Individual loss	0	1	2	3	4	5	6	7	8	9	10
Production cost	30	29	28	27	26	25	24	23	22	21	20

Table 1: Product types, losses for third parties, and production costs

At the same time as they select product types, firms also determine prices for their product offers.⁴ Products are worth 70 to consumers, independently of the externality they impose; the ability to hold constant the characteristics of a product, other than its social impact, is a valuable

⁴ The interfaces for firms and consumers are provided in Appendices A and B.

element of the control afforded by a laboratory environment. Firms are required to set prices between the production cost of the selected product type and the value of the product.

Firm's offers are conveyed to consumers in a posted-offer market. After firms make their decisions, consumers see the prices and types of the six products offered in that period. Offers are displayed in a random order. Each consumer can buy one product but can also decide not to buy any product. A decision not to buy a product yields no profits for either the consumer or any firm, but also means no losses for third parties. There is no capacity constraint on the supply side; that is, each firm can serve the entire market and sell up to six units of the offered product. Firms do not have to build up an inventory *ex ante* in order to meet the demand.⁵ Firms' profits are given by the difference between the price and the production cost for each unit sold.

The third parties are passive participants and do not make any decisions. However, their payoffs in a period are impacted by the types of products exchanged in the market. Specifically, each third party experiences a loss between 0 (when all consumers only buy products that produce no loss or do not buy products at all) and 60 (when all consumers buy products that produce the maximum possible loss).⁶

Players' final payoffs, in points, in each period are thus as follows:

 $\begin{aligned} \pi_{Consumer} &= 100 + (70 - price) \cdot quantity purchased, \\ \pi_{Firm} &= 100 + (price - cost) \cdot quantity sold, \\ \pi_{Third Party} &= 100 - sum \, of \, losses \, from \, products \, exchanged, \end{aligned}$

where the quantity purchased by a consumer is either 0 or 1, the quantity sold for a firm can be any integer from 0 to 6 and the sum of losses for a third party ranges from 0 to 60. At the end of a period, players observe their own payoff. In addition, firms observe the offers made by all firms, how many products they sold, their payments and the impact of the products they sold on third parties. Consumers observe the effect of their purchasing decision on the payments of the six third parties, but receive no feedback on the behavior of other consumers. Individual subjects are not identified to one another—i.e., there are no identification numbers associated with feedback—and therefore cannot track each other's actions across periods.

⁵ We chose this form of "production on demand" to prevent outcomes like unsold inventory or supply shortages that might otherwise arise when firms commit *ex ante* to production quantities. Hence, within our experimental paradigm, it cannot be distinguished whether it is the production or the consumption that causes the externality.

⁶ Our design shares features with three-person ultimatum games, where a proposer makes a three-way offer that can be accepted by a responder but that also determines the payoff of a third, passive player (see, e.g., Güth and van Damme 1998, Bereby-Meyer and Niederle 2005).

This baseline design is similar to the one in Bartling et al. (2015), but there are several differences that are intended to mimic more natural consumer product market contexts. First, rather than a binary product type, our design allows for varying degrees of social impact, with the production costs proportional to the degree of externality mitigation. While this adds complexity to the design, it allows for more nuanced responses of consumers to changes in their income. Second, rather than having a product externality that has a large impact on only one third party, each product has a smaller impact on a larger number of individuals (see Bartling et al., 2019, for a comparison of these two types of external impacts). Finally, we introduce much harsher competition on the supply side, by allowing each firm unlimited production capacity.

3.1.2 Treatments

Consumers' initial per-period income is 100 in the first 10 periods in all our treatments. To study the causal effect of consumer income on socially responsible market behavior, our design exogenously varies the size of consumers' initial per-period income in the remaining 20 periods. We implement this design—rather than one in which consumers have varying income levels from the outset—primarily to provide us with a baseline measure of social responsibility, but also to mimic cases involving income *growth*. Hence, much of our analysis will consist of difference-in-difference estimates of the responses of consumers in the treatment conditions involving positive income shocks, relative to the comparable behavior in a *Baseline* control that retains the same per-period income of 100 in Part II, as in Part I.

Table 2 provides an overview of our treatments. In a *Medium* condition, consumers each receive 200 in income at the start of a period throughout Part II, while in a *High* condition they each receive 400. Finally, in an *Unequal* condition two consumers in each market receive 400, while the remaining four consumers continue to each receive 100. This implements an average increase of 200, as in *Medium*, but with gains concentrated on a small subset of consumers. At the end of Part I subjects receive new instructions that explain the change in initial income for consumers and that, otherwise, all procedures remain the same. For comparability, subjects also receive new instructions in the *Baseline*.

By comparing, in Part II, the types of products purchased in all three conditions receiving a positive income shock with the *Baseline*, we can test whether the consumption of socially responsible products respond to changes in income. Furthermore, a comparison of *Unequal* and *Medium* allows us to study whether the distribution of income influences market behavior, when holding aggregate income fixed. Finally, we can also compare the behavior of consumers in *Unequal*, who receive income of either 100 or 400, to the behavior of consumers in the *Baseline* and *High* who have the same per-period income level in Part II. Note that consumers earning 100 and 400 in the *Unequal* condition receive the same absolute income as consumers in the *Baseline* and *High* conditions, respectively, but they differ in their income relative to other consumers in their market. We focus on the question of whether greater income inequality limits the degree to which consumers purchase socially responsible products.

	Consumers' pe	r-period income	Number of	Number of consumers in	
Treatment	Part I (periods 1 to 10)	Part II (periods 11 to 30)	markets (participants)	a market (total number of consumers) with a given initial income in Part II	
Baseline	100	100	10 (180)	6 (60)	
Medium	100	200	10 (180)	6 (60)	
High	100	400	6 (108)	6 (36)	
Unequal	100	100	16 (200)	4 (64)	
	100	400	10 (288)	2 (32)	

Table 2: Treatment overview

3.1.3 Procedural Details

We implemented a between-subjects design. In total, 756 subjects participated in Study 1, in 42 independent markets. Table 2 shows the number of markets and consumers across conditions. We originally collected data from 10 markets (60 consumers) in the *Baseline*, *Medium* and *Unequal* conditions. In a second wave, we collected data from 6 markets (36 consumers) in the *High* condition, along with 6 additional markets in the *Unequal* condition. We aimed to obtain 60 consumers in each treatment; however, the substantial cost of the *High* condition limited the number of sessions we conducted and we targeted a comparable number of consumers with incomes of 400 in the *High* and *Unequal* conditions (36 and 32, respectively).⁷

⁷ To determine the power of our design to detect a significant difference at the 5% level, we used the effect size in the change in dictator-game sharing in Forsythe et al. (1994), who increase stakes in an incentivized dictator game from $5 \pmod{4} = 1.11 (1.02)$ to $10 \pmod{4} = 2.33 (1.79)$. The power analysis indicates that the probability of detecting a two-sided effect between any two treatments in a Wilcoxon rank-sum test is about 90% if we use consumers as unit of observation and have a minimum of 32 observations per treatment.

Before entering the lab, each subject randomly drew a card specifying at which computer terminal to sit and determining the subject's role. Subjects received written instructions, including comprehension questions that had to be answered correctly before the market began. An audio file with a summary of the instructions was played aloud to establish common information about actions, payoffs and procedures. Subjects initially learned only the details of Part I but were informed that Part II would follow and would consist of the same kind of market activity. Subjects received information about the details of Part II only after the conclusion of Part I. All our treatments are thus identical in Part I. The instructions used an explicit market context, describing the two different types of market participants as "firms" and "consumers" and referring to their actions as "trading" different "types of products" at offered "prices." The third parties were simply described as "Players C." We told the subjects in neutral language that a type of product "refers to the individual loss that a product imposes on each Participant C." At the conclusion of Part I, subjects received new instructions stating that the market procedures would be the same in Part II and specifying each type of participant's income, noting any relevant changes. All subjects, including those in the roles of firms and third parties, were informed of the income changes. The original English instructions for all treatments are in Appendix F.

At the end of the experiment, one period was selected at random to count for payment. Payoffs from the experiment, denominated in points, were converted to Swiss francs at the rate of 3 points per CHF 1 (Swiss francs and US Dollars were roughly at parity at the time of the study). In addition, they received a show-up fee of CHF 15.

We conducted the experiments using the software z-Tree (Fischbacher 2007) and recruited subjects using the software h-Root (Bock et al. 2014). Subjects were mainly students from the University of Zurich and the Swiss Federal Institute of Technology in Zurich. Sessions lasted about two hours and took place at the computer laboratory of the Department of Economics at the University of Zurich between May 2016 and March 2017.

3.2 Results

We define our measure of social responsibility as the percentage of the total potential loss that is mitigated in the market. This directly corresponds to the degree to which consumers purchase socially responsible products. If all consumers buy the product type that produces the greatest negative externality—i.e., that imposes a loss of 60 on third parties—they are not mitigating any

loss and this measure is 0. If, to the contrary, all consumers mitigate the entire externality—either by buying only the most responsible product type or by not buying any product at all—then the measure takes a value of $100.^{8}$

Figure 1 shows the time paths of this measure of social responsibility in all four treatments. To smooth variation, we pool the data into two-period blocks. A first observation is that, in Part I, our measure of social responsibility is similar in all treatments, at approximately 33 percent.⁹



3.2.1 Income Growth and Externality Mitigation

Our primary focus is on the impact of increasing consumers' incomes in Part II on social responsibility. We first focus on comparisons between the *Baseline*, *Medium* and *High* conditions.

Figure 1 reveals that social responsibility increases slightly in the *Baseline* in Part II.¹⁰ Importantly, Figure 1 also reveals that social responsibility does not increase to a larger degree in

⁸ Cases in which consumers did not buy a product are very infrequent, ranging between 0.5 percent in *High* and 1.9 percent in *Baseline*. The market outcomes are thus almost entirely determined by consumers' purchases of different types of products and not by consumers refraining from buying at all.

⁹ Table C.1 in Appendix C provides the average measure of social responsibility for each treatment and in each part. Table C.2 shows that none of the pairwise treatment comparisons for Part I is statistically significant in two-sided Wilcoxon rank-sum tests, neither at the consumer nor at the market level.

¹⁰ Appendix Figure C.1 plots the relationship between average social responsibility in Parts I and II. The figure provides these relationships, separately, by market and for individual consumers and firms.

Part II in *Medium*. Indeed, *Baseline* and *Medium* are not statistically significantly different in Part II (two-sided Wilcoxon rank-sum tests at the consumer (market) level, p=0.83 (0.65)). However, social responsibility increases substantially in Part II in *High*. The difference between *Baseline* and *High* is statistically significant in Part II (two-sided Wilcoxon rank-sum test, at the consumer (market) level, p=0.00 (0.04)), as is the difference between *Medium* and *High* (p=0.00 (0.01)).¹¹

Model (1) in Table 3 presents a linear regression complementing these observations, using a consumer's purchasing decision in a period as the unit of observation.¹² The dependent variable is our measure of social responsibility (percent loss mitigated). Because these outcomes are determined jointly by the behavior of consumers and firms, one can interpret this as the degree to which a given market outcome produced by their combined choices mitigates external impacts. We employ a standard differences-in-differences approach to examine treatment effects in Part II conditional on behavior in Part I. We include binary treatment variables, *Medium, High* and *Unequal* (taking on value 1 in the respective treatments and 0 otherwise), a binary variable *Part II* (taking on value 1 for data from periods 11 to 30 and 0 otherwise), and interactions of the treatment variables with *Part II. Baseline* and *Part I* serve as omitted categories.

The positive coefficient for *Part II x Medium* indicates an increase in the degree of socially responsible exchange consumers' income increases from 100 to 200, but the impact is small and not statistically significant. However, the coefficient for *Part II x High* is positive, much larger in magnitude and significant at the one percent level. This reveals a large impact on externality mitigation when income increases substantially.¹³

As a complement to the analysis in Table 3, Appendix Table C.4 presents results from regressions of our measure of social responsibility on a consumer's income in a period, using data from all treatments and using the level of income in a period as the explanatory variable. The identification of income effects in this regression comes from the variation between subjects and across time in the size of the per-period income. The results reveal a positive and statistically

¹¹ Figure 1 reveals small time trends in socially responsible behavior over the course of the experiment. Most importantly, the increase in socially responsible behavior that occurs in Part II in the *High* condition does not appear to decline over time. This provides suggestive evidence that buyers' behavior does not rapidly acclimate to the higher income, though we are cautious to make strong claims based on behavior occurring over a short time frame.

¹² Appendix Table C.3 reports analogous regressions with market-level random effects. The significance of the estimated treatment effects is unchanged.

¹³ We observe this increase in socially responsible consumption despite the fact that higher production costs of more responsible products translate into higher market prices. On average, the least responsible product, which costs 20 to produce, traded at a price of 22.48, while the most responsible product, costing 30 to produce, traded at a price of 37.58. We discuss the menu of product offers and prices in more detail in Section 3.2.3.

significant relationship, supporting the conclusion that socially responsible consumption increases with higher consumer income.

3.2.2 Relative Income and Externality Mitigation

We next study the *Unequal* condition, to investigate whether income inequality affects the relationship between income and social responsibility. Figure 1 shows that, on aggregate, the degree of socially responsible consumption in *Unequal* is very similar to that in the *Medium* condition, both of which have the same aggregate income increase. Indeed, the measures of social responsibility in *Unequal* and *Medium* are not significantly different in Part II (two-sided Wilcoxon rank-sum test, at the consumer (market) level, p=0.58 (0.71)). This is also reflected in the coefficient estimate for *Part II x Unequal* in model (1) in Table 3, which shows a small positive, but statistically insignificant, estimate similar in magnitude to that of the *Medium* condition.¹⁴

While the aggregate response to a positive income shock is small in the *Unequal* condition, we observe larger effects when we consider only those consumers in this condition whose incomes increased. Figure 2 shows that consumers whose income increases from 100 in Part I to 400 in Part II in *Unequal* consume products that are substantially more socially responsible, while those consumers whose income remains at 100 demonstrate little change in their behavior. Using the difference in each market between the average social responsibility of products purchased by consumers whose income remains at 100 and consumers whose income increased, a sign test rejects the null hypothesis that both types of consumers demonstrate the same level of social responsibility in *Unequal* (two-sided test using a market as the unit of analysis, p = 0.02).

The regression analysis reported in model (2) in Table 3 addresses the same comparison. The regression includes only observations from the *Unequal* condition to study how social responsibility is affected by the income shock experienced by two out of the six consumers in each market. *Income of 400* is a binary variable taking on value 1 in case a consumer is to receive an initial per-period income of 400 in Part II and 0 otherwise. The coefficient for *Part II x Income of 400* is positive and statistically significant, again indicating that consumers whose initial income increases from 100 to 400 exhibit a substantially higher level of socially responsible behavior than consumers whose initial income stays constant at 100. This finding supports our earlier analysis

¹⁴ A post-estimation test of equality of the coefficients for *Part II x Unequal* and *Part II x Medium* in model (1) fails to reject equality (p=0.69).

comparing the *Baseline* and *High* conditions, finding that a substantial income increase (from 100 to 400) fosters increased socially responsible market behavior. However, in the case where there are only two consumers with the large income increase, the effect of their increased social responsibility is not sufficient to produce a large impact on aggregate outcomes.

	(1)	(2)	(3)	(4)
	All subjects	Unequal	Income of 100	Income of 400
	5	1	(<i>Unequal</i> and	(Unequal and
			Baseline)	High)
Medium	-3.700			
	(0.703)			
High	-8.394			
	(0.552)			
Unequal	-8.325		-9.497	2.413
	(0.380)		(0.309)	(0.865)
Part II	7.300	1.883	7.300	44.986***
	(0.110)	(0.380)	(0.107)	(0.000)
Part II x Medium	1.308			
	(0.849)			
Part II x High	37.686***			
	(0.000)			
Part II x Unequal	3.710		-5.417	-15.720
	(0.483)		(0.248)	(0.141)
Income of 400		3.516		
		(0.627)		
Part II x Income of 400		27.383***		
		(0.000)		
Constant	37.950***	28.453***	37.950***	29.556***
	(0.000)	(0.000)	(0.001)	(0.000)
Observations	7,560	2,880	3,720	2,040
Number of subjects	252	96	124	68

Table 3: Linear regressions of social responsibility measure

Notes: The dependent variable in all models is our measure of social responsibility (percent loss mitigated). Model (1) considers all treatments. Model (2) considers only observations from the *Unequal* condition. Model (3) considers only observations from consumers who receive an income of 100 in Part II (*Unequal* and *Baseline*). Model (4) considers only observations from consumers who receive an income of 400 in Part II (*Unequal* and *High*). *Medium, High* and *Unequal* are binary variables taking on value 1 in the respective treatments and 0 otherwise. *Part II* is a binary variable taking on value 1 for data from periods 11 to 30 and 0 otherwise. *Income of 400* is a binary variable taking on value 1 in case a consumer receives an income of 400 in Part II and 0 otherwise. P-values from standard errors clustered at the market level, estimated using the wild bootstrap (derived from running 10,000 replications in each case) are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.



Figure 2: Average social responsibility in treatment Unequal by income

The Unequal condition also allows us to investigate how relative income comparisons influence socially responsible market behavior. First, recall that the behavior of consumers who receive 100 in Part II in the *Baseline*, where all consumers receive 100, changes little from their behavior in Part I (see Figure 1 and model (1) in Table 3). Our design allows us to compare the behavior of these consumers to the behavior of subjects who receive 100 in the *Unequal* condition, where some other consumers receive 400. Figure 2 reveals that the behavior of these consumers changes very little from Part I to Part II. The difference between *Baseline* and *Unequal* in Part II for the consumer who receive 100 is only marginally statistically significant at the consumer level but not at the market level (two-sided Wilcoxon rank-sum test, at the consumer (market) level, p=0.051 (0.13)). A similar result obtains in model (3) of Table 3, which uses only observations from subjects who received incomes of 100 in Part II in the *Baseline* and *Unequal* conditions. The interaction term *Part II x Unequal* is negative, but statistically insignificant.

Second, we can also compare socially responsible behavior in Part II by consumers who receive 400 in the *High* condition, where all consumers receive similar income shocks, to the behavior of the subset of consumers who receive 400 in the *Unequal* condition. The difference between *Unequal* and *High* in Part II for the consumers who receive 400 is not statistically significant (two-sided Wilcoxon rank-sum test, at the consumer (market) level, p=0.15 (0.13)).

Model (4) in Table 3 considers only observations from these two classes of subjects. The interaction term *Part II x Unequal* is negative and sizable in magnitude, suggesting that inequality may mitigate some of the increase in socially responsible behavior that arises from a particular consumer's income increasing. However, the coefficient is not statistically significantly different from zero.¹⁵

Based on these results, we conclude that relative income comparisons do not appear to have large and robust effects on consumers' social responsibility. However, we must also acknowledge limitations of the power of our analysis to rule out differences between consumers receiving 100 in the *Baseline* versus the *Unequal* treatment and between consumers receiving 400 in the *High* versus the *Unequal* treatment. Small effects of income inequality are also consistent with the observation of small, negative effects of inequality on pro-sociality in other contexts (Yang and Konrath, 2023).

3.2.3 Firm Behavior

The above analysis reveals a causal impact of an exogenous increase in consumer income on consumers purchase of products that mitigate negative externalities. While the focus of our design is on consumer preferences and how they drive changing market outcomes in response to income increases, consumers can only choose from the products offered by firms, meaning that it is also important to study firms' behavior as a potential driver of the increase in socially responsible consumption. For example, it could be the case that firms, in response to the increase in consumer income, offered only products that impose a small negative externality. This would leave consumers with little choice, meaning that such firm responses to higher consumer income might drive the increase in socially responsible market outcomes. It could also be the case that responsible products become relatively cheaper (e.g., due to increased competition among firms now all offering responsible products), and such a change in relative prices, rather than consumer preferences, could drive the observed change in market outcomes. To study these possibilities, we analyze relative prices and the menu of product offers.

Figure 3 shows the distributions of product types offered by firms and their average prices, separately for each treatment and in Parts I and II. The histograms show the frequency with which

¹⁵ It is worth noting, however, that the effect of *High* income, even in the unequal condition (*Part II + Part II x Unequal* in model 4 of Table 3), remains statistically significantly positive (p < 0.01).

each product type was offered in Part I (dark shading) and Part II (light shading). The markers indicate the corresponding average prices. A few observations are immediate.



Figure 3: Distribution of Offered Product Types and Mean Prices

First, the distribution of product types offered is highly bimodal, with the least responsible (leftmost bars) and most responsible products (rightmost bars) offered most frequently. These two product types make up over 50 percent of the product offers in every case, and no intermediate product type is offered more than 10 percent of the time.¹⁶ Moreover, there is a pronounced shift between Part I and Part II from offering the least responsible product type to the most responsible product type. This shift is most pronounced in *High*, but it is also observed, to a lesser extent, in the other conditions, including in *Baseline*, where consumers' incomes remain constant in Part II.

Second, prices increase in the degree to which a product mitigates negative externalities, which is not surprising given the additional production cost (20 for the least responsible product type and 30 for the most responsible product type). The figure reveals that the mark-up on top of the cost of production is very similar in all treatments, between 5 and 10, except for the most responsible product type, where firms ask for higher markups in Part II of *Medium*, *Unequal*, and *High*. Importantly, the markup for the most responsible product type is highest in *High* in Part II,

¹⁶ Figure C.2 in Appendix C shows the frequencies of least responsible and most responsible products offered by firms across periods. The share of most responsible products, with a social responsibility of 100, increases across Part II in all conditions.

where we observe, nevertheless, the most responsible market outcome. This suggests that our earlier observation that consumers purchase more socially responsible products in Part II of *High* in Part II is not driven by firms making these products relatively less expensive.

The observation that firms shift toward offering the most responsible product type in Part II—and that this shift is most pronounced in *High*, where we also observe the largest effect of the increase in consumer income on market outcomes—leaves open the possibility that the changing behavior of firms plays a driving role for our results. However, this shift could also just as likely be a response to changing consumer behavior. We investigate these two potential mechanisms by studying, first, the extent to which "restrictive" menus of firms' product offers drive consumers' purchasing behavior and, second, by how past profitability affects firms' offer decisions.

First, if firms' product offers are driving consumers' purchasing behavior, we would expect that consumers have fewer less responsible product offers available in Part II—particularly in *High*, where we observe the largest change in market outcomes. To get at this, we study the number of cases in which consumers bought a product in a period when there was another option available that was both strictly less socially responsible and cheaper—that is, cases in which a consumer paid a higher price to purchase a more responsible product than an alternative available at a lower price. If the number of such cases is lower in *High*, then this would be consistent with firms' product offers restricting the consumers' purchasing decisions to a larger extent in *High* than in the other conditions. However, the proportions of cases in which a consumer had a cheaper and less responsible alternative to the product they actually purchased are very similar in Part II of all treatments (0.43, 0.34, 0.44, and 0.44 in *Baseline*, *Medium*, *High*, and *Unequal*, respectively). None of the proportions in *Medium*, *High* or *Unequal* is significantly different from *Baseline* (two-sided Wilcoxon rank-sum test at the market level, $p \ge 0.257$ for all comparisons), suggesting that the menu of product offers was not differentially restrictive in Part II.

Second, we study how the past profitability of different types of products affects firms' current product type offers. Appendix Table C.5 reports linear regressions of firms' product type offers in Part II on (i) the difference between the average profit made from offering the most responsible product type and from offering the least responsible product type in the previous period and on (ii) the product type offered by a firm in the previous period. Appendix Table C.6 reports the same regressions but considers only the first 10 periods of Part II, where the dynamic adjustment following the implementation of the treatments is likely to be strongest. We find

positive relationships between past profitability and current product type offers in all four conditions. The magnitudes and statistical significance of these relationships vary, though they are at least always marginally statistically significant for the first 10 periods of Part II. This analysis provides suggestive evidence that firms, on average, tend to be more likely to offer products that were previously more profitable, reflecting the impact of consumers' behavior on firms' offers.¹⁷

The analyses provided in this section suggest that the increase in socially responsible products exchanged in Part II in *High* is not mainly driven by firms' preferences over different product types. Instead, it seems that firms' reactions to consumers' preferences play an important role. We will revisit this question in our subsequent studies, and particularly in Study 3, where we hold the offers made by firms fixed to isolate and focus on consumers' responses.

4 Study 2

Study 1 provides causal evidence that increases in consumer income lead to an increase in the purchase of products that mitigate negative external impacts. Study 2 aims to test the robustness of this finding, while also moving the impact of the externality closer to the kinds of social and environmental impacts that matter outside the laboratory.

It is important to consider whether particular features of laboratory experiments, not present outside the laboratory, might cause the positive relationship between income and concern for mitigating externalities. Specifically, the fact that external market impacts fall on other experimental subjects, who differ from consumers only in a random draw of roles and who also start each period with an initial income of 100, might make inequality particularly salient. Consumers with higher incomes might thus mitigate externalities to reduce inequalities among otherwise similar laboratory subjects. Study 2 further tests the null hypothesis that income does not affect the degree to which consumers purchase socially responsible products when we remove the direct contrast between higher consumer incomes and the incomes of third parties, as well as of firms, thereby moving our experimental environment closer to conditions outside the laboratory.

Study 2 replicates the design of Study 1, but changes two main features. First, we change the impact of the externality to affect a charity fighting climate change, deforestation and poverty in

¹⁷ This is also consistent with the observation that firms offering the most responsible product types tend to generate higher profits than those offering the least responsible product types in Part II of *Medium*, *Unequal* and *High* (see Appendix Figure C.3), further suggesting that an increased willingness to pay by consumers for purchasing socially responsible products drives market outcomes.

low-income countries. This brings our design closer to many non-laboratory markets involving externalities, where the impacts are often imposed on the environment or on poor individuals in distant countries. It also makes payoff comparisons between consumers and those affected by the externality less clear than when these comparisons involve participants randomly assigned to different roles in the same laboratory session. Second, in one of the treatments, we additionally keep the relative income of all laboratory subjects—consumers and firms—equal, by giving all of them the same income shock.

4.1 Experimental Design

In Study 2, each experimental market comprises 12 participants: six firms and six consumers. For each 12-person market, we allocate an initial donation of 360 points (corresponding to CHF 120) to the charitable organization, *Carbon Offsets To Alleviate Poverty* (see https://cotap.org/). This organization funds programs that fight deforestation, climate change and poverty. However, the size of the actual resulting donation could change depending on the external impacts produced by the types of products exchanged in the market. As in Study 1, each possible product type corresponds to a particular external impact—in this case, a reduction in the size of the donation, and its corresponding cost, as shown in Table 4.¹⁸

					Pro	duct t	ypes				
Reduction to the donation	0	6	12	18	24	30	36	42	48	54	60
Production cost	40	38	36	34	32	30	28	26	24	22	20

Table 4: Product types, reduction to the donation, and production costs

As in Study 1, market participants' initial per-period income is 100 in the first 10 periods (Part I) in all our treatments. We then exogenously vary the size of participants' per-period income in the remaining 20 periods (Part II). Our first condition is a *Baseline* control that implements the same per-period income of 100 in Part II. In a *High (consumers)* condition, consumers each receive 400 in income at the start of a period throughout Part II, while firms continue to each receive 100.

¹⁸ The marginal production cost of socially responsible products is higher in Study 2 than in Study 1. This reflects our prior that, even in the *Baseline* condition, donating to fight poverty and mitigate climate change would provide stronger motives to exchange socially responsible products than the external impacts in Study 1.

In a *High (consumers & firms)* condition, both consumers and firms each receive 400.¹⁹ Table 5 provides an overview of the treatments.

All procedures are as in Study 1. We conducted six markets in each treatment, using a total of 216 subjects, mainly from the University of Zurich and the Swiss Federal Institute of Technology in Zurich. We conducted the sessions in April 2019. The number of consumers in each condition (36) is the same as in the *High* condition in Study 1, due to similarly high costs of collecting these observations.

Table 5: Treatment overview						
Tracture and	Part I (periods 1 to 10)	Par (periods	t II 11 to 30)	Number of markets (participants)		
Ireatment	All participants' income	Consumers' income	Sellers' income			
Baseline	100	100	100	6 (72)		
High (consumers)	100	400	100	6 (72)		
High (consumers & firms)	100	400	400	6 (72)		

4.2 Market Outcomes

Figure 4 shows the time paths of our measure of social responsibility in all three treatments, equivalently to Figure 1 for Study 1.²⁰ The figure shows the degree to which products exchanged mitigate negative externalities increases in Part II both in *High (consumers)* and *High (consumers & firms)*. The figure also reveals some differences in the degree of responsible behavior across treatments in Part I. Even though subjects are randomized into treatments, which are identical in Part I, externality mitigation in Part I appears to be higher in *High (consumers & firms)* and somewhat lower in *High (consumers)* relative to the *Baseline* condition.²¹ Figure 4 reveals that

¹⁹ The instructions for all treatments of Study 2 are in Appendix G.

 $^{^{20}}$ As in Study 1, cases in which consumers do not buy a product at all are very infrequent, ranging between 1.0 percent in *High (consumers & firms)* and 2.6 percent in *Baseline*. Recall that these cases enter the measure of responsibility with a value of 100 because no loss is imposed in cases where a consumer does not buy a product.

²¹ We report a scatterplot of the relationship between average market social responsibility in Parts I and II, separately, by market and for individual consumers and firms in Appendix Figure D.1. The average measure of social responsibility in each treatment and in each part can be found in Table D.1 in Appendix D. Table D.2 shows that the differences between *Baseline* and *High (consumer & firms)* and between *Baseline* and *High (consumers)* in Part I are not statistically significant at the five percent level using two-sided Wilcoxon rank-sum tests, neither at the consumer nor at the market level; the difference between *High (consumers)* and *High (consumers & firms)* is significant at the consumer (market) level (p=0.00 (0.01)). We confirmed that subject assignment to the different conditions was

social responsibility increases substantially in Part II in *High (consumers)* and *High (consumers & firms)*.²²



Model (1) in Table 6 reports a linear regression using a differences-in-differences panel structure, comparable to model (1) in Table 3 for Study $1.^{23}$ The model regresses our measure of social responsibility, defined as the percentage of the total possible externality mitigation realized, on binary treatment variables, *High (consumers)* and *High (consumers & firms)* (taking on value 1 in the respective treatments and 0 otherwise), a binary variable for *Part II*, and interactions of the treatment variables with *Part II. Baseline* and *Part I* serve as omitted categories. Part I differences do not reach conventional levels of statistical significance. More importantly, the coefficients for *Part II x High (consumers)* and *Part II x High (consumers)*, which measure the treatment effects of increasing income relative to the *Baseline*, are both positive, large in

balanced by observable characteristics (including age, gender and political orientation) and that sessions corresponding to the different treatments were evenly dispersed throughout the week.

²² The difference between *Baseline* and *High (consumers)* is statistically significant in Part II (two-sided Wilcoxon rank-sum test, at the consumer (market) level, p=0.00 (0.04)), as is the difference between *Baseline* and *High (consumers & firms)* (p=0.00 (0.03)). Figure 5 also reveals that social responsibility does not differ significantly in Part II between *High (consumers)* and *High (consumers & firms)* (two-sided Wilcoxon rank-sum tests at the consumer (market) level, p=0.39 (0.52)).

²³ Appendix Table D.3 reports analogous regressions with market-level random effects. The estimated treatment effects are unchanged.

magnitude and significant at the one percent level.²⁴ Both conditions thus reproduce the key finding from Study 1 that a substantial increase in income causes an increase in the consumption of socially responsible products. Note that this holds even in the *High (consumers & firms)* condition that eliminates relative income differences among all laboratory subjects and where socially responsible consumption in Part I is already at a relatively high level, thereby reducing the scope for a further increase.

In Appendix Table D.4, we estimate the aggregate effects of income on responsible consumption, similarly to Table C.4 for Study 1, by using data from all three treatments in Study 2. In all models use the level of externality mitigation as the dependent variable and the level of income as an explanatory variable, revealing a positive and statistically significant relationship whether or not we control for time trends. The positive and statistically significant coefficients for *Income* are similar in magnitude to those in Study 1, again indicating that responsible consumption rises with income. The null hypothesis that income does not affect responsible market behavior is thus again rejected in Study 2.

	(1)	
High (consumers)	-11.389	
	(0.301)	
High (consumers & firms)	15.750	
	(0.236)	
Part II	0.583	
	(0.984)	
Part II x High (consumers)	41.569***	
	(0.000)	
Part II x High (consumers & firms)	17.958**	
	(0.022)	
Constant	41.139**	
	(0.025)	
Observations	3,240	

Table 6: Linear regression of the percent loss mitigated

Notes. The dependent variable is the percent loss mitigated. *High (consumers)* and *High (consumers & firms)* are binary variables taking on the value 1 in the respective treatment, and 0 otherwise. *Baseline* serves as omitted category in model (1). *Part II* is a binary variable taking on value 1 for data generated from period 11 to 30 and 0 from period 1 to 10. P-values from standard errors clustered at the market level, estimated using the wild bootstrap (derived from running 10,000 replications in each case) are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.

²⁴ A post-estimation test for model (1) indicates that the coefficients for *High (consumers)* and *High (consumers & firms)* and the coefficients for *Part II x High (consumers)* and *Part II x High (consumers & firms)* are statistically significantly different from each other (p=0.004 and p=0.009, respectively).

4.3 Firm Behavior

Analogously to Study 1, we also analyze firm behavior. Figure 5 shows the distributions of product types offered and the average prices for each product type in Parts I and II.²⁵



Figure 5: Distribution of Product Type Offers and prices

As in Study 1, the least and the most responsible product are the modal product types offered. Moreover, there is again a pronounced shift toward the most responsible product type in Part II in *High (consumers)* and *High (consumers & firms)*, though not in the *Baseline*. This observation is again consistent with firms' changing product offers either driving or responding to consumer purchasing behavior. As in Study 1, we measure the restrictiveness of the product menus offered by firms by studying the number of cases in which consumers had a less responsible and less expensive alternative to the product that they actually bought. We find that the number of such cases is comparable in Part II of all three treatments and amounts to 0.57, 0.67, and 0.72 in *Baseline, High (consumers)* and *High (consumers & firms)*, though it is somewhat higher in the treatments with increased consumer income and marginally statistically significantly higher in treatment *High (consumers & firms)* compared to *Baseline* (two-sided Wilcoxon rank-sum test at the market level, p=0.093). Thus, if anything, consumers are acting more responsible given the

²⁵ Similarly to Study 1, we provide additional graphs of the types of products offered and the corresponding profits in Appendix D.

choice menus that they face in the two *High* conditions, by forgoing options that were cheaper and less responsible. This suggests, as in Study 1, that it is not firms' menu offers that are driving consumers to purchase more responsible products in conditions with higher income, but instead consumers' willingness to sacrifice personal benefit for social responsibility.

Also as in Study 1, there is no evidence that the increase in consumption of more responsible products is driven by firms' offering these products at a discount in Part II. For *High (consumers)* we observe that the least responsible product is relatively more expensive in Part II, but this pattern is not present in *High (consumers & firms)*. This suggests, again, that the more responsible market outcomes in conditions with increased consumer income are not driven by more responsible products becoming relatively less expensive due to differential markup strategies by firms.

In Tables D.5 and D.6 in Appendix D we report linear regressions of firms' product type offers on the past profitability of different product types, controlling for the product type offered by that firm in the previous period, equivalent to the analysis provided for Study 1. We again find a positive relationship between the past relative profitability of more responsible products and firms' subsequent product type offers, which is at least marginally statistically significant in every comparison. This provides evidence that firms react to the profitability of the different product types, rather than acting entirely on their own preferences over products.²⁶

We again conclude that market outcomes appear to be at least partly driven by firms responding to changes in consumers' preferences rather than firms forcing consumers to buy more responsible products.

5 Study 3

Study 3 examines income effects on socially responsible market behavior using an online sample of the general U.S. population. The design of this experiment departs substantially from the approach used in our earlier studies: Consumers initially work to earn an income, and in the subsequent market activity, rather than purchasing at most a single product, consumers allocate their entire income toward purchasing units of two types of products: harmful and responsible. Our

 $^{^{26}}$ Unlike in Study 1, we do not find that firms offering the most responsible product type earn higher profits, on average, than those offering the least responsible product types (see Figure D.3 in Appendix D). This is consistent with the lack of a price premium for the most responsible products, unlike in Study 1 (see Figures 3 and 5).

primary interest lies in the purchasing decisions of consumers across varying income levels, which are randomly assigned in a within-subjects design. The main part of our experiment holds fixed the prices and product types available to consumers as their income varies.

5.1 Experimental Design

A market comprises 20 consumers and 10 firms. There are two types of products that can be exchanged: a "harmful" product that leads to a reduction of 10 cents per unit exchanged in the size of a donation to the charitable organization *Carbon Offsets To Alleviate Poverty* (see Study 2 for details) and a "responsible" product that does not impact the donation. The prices for these products are set by participants in the role of firms. Based on these prices and their income, consumers encounter an opportunity set consisting of feasible bundles of the two goods. Our primary treatment variation is in the income provided to consumers, which they allocate to the purchase of the two types of products. In a second part of the study, we conduct an exploratory investigation of the role of varying competition, comparing markets in which there is price competition between 10 firms with markets consisting of 2 firms, and of the role of firms' knowledge of consumers' incomes. In total, consumers choose consumption bundles in 20 markets under varying income levels.

5.1.1 Price Setting by Firms

Within a market, each firm sets a pair of prices: one for the harmful product and one for the responsible product. In contrast to Studies 1 and 2, firms do not decide which type of product to offer; they only set prices. Only the lowest price for each product type is offered to consumers, meaning that a firm can sell to the 20 consumers in a market only if its price for a product type is the lowest among all firms in the market. A firm might set the lowest price for both product types, one type, or none. If two or more firms set the lowest price for a particular product type, the firm that can sell to the consumers is determined randomly.

Participants in the role of firms are paid a guaranteed participation fee of USD 1. They can earn an additional bonus only if they set the lowest price for at least one of the two product types. In that case, they earn a bonus equal to the price markup (the difference between their set price and the unit production cost) multiplied by the total number of units of that product purchased by the 20 consumers in the market.

Firms set price pairs under eight conditions that vary (i) the production costs of the product types, (ii) firms' knowledge of the consumers' incomes, and (iii) the level of competition among the firms. Firms' pricing decisions are arranged in three separate blocks. Table 7 provides an overview of the conditions under which the firms set their price pairs.

			Unit produc	ction cost
	Number of firms in a market (level of price competition)	Knowledge about consumers' income	Responsible product	Harmful product
Block 1	10	range only (50-350)	8	6
	10	range only (50-350)	10	6
	10	range only (50-350)	10	8
	10	range only (50-350)	12	8
Block 2	10	known to be 50	8	6
	10	known to be 350	8	6
Block 3	2	known to be 50	8	6
	2	known to be 350	8	6

Table 7: Overview of Firms' Price Setting Conditions

Notes. Income levels and production costs in US cents. Production cost combinations in Block 1 and consumers' income levels in Blocks 2 and 3 are randomized at the firm level, with the order in Blocks 2 and 3 matching.

In Block 1, 10 firms set prices across 4 choices that vary in the unit production costs of the two product types. Specifically, in each choice, firms are shown one of the following cost combinations: (8,6), (10,6), (10,8), and (12,8), where the first entry refers to the unit production cost of the responsible product and the second entry refers to the unit production cost of the harmful product in U.S. cents. Note that the responsible product type is always more costly to produce than the harmful product. The order of the cost combinations is randomized at the firm level in Block 1. For each product type, a firm sets a price between the production cost and 15 cents, which is the value for consumers when they purchase a unit of a product.

The most important design feature is that, in Block 1, firms are not informed about the consumers' actual income levels but only about the range of possible incomes, which is between 50 and 350 U.S. cents. This allows us to use these firm pricing decisions across several markets that vary in consumers' incomes (as explained below), thereby holding the price combinations

available to a set of 20 consumers fixed across income levels. Our primary focus is on consumers' purchasing behavior across the resulting markets that hold prices fixed.

Firms' choices in Blocks 2 and 3 are used to provide an exploratory analysis of how firms' knowledge of consumers' incomes and varying levels of competition affect the prevalence of socially responsible products in a market. In Block 2, firms continue to set prices under high competition (10 firms in a market), but they are informed of consumers' income levels, which are either 50 or 350, with the order randomized. Block 3 repeats these two sets of pricing decisions, again varying consumers' income randomly between 50 or 350. But in this case, firms are informed that they are setting prices in a market consisting only of 2 firms, and that the lowest price for each product among these two firms will determine the firm that is able to sell products to consumers. We only consider one combination of production costs, (8, 6), in Blocks 2 and 3.

5.1.2 Consumers' Purchasing Decisions

For each market, we recruited 20 participants from the same population to serve as consumers. These participants also received a participation payment of USD 1 and could earn a bonus based on their purchasing decisions. We recruited the consumers after collecting firms' choices, so that we could put together the set of prices that these consumers would face across 20 choices of consumption bundles.

Consumers participated in two stages of the experiment. In Stage 1, they completed a work task involving 10 simple math problems. Upon completing this task, they were informed that they had earned a given income level that could be used to purchase goods in a subsequent market activity. They were told that the precise income level would be randomly determined later and that they would make purchasing decisions under varying income levels, with one of these decisions determining their bonus payment.

In Stage 2, consumers were confronted with 20 markets, that is, with 20 choices of consumption bundles. In each market, they were informed of their income level, $Y \in$ {50, 150, 250, 350}, in cents, and decided how to allocate their income between the responsible and harmful products at the given prices set by firms. For each market, we took the lowest price offered by any of the 10 (or 2) firms in that market for the responsible product (p_R) and for the harmful product (p_H) and presented consumers with opportunity sets consisting of different combinations of the two goods (q_R, q_H), such that $Y = q_R p_R + q_H p_H$. A consumer received a

bonus payment from his or her choice in one randomly selected market, given by $15(q_R + q_H)$, meaning that the consumer's pecuniary valuation of the two product types was independent of the product's social responsibility. However, consumers were aware that their consumption choices in a market would produce a negative externality for the charity COTAP equal to $-10 q_H$. As with firms, consumers made their decisions in a series of blocks. Table 8 provides an overview.

In Block 1, our primary interest, consumers made 16 purchasing decisions: for each of the four income levels, they chose a consumption bundle for the four different price combinations that were generated by the pricing decisions of 10 firms in the firms' Block 1 (where firms only knew the income range). The order of the income levels and the price combinations for a given income level were randomized at the consumer level.

In Blocks 2 and 3, consumers made four additional purchasing decisions: two for an income level of 50 and two for an income level of 350. The corresponding prices were taken from the decisions in firms' Blocks 2 and 3, where firms knew the consumers' income but faced varying levels of competition. The order of the income levels and price combinations was randomized at the consumer level.

	Income levels	Number of price combinations/ purchasing decisions	Price combinations
Block 1	50	4	from firms' Block 1 decisions
	150	4	from firms' Block 1 decisions
	250	4	from firms' Block 1 decisions
	350	4	from firms' Block 1 decisions
Block 2	50	1	from firms' Block 2 decisions
	50	1	from firms' Block 3 decisions
Block 3	350	1	from firms' Block 2 decisions
	350	1	from firms' Block 3 decisions

Table 8: Overview of Consumers' Purchasing Conditions

Notes. Income levels in U.S. cents. The order of the income levels and the four price combinations within income levels in Block 1, and the order of Blocks 2 and 3 and the order of the price combinations within these blocks are randomized at the consumer level.

5.1.3 Sample and Procedural Details

We collected 50 markets, with 500 firms and 1000 consumers in total, with participants sampled from the general population of the U.S. via the recruiting platform Prolific. The data were collected in July and August 2024. At the end of the study, participants completed a questionnaire on their socio-economic background. Summary statistics are provided in Appendix Table E.1.

Firms took about 8 to 9 minutes and consumers took about 11 minutes to complete the study. One of the consumers' 20 purchasing decisions was randomly selected in each market at the end of the study to determine the consumers' bonus payments, the impact on the donation, and the firms' bonus payments. Participants had to pass several attention-checks to be eligible to participate and receive their bonus payment. Participants who failed any attention checks received the participation payment but were not eligible for the bonus payment and are not included in the analysis. The exclusion criteria and details of the study design were pre-registered at AsPredicted.org (#183139).

We conducted the experiments using the software Qualtrics. Consumers made their purchasing choices by moving a slider (with no default position) to select a combined number of units of the responsible and harmful products.²⁷ To facilitate decision-making, consumers could see the consequences of their purchasing decisions for a given slider position, with values instantly updated when the slider position was changed, including (i) the share of the responsible product in their consumption bundle, (ii) their earnings, (iii) the reduction of the donation to charity, (iv) the number of units of the harmful product in their bundle, (v) the number of units of the responsible product in their bundle.

We set the initial donation to COTAP to USD 1,500. The final donation among was determined by subtracting total externality imposed in the study, which amounted to USD 1070.13.²⁸ The final donation resulting from the study is thus USD 429.87.

²⁷ In the instructions, we referred to the two product types more neutrally as "Product that does not impact the donation" and "Product that reduces the donation by 10 cents," respectively. The instructions of Study 3 are in Appendix H.

 $^{^{26}}$ We calibrated the initial donation amount by assuming consumers spend, on average, 50 percent of their incomes on the harmful product and that the average markup on the unit production cost is 1 cent. A consumer's average income is 200 U.S. cents, and the average production cost of the harmful product is 6.5 cents, resulting in an average price of 7.5 cents. Given these assumptions, consumers purchase, on average, 13.3 units of the harmful product, leading to a reduction in the donation by USD 1.33 per consumer. Given our target sample of 1,000 consumers, and to ensure that each unit of the harmful product exchanged has an effective negative impact of 10 cents on the donation to charity, we set the initial donation at USD 1,500, higher than the expected reduction of USD 1,330.

5.2 Results

5.2.1 Income effects on consumers' behavior

We first analyze consumers' purchasing decisions across the four income levels, $Y \in \{50, 150, 250, 350\}$, while keeping the prices of the two product types constant for each set of 20 consumers. This design feature allows us to identify the causal impact of the consumers' income on their purchasing decisions unconfounded of price differences.



Figure 6: Average Engel curve

Notes: The figure aggregates purchasing decisions across consumers and markets

Figure 6 illustrates the relationship between income (on the vertical axis) and average consumption of the responsible product (horizontal axis), in the form of the average Engel curve. The curve demonstrates a positive correlation between income and the average quantity of responsible products purchased, clearly rejecting the null hypothesis of no relationship between income and socially responsible consumption, in favor of the alternative hypothesis of a positive relationship. Furthermore, the linear nature of the Engel curve suggests a constant marginal propensity to consume responsible products, on average, as income increases, at least in the context of our experiment. Using the slope of the Engel curve, we calculate the average income elasticity of demand for responsible products to be 1.011, indicating that a 1% increase in income results in an increase in the quantity of responsible products purchased of slightly above 1%. This suggests
that, as consumers' income rise, they allocate slightly more than a proportional share of their additional income to responsible products.

	OLS			FE			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Incomo	0.058***	0.058***	0.058***	0.058***	0.058***	0.058***	0.058***
Income	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Price of responsible products		-1.553***	-1.553***	-1.541***		-1.541***	-1.541***
The of responsible producis		(0.087)	(0.087)	(0.086)		(0.054)	(0.054)
Price of harmful products		0.366***	0.366***	0.359***		0.409^{***}	0.409^{***}
Trice of narmful products		(0.131)	(0.131)	(0.130)		(0.067)	(0.067)
Decision order			-0.013	-0.014			-0.013
Decision order			(0.018)	(0.018)			(0.018)
Age				0.013			
nge				(0.019)			
Fomalo				2.225***			
Temute				(0.422)			
High Reported Income				-0.726			
mgn neporteu meome				(0.490)			
Low Reported Income				-0.800			
Low Reported Income				(0.510)			
Constant	-0.036	13.195***	13.304***	12.014***	-0.036	12.761***	12.870***
Constant	(0.063)	(0.574)	(0.594)	(0.968)	(0.226)	(0.284)	(0.331)
Observations	16000	16000	16000	15920	16000	16000	16000
Subjects					1000	1000	1000
\mathbb{R}^2	0.347	0.379	0.379	0.379	0.545	0.590	0.590

Table 9: Regressions of quantity of responsible products purchased

Notes: The dependent variable in all models represents the quantity of responsible products. Models 1 to 4 present OLS regressions of the quantity of responsible products purchased, while Models 5 to 7 present fixed-effects regressions of the same quantity. "Income" is the manipulated level of consumers' income. "Price of responsible products" and "Price of harmful products" are the realized prices for the respective product types in a market. "Decision order" refers to the position in Block 1 during which a subject in the role of consumer encountered a particular decision. The variable "Age" denotes the age of the participants. The variable "Female" takes the value of 1 if the participant is female and 0 otherwise. "High Reported Income" takes the value 1 if the reported income is greater than the median income category (\$25'000 to \$50'000), and "Low Reported Income" takes the value 1 if the reported income is less than the median income category. Standard errors (in parentheses) are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1.

Table 9 presents the results of regression models analyzing the determinants of the quantity of responsible products purchased, complementing the evidence shown in Figure 6^{29} The coefficient for the *Income* variable is positive and statistically significant across all models, confirming the classification of responsible products as a normal good. This indicates that as

²⁹ We supplement the regression analyses presented in Tables 9, 10 and 11 with rank-sum tests, as reported in Appendix Tables E.2, E.3 and E.4 respectively, which confirm the main findings.

income increases, consumers purchase more responsible products, on average. Furthermore, consumers respond sensibly to the prices of both responsible and harmful products: the coefficient for the *Price of Responsible Products* is negative and significant across all models, while the coefficient for the *Price of Harmful Products* is positive and significant. These results underscore the sensitivity of consumer purchasing behavior to relative price changes between responsible and harmful products. Finally, among individual characteristics, only gender appears to play a role, with females purchasing more responsible products.³⁰

As a complement to the average Engel curve in Figure 6, we can examine the relationships between income and consumption more deeply using Income Consumption Curves, which reveal how consumption of both product types is influenced by both income levels and the relative prices of responsible and harmful products. Figure 7 presents such curves for the various realized combinations of responsible (p_R) and harmful (p_H) product prices, with individual graphs sorted by the realized price ratio of responsible to harmful products (the label for each graph shows for how many markets this particular price combination obtained in Block 1). Each graph depicts the trade-off between the quantities of responsible and harmful products purchased at the four different income levels (50, 150, 250, and 350). The x-axis represents the quantity of responsible products, while the y-axis represents the quantity of harmful products.

The graphs reveal that as income increases, the total quantity of both responsible and harmful products purchased generally rises. However, consistent with consumers' price sensitivity observed in Table 10, the proportion of responsible products within this total varies significantly depending on the price ratio. When the price ratio is low (responsible products are relatively inexpensive), consumers tend to purchase a higher proportion of responsible products. Conversely, as the price ratio increases (responsible products become more expensive relative to harmful products), the proportion of responsible products decreases, consistent with a substitution effect towards the less expensive product type. These curves provide valuable insights into how income levels and price ratios jointly influence the proportion of responsible products in total consumption, highlighting the critical role of both factors in shaping consumer behavior.

³⁰ If we interact the variables measuring individual characteristics (Age, Female, High Reported Income, Low Reported Income) with the experimentally manipulated income, only the interaction term between Female and Income is statistically significant with a coefficient of 0.011 suggesting that effect of income on the quantity of responsible products purchased is stronger for women compared to men.



Figure 7: Income Consumption Curves

Notes: Income consumption curves are shown in black. The budget lines corresponding to the different income levels (50, 150, 250, and 350) at the respective realized prices are shown in grey. Individual graphs are sorted by the realized price ratio of responsible to harmful products; p_R represents the price of responsible products, and p_H represents the price of harmful products.

Table 10 shows regression analysis of the effect of income on the share of responsible products purchased, complementing the insights from the Income Consumption Curves. The table indicates that *Income* has a modest positive effect on the overall share of responsible products that consumers purchase, indicating that on average they shift their consumption slightly in the direction of more socially responsible consumption as their income increases. We again observe substantial price sensitivity, consistent with the variation in the responsible product shares across price combinations in Figure 7.

	OLS				FE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Income	0.004^{*}	0.004^{*}	0.004^{*}	0.004^{*}	0.004^{*}	0.004^{*}	0.004^{*}
Income	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Duigo of upprovible pueduate		-3.250***	-3.249***	-3.179***		-3.118***	-3.117***
Trice of responsible products		(0.413)	(0.413)	(0.410)		(0.241)	(0.241)
Dries of harmful products		3.257***	3.257***	3.204***		3.403***	3.404***
1 rice of narmful products		(0.637)	(0.637)	(0.632)		(0.304)	(0.304)
Dagisian ander			-0.100^{*}	-0.098^{*}			-0.100*
Decision order			(0.052)	(0.053)			(0.052)
199				0.086			
Age				(0.095)			
Famala				10.852^{***}			
1 emule				(2.107)			
High Reported Income				-3.835			
Tign Reported Income				(2.454)			
I ow Reported Income				-3.176			
Low Reported Income				(2.545)			
Constant	53.886***	62.916***	63.737***	56.741***	53.886***	60.462***	61.284***
Constant	(1.144)	(2.795)	(2.817)	(4.709)	(0.459)	(1.296)	(1.374)
Observations	16000	16000	16000	15920	16000	16000	16000
Subjects					1000	1000	1000
\mathbb{R}^2	0.000	0.008	0.008	0.031	0.001	0.026	0.027

Table 10: Regressions of share of responsible products purchased

Notes: The dependent variable in all models represents the share of responsible products purchased relative to the total number of products purchased (i.e., the sum of responsible and harmful products). Models 1 to 4 present OLS regressions of the share of responsible products purchased, while models 5 to 7 present fixed-effects regressions of the same share. "Income" is the manipulated level of consumers' income. "Price of responsible products" and "Price of harmful products" are the realized prices for the respective product types in a market. "Decision order" refers to the position in Block 1 during which a subject in the role of consumer encountered a particular decision. The variable "Age" denotes the age of the participants. The variable "Female" takes the value of 1 if the participant is female and 0 otherwise. "High Reported Income" takes the value 1 if the reported income is less than the median income category. Standard errors (in parentheses) are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1.

An important question that Study 3 allows us to investigate is whether the change in consumer behavior in response to higher income increases, reduces, or has no effect on the total externality produced by their consumption. On one hand, we observe that consumers purchase more socially responsible products as their income increases, including a slightly higher share of such products. However, as Figure 7 also indicates, their total consumption of both product types increases with income, indicating that the total quantity of negative externalities generated by their consumption also increases substantially with income.

	OLS			FE			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Income	0.566**	0.566**	0.566**	0.566**	0.566**	0.566**	0.566**
Income	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Price of responsible products		5.196***	5.194***	5.022***		5.093***	5.092***
Trice of responsible producis		(1.102)	(1.102)	(1.096)		(0.676)	(0.676)
Price of harmful products		-20.133***	-20.134***	-20.014***		-20.760***	-20.761***
Trice of narmful products		(1.814)	(1.814)	(1.802)		(1.010)	(1.010)
Decision order			0.202	0.218			0.202
Decision order			(0.252)	(0.253)			(0.252)
100				-0.159			
Age				(0.261)			
Founds				-30.697***			
remale				(5.809)			
High Departed Income				11.087			
nign Reported Income				(6.743)			
Low Donouted Income				11.620**			
Low Reported Income				(7.007)			
Constant	0.519	97.953***	96.290***	112.666***	0.519	103.702***	102.037***
Constant	(0.871)	(8.039)	(8.305)	(13.392)	(3.107)	(3.890)	(4.547)
Observations	16000	16000	16000	15920	16000	16000	16000
Subjects					1000	1000	1000
R ²	0.216	0.233	0.233	0.247	0.394	0.421	0.421

Table 11: Regressions of externalities imposed

Notes: The dependent variable in all models represents the externalities imposed on the donation. Models 1 to 4 present OLS regressions of the externalities imposed, while models 5 to 7 present fixed-effects regressions of the same quantity. "Income" is the manipulated level of consumers' income. "Price of responsible products" and "Price of harmful products" are the realized prices for the respective product types in a market. "Decision order" refers to the position in Block 1 during which a subject in the role of consumer encountered a particular decision. The variable "Age" denotes the age of the participants. The variable "Female" takes the value of 1 if the participant is female and 0 otherwise. "High Reported Income" takes the value 1 if the reported income is less than the median income category. Standard errors (in parentheses) are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1.

Table 11 presents regression analysis of the impact of income on externalities. The coefficient for *Income* is positive and significant across all models, confirming a positive relationship between income and negative externalities. This relationship underscores how higher income levels can amplify the impact of harmful product consumption, despite consumers purchasing more—and even a slightly higher share of—socially responsible products. Additionally, the magnitude of negative externalities generated is highly sensitive to the *Price of harmful products* and, to a lesser extent, to the *Price of responsible products*, suggesting that policies influencing the relative prices of harmful and responsible products may play an important role in shifting behavior toward more socially responsible consumption that mitigates negative externalities.

5.2.2 The Role of Firms and Competition

In our analysis above we hold prices fixed across varying levels of consumers' income—firms in a market make a single set of pricing decisions for all the markets in Block 1. This is our primary focus in this study, as it allows us to investigate how consumers' behavior changes as their income varies, holding prices constant.

We use Blocks 2 and 3 to conduct an exploratory investigation of how providing firms with information on consumers' income and varying firm competition influence the prevalence of socially responsible consumption. In these blocks, we study four markets in a 2x2 design, varying whether consumers have income of 50 or 350 and whether firms face high competition (10 firms in a market) or low competition (2 firms). We only use one set of production cost parameters, fixing the cost of the responsible product at 8 and the harmful product at 6. Unlike in Block 1, firms in these four markets know consumers' income at the time when they make their pricing decisions, potentially allowing them to adjust their behavior both to varying consumer income and to the degree of competition.

Table 12 presents the average quantities of responsible and harmful products purchased, the shares of responsible products as part of total consumption, and the average size of the externality imposed, across both income levels (50 and 350) in high and low competition. The table also shows the average realized prices for the two product types across each condition. Consistent with our earlier observations, higher consumer income yields substantially higher consumption of the responsible product, a slightly higher share of socially responsible consumption, and a higher level of consumption of the harmful product resulting in an increase in the negative externalities produced by consumption. These patterns hold across both high and low competition.

	High Co	mpetition	Low Cor	mpetition
	Income 50	Income 350	Income 50	Income 350
Quantity of responsible products	3.50	24.52	3.19	22.14
Quantity of harmful products	3.11	21.28	2.54	15.76
Share of responsible products	56.67	57.22	58.86	61.66
Externalities	-31.13	-212.79	-25.38	-157.63
Price of responsible product (price premium over cost =8)	8.50 (0.50)	8.58 (0.58)	9.60 (1.60)	10.18 (2.18)
Price of harmful product (price premium over cost = 6)	6.64 (0.64)	6.72 (0.72)	8.26 (2.26)	8.96 (2.96)

Table 12: Average market outcomes, by consumer income and firm competition

Notes: These data are from Blocks 2 and 3, when firms know variation in consumers' income and when competition varies.

While the general patterns are similar, however, there are some differences in the outcomes we observe as firm competition varies. First, consumption of both product types is lower under low competition, a consequence of higher realized prices when a market contains only two firms, rather than 10.³¹ Low competition also yields substantially lower externalities (by about 20 percent) than high competition. Importantly, while some of this can be attributed to the lower levels of overall consumption under low competition, we also observe slightly higher shares of socially responsible consumption under low competition than under high competition (58.9 vs. 56.7 percent with income of 50, and 61.7 vs. 57.2 with income of 350). One potential interpretation

³¹ Interestingly, we observe little evidence that firms responded strategically to the level of competition. Wilcoxon rank-sum tests comparing the prices set by individual subjects in the role of firms by the level of competition are never statistically significant ($p \ge 0.317$ in all four comparisons that hold fixed consumers' income and the type of product). The higher realized prices in low versus high competition observed in Table 12 (which are all highly statistically significant, p < 0.001 in all four comparisons) are largely the result of prices being determined by the minimum of two firms' prices under low competition rather than 10 firms' prices under high competition. While it is important to note that our focus is primarily on the behavior of consumers, who responded sensibly to prices, we can think of a few potential explanations for why firms may not have responded more strongly to the varying competition in their pricing decisions. First, subjects in the role of firms may not have attended to the information about the number of competitors (though this information was prominently displayed on the choice interface; see Appendix H). Second, we cannot rule out potential order effects because our design for firms always had low competition last (in Block 3), to hold constant the level of competition through the initial decisions in Blocks 1 and 2. It is also worth noting that equilibrium pricing strategies do not change in a one-shot environment containing either 2 or 10 firms.

of this lies in the observation that, while the price premiums for the two product types are generally low and similar under high competition (between 0.50 and 0.74), they are higher for harmful products under low competition (2.26 and 2.96) than for responsible products (1.60 and 2.18). Of course, the differences in shares and price premiums are not large, so we caution against drawing conclusions based on these observations.³²

In Table 13, we complement the above observations with regression analysis investigating the impacts of varying income and competition on the quantities and shares of responsible products purchased, as well as on the externalities imposed due to the consumption of harmful products.³³ The results in models (1) and (2) show that *Income* has a large and positive impact on the quantity of responsible products purchased, confirming the results in Table 9. The coefficient for Low Competition indicates that reduced competition has little impact when consumers have low income, but the interaction between Low Competition x Income shows that low competition reduces the quantity of responsible products bought when consumers have high income, consistent with the negative effects of higher prices that we find above. However, the small magnitude of the coefficient, relative to the one for *Income*, indicates that the overall effect of high income on socially responsible consumption remains positive even under low competition. The results in models (3) and (4) investigate the share of responsible products purchases. Consistent with our observations from Block 1 shown in Table 10, model (3) shows that Income has a small and positive impact on the share of responsible products purchase. However, model (4) shows that this is primarily driven by behavior under low competition, which is consistent with what we see in Table 12. Finally, models (5) and (6) confirm that higher income produces significantly greater negative externalities, as observed in Table 11, but that this negative impact of higher income is mitigated under low firm competition.

³² We can also investigate whether consumers face different prices when firms know consumers' income to be high (350) instead of low (50). Under high competition, we observe slightly higher minimum prices for both product types when consumer income is high—by 0.08 for both responsible and harmful products, but these differences are not statistically significant (p = 0.515 and p = 0.677, respectively, Wilcoxon rank-sum tests). Under low competition, we observe slightly larger differences in minimum prices. For the responsible product, the realized price is 0.58 higher when consumer income is high rather than low (p = 0.063), while for the harmful product, the realized price is 0.70 higher when consumer income is high (p = 0.145). Thus, we observe at best suggestive, statistically weak evidence that consumers face higher prices when firms know that their income is high.

³³ Appendix Tables E.5 present the results of the fixed-effects regressions of these same outcomes. The results are very similar.

	Quantity of	Quantity of responsible		esponsible duct	Externalities	
	(1)	(2)	(3)	(4)	(5)	(6)
Income	0.067 ^{***} (0.001)	0.070^{***} (0.001)	0.006 ^{**} (0.003)	0.002 (0.003)	0.523 ^{***} (0.016)	0.606 ^{***} (0.019)
Low Competition		0.047 (0.065)		1.820** (0.898)		2.487 ^{***} (0.817)
Low Competition x Income		-0.007*** (0.001)		0.007** (0.003)		-0.165 ^{***} (0.014)
Constant	0.011 (0.053)	-0.012 (0.062)	57.488 ^{***} (1.220)	56.578 ^{***} (1.282)	2.092^{***} (0.658)	0.848 (0.795)
Observations	4000	4000	4000	4000	4000	4000
R ²	0.473	0.477	0.000	0.003	0.255	0.271

 Table 13: OLS regressions of quantity and share of responsible products purchased and externalities imposed

Notes: In models 1 and 2, the dependent variable is *Quantity*, which refers to the number of responsible products purchased. In models 3 and 4, the dependent variable is *Share*, which denotes the percentage of responsible products out of the total products purchased. In models 5 and 6, the dependent variable is *Externalities*, representing the negative externalities imposed on charitable donations due to the consumption of harmful products. "Income" is the manipulated level of consumers' income. The variable "Low Competition" is an indicator variable that takes the value 1 when there is low competition and 0 when there is high competition. Standard errors (in parentheses) are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1.

6 Conclusion

Despite prominent claims that socially responsible consumption increases with income (Shleifer 2004, Bénabou and Tirole 2010), there is little empirical evidence of this relationship. We report experimental tests designed to provide causal evidence on how variation in income affects individuals' willingness to impose externalities on others through their market actions. This question is important for understanding the degree to which changes in household income may affect the degree to which consumers voluntarily internalize the negative impacts of their market activity. However, addressing this question using observational data is challenging due to limitations of data availability and the inability to establish causality.

To obtain causal evidence of the relationship between income and concern for external impacts, we conduct three experiments—two in the laboratory and one online—that create stylized product markets with varying product types that differ in the degree to which they generate externalities borne by others outside of the market. More responsible products cost more to produce, meaning that consumers must be willing to pay a premium for such products for them to

be profitable for firms to produce. Using this design, we introduce exogenous income shocks to identify the resulting effects of such income growth on responsible consumption.

The results of all three studies document positive relationships between consumers' incomes and the quantities of socially responsible products exchanged in the markets. This holds despite variation across the three experiments in the populations studied, the procedures employed, the potential role of firms' behavior, and the nature of the externalities. However, we also observe that the magnitudes of these impacts are sometimes small and tend to be large only under substantial changes to income. In our third study we observe that the quantity of socially responsible consumption increases substantially, but also that the purchase of harmful products that yield negative externalities increases by a similar amount. Nevertheless, our experiments clearly reject the null hypothesis that income has no impact on responsible market behavior.

The changing nature of consumption across the three studies is important, and it is relevant for understanding when higher incomes are likely to mitigate the degree to which consumers' market activity produces negative externalities. In our first two studies, consumers can buy at most one product, meaning that by substituting toward purchasing more responsible products and away from more harmful ones they must necessarily reduce the degree to which their activities in the market produce negative externalities. This is consistent with what we observe. However, by allowing consumers with greater income to simultaneously increase their consumption of more responsible *and* more harmful products, our third study demonstrates that even when socially responsible consumption responds positively to income—i.e., when it is a normal good—the impact of increasing overall consumption can nevertheless produce increases in negative externalities with higher income. Thus, when evaluating the positive impacts of income on socially responsible consumption, it is also important to evaluate its impacts on overall consumption and the resulting negative externalities that this may produce.

We also need to highlight several potential limitations and open questions for our research. First, it is important to stress that the positive income effects we observe in the laboratory are unlikely to provide much guidance about the magnitude of comparable income effects in other settings. In our experiments, increases that raise "income" by factors of up to seven have positive effects on the consumption of socially responsible products; but the magnitude of these income increases remain small (always under \$100, even in the most extreme cases) relative to how much income can vary outside the laboratory. Moreover, it is difficult to quantify what a percentage change in consumption in one of our stylized product markets might imply for comparable changes in behavior in real consumer markets. Instead of making claims about how the magnitudes of our findings are likely to generalize to non-laboratory contexts, we focus on the observation that, in our experiments, increased income *always* produces at least directionally positive impacts on socially responsible market exchange. Thus, the qualitative finding in our studies, which holds across many treatment comparisons and different designs and samples, is likely relevant for what kinds of directional effects one may find in more natural contexts—our data suggest that the consumption of socially responsible goods will exhibit a positive relationship with income, in the manner of normal goods.

In addition, there are many features of markets, consumer behavior and income changes outside the laboratory that do not correspond to specific elements of our experimental designs. However, our studies also shed some light on the robustness of our results to such variation. For example, in real consumer markets, individuals typically have a wide variety of product choices available to them-rather than a unique product category that varies only along the dimension of external impact as in our study. Therefore, consumers with rising incomes may often start to consume new categories of products—such as beef, diamonds and air travel—that may have more detrimental environmental and social impacts than the products purchased at lower income levels. In this regard, our third study provides a valuable complement to Studies 1 and 2, by considering alternative ways of designing the choices available to a consumer. Moreover, the variation in income that one observes outside the laboratory is more complex and gradual than the dramatic changes implemented in our studies. It is possible that gradual and anticipated increases in income might have different impacts on socially responsible consumption than the salient and sudden shocks we introduce.³⁴ Finally, rising incomes themselves may be partly due to certain kinds of economic activities-such as industrialized production with high pollution levels-that themselves can produce more negative external impacts. Hence, the question of whether rising incomes will necessarily reduce the degree to which a society creates negative environmental and

³⁴ This also raises the question of what role demand effects (subjects' desires to comply with their interpretation of the experimenter's wishes) play in our study. While we cannot rule out that such effects may drive part of the behavioral changes we observe as income increases, they are unlikely to account for all the results we observe. For example, the fact that we observe small changes in consumers' behavior in the *Medium* treatment of Study 1 suggests that a substantial change in per-period income introduced by the experimenter is, in itself, insufficient to produce large changes in behavior. Thus, an explanation based on experimenter demand effects would have to account for why, in this study, they produce small effects when income increases by 100 experimental points but large effects when it increases by 300 points.

social impacts is more complex than what our experiments can fully answer. But, like most laboratory paradigms, our designs provide potentially useful building blocks upon which further research can aim to develop an improved understanding of the importance of the above factors.

Finally, our studies are largely silent on the mechanisms driving increased socially responsible consumption, which is beyond the scope of our research. For example, our data do not allow us to characterize the precise nature of consumers' preferences that give rise to the positive relationships between income and the consumption of socially responsible products. We also cannot distinguish between changes in behavior driven by the nature of intrinsic preferences or other motivations—for example, based on self-image or social norms. Nevertheless, our data does shed light on some aspects of the underlying motives. For example, by eliminating all interaction in Study 3, we can rule out that our results are entirely driven by consumers learning from or signaling to other consumers. Similarly, our design in Study 3 allows us to isolate the behavioral response to income changes by consumers that is independent of firms' actions. However, we encourage additional research to try to better understand and model the precise nature of preferences that drives socially responsible consumption and understand exactly why it responds to changes in income.

References

- Aghion, Philippe, Bénabou, Roland, Martin, Ralf and Roulet, Alexandra. 2023. "Environmental preferences and technological choices: Is market competition clean or dirty?" *American Economic Review: Insights*, 5(1), 1–20.
- Anderson, L. R., Mellor, J. M., and Milyo, J., 2008. Inequality and public good provision: An experimental analysis. *The Journal of Socio-Economics*, **37**(3), 1010–28.
- Andreoni, James and Levinson, A., 2001. The simple analytics of the environmental Kuznets curve. *Journal of Public Economics*, 80, 269–286.
- Andreoni, J., 2006. Philanthropy. *Handbook of the Economics of Giving, Altruism and Reciprocity*, 2, 1201-1269.
- Andreoni, J. and Bernheim, B. D., 2009. Social image and the 50–50 norm: A theoretical and experimental analysis of audience effects. *Econometrica*, 77(5), 1607-1636.
- Andreoni, J., Nikiforakis, N. and Stoop, J., 2021. Higher socioeconomic status does not predict decreased prosocial behavior in a field experiment. *Nature Communications*, 12(1): 1-8.
- Andreoni, J. and Payne, A.A., 2013. Charitable giving. *Handbook of Public Economics*, Vol. 5, 1-50. Elsevier.
- Alvaredo, F., Atkinson, A., Piketty, T., and Saez, E., 2013. The Top 1 Percent in International and Historical Perspective. *Journal of Economic Perspectives*, 27 (3), 3-20.
- Bartling, B., Weber, R.A. and Yao, L., 2015. Do Markets Erode Social Responsibility? *The Quarterly Journal of Economics*, 130(1), 219-266.
- Bartling, B., Valero, V. and Weber, R. A., 2019. On the Scope of Externalities in Experimental Markets. *Experimental Economics*, 22(3), 610-624.
- Bartling, B., Valero, V. Weber, R. A. and Yao, L., 2024. Public Discourse and Socially Responsible Market Behavior. *American Economic Review*, forthcoming.
- Bénabou, R. and Tirole, J., 2010. Individual and corporate social responsibility. *Economica*, 77(305), 1-19.
- Bereby-Meyer, Y., and Niederle, M., 2005. Fairness in Bargaining. *Journal of Economic Behavior* and Organization. 56, 173-186.
- Bock, O., Baetge, I., and Nicklisch, A., 2014. hroot: Hamburg registration and organization online tool. *European Economic Review*. 71, 117-120.
- Brekke, K. A., Konow, J., and Nyborg, K., 2017. Framing in a threshold public goods experiment with heterogeneous endowments. *Journal of Economic Behavior & Organization*, 138, 99-110.

- Buckley, E., and Croson, R., 2006. Income and wealth heterogeneity in the voluntary provision of linear public goods. *Journal of Public Economics*, *90*(4-5), 935-55.
- Carpenter, J., Verhoogen, E., and Burks, S., 2005. The effect of stakes in distribution experiments. *Economics Letters*, 86(3), 393-398.
- Cherry, T.L., Frykblom, P. and Shogren, J.F., 2002. Hardnose the dictator. *American Economic Review*, 92(4), 1218-1221.
- Danz, D., Engelmann, D. and Kübler, D., 2022. Do Legal Standards Affect Ethical Concerns of Consumers? *European Economic Review*, 144, 104044.
- Dufwenberg, M., Heidhues, P., Kirchsteiger, G., Riedel, F., and Sobel, J., 2011. Other-regarding Preferences in General Equilibrium. *Review of Economic Studies*, 78(2), 613-639.
- Dewatripont, M. and Tirole, J., 2024. The Morality of Markets. *Journal of Political Economy*, 132(8), 2655-94.
- Engel, C., 2011. Dictator games: A meta study. *Experimental Economics*. 14(4), 583-610.
- Engelmann, D., J. Friedrichsen and D. Kübler. 2024. Fairness in markets and market experiments: insights from a field-plus-lab study and a failed replication. *Scandinavian Journal of Economics*, in press.
- Fischbacher, U., 2007. z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, 10(2), 171-178.
- Forsythe, R., Horowitz, J.L., Savin, N.E. and Sefton, M., 1994. Fairness in simple bargaining experiments. *Games and Economic Behavior*, 6(3), 347-369.
- Franciosi, R., Kujal, P., Michelitsch, R., Smith, V., and Deng, G., 1995. Fairness: effect on temporary and equilibrium prices in posted-offer markets. *Economic Journal*, 105(431), 938-50.
- Friedrichsen, J., 2017. Is Socially Responsible Production a Normal Good? *DIW Discussion Paper 1644*, German Institute for Economic Research, Berlin.
- Güth, W. and E. van Damme, 1998. Information, Strategic Behavior and Fairness in Ultimatum Bargaining: An Experimental Study. *Journal of Mathematical Psychology*, 42(2), 227-247.
- Greitemeyer, T., 2023. The relationship between social class and unethical and prosocial (traffic) behavior: two naturalistic replication studies. *Social Influence*, 18(1), 2203947.
- Grossman, G.M. and Krueger, A.B., 1995. Economic Growth and the Environment. *Quarterly Journal of Economics*, 110, 353-377.
- Hainmueller, J., Hiscox, M.J. and Sequeira S., 2015. Consumer Demand for Fair Trade: Evidence from a Multistore Field Experiment. *Review of Economics and Statistics*, 97(2), 242–256.

- Harbaugh, W., Levinson, A. and Wilson, D.M., 2002. Reexamining the Empirical Evidence for an Environmental Kuznets Curve. *Review of Economics and Statistics*, 84(3), 541-551.
- Hargreaves Heap, S. P. H., Ramalingam, A., and Stoddard, B. V., 2016. Endowment inequality in public goods games: A re-examination. *Economics Letters*, 146, 4–7.
- Irlenbusch, B. and Saxler, D., 2019. The Role of Social Information, Market Framing, and Diffusion of Responsibility as Determinants of Socially Responsible Behavior. *Journal of Behavioral and Experimental Economics*. 80, 141-161.
- Israel, D. and A. Levinson, 2014. Willingness to pay for environmental quality: testable empirical implications of the growth and environment literature. In: Is the Environment a Luxury? An inquiry into the relationship between environment and income. Eds.: S. Tiezzi and C. Martini. Routledge, London and New York.
- Jung, M. H., Smeets, P., Stoop, J., and Vosgerau, J., 2023. Social status and unethical behavior: Two replications of the field studies in Piff et al. (2012). *Journal of Experimental Psychology: General*, 152(5), 1368–78.
- Kessler, J. and Vesterlund, L., 2015. The External Validity of Laboratory Experiments: The Misleading Emphasis on Quantitative Effects. In: Handbook of Experimental Economic Methodology. Eds.: G. Fréchette and A. Schotter. Oxford UP.
- Kirchler, M., Huber, J., Stefan, M. and Sutter, M., 2015. Market Design and Moral Behavior. *Management Science*, 62(9), 2615-2625.
- Kocher, M., Martinsson, P., and Visser, M., 2008. Does stake size matter for cooperation and punishment? *Economics Letters*, 99(3), 508-11.
- Krupka, E and Weber, R., 2013. Identifying Social Norms Using Coordination Games: Why Does Dictator Game Sharing Vary? *Journal of the European Economic Association*, 11(3), 495– 524.
- Larney, A., Rotella, A., and Barclay, P., 2019. Stake size effects in ultimatum game and dictator game offers: A meta-analysis. Organizational Behavior and Human Decision Processes, 151, 61-72.
- Piff, P.K., Kraus, M.W., Côté, S., Cheng, B.H. and Keltner, D., 2010. Having less, giving more: the influence of social class on prosocial behavior. *Journal of Personality and Social Psychology*, 99(5), 771.
- Piff, P.K., Stancato, D.M., Côté, S., Mendoza-Denton, R. and Keltner, D., 2012. Higher social class predicts increased unethical behavior. *Proceedings of the National Academy of Sciences*, 109(11), 4086-91.

- Pigors, M. and Rockenbach, B., 2016. Consumer social responsibility. *Management Science*, 62(11), 3123-3137.
- Rode, J., Hogarth, R. M. and Le Menestrel, M., 2008. Ethical differentiation and market behavior: An experimental approach. *Journal of Economic Behavior and Organization*, 66, 265-280.
- Saragosa, Manuela. 2020. "A palm oil alternative could help save rainforests." BBC News (https://www.bbc.com/news/business-55016453, accessed on September 18, 2022).
- Shleifer, A., 2004. Does competition destroy ethical behavior? *American Economic Review*, 94(2), 414-418.
- Stern, D.I., 2004. The rise and fall of the environmental Kuznets curve. *World Development*, 32(8), 1419-1439.
- Sutter, M., Huber, J., Kirchler, M., Stefan, M., and Walzl, M., 2020. Where to Look for the Morals in Markets? *Experimental Economics*, 23, 30-52.
- Vesterlund, L., 2006. Why do people give? *The Nonprofit Sector: A Research Handbook, 2*, 168-190.
- Xu, Y. and Marandola, G., 2023. The (negative) effects of inequality on Social Capital. *Journal of Economic Surveys*, 37(5), 1562-88.
- Yang, Y., and Konrath, S., 2023. A systematic review and meta-analysis of the relationship between economic inequality and prosocial behaviour. *Nature Human Behaviour*, 7(11), 1899-1916.
- Yeung, Peter. 2019. "The toxic effects of electronic waste in Accra, Ghana." Bloomberg (https://www.bloomberg.com/news/articles/2019-05-29/the-rich-world-s-electronic-waste-dumped-in-ghana, accessed on September 18, 2022).
- Ziegler, A. G., Romagnoli, G., and Offerman, T., 2024. Morals in multi-unit markets. *Journal of the European Economic Association*, in press.

The Causal Effect of Income on Market Social Responsibility

Björn Bartling University of Zurich Vanessa Valero Institut Mines-Télécom Business School Roberto A. Weber University of Zurich

Supplemental Appendix (for online publication)

Contents

A.	Study 1 Interfaces: Firms' and Consumers' Decisions	p. 1
B.	Study 1 Interfaces: Feedback Received by Participants at the End of Each Period	p. 3
C.	Additional Analysis for Study 1	p. 6
D.	Additional Analysis for Study 2	p. 15
E.	Additional Analysis for Study 3	p. 24
F.	Experimental Instructions for Study 1	p. 27
G.	Experimental Instructions for Study 2	p. 46
H.	Experimental Instructions for Study 3	p. 64

A. Study 1 Interfaces: Firms' and Consumers' Decisions

For Firms: They can select the product type they want to sell and determine a price for their product offer.

2 out of 30		Remaining time [sec]: 15			
You can now determine the type and price of the product you want to offer.					
Please, remember that the price of the product you decide to offer should	l be higher than (or equal	to) its production cost and lower than (or equal to) 70.			
If you need to use the calculator to make your dec	isions, please click on the	calculator icon at the bottom left.			
	Your offer				
What type of product do you want to sell?	O Product with combin	ed loss of 60 (Cost=20)			
	O Product with combin	ed loss of 54 (Cost=21)			
	O Product with combin	ed loss of 48 (Cost=22)			
	 Product with combin C. Broduct with combin 	ed loss of 42 (Cost=23)			
	Product with combin	ed loss of 30 (Cost=24)			
	 Product with combin Product with combin 	ed loss of 24 (Cost=26)			
	O Product with combin	ed loss of 18 (Cost=27)			
	O Product with combin	ed loss of 12 (Cost=28)			
	O Product with combin	ed loss of 6 (Cost=29)			
	O Product with combin	ed loss of 0 (Cost=30)			
At what price do you offer the product?					
At what price do you oner the product?					
		ОК			

For Consumers: They decide which product they want to buy if any.

Period					
1 out of 30		Remaining time [sec]: 1			
The products on offer					
To accept an offer, you first have to highlight it. This is done by clicking on t	he respective row. This row will then	turn blue.			
To finally accept the offer, you have to click on the ACCEPT button. As long	as you have not yet clicked on the AC	CCEPT button, you can change your selection.			
If you click on the DO NOT ACCEPT AN OFFER button, you reject all offers,	even if you already highlighted one of	of the offers.			
Price	Туре о	f product			
21	Product with co	mbined loss of 60			
32	Product with co	mbined loss of 18			
40	Product with co	ombined loss of 0			
35	Product with co	ombined loss of 0			
25	Product with co	mbined loss of 36			
26	Product with co	mbined loss of 48			
		ACCEPT			
		DO NOT ACCEPT AN OFFER			

B. Study 1 Interfaces: Feedback Received by Participants at the End of Each Period

For Firms: They observe the offers made by all firms and their respective payments.

Desired						
1 out of 30					Remaining time [sec]: 0	
				[Please proceed
This following table shows the offer made by each seller, how many products he sold, his payment, the total impact of the products he sold on all six Participants C (i.e., quantity sold x combined loss imposed by that product) and the total impact of the products he sold on each Participant C (i.e., quantity sold x individual loss imposed by that product). Note that your own information is highlighted in blue.						
Price	Type of product	Quantity sold	Sellers' pa	yments	Total impact of products sold on all six Participants	Total impact of products C sold on each Participant C
21	Prod. w/ combined loss of 60	0	10	0	0	0.0
32	Prod. w/ combined loss of 18	1	10	5	-18	-3.0
40	Prod. w/ combined loss of 0	1	11()	0	0.0
35	Prod. w/ combined loss of 0	0	10	D	0	0.0
25	Prod. w/ combined loss of 36	1	10	1	-36	-6.0
26	Prod. w/ combined loss of 48	2	10	В	-96	-16.0
	This following table shows each buyer's purchasing decision, his initial endowment and his payment.					
Buyer ID	Price paid	Type of product	t chosen	Initia	l endowment	Buyers' payments
Buyer 1	32	Product with combin	ied loss of 18		100	138
Buyer 2	26	Product with combin	ied loss of 48		100	144
Buyer 3	25	Product with combin	ied loss of 36		100	145
Buyer 4	No purchase	No purcha	ise		100	100
Buyer 5	40	Product with combined loss of 0			100	130
Buyer 6	26	Product with combin	ied loss of 48		100	144
	1	I	I		I	ОК

For Consumers: They observe the effect of their purchasing decision on the payments of the third parties.

Period	
1 out of 30	Remaining time [sec]: 0
You purchased the following type of product: Product with combined loss of 18	
You paid the following price: 32	
Your resulting payment:	
Initial endowment + Value - Price = 100 + 70 - 32 = 138	
The effect on the payments of the six Participants C from the product you purchased:	
Combined loss for all six Participants C: 18	
Individual loss for each Participant C: 3	
	ок

For Third Parties: They can only observe their payment.

- Period	
1 out of 30	Remaining time [sec]: 0
	Please proceed.
Your resulting payment: 75	
	ОК

C. Additional Analysis for Study 1

	Part I	Part II
Baseline	37.95 %	45.25 %
Medium	34.25 %	42.86 %
High	29.56 %	74.54 %
Unequal	29.62 %	40.64 %

Table C.1: Average social responsibility across treatments and parts

Table C.2: Wilcoxon rank-sum tests of social responsibility measure at the consumer (market) level, two-sided

<i>p</i> -values	Baseline	Medium	High	Unequal
Baseline	-	0.8131 (0.9397)	0.3117 (0.4477)	0.3349 (0.5980)
Medium	0.8335 (0.6501)	-	0.2638 (0.3290)	0.3126 (0.4292)
High	0.0002 (0.0393)	0.0000 (0.0092)	-	0.6399 (0.4610)
Unequal	0.4835 (0.6732)	0.5804 (0.7121)	0.0000 (0.0007)	-

Notes. Test of differences in the measure of socially responsible behavior across treatments. The p-values in the shaded area correspond to Part I and the rest to Part II.

	(1)	(2)	(3)	(4)
	All subjects	Unequal	Income of 100	Income of 400
			(Unequal and	(Unequal and
			Baseline)	High)
Medium	-3.700			
	(0.696)			
High	-8.394			
	(0.521)			
Unequal	-8.325		-9.497	2.413
	(0.347)		(0.288)	(0.846)
Part II	7.300*	1.883	7.300*	44.986**
	(0.057)	(0.375)	(0.059)	(0.000)
Part II x Medium	1.308			
	(0.837)			
Part II x High	37.686***			
-	(0.000)			
Part II x Unequal	3.710		-5.417	-15.720
-	(0.452)		(0.219)	(0.104)
Income of 400		3.516		
v		(0.616)		
Part II x Income of 400		27.383***		
v		(0.000)		
Constant	37.950***	28.453***	37.950***	29.556***
	(0.000)	(0.000)	(0.000)	(0.005)
Observations	7,560	2,880	3,720	2,040
Number of markets	42	16	26	22

 Table C.3: Linear regressions of social responsibility measure with market-level random effects

Notes: The dependent variable in all models is our measure of social responsibility (percent loss mitigated). Model (1) considers all treatments. Model (2) considers only observations from the *Unequal* condition. Model (3) considers only observations from consumers who receive an income of 100 in Part II (*Unequal* and *Baseline*). Model (4) considers only observations from consumers who receive an income of 400 in Part II (*Unequal* and *High*). *Medium, High* and *Unequal* are binary variables taking on value 1 in the respective treatments and 0 otherwise. *Part II* is a binary variable taking on value 1 for data from periods 11 to 30 and 0 otherwise. *Income of 400* is a binary variable taking on value 1 in case a consumer receives an income of 400 in Part II and 0 otherwise. P-values from standard errors clustered at the market level, *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)
Income	0.109***	0.105***	0.130***
	(0.000)	(0.000)	(0.000)
Period		0.159	0.329
		(0.273)	(0.197)
Income x Period			-0.001
			(0.178)
Constant	23.732***	22.001***	18.931***
	(0.000)	(0.000)	(0.000)
Observations	7,560	7,560	7,560
Number of subjects	252	252	252

Table C.4: OLS regression of social responsibility

Notes. The dependent variable in models (1), (2) and (3) is our measure of social responsibility (percent loss mitigated). *Income* represents subjects' per-period income (100, 200 or 400). Model (2) includes the variable *Period*, taking on integer values between 1 and 30. Model (3) also includes the interaction of *Income* with *Period*. P-values from standard errors clustered at the market level, estimated using the wild bootstrap (derived from running 10,000 replications in each case) are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.

	(1)	(2)	(3)	(4)
	Baseline	Medium	High	Unequal
Lag Profit	1.056**	0.628*	0.376	0.575**
Difference	(0.022)	(0.051)	(0.156)	(0.050)
Lag Loss	0.482***	0.586***	0.311**	0.463***
Mitigated	(0.000)	(0.001)	(0.031)	(0.000)
Constant	18.025***	15.275***	32.996***	19.538***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations Number of subjects	1,140	1,140	684 36	1,824

Table C.5: Linear Regressions of Firm Product Type Offers in Part II (All Periods)

Notes. The dependent variable in all models is the percent loss mitigated. *Lag Profit Difference* is the difference in the average profit obtained in the prior period between firms offering the most responsible product type and firms offering the least responsible product type. *Lag Loss Mitigated* is a firm's type of product offered in the previous period. P-values from standard errors clustered at the market level, estimated using the wild bootstrap (derived from running 10,000 replications in each case) are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.

	(1)	(2)	(3)	(4)
	Baseline	Medium	High	Unequal
Lag Profit	1.171**	0.510*	0.933**	0.692*
Difference	(0.041)	(0.100)	(0.031)	(0.061)
Lag Loss	0.478***	0.523***	0.305***	0.449***
Mitigated	(0.000)	(0.000)	(0.000)	(0.000)
Constant	17.853***	17.401***	31.357***	20.124***
	(0.000)	(0.001)	(0.000)	(0.000)
Observations	540	540	324	864
Number of subjects	60	60	36	96

Table C.6: Linear Regressions of Firm Product Type Offers in Part II (Periods 11-20)

Notes. The dependent variable in all models is the percent loss mitigated. *Lag Profit Difference* is the difference in the average profit obtained in the prior period between firms offering the most responsible product type and firms offering the least responsible product type. *Lag Loss Mitigated* is a firm's type of product offered in the previous period. P-values from standard errors clustered at the market level, estimated using the wild bootstrap (derived from running 10,000 replications in each case) are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.

	Baseline	Medium	High	Unequal
Firms	148 (49)	149 (50)	153 (51)	149 (50)
Consumers	187 (62)	253 (84)	381 (127)	253 (84)
Third Parties	112 (37)	109 (36)	121 (40)	108 (36)

Notes. Values represent average earnings in points by treatment and role, with corresponding earnings in Swiss francs shown in parentheses. Swiss francs and US Dollars were roughly at parity at the time of the study. All values include a show-up fee of CHF 15. All figures have been rounded for clarity.



Figure C.1a: Average social responsibility in Parts I and II by market



Figure C.1b: Average social responsibility in Parts I and II by consumer



Figure C.1c: Average social responsibility in Parts I and II by firm



Figure C.2: Shares of most and least responsible product types offered by firms



Figure C.3: Firms' profits for different products types

Figure C.4: Average social responsibility by markets over time in each treatments in Study 1



D. Additional Analysis for Study 2

	Part I	Part II
Baseline	41.14 %	41.72 %
High (consumers)	29.75 %	71.90 %
High (consumers & firms)	56.89 %	75.43 %

Table D.1: Percentage of the total potential loss mitigated by purchased products

Table D.2: Wilcoxon rank-sum tests of social responsibility measure at the consumer (market) level, two-sided

<i>p</i> -values	Baseline	High (consumers)	High (consumers & firms)
Baseline	-	0.2768 (0.4233)	0.0546 (0.2002)
High (consumers)	0.0008 (0.0374)	-	0.0003 (0.0104)
High (consumers & firms)	0.0004 (0.0250)	0.3385 (0.5218)	-

Notes. Test of differences in the measure of socially responsible behavior across treatments. The p-values in the shaded area correspond to Part I and the rest to Part II.

	(1)
High (consumers)	-11.389
	(0.248)
High (consumers & firms)	15.750
	(0.185)
Part II	0.583
	(0.850)
Part II x High (consumers)	41.569***
	(0.000)
Part II x High (consumers & firms)	17.958**
	(0.007)
Constant	41.139**
	(0.000)
Observations	3,240
Number of markets	18

Table D.3: Linear regression of the percent loss mitigated with market-level random effects

Notes. The dependent variable in all models is the percent loss mitigated. *High (consumers)* and *High (consumers & firms)* are binary variables taking on the value 1 in the respective treatment, and 0 otherwise. *Baseline* serves as omitted category in model (1). *Part II* is a binary variable taking on value 1 for data generated from period 11 to 30 and 0 from period 1 to 10. P-values from standard errors clustered at the market level, *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)
Income	0.105***	0.106***	0.124***
	(0.000)	(0.004)	(0.000)
Period		-0.049	0.132
		(0.861)	(0.808)
Income x Period			-0.001
			(0.511)
Constant	31.770***	32.186***	29.445***
	(0.000)	(0.000)	(0.000)
Observations	3,240	3,240	3,240

Table D.4: Linear regression of the percent loss mitigated

Notes. The dependent variable in all models is the percent loss mitigated. The variable *Income* represents subjects' per-period income (100 or 400). Model (2) includes the variable *Period* taking on integer values between 1 and 30. Model (3) also includes the interaction of *Income* with *Period*. P-values from standard errors clustered at the market level, estimated using the wild bootstrap (derived from running 10,000 replications in each case) are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.

	(1)	(2)	(3)
	Baseline	High (consumers)	High (consumers & firms)
Lag Profit	0.631***	0.336*	1.572***
Difference	(0.000)	(0.063)	(0.000)
Lag Loss	0.493***	0.406***	0.426***
Mitigated	(0.000)	(0.000)	(0.000)
Constant	18.419***	24.433***	23.608***
	(0.000)	(0.000)	(0.000)
Observations	684	684	684
Number of subjects	36	36	36

Table D.5: Linear regressions of firm product type offers in part II (All periods)

Notes. The dependent variable in all models is the percent loss mitigated. *Lag Profit Difference* is the difference in the average profit obtained in the prior period between firms offering the most responsible product type and firms offering the least responsible product type. *Lag Loss Mitigated* is a firm's type of product offered in the previous period. P-values from standard errors clustered at the market level, estimated using the wild bootstrap (derived from running 10,000 replications in each case) are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.

	(1)	(2)	(3)
	Baseline	High (consumers)	High (consumers & firms)
Lag Profit	0.745***	0.420*	1.514***
Difference	(0.000)	(0.063)	(0.000)
Lag Loss	0.454***	0.390***	0.404***
Mitigated	(0.000)	(0.000)	(0.000)
Constant	18.488***	25.690***	24.034***
	(0.000)	(0.000)	(0.000)
Observations	324	324	324
Number of subjects	36	36	36

Table D.6: Linear	regressions	of firm	product type	offers in	part II (Periods	11-20)
I ubic Dio. Lincui	regressions	or mm	product type	onens m		(I CIICUD	11 20)

Notes. The dependent variable in all models is the percent loss mitigated. *Lag Profit Difference* is the difference in the average profit obtained in the prior period between firms offering the most responsible product type and firms offering the least responsible product type. *Lag Loss Mitigated* is a firm's type of product offered in the previous period. P-values from standard errors clustered at the market level, estimated using the wild bootstrap (derived from running 10,000 replications in each case) are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table D.7: Ave	rage earning in	points (and Swiss	francs) by	v treatment	and role
	ruge eurining in	pomes		manes) og	, incutinent	una 1010

	Baseline	High (consumers)	High (consumers & firms)
Firms	103 (34)	104 (35)	303 (101)
Consumers	138 (46)	334 (111)	333 (111)

Notes. Values represent average earnings in points by treatment and role, with corresponding earnings in Swiss francs shown in parentheses. Swiss francs and US Dollars were roughly at parity at the time of the study. All values include a show-up fee of CHF 15. All figures have been rounded for clarity.



Figure D.1a: Average social responsibility in Parts I and II by market


Figure D.1b: Average social responsibility in Parts I and II by consumer



Figure D.1c: Average social responsibility in Parts I and II by firm



Figure D.2: Shares of most and least responsible product types offered by firms

Figure D.3: Firms' profits for different products types





Figure D.4: Average social responsibility by markets over time in each treatments in Study 2

E. Additional Analysis for Study 3

Variable	Ν	Mean	SD	Min	Max
Female	995	0.55	0.50	0	0
Age	1000	36.30	10.63	18	69
Reported Income:	1000	4.79	1.23	1	7
\$0-\$5,000	1000	0.03	0.17	0	1
\$5,001-\$10,000	1000	0.03	0.16	0	1
\$10,001-\$25,000	1000	0.07	0.26	0	1
\$25,001-\$50,000	1000	0.18	0.39	0	1
\$50,001-\$100,000	1000	0.39	0.49	0	1
\$100,001-\$250,000	1000	0.27	0.44	0	1
More than \$250,000	1000	0.03	0.16	0	1

Table E.1: Descriptive statistics

Notes: *Female* is coded as 0 for male and 1 for female. *Age* is reported in years. *Reported Income* corresponds to the reported total household income over the last past 12 months. Income categories are coded as follows: 1 = \$0-\$5,000, 2 = \$5,001-\$10,000, 3 = \$10,001-\$25,000, 4 = \$25,001-\$50,000, 5 = \$50,001-\$100,000, 6 = \$100,001-\$250,000, and 7 = More than \$250,000.

Income	Mean	vs. Income 150 (p-value)	vs. Income 250 (p-value)	vs. Income 350 (p-value)
50	3	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
150	9	-	0.000 (0.000)	0.000 (0.000)
250	15	-	-	0.000 (0.000)
350	20	-	-	-

Table E.2: Mean of quantity of responsible product purchased and Wilcoxon rank-sum test results across income levels

Notes: Wilcoxon rank-sum test p-values at the consumer (market) level, two-sided.

Table E.3: Mean of proportion	of responsible	product purchased a	and Wilcoxon	rank-sum tes
	results across	income levels		

Income	Mean	vs. Income 150 (p-value)	vs. Income 250 (p-value)	vs. Income 350 (p-value)
50	53	0.290 (0.341)	0.440 (0.480)	0.400 (0.630)
150	55	-	0.818 (0.725)	0.848 (0.767)
250	55	-	-	0.936 (0.986)
350	55	-	-	-

Notes: Wilcoxon rank-sum test p-values at the consumer (market) level, two-sided.

 Table E.4: Mean of externalities imposed and Wilcoxon rank-sum test results across income levels

Income	Mean	vs. Income 150 (p-value)	vs. Income 250 (p-value)	vs. Income 350 (p-value)
50	30	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
150	84	-	0.000 (0.000)	0.000 (0.000)
250	142	-	-	0.000 (0.000)
350	199	-	-	-

Notes: Wilcoxon rank-sum test p-values at the consumer (market) level, two-sided.

		••••••••••••	mposed			
	Quantity		Proportion		Externalities	
	(1)	(2)	(3)	(4)	(5)	(6)
Income	0.067 ^{***} (0.001)	0.070^{***} (0.001)	0.006 ^{**} (0.003)	0.002 (0.003)	0.523 ^{***} (0.016)	0.606 ^{***} (0.019)
Low Competition		0.047 (0.065)		1.820** (0.898)		2.487 ^{***} (0.817)
Low Competiton x Income		-0.007 ^{***} (0.001)		0.007 ^{**} (0.003)		-0.165 ^{***} (0.014)
Constant	0.011 (0.258)	-0.012 (0.262)	57.488 ^{***} (0.546)	56.578 ^{***} (0.658)	2.092 (3.245)	0.848 (3.298)
Observations	4000	4000	4000	4000	4000	4000
Number of consumers	1000	1000	1000	1000	1000	1000
\mathbb{R}^2	0.655	0.660	0.002	0.011	0.414	0.440

Table E.5: Fixed-effects regressions of quantity and proportion of responsible products purchased and externalities imposed

Notes: In models 1 and 2, the dependent variable is *Quantity*, which refers to the number of responsible products purchased. In models 3 and 4, the dependent variable is *Proportion*, which denotes the percentage of responsible products out of the total products purchased. In models 5 and 6, the dependent variable is *Externalities*, representing the negative externalities imposed on charitable donations due to the consumption of harmful products. The variable *Low Competition* is an indicator variable that takes the value 1 when there is low competition and 0 when there is high competition. Standard errors (in parentheses) are clustered at the individual level. *** p < 0.01, ** p < 0.05, * p < 0.1.

F. Experimental Instructions for Study 1

In the following, we provide the instructions for Part I, and the instructions for Part II for the treatments *Baseline*, *Medium*, *High* and *Unequal*.

General instructions

We are pleased to welcome you to this economic study.

Please read the following instructions carefully. You can—depending on your decisions and/or those of the other participants—earn money in addition to the **15 Swiss francs** that you receive as an initial participation payment. It is thus very important that you read the instructions carefully.

This study will have **two parts**. Part I lasts 10 periods and Part II lasts 20 periods. The entire study will thus last for **30 periods**.

In addition to the initial participation payment of 15 Swiss francs, you will be paid your earnings from <u>one</u> randomly selected period. That is, the computer will randomly select one period out of 30 at the end of the study to count for payment. Since you do not know which period the computer will randomly select, you must consider your decisions in each of the 30 periods very carefully.

During the study, we will not speak of Swiss francs, but of points. The points you earn during the study will be converted to Swiss francs at the end of the study. The following conversion rate applies:

6 points = 2 Swiss francs

At the end of today's study, you will receive your payment in cash.

We will explain **the exact procedures for Part I on the next pages**. You will receive instructions about all changes, if any, to the procedures prior to the start of Part II. *Note that the decisions taken in Part I of the study do not influence the procedures for Part II.*

Communication with the other participants is strictly forbidden during the study. Violation of this rule will lead to exclusion from the study and loss of all payments.

For the sake of simplicity, we will always use male forms of pronouns for participants; the instructions obviously also refer to female participants.

A. THE MARKET ACTIVITY

In all periods in Parts I and II, you will participate in the same market activity, described below.

Market participants

There are three types of participants in this study: Participants A, B, and C. **Participants A are sellers and Participants B are buyers. Participants C can neither sell nor buy, but they** <u>can incur losses</u> due to the transactions between Participants A and B.

The participants are divided into groups of 18 people. There are **six** Participants A (sellers), **six** Participants B (buyers), and **six** Participants C in each group.

You will see whether you are Participant A, B, or C on your screen at the beginning of the study. **Your role as Participant A, B, or C will remain the same during the entire study**.

► <u>Market products</u>

In the market activity, different types of product can be exchanged, i.e. sold and bought. The **type of product** refers to the **loss** that exchanging a product imposes on Participants C. A product only creates a loss when it is sold by a Participant A (seller) to a Participant B (buyer).

Each possible type of product produces a particular loss for the six Participants C, as shown in **Table 1**. The *individual loss* is the loss that the product imposes on each Participant C. This can be any value from 0 to 10. Because there are six Participants C who all incur the same loss from a product, the total *combined loss* produced by a product corresponds to the individual loss multiplied by six, and is between 0 and 60. For example, if the individual loss from a product is 5 points for each of the six Participants C then the combined loss produced by this product is 6 **X** 5 = 30 points.

Each type of product entails a production cost for Participant A when the product is sold. The production cost is **between 20 and 30 points** and **depends on the type of product**. Lower production costs imply higher losses for Participants C. Specifically, each decrease in the production cost of 1 point induces a 1-point increase in the individual loss for each Participant C (and, hence, a 6-point increase in the combined loss for all Participants C). **Table 1** shows the exact production cost for each type of product.

All products are **worth 70 points** to Participants B (buyers) when they are bought, regardless of what type of product it is.

Please take a moment to look over the following table carefully. It is important for understanding how earnings in this study are determined.

Ty (Combined and individual i	Production cost		
Combined loss of 60	>	Individual loss of 10	20
Combined loss of 54	→	Individual loss of 9	21
Combined loss of 48	→	Individual loss of 8	22
Combined loss of 42	→	Individual loss of 7	23
Combined loss of 36	→	Individual loss of 6	24
Combined loss of 30	→	Individual loss of 5	25
Combined loss of 24	→	Individual loss of 4	26
Combined loss of 18	→	Individual loss of 3	27
Combined loss of 12	→	Individual loss of 2	28
Combined loss of 6	>	Individual loss of 1	29
Combined loss of 0	>	Individual loss of 0	30

Table 1: Types of products and corresponding production costs

► <u>Market procedures</u>

◆ Each **Participant A** (seller) can make **one sales offer** in each period, by entering it on the following screen:

What type of product do you want to sell?	 Product with combined loss of 60 (Cost=20) Product with combined loss of 54 (Cost=21) Product with combined loss of 48 (Cost=22) Product with combined loss of 42 (Cost=23) Product with combined loss of 36 (Cost=24) Product with combined loss of 30 (Cost=25) Product with combined loss of 30 (Cost=26) Product with combined loss of 18 (Cost=27) Product with combined loss of 12 (Cost=28) Product with combined loss of 6 (Cost=29) Product with combined loss of 0 (Cost=30)
At what price do you offer the product?	
	ок

More specifically, each Participant A must indicate:

- <u>The type of product he would like to offer</u>. To do this, he must click on the corresponding type of product.
- <u>The price of the product</u>. The corresponding number must be entered in the box. The price may be any integer between the production cost of the chosen product up to a maximum of 70.

Once a Participant A has made his decisions, he must click on the OK button at the bottom right of the screen. *Note that the type of product and the price can be changed until the OK button is clicked.*

Once all six Participants A have made their sales offers, they will be informed about the sales offers (price and type of product) made by all Participants A. This information will be on a screen like the one below:

Price	Type of product	Quantity of products sold
This is where Participants A see the price of the product for every sales offer	This is where Participants A see the type of product for every sales offer	This is where Participants A see the quantity of products sold for every sales offer

A participant's own sales offer is always marked in blue. In the column on the right, Participants A will see how many Participants B (buyers) accept each of the offers, i.e. the quantity of the product sold by each of the six Participants A.

Each Participant B will make his decision by selecting from one of the six offers, or deciding not to purchase a product. A maximum of 6 products can thus be sold in a given period. These products can be sold by the same or by different Participants A. Therefore, each Participant A can sell between 0 and 6 products in a period.

Once all Participants B have made their decisions, each Participant A will learn the payments of all Participants A. Participants A will also be informed about each Participant B's purchasing decisions and payments. Finally, Participants A will learn the losses incurred by Participants C due to the product(s) he sold.

• Each **Participant B** (buyer) can decide whether or not to accept at most one offer. In each period, they can see the six sales offers on a screen like the one below:

Price	Type of product	
This is where Participants B see the price of the product for every sales offer	This is where Participants B see the type of product for every sales offer	
		ACCEPT DO NOT ACCEPT AN OFFER

The prices appear in the left column of the table, and the type of product appears in the right column. Each offer is always in a separate row.

- <u>If a Participant B wants to accept an offer</u>, he must first click on the corresponding row. The marked row will then appear with a blue background. In order to accept the offer marked in blue, Participant B must click on the ACCEPT button. *Note that the choice of offer can be changed until the ACCEPT button is clicked*.
- <u>If a Participant B does not want to accept any offer</u>, he must click on the DO NOT ACCEPT AN OFFER button. *Note that even if a row had already been marked, all offers will be declined if the DO NOT ACCEPT AN OFFER button is clicked.*

When all Participants B have made their decisions, each Participant B will learn of his own payment and the corresponding losses incurred by Participants C based on his decision.

• **Participants C** cannot make any decisions during this study. We ask Participants C, however, to indicate in each period their expectations about the behaviors of Participants A (sellers) and B (buyers).

When all Participants A and B have made their decisions, Participants C will learn of their own payments, which are entirely dependent on the decisions of Participants A and B. These payments depend on the type of products exchanged: Each time a product is exchanged, each of the six Participants C incurs the associated individual loss from that product, which is between 0 and 10 points. Since up to 6 products can be exchanged, **the sum of the individual losses incurred by each Participant C is between 0 and 60 points**.

After all participants have been informed about their payments in a period, the next period will begin.

Note that, during each period, you will see a timer in the top right corner of your screen. Please use the time indicated by the timer to make your decision.

B. PAYMENTS OF PARTICIPANTS

In each period, each Participant A, B, and C initially receives an endowment of **100 points**. The payments in points of Participant A (seller), Participant B (buyer), and Participant C in a period are then determined as follows:

Participant A's payment:

100 + quantity sold x (price - production cost)

where the production cost, between 20 and 30, depends on the type of product offered, as shown in Table 1.

Note: if no Participant B accepts Participant A's sales offer, A's payment is 100.

Participant B's payment:

If Participant B makes a purchase:

100 + 70 - price

- If Participant B does not make a purchase, his payment is *100*.

Participant C's payment:

100 – sum of individual losses

where the *sum of individual losses* is the sum of the individual losses for a Participant C resulting from all products that are exchanged.

Note: if all six Participants B purchase a product with the smallest possible individual loss (0) for Participants C or do not purchase a product, Participants C's payment is **100**; if all six Participants B purchase a product with the largest possible individual loss (10) for each Participant C, Participant C's payment is **40**.

C. EXAMPLES

► <u>Example 1</u>

Assume that a Participant A (seller) offers a product with a combined loss of 30 points (i.e. an individual loss of 5 points) at the price of 40 and **all six** Participants B (buyers) accept this offer. The following payments will result:

• A product with a combined loss of 30 points for Participants C costs 25 points to produce (see Table 1 on Page 3). <u>The Participant A's payment</u> is thus equal to:

 $100 + quantity \ sold \ \mathbf{x} \ (price - production \ cost) = 100 + 6 \ \mathbf{x} \ (40 - 25) = 190$

• Each Participant B purchased a product. Therefore, <u>each Participant B's payment</u> is equal to:

100 + 70 - price = 100 + 70 - 40 = 130

• When a product with a combined loss of 30 points is sold, it imposes an individual loss of 5 points on each of the six Participants C. Since six products are sold, the sum of the

individual losses for a Participant C is equal to 30 points (6×5). Each Participant C's payment is thus equal to:

 $100 - sum of individual losses = 100 - 6 \times 5 = 100 - 30 = 70.$

Example 2

Assume that **four** Participants B (buyers) accept an offer for a product with a combined loss of 18 points (i.e. individual loss of 3 points). The remaining **two** Participants B accept an offer for a product with a combined loss of 42 points (i.e. individual loss of 7 points). Here we focus on the payments to each Participant C:

When a product with a combined loss of 18 points is sold, it imposes an individual loss of 3 points on each of the six Participants C. Since four products of this type are sold, each Participant C thus incurs a loss of 12 points (4 X 3) from these products.

In addition, when a product with a combined loss of 42 points is sold, it imposes an individual loss of 7 points on each of the six Participants C. Since two products of this type are sold, each Participant C thus incurs a loss of 14 points (2 X 7) from these two products.

Each Participant C's payment is thus equal to:

 $100 - sum of individual losses = 100 - (4 \times 3) - (2 \times 7) = 100 - 12 - 14 = 74$

Instructions for Part II

A. THE MARKET GAME

As previously announced, the market activity remains the same in Part II.

► **Participants A** are sellers. At the beginning of each period, each Participant A makes an offer to sell a product. To do so, he has to determine the price and the type (i.e. the losses for Participants C) of the product he would like to offer.

► **Participants B** are buyers. Each Participant B can then choose to buy one product from one of the Participants A, or can choose not to buy a product.

► **Participants C** can neither sell nor buy, but they can incur losses due to the transactions between Participants A and B.

Your role in Part II is the same as it was in Part I.

B. PAYMENTS OF PARTICIPANTS

In Part II, the way payments are determined by the market activity is the same as in Part I.

In each period, each Participant A, B, and C initially receives an endowment of 100 points as in Part I.

The payments of Participant A (seller), Participant B (buyer), and Participant C in a period are thus determined as follows:

Participant A's payment:

100 + quantity sold x (price - production cost)

where the production cost, between 20 and 30, depends on the type of product offered, as shown in Table 1.

Note: if no Participant B accepts Participant A's sales offer, Participant A's payment is 100.

▶ <u>Participant B's payment</u>:

- If Participant B makes a purchase:

$$100 + 70 - price$$

If Participant B does not make a purchase, his payment is 100.

▶ <u>Participant C's payment</u>:

100 – sum of individual losses

where the *sum of individual losses* is the sum of the individual losses for a Participant C resulting from all products that are exchanged.

<u>Note</u>: if all six Participants B purchase a product with the smallest possible individual loss (0) for Participants C or do not purchase a product, Participants C's payment is 100; if all six Participants B purchase a product with the largest possible individual loss (10) for each Participant C, Participant C's payment is 40.

To summarize: Part II is identical to Part I.

Do you have any further questions? If yes, please raise your hand. We will come to you at your workplace. Otherwise, we ask you to click the "OK" button.

Instructions for Part II

A. THE MARKET GAME

As previously announced, the market activity remains the same in Part II.

► **Participants A** are sellers. At the beginning of each period, each Participant A makes an offer to sell a product. To do so, he has to determine the price and the type (i.e. the total loss for Participant C) of the product he would like to offer.

► **Participants B** are buyers. Each Participant B can then choose to buy one product from one of the Participants A, or can choose not to buy a product.

► **Participants C** can neither sell nor buy, but they can incur losses due to the transactions between Participants A and B.

Your role in Part II is the same as it was in Part I.

B. PAYMENTS OF PARTICIPANTS

In Part II, the way payments are determined is different than in Part I.

In each period, each Participant A and each Participant C initially receives an endowment of 100 points as in Part I. But the endowments of the Participants B now change. Specifically, each Participant B now receives an initial endowment of 200 points in each period.

The payments of Participant A (seller), Participant B (buyer), and Participant C in a period are thus determined as follows:

▶ <u>Participant A's payment</u>:

100 + quantity sold x (price - production cost)

where the production cost, between 20 and 30, depends on the type of product offered, as shown in Table 1.

Note: if no Participant B accepts Participant A's sales offer, Participant A's payment is 100.

▶ <u>Participant B's payment</u>:

- If Participant B makes a purchase:

$$200 + 70 - price$$

If Participant B does not make a purchase, his payment is 200.

▶ <u>Participant C's payment</u>:

100 – sum of individual losses

where the *sum of individual losses* is the sum of the individual losses for a Participant C resulting from all products that are exchanged.

<u>Note</u>: if all six Participants B purchase a product with the smallest possible individual loss (0) for Participants C or do not purchase a product, Participants C's payment is 100; if all six Participants B purchase a product with the largest possible individual loss (10) for each Participant C, Participant C's payment is 40.

To summarize: Part II is identical to Part I except that the initial endowments of Participants B are higher.

Do you have any further questions? If yes, please raise your hand. We will come to you at your workplace. Otherwise, we ask you to click the "OK" button.

Instructions for Part II

A. THE MARKET GAME

As previously announced, the market activity remains the same in Part II.

► **Participants A** are sellers. At the beginning of each period, each Participant A makes an offer to sell a product. To do so, he has to determine the price and the type (i.e. the total loss for Participant C) of the product he would like to offer.

► **Participants B** are buyers. Each Participant B can then choose to buy one product from one of the Participants A, or can choose not to buy a product.

► **Participants C** can neither sell nor buy, but they can incur losses due to the transactions between Participants A and B.

Your role in Part II is the same as it was in Part I.

B. PAYMENTS OF PARTICIPANTS

In Part II, the way payments are determined is different than in Part I.

In each period, each Participant A and each Participant C initially receives an endowment of 100 points as in Part I. But the endowments of the Participants B now change. Specifically, each Participant B now receives an initial endowment of 400 points in each period.

The payments of Participant A (seller), Participant B (buyer), and Participant C in a period are thus determined as follows:

▶ <u>Participant A's payment</u>:

100 + quantity sold x (price - production cost)

where the production cost, between 20 and 30, depends on the type of product offered, as shown in Table 1.

Note: if no Participant B accepts Participant A's sales offer, Participant A's payment is 100.

▶ <u>Participant B's payment</u>:

- If Participant B makes a purchase:

If Participant B does not make a purchase, his payment is 400.

▶ <u>Participant C's payment</u>:

100 – sum of individual losses

where the *sum of individual losses* is the sum of the individual losses for a Participant C resulting from all products that are exchanged.

<u>Note</u>: if all six Participants B purchase a product with the smallest possible individual loss (0) for Participants C or do not purchase a product, Participants C's payment is 100; if all six Participants B purchase a product with the largest possible individual loss (10) for each Participant C, Participant C's payment is 40.

To summarize: Part II is identical to Part I except that the initial endowments of Participants B are higher.

Do you have any further questions? If yes, please raise your hand. We will come to you at your workplace. Otherwise, we ask you to click the "OK" button.

Instructions for Part II

A. THE MARKET GAME

As previously announced, the market activity remains the same in Part II.

► **Participants A** are sellers. At the beginning of each period, each Participant A makes an offer to sell a product. To do so, he has to determine the price and the type (i.e. the total loss for Participant C) of the product he would like to offer.

► **Participants B** are buyers. Each Participant B can then choose to buy one product from one of the Participants A, or can choose not to buy a product.

► **Participants C** can neither sell nor buy, but they can incur losses due to the transactions between Participants A and B.

Your role in Part II is the same as it was in Part I.

B. PAYMENTS OF PARTICIPANTS

In Part II, the way payments are determined is different than in Part I.

In each period, each Participant A and each Participant C initially receives an endowment of 100 points as in Part I. But the endowments of some Participants B now change. Specifically, four Participants B now each receive an initial endowment of 100 points and two Participants B now each receive an initial endowment of 400 points. The endowment that a particular Participant B receives will be randomly determined and will be the same for all of Part II. Each Participant B will be informed about the amount of their initial endowment on their screen once Part II begins.

The payments of Participant A (seller), Participant B (buyer), and Participant C in a period are thus determined as follows:

Participant A's payment:

100 + quantity sold x (price - production cost)

where the production cost, between 20 and 30, depends on the type of product offered, as shown in Table 1.

Note: if no Participant B accepts Participant A's sales offer, Participant A's payment is 100.

Participant B's payment:

If Participant B initially receives 100:

• If Participant B makes a purchase:

100 + 70 - price

• If Participant B does not make a purchase, his payment is *100*.

If Participant B initially receives 400:

• If Participant B makes a purchase:

• If Participant B does not make a purchase, his payment is 400.

Participant C's payment:

100 – sum of individual losses

where the *sum of individual losses* is the sum of the individual losses for a Participant C resulting from all products that are exchanged.

<u>Note</u>: if all six Participants B purchase a product with the smallest possible individual loss (0) for Participants C or do not purchase a product, Participants C's payment is 100; if all six Participants B purchase a product with the largest possible individual loss (10) for each Participant C, Participant C's payment is 40.

To summarize: Part II is identical to Part I except that the initial endowments of some Participants B are higher.

Do you have any further questions? If yes, please raise your hand. We will come to you at your workplace. Otherwise, we ask you to click the "OK" button.

Comprehension questions

► <u>Question 1</u>

(To answer this question, it might help to compare it to Example 1.)

Assume that a Participant A (seller) offers a product with a combined loss of 48 points (i.e., an individual loss of 8 points) at the price of 40 and **all six** Participants B (buyers) accept this offer. How high are the payments to that Participant A, to each Participant B, and to each Participant C?

• Payment to that Participant A

Remember that Participants A's payments are given by:

100 + *quantity sold x (price – production cost)*

Your answer _____

• Payment to each Participant B

Remember that Participants B's payments from making a purchase are given by:

$$100 + 70 - price$$

Your answer _____

• <u>Payment to each Participant C</u>

Remember that Participants C's payments are given by:

100 – sum of individual losses

► <u>Question 2</u>

(To answer this question, it might help to compare it to Example 1)

Assume that a Participant A (seller) offers a product with a combined loss of 30 points (i.e. an individual loss of 5 points) at the price of 40 and **four** Participants B (buyers) accept this offer. Assume that the other **two** Participants B reject all offers. How high are the payments to that Participant A, to each of the four Participants B who accept this offer, and to each Participant C?

• <u>Payment to that Participant A</u>:

Remember that Participants A's payments are given by:

100 + quantity sold x (price – production cost)

Your answer _____

• Payment to each of the four Participants B who accept the offer:

Remember that Participants B's payments from making a purchase are given by:

$$100 + 70 - price$$

Your answer _____

• <u>Payment to each Participant C</u>: Remember that Participants C's payments are given by:

100 – sum of individual losses

► <u>Question 3</u>

(To answer this question, it might help to compare it to Example 2.)

Assume that **four** Participants B (buyers) accept an offer for a product with a combined loss of 6 points (i.e. an individual loss of 1 point). The remaining **two** Participants B accept an offer for a product with a combined loss of 42 points (i.e. an individual loss of 7 points). How high are the payments to each Participant C?

• <u>Payment to each Participant C</u>: Remember that Participants C's payments are given by:

100 – sum of individual losses

Your answer _____

► <u>Question 4</u>

(To answer this question, it might help to compare it to Example 2.)

Assume that **one** Participant B (sellers) accepts an offer for a product with a combined loss of 18 points (i.e. an individual loss of 3 points). The **five** remaining Participants B accept an offer for a product with a combined loss of 42 points (i.e. an individual loss of 7 points) C. How high are the payments to each Participant C?

• <u>Payment to each Participant C</u>: Remember that Participants C's payments are given by:

100 – sum of individual losses

► <u>Question 5</u>

Assume that **none** of the Participants A sells any products. How high are the payments to each Participant A, to each Participant B, and to each Participant C?

• Payment to each Participant A:

Remember that Participants A's payments are given by:

100 + *quantity sold x (price – production cost)*

Your answer _____

• Payment to each Participant B:

Remember that Participants B's payments are given by:

- if Participant B makes a purchase: 100 + 70 price
- if Participant B does not make a purchase: 100

Your answer _____

• <u>Payment to each Participant C</u>: Remember that Participants C's payments are given by:

100 – sum of individual losses

G. Experimental Instructions for Study 2

In the following, we provide the instructions for Part I, and the instructions for Part II for the treatments *Baseline*, *High* (*consumers*) and *High* (*consumers* & *firms*).

General instructions

We are pleased to welcome you to this economic study.

Please read the following instructions carefully. You can—depending on your decisions and/or those of the other participants—earn money in addition to the **15 Swiss francs** that you receive as an initial participation payment. It is thus very important that you read the instructions carefully.

This study will have **two parts**. Part I lasts 10 periods and Part II lasts 20 periods. The entire study will thus last for **30 periods**.

In addition to the initial participation payment of 15 Swiss francs, you will be paid your earnings from <u>one</u> randomly selected period. That is, the computer will randomly select one period out of 30 at the end of the study to count for payment. Since you do not know which period the computer will randomly select, you must consider your decisions in each of the 30 periods very carefully.

During the study, we will typically not refer to Swiss francs, but instead to "points." The points you earn during the study will be converted to Swiss francs at the end of the study. The following conversion rate applies:

6 points = 2 Swiss francs

At the end of today's study, you will receive your payment in cash.

We will explain **the exact procedures for Part I on the next pages**. You will receive instructions about all changes, if any, to the procedures prior to the start of Part II. *Note that the decisions taken in Part I of the study do not influence the procedures for Part II.*

Communication with the other participants is strictly forbidden during the study. Violation of this rule will lead to exclusion from the study and loss of all payments.

For the sake of simplicity, we will always use male forms of pronouns for participants; the instructions obviously also refer to female participants.

A. THE MARKET ACTIVITY

In all periods in Parts I and II, you will participate in the same market activity, described below.

► <u>Market participants</u>

There are two types of participants in this study: Participants A and B. **Participants A are sellers** and **Participants B are buyers.**

The participants are divided into groups of 12 people. There are **six** Participants A (sellers) and **six** Participants B (buyers) in each group.

You will see whether you are Participant A or B on your screen at the beginning of the study. Your role as Participant A or B will remain the same during the entire study.

► <u>Donation</u>

Participants A and B can influence the size of a donation that will be made at the end of this study. Specifically, for each 12-person group (six participants A and six participants B), we generated a donation of 360 points to an organization called *Carbon Offsets To Alleviate Poverty* (COTAP). This organization supports certified forestry projects in under-developed countries, which help reduce CO₂ in the atmosphere and create life-changing income for the world's poorest people. More details about COTAP's mission are provided in Section C below. The initial size of this donation, 360 points, is the same for each group. However, the size of the actual donation made may change based on the choices of the 6 participants A and 6 participants B in your group, as explained in the instructions below.

► <u>Market products</u>

In the market activity, different types of products can be exchanged, i.e., sold and bought. The **type of product** refers to a **reduction**, or loss, that exchanging that particular type of product imposes on the size of the donation. A product only creates a reduction in the donation when it is sold by a Participant A (seller) to a Participant B (buyer).

Each possible type of product produces a particular reduction in the size of the donation, as shown in **Table 1**. The reduction produced by each type of product is between 0 and 60. For instance, one type of product (shown at the top) produces a reduction of 60 points from the total donation for your group. A different type of product (shown at the bottom) produces no reduction from the total donation for your group. Other types of products produce different reductions from the size of the donation, as shown in Table 1.

Each type of product entails a production cost for Participant A when the product is sold. The

production cost is **between 20 and 40 points** and **depends on the type of product**. Lower production costs imply higher reductions in the size of the donation. Specifically, each decrease in the production cost of 2 point induces a 6-point reduction to the donation. **Table 1** shows the exact production cost for each type of product.

All products are **worth 70 points** to Participants B (buyers) when they are bought, regardless of what type of product it is.

Please take a moment to look over the following table carefully. It is important for understanding how earnings in this study are determined.

Type of product (reduction to the donation produced by this product)	Production cost
Reduction to the donation of 60	20
Reduction to the donation of 54	22
Reduction to the donation of 48	24
Reduction to the donation of 42	26
Reduction to the donation of 36	28
Reduction to the donation of 30	30
Reduction to the donation of 24	32
Reduction to the donation of 18	34
Reduction to the donation of 12	36
Reduction to the donation of 6	38
Reduction to the donation of 0	40

Table 1: Types of products and corresponding production costs

► <u>Market procedures</u>

• Each **Participant A** (seller) can make **one sales offer** in each period, by entering it on the following screen:

What type of product do you want to sell?	 Product with reduction to the donation of 60 (Cost=20) Product with reduction to the donation of 54 (Cost=22) Product with reduction to the donation of 48 (Cost=24) Product with reduction to the donation of 42 (Cost=26) Product with reduction to the donation of 36 (Cost=28) Product with reduction to the donation of 30 (Cost=30) Product with reduction to the donation of 24 (Cost=32) Product with reduction to the donation of 18 (Cost=34) Product with reduction to the donation of 12 (Cost=36) Product with reduction to the donation of 6 (Cost=38) Product with reduction to the donation of 0 (Cost=40)
At what price do you offer the produ	ct?
	ок

More specifically, each Participant A must indicate:

- <u>The type of product he would like to offer</u>. To do this, he must click on the corresponding type of product.
- <u>The price of the product</u>. The corresponding number must be entered in the box. The price may be any integer between the production cost of the chosen product up to a maximum of 70.

Once a Participant A has made his decisions, he must click on the OK button at the bottom right of the screen. *Note that the type of product and the price can be changed until the OK button is clicked.*

Once all six Participants A have made their sales offers, they will be informed about the sales offers (price and type of product) made by all Participants A. This information will be on a screen like the one below:

Price	Type of product	Quantity of products sold
This is where Participants A see the price of the product for	This is where Participants A see the type of product for every sales offer	This is where Participants A see the quantity of products
every sales offer		sold for every sales offer

A participant's own sales offer is always marked in blue. In the column on the right, Participants A will see how many Participants B (buyers) accept each of the offers, i.e. the quantity of the product sold by each of the six Participants A.

Each Participant B will make his decision by selecting from one of the six offers, or deciding not to purchase a product. A maximum of 6 products can thus be sold in a given period. These products can be sold by the same or by different Participants A. Therefore, each Participant A can sell between 0 and 6 products in a period.

Once all Participants B have made their decisions, each Participant A will learn the payments of all Participants A. Participants A will also be informed about each Participant B's purchasing decisions and payments. Finally, Participants A will learn the amount of the reduction imposed on the donation due to the product(s) sold.

• Each **Participant B** (buyer) can decide whether or not to accept at most one offer. In each period, they can see the six sales offers on a screen like the one below:

Price	Type of product	
This is where Participants B see the price of the product for every sales offer	This is where Participants B see the type of product for every sales offer	
		ACCEPT DO NOT ACCEPT AN OFFER

The prices appear in the left column of the table, and the types of products appears in the right column. Each offer is always in a separate row.

- <u>If a Participant B wants to accept an offer</u>, he must first click on the corresponding row. The marked row will then appear with a blue background. In order to accept the offer marked in blue, Participant B must click on the ACCEPT button. *Note that the choice of offer can be changed until the ACCEPT button is clicked*.
- <u>If a Participant B does not want to accept any offer</u>, he must click on the DO NOT ACCEPT AN OFFER button. *Note that even if a row had already been marked, all offers will be declined if the DO NOT ACCEPT AN OFFER button is clicked*. When a buyer does not purchase a product, there <u>is no reduction to the size of the</u> donation.

When all Participants B have made their decisions, each Participant B will learn of his own payment and the corresponding reduction to the amount of the donation based on his decision.

When all Participants A and B have made their decisions, they will all learn the total reduction imposed on the size of the donation of 360 points, and thus the total amount donated to COTAP in their group. The size of the donation is entirely dependent on the decisions of Participants A and B as it depends on the type of products exchanged: Each time a product is exchanged, the donation is reduced by the amount corresponding to that product type, which is between 0 and 60 points. Since up to 6 products can be exchanged, the total amount of the reduction to the size of the donation for the group is between 0 and 360 points.

After all participants have been informed about their payments in a period, the next period will begin.

Note that, during each period, you will see a timer in the top right corner of your screen. Please use the time indicated by the timer to make your decision.

B. PAYMENTS OF PARTICIPANTS

In each period, each Participant A and Participant B initially receives an endowment of **100 points**. The payments in points of Participant A (seller) and Participant B (buyer) in a period are then determined as follows:

► <u>Participant A's payment</u>:

100 + quantity sold X (price - production cost)

where the production cost, between 20 and 40, depends on the type of product offered, as shown in Table 1.

Note: if no Participant B accepts Participant A's sales offer, A's payment is 100.

▶ <u>Participant B's payment</u>:

- If Participant B makes a purchase:

- If Participant B does not make a purchase, his payment is *100*.

C. DONATION

In each period, a donation to COTAP equal to 360 points is generated for your group. The size of the actual donation can change based on the types of products exchanged.

The mission of COTAP is to empower individuals and organizations in developed countries to address both **climate change** and **global poverty**. COTAP counteracts carbon emissions through certified forestry projects in under-developed regions, which create transparent, accountable, and life-changing earnings for rural farming communities where income levels are less than \$2 per day.

COTAP sources carbon offset funds from those who care about both climate change and poverty alleviation, pools those funds, and transparently matches those funds with their partners' forestry projects in order to fill the forestry carbon finance gap, restore landscapes, and create direct, significant, verifiable, and lasting benefits for the most economically vulnerable people in the world.

Through COTAP, you are paying smallholder farmers in developing countries for planting and maintaining trees, which capture and store your CO2 emissions. A donation of 6 points (= CHF 2) offsets 0.2 tons of carbon dioxide (CO₂), or 200 Kg of CO₂.

► <u>The total amount donated for your group</u>:

360 – combined losses to the donation

where the *combined losses to the donation* equals the sum of the reductions to the donation resulting from all products that are exchanged.

<u>Note</u>: if all six Participants B purchase a product with the smallest possible reduction (0) for the donation or do not purchase a product, the total amount donated will equal **360** (CHF 120); if all six Participants B purchase a product with the largest possible reduction (60) for the donation, the total amount donated will equal $\boldsymbol{\theta}$ (CHF 0).

Remember that you will be paid your earnings from <u>one</u> randomly selected period. This selected period will also determine the actual donation that is made to COTAP.

At the end of today's session, you will have the possibility to request that we send you a receipt confirming the precise donation that we will make on behalf of your group to COTAP. To do so, you will be prompted to type in your e-mail address and we will send you a dated receipt indicating the donated amount. Thus, you can verify that COTAP actually receives the money donated on behalf your group. Your e-mail will not be used for any other purposes and will not be stored with the data from this study.

D. EXAMPLES

► <u>Example 1</u>

Assume that a Participant A (seller) offers a product with a reduction to the donation of 30 points at the price of 40 and **all six** Participants B (buyers) accept this offer. The following payments will result:

- A product with a reduction of 30 points costs 30 points to produce (see Table 1 on Page 3). <u>The Participant A's payment</u> is thus equal to: 100 + quantity sold X (price - production cost) = 100 + 6 X (40 - 30) = 160
- Each Participant B purchased a product. Therefore, <u>each Participant B's payment</u> is equal to:

100 + 70 - price = 100 + 70 - 40 = 130

When a product with a reduction of 30 points is sold, the donation is reduced by 30 points. Since six products are sold, the combined losses for the donation are equal to 180 points (6 X 30). The total amount donated is thus equal to:
 360 - combined losses = 360 - 6 X 30 = 360 - 180 = 180.

The total amount donated for the group thus equals CHF 60.

Example 2

Assume that **four** Participants B (buyers) accept an offer for a product with a reduction of 18 points. The remaining **two** Participants B accept an offer for a product with a reduction of 42 points. Here we focus on the total amount donated.

When a product with a reduction of 18 points is sold, the donation is reduced by 18 points. Since four products of this type are sold, the sum of the reductions to the size of the donation for these products is equal to 72 points (4×18).

In addition, when a product with a loss of 42 points is sold, the donation is reduced by 42 points. Since two products of this type are sold, the sum of the reductions to the size of the donation for these products is equal to 84 points (2 X 42).

The combined loss to the donation is thus equal to:

 $360 - combined \ losses = 360 - (4 \ X \ 18) - (2 \ X \ 42) = 360 - 72 - 84 = 204.$

The total amount donated for the group thus equals CHF 68.

Instructions for Part II

A. THE MARKET GAME

As previously announced, the market activity remains the same in Part II.

▶ **Participants A** are sellers. At the beginning of each period, each Participant A makes an offer to sell a product. To do so, he has to determine the price and the type (i.e., the reduction to the donation) of the product he would like to offer.

► **Participants B** are buyers. Each Participant B can then choose to buy one product from one of the Participants A, or can choose not to buy a product.

Your role in Part II is the same as it was in Part I.

Participants A and B can influence the size of the donation that will be made to COTAP at the end of this study. As in Part I, the initial size of this donation, 360 points, is the same for each group.

B. PAYMENTS OF PARTICIPANTS

In Part II, the way payments are determined by the market activity is the same as in Part I.

In each period, each Participant A and Participant B initially receives an endowment of 100 points as in Part I.

The payments of Participant A (seller) and Participant B (buyer) in a period are thus determined as follows:

Participant A's payment:

100 + quantity sold X (price - production cost)

where the production cost, between 20 and 40, depends on the type of product offered, as shown in Table 1.

Note: if no Participant B accepts Participant A's sales offer, Participant A's payment is 100.

▶ <u>Participant B's payment</u>:

If Participant B makes a purchase:

$$100 + 70 - price$$

If Participant B does not make a purchase, his payment is *100*.

C. DONATION

In Part II, the way donations are determined by the market activity is the same as in Part I.

In each period, a donation to COTAP equal to 360 points is generated for your group. The size of the actual donation can change based on the types of products exchanged.

► <u>The total amount donated for your group</u>:

360 – combined losses to the donation

where the *combined losses to the donation* equals the sum of the reductions to the donation resulting from all products that are exchanged.

To summarize: Part II is identical to Part I.

Do you have any further questions? If yes, please raise your hand. We will come to you at your workplace. Otherwise, we ask you to click the "OK" button.
Instructions for Part II

A. THE MARKET GAME

As previously announced, the market activity remains the same in Part II.

▶ **Participants A** are sellers. At the beginning of each period, each Participant A makes an offer to sell a product. To do so, he has to determine the price and the type (i.e., the reduction to the donation) of the product he would like to offer.

► **Participants B** are buyers. Each Participant B can then choose to buy one product from one of the Participants A, or can choose not to buy a product.

Your role in Part II is the same as it was in Part I.

Participants A and B can influence the size of the donation that will be made to COTAP at the end of this study. As in Part I, the initial size of this donation, 360 points, is the same for each group.

B. PAYMENTS OF PARTICIPANTS

In Part II, the way payments are determined is the same as in Part I, except for one change.

In each period, each Participant A initially receives an endowment of 100 points as in Part I. But the endowments of the Participants B is now different than in Part I. Specifically, each Participant B now receives an initial endowment of 400 points in each period.

The payments of Participant A (seller) and Participant B (buyer) in a period are thus determined as follows:

▶ <u>Participant A's payment</u>:

100 + quantity sold X (price - production cost)

where the production cost, between 20 and 40, depends on the type of product offered, as shown in Table 1.

Note: if no Participant B accepts Participant A's sales offer, Participant A's payment is 100.

▶ <u>Participant B's payment</u>:

- If Participant B makes a purchase:

400 + 70 - price

If Participant B does not make a purchase, his payment is 400.

C. DONATION

In Part II, the way donations are determined by the market activity is the same as in Part I.

In each period, a donation to COTAP equal to 360 points is generated for your group. The size of the actual donation can change based on the types of products exchanged.

► <u>The total amount donated for your group</u>:

360 – combined losses to the donation

where the *combined losses to the donation* equals the sum of the reductions to the donation resulting from all products that are exchanged.

To summarize: Part II is identical to Part I except that the initial endowments of Participants B are higher.

Do you have any further questions? If yes, please raise your hand. We will come to you at your workplace. Otherwise, we ask you to click the "OK" button.

Instructions for Part II

A. THE MARKET GAME

As previously announced, the market activity remains the same in Part II.

▶ **Participants A** are sellers. At the beginning of each period, each Participant A makes an offer to sell a product. To do so, he has to determine the price and the type (i.e., the reduction to the donation) of the product he would like to offer.

► **Participants B** are buyers. Each Participant B can then choose to buy one product from one of the Participants A, or can choose not to buy a product.

Your role in Part II is the same as it was in Part I.

Participants A and B can influence the size of the donation that will be made to COTAP at the end of this study. As in Part I, the initial size of this donation, 360 points, is the same for each group.

B. PAYMENTS OF PARTICIPANTS

In Part II, the way payments are determined is the same as in Part I, except for one change.

The endowments of each Participant A and Participant B are now different than in Part I. Specifically, each Participant A and Participant B now receives an initial endowment of 400 points in each period. The payments of Participant A (seller) and Participant B (buyer) in a period are thus determined as follows:

Participant A's payment:

400 + quantity sold X (price - production cost)

where the production cost, between 20 and 40, depends on the type of product offered, as shown in Table 1.

Note: if no Participant B accepts Participant A's sales offer, Participant A's payment is 400.

▶ <u>Participant B's payment</u>:

- If Participant B makes a purchase:

400 + 70 - price

- If Participant B does not make a purchase, his payment is 400.

C. DONATION

In Part II, the way donations are determined by the market activity is the same as in Part I.

In each period, a donation to COTAP equal to 360 points is generated for your group. The size of the actual donation can change based on the types of products exchanged.

► <u>The total amount donated for your group</u>:

360 – combined losses to the donation

where the *combined losses to the donation* equals the sum of the reductions to the donation resulting from all products that are exchanged.

To summarize: Part II is identical to Part I except that the initial endowments of Participants A and B are higher.

Do you have any further questions? If yes, please raise your hand. We will come to you at your workplace. Otherwise, we ask you to click the "OK" button.

Comprehension questions

► <u>Question 1</u>

(To answer this question, it might help to compare it to Example 1.)

Assume that a Participant A (seller) offers a product with a reduction to the donation of 48 points at the price of 40 and **all six** Participants B (buyers) accept this offer. How high are the payments to that Participant A and to each Participant B? How many points are donated to COTAP?

• Payment to that Participant A

Remember that Participants A's payments are given by:

```
100 + quantity sold x (price – production cost)
```

Your answer _____

• Payment to each Participant B

Remember that Participants B's payments from making a purchase are given by:

100 + 70 - price

Your answer _____

• Total amount donated

Remember that the total amount donated is equal to:

360 – combined losses

► <u>Question 2</u>

(To answer this question, it might help to compare it to Example 1)

Assume that a Participant A (seller) offers a product with a reduction to the donation of 30 points at the price of 40 and **four** Participants B (buyers) accept this offer. Assume that the other **two** Participants B reject all offers. How high are the payments to that Participant A and to each of the four Participants B who accept this offer? How many points are donated to COTAP?

• <u>Payment to that Participant A</u>:

Remember that Participants A's payments are given by:

```
100 + quantity sold x (price – production cost)
```

Your answer _____

• Payment to each of the four Participants B who accept the offer:

Remember that Participants B's payments from making a purchase are given by:

$$100 + 70 - price$$

Your answer _____

• Total amount donated

Remember that the total amount donated is equal to:

360 – combined losses

► <u>Question 3</u>

(To answer this question, it might help to compare it to Example 2.)

Assume that **four** Participants B (buyers) accept an offer for a product with a reduction to the donation of 6 points. The remaining **two** Participants B accept an offer for a product with a reduction to the donation of 42 points. How many points are donated to COTAP?

• <u>Total amount donated</u>

Remember that the total amount donated is equal to:

360 – combined losses

Your answer _____

► <u>Question 4</u>

(To answer this question, it might help to compare it to Example 2.)

Assume that **one** Participant B (buyers) accepts an offer for a product with a reduction to the donation of 18 points. The **five** remaining Participants B accept an offer for a product with a reduction to the donation of 42 points. How many points are donated to COTAP?

• Total amount donated

Remember that the total amount donated is equal to:

360 – combined losses

► <u>Question 5</u>

Assume that **none** of the Participants A sells any products. How high are the payments to each Participant A and to each Participant B? How many points are donated to COTAP?

• Payment to each Participant A:

Remember that Participants A's payments are given by:

100 + *quantity sold x (price – production cost)*

Your answer _____

• Payment to each Participant B:

Remember that Participants B's payments are given by:

- if Participant B makes a purchase: 100 + 70 price
- if Participant B does not make a purchase: 100

Your answer _____

• Total amount donated

Remember that the total amount donated is equal to:

360 – combined losses

H. Experimental Instructions for Study 3

For Firms

Welcome to this Research Study

Study Overview: This study takes about 10 minutes to complete. It has been approved by the University of Zurich, Switzerland. Your participation does not pose any risks to your health or well-being. The information gathered in this study is kept strictly anonymous and will never be associated with your identity.

Payment: You will receive a participation payment of \$2 for completing this study. Additionally, you may earn a bonus payment, based on choices you and others make during the study. The bonus payment will be paid within the next 10 working days.

General Rules: Please read all instructions carefully. This study requires your full attention, so please find a quiet space and do not engage in other activities or conversations during the study.

Comprehension Checks: On the following screens, there will be three comprehension checks. If you fail any comprehension checks, you will be ineligible to receive a bonus payment from this study.

Agreement: By continuing, you are acknowledging that you understand the above information and give your consent to participate in the study. Participation in this study is voluntary. You may withdraw your consent and discontinue participation in the study at any time.

If you choose not to participate, please click "I do NOT want to participate" at the bottom of this page. If you want to participate, please answer the following questions correctly and then choose "I want to participate".

1. Given the instructions above, what is the fixed participation payment that you receive for completing the study?

\$0.50		
\$1.00		
\$1.25		
\$1.50		
\$2.00		

2. Given the instructions above, about how many minutes does it take to complete the study?

2 minutes	
5 minutes	
10 minutes	
15 minutes	
20 minutes	

Do you want to participate in this study?

I do NOT want to participate	
I want to participate	

Study Description

This study involves a market in which 10 sellers and 20 buyers can exchange products. The products are hypothetical, but buyers and sellers can generate real bonus payments by exchanging products.

You are a seller. Your task is to select prices for the products you offer.

Buyers, who are recruited from Prolific in the same way as you and the other sellers, will see prices for products and decide which products to buy.

This study also generates a donation to a charity, "Carbon Offsets to Alleviate Poverty" (COTAP), that supports forestry projects that reduce CO2 in the atmosphere and provide earnings for low-income rural farming communities. If you wish to learn more about COTAP, click here: [https://cotap.org/mission/].

The researchers set aside an initial amount for donation to the charity. **Exchanging certain types of products in the market reduces the final amount actually donated.** You will have the opportunity to see the final donation amount and a proof of the donation after the conclusion of the study.

Your Task, Bonus Payments and Impact on Charity

Each seller must set prices for two types of products:

- · "Product that does not impact the donation"
- · "Product that reduces the donation by 10 cents"

You will see a production cost for each type of product. Your bonus payment increases by the price minus the production cost whenever a buyer purchases one of your products.

Only the seller who sets the lowest price for a product type can sell that product type in the market, with ties resolved at random. Thus, you can only earn a bonus payment if you set the lowest price for one or both product types.

Each buyer receives a budget for buying products. Buyers will see the lowest price for each product type and must decide how to allocate their budget between the two product types. For every unit of product that a buyer purchases, the buyer's bonus payment increases by 15 cents, regardless of the product type.

Recall that there is an initial amount set aside for donation to the charity. For every "Product that reduces the donation by 10 cents" purchased by a buyer, the final donation to the charity will decrease by \$0.10.

Please answer the following three comprehension checks correctly to be eligible for a bonus payment.

Comprehension Check 1: What happens to the donation made to the charity every time a "Product that does not impact the donation" is exchanged between a buyer and a seller?

Exchanging this product has <u>no impact</u> on the donation

Every unit of this product exchanged increases the donation by 10 cents

Every unit of this product exchanged decreases the donation by 10 cents

Comprehension Check 2: What happens to the donation made to the charity every time a "Product that reduces the donation by 10 cents" is exchanged between a buyer and a seller?

Exchanging this product has no impact on the donation

Every unit of this product exchanged increases the donation by 10 cents

Every unit of this product exchanged decreases the donation by 10 cents

Comprehension Check 3: Which of the following statements is true (select one):

Only a seller who sets the $\underline{highest\ price}$ for a product type will have the opportunity to sell that product to buyers

Only a seller who sets the $\underline{\mathsf{lowest}\,\mathsf{price}}$ for a product type will have the opportunity to sell that product to buyers

Sellers will always be $\underline{picked} \ at \ random$ to have the opportunity to sell products to buyers, regardless of the prices they set



→

Stage 1

This study has three stages. In each stage, you will set prices for both types of products in different versions of the market. At the end of the study, we will randomly pick one market to determine your bonus payment.

In Stage 1, the production costs of the two product types will vary across versions of the market.

Recall that there are 10 sellers (including you) and 20 buyers. All sellers in a market have the same production cost for a given product type. All buyers have the same budget, which is between 50 cents (\$0.50) and 350 cents (\$3.50), but you do not know the actual budget available to buyers.

The price you set for a product type must not exceed 15 cents, the value to a buyer, and must not be lower than the production cost for that product type.

Remember that you can only earn a bonus payment if you set the lowest price for one or both product types. However, if you set a price equal to the production cost, you cannot earn a bonus payment for that product because the price minus the production cost equals zero.

Stage 1: Market 1 / 4

The production costs of each product type are as follows:

- "Product that does not impact the donation:" Production cost of 8 cents (\$0.08)
- "Product that reduces the donation by 10 cents (\$0.10):" Production cost of 6 cents (\$0.06)

We now ask you to set your prices. Recall that you can only earn a bonus payment if you set the lowest price for a product type and if that price is above the corresponding production cost.

My price for the "Product that does not impact the donation:" cents
My price for the "Product that reduces the donation by 10 cents:" cents

Stage 1: Market 2 / 4

The production costs of each product type are as follows:

- "Product that does not impact the donation:" Production cost of 10 cents (\$0.10)
- "Product that reduces the donation by 10 cents (\$0.10):" Production cost of 8 cents (\$0.08)

We now ask you to set your prices. Recall that you can only earn a bonus payment if you set the lowest price for a product type and if that price is above the corresponding production cost.

My price for the	"Product that does not impact the donation:"	cents
My price for the	"Product that reduces the donation by 10 cents:"	cents

Stage 1: Market 3 / 4

The production costs of each product type are as follows:

- "Product that does not impact the donation:" Production cost of 12 cents (\$0.12)
- "Product that reduces the donation by 10 cents (\$0.10):" Production cost of 8 cents (\$0.08)

We now ask you to set your prices. Recall that you can only earn a bonus payment if you set the lowest price for a product type and if that price is above the corresponding production cost.

My price for the "Product that does not impact the donation:" cents

My price for the "Product that reduces the donation by 10 cents:" cents

←

Stage 1: Market 4 / 4

The production costs of each product type are as follows:

- "Product that does not impact the donation:" Production cost of 10 cents (\$0.10)
- "Product that reduces the donation by 10 cents (\$0.10):" Production cost of 6 cents (\$0.06)

We now ask you to set your prices. Recall that you can only earn a bonus payment if you set the lowest price for a product type and if that price is above the corresponding production cost.

My price for the "Product that does not impact the donation:" cents

My price for the "Product that reduces the donation by 10 cents:" cents



Stage 2

Recall that in Stage 1 you only knew that the buyers' budgets were between 50 cents (\$0.50) and 350 cents (\$3.50).

In Stage 2, you will know the buyers' exact budgets before setting prices for the two product types. The buyers' budgets will vary across versions of the market.

Stage 2: Market 1 / 2

All buyers have the same budget, which is exactly 350 cents (\$3.50).

The production costs of each product type are as follows:

- "Product that does not impact the donation:" Production cost of 8 cents (\$0.08)
- "Product that reduces the donation by 10 cents (\$0.10):" Production cost of 6 cents (\$0.06)

We now ask you to set your prices. Recall that you can only earn a bonus payment if you set the lowest price for a product type and if that price is above the corresponding production cost.

My price for the "Product that does not impact the donation:"

My price for the "Product that reduces the donation by 10 cents:" cents

_	•

cents

Stage 2: Market 2 / 2

All buyers have the same budget, which is exactly 50 cents (\$0.50).

The production costs of each product type are as follows:

- "Product that does not impact the donation:" Production cost of 8 cents (\$0.08)
- "Product that reduces the donation by 10 cents (\$0.10):" Production cost of 6 cents (\$0.06)

We now ask you to set your prices. Recall that you can only earn a bonus payment if you set the lowest price for a product type and if that price is above the corresponding production cost.

My price for the "Product that does not impact the donation:"		cents
My price for the "Product that reduces the donation by 10 cents:	"	cents

Stage 3

Recall that in Stages 1 and 2, markets consisted of 10 sellers-you and 9 other sellers-and 20 buyers.

In Stage 3, there are only two sellers in each market—you and one other seller. There are again 20 buyers in each market.

As in Stage 2, you will know the buyers' exact budgets before setting prices for the two product types. The buyers' budgets will vary across versions of the market.

_	<u>.</u>

Stage 3: Market 1 / 2

All buyers have the same budget, which is exactly 350 cents (\$3.50).

The production costs of each product type are as follows:

- "Product that does not impact the donation:" Production cost of 8 cents (\$0.08)
- "Product that reduces the donation by 10 cents (\$0.10):" Production cost of 6 cents (\$0.06)

We now ask you to set your prices. Recall that you can only earn a bonus payment if you set the lowest price for a product type and if that price is above the corresponding production cost.

Recall that, unlike in earlier stages, **there is now only one other seller** who sets prices for the two product types.

My price for the "Product that does not impact the donation:" cents

My price for the "Product that reduces the donation by 10 cents:" cents

Stage 3: Market 2 / 2

All buyers have the same budget, which is exactly 50 cents (\$0.50).

The production costs of each product type are as follows:

- "Product that does not impact the donation:" Production cost of 8 cents (\$0.08)
- "Product that reduces the donation by 10 cents (\$0.10):" Production cost of 6 cents (\$0.06)

We now ask you to set your prices. Recall that you can only earn a bonus payment if you set the lowest price for a product type and if that price is above the corresponding production cost.

Recall that, unlike in earlier stages, **there is now only one other seller** who sets prices for the two product types.

My price for the "Product that does not impact the donation:" cents

My price for the "Product that reduces the donation by 10 cents:" cents

←

End of Study

Thank you for your participation in this study. If you earn a bonus payment as a result of your choices, you will receive it through Prolific in the next 10 working days.

If you would like to see the final donation amount, how it was determined, and a proof of the donation after the conclusion of the study, please send an e-mail to <u>studycontactproof@gmail.com</u> with the subject, "COTAP Donation Prolific Study." You will receive information on the donation once we conclude the study.

For Consumers

Welcome to this Research Study

Study Overview: This study takes about 10 minutes to complete. It has been approved by the University of Zurich, Switzerland. Your participation does not pose any risks to your health or well-being. The information gathered in this study is kept strictly anonymous and will never be associated with your identity.

Payment: You will receive a participation payment of \$2 for completing this study. Additionally, you may earn a bonus payment, based on choices you and others make during the study. The bonus payment will be paid within the next 10 working days.

General Rules: Please read all instructions carefully. This study requires your full attention, so please find a quiet space and do not engage in other activities or conversations during the study.

Comprehension Checks: On the following screens, there will be three comprehension checks. If you fail any comprehension checks, you will be ineligible to receive a bonus payment from this study.

Agreement: By continuing, you are acknowledging that you understand the above information and give your consent to participate in the study. Participation in this study is voluntary. You may withdraw your consent and discontinue participation in the study at any time.

If you choose not to participate, please click "I do NOT want to participate" at the bottom of this page. If you want to participate, please answer the following questions correctly and then choose "I want to participate".

1. Given the instructions above, what is the fixed participation payment that you receive for completing the study?

\$0.50			
\$1.00			
\$1.25			
\$1.50			
\$2.00			

2. Given the instructions above, about how many minutes does it take to complete the study?

2 minutes	
5 minutes	
10 minutes	
15 minutes	
20 minutes	

Do you want to participate in this study?

I do NOT want to participate

I want to participate

-+

Stage 1 – Work task

This study involves two stages. You will first complete Stage 1 and will then receive new instructions for Stage 2.

Stage 1 consists of a work task, in which you will solve 10 math problems (e.g., "23 x 5 = ?"). You can proceed to Stage 2 only after successfully answering all 10 problems.

For completing this work task in Stage 1, you will receive a budget that will allow you to increase your bonus payment in Stage 2. The exact amount of this budget will be randomly determined. In Stage 2 you will make decisions for various amounts, one of which is the randomly determined budget that determines your bonus payment.

Please click "Continue" to proceed to the work task.



Stage 1 - Work task

Please solve the following 10 math problems. Once you have entered the answers for all 10 math problems, click the arrow to verify whether your answers are correct.



Overview of Stage 2

Stage 2 involves a market in which participants in the roles of buyers and sellers exchange products. The products are hypothetical, but buyers and sellers generate real bonus payments by exchanging products.

You are a buyer. Your task is to decide how to use your budget to buy products.

Sellers, who were recruited from Prolific in the same way as you, set prices for products that you can choose to buy.

This study also generates a donation to a charity, "Carbon Offsets to Alleviate Poverty" (COTAP), that supports forestry projects that reduce CO2 in the atmosphere and provide earnings for low-income rural farming communities. If you wish to learn more about COTAP, click here: [https://cotap.org/mission/].

The researchers set aside an initial amount for donation to the charity. Exchanging certain types of products in the market reduces the final amount actually donated. You will have the opportunity to see the final donation amount and a proof of the donation after the conclusion of the study.

Your Task, Bonus Payments and Impact on Charity

Recall that you receive a budget for the work task in Stage 1.

In the market, you must decide how to spend your budget on two types of products:

- "Product that reduces the donation by 10 cents"
- "Product that does not impact the donation"

For each product type, you will see a price. The prices for the two product types were set by sellers, who can earn bonus payments by selling their products.

For every unit of product that you purchase, your bonus payment increases by 15 cents, regardless of the product type.

Your budget determines how many products of each type you can buy at the given prices. For example, suppose that your budget is 150 cents, one product type costs 6 cents, and the other product type costs 10 cents. Then, in this example, you could buy:

- 25 units of the first product (150 cents divided by 6 cents) and 0 of the second product,
- 15 units of the second product (150 cents divided by 10 cents) and 0 of the first product,
- or any other combination of the two products within your budget.

Recall that there is an initial amount set aside for donation to the charity. For every "Product that reduces the donation by 10 cents" that you purchase, the final donation to the charity will decrease by \$0.10.

Please answer the following three comprehension checks correctly to be eligible for a bonus payment.

Comprehension Check 1: What happens to the donation made to the charity for every unit you buy of the "Product that does not impact the donation"?

Buying this product has no impact on the donation

Buying this product increases the donation by 10 cents

Buying this product decreases the donation by 10 cents

Comprehension Check 2: What happens to the donation made to the charity for every unit you buy of the "Product that reduces the donation by 10 cents"?

Buying this product has <u>no impact</u> on the donation

Buying this product increases the donation by 10 cents

Buying this product decreases the donation by 10 cents

Comprehension Check 3: How does your bonus payment increase when you purchase one unit of a product?

It depends on the type of product I purchase

Regardless of the type of product, my bonus increases by 15 cents for every unit of a product I purchase

Regardless of the type of product, my bonus increases by 10 cents for every unit of a product I purchase



Making Choices in the Market

Stage 2 consists of 20 markets, arranged into sets of markets. The prices of the two product types can vary across the markets within a set.

You will have a different budget available in each set of markets. Your budget will not change within a set.

In each market, you will choose a combination of products by moving a slider to determine how you allocate your budget between the two product types.

At the end of the study, we will randomly select one of the 20 markets. Your choice in this market will determine your bonus payment and your impact on the donation.



Set 1

Set 1 consists of 4 markets.

In all the markets in Set 1, your budget will be 50 cents (\$0.50).

Set 1, Market 1 / 4

In Set 1, your budget is 50 cents (\$0.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 7 cents (\$0.07)
- "Product that does not impact the donation:" Price of 9 cents (\$0.09)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" **xx%** Your earnings in this market: **xx cents** Reduction of the donation to charity: **xx cents** Units of the "Product that reduces the donation by 10 cents:" **x.x** Units of the "Product that does not impact the donation:" **x.x**



Set 1, Market 2 / 4

In Set 1, your budget is 50 cents (\$0.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 7 cents (\$0.07)
- "Product that does not impact the donation:" Price of 10 cents (\$0.10)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 1, Market 3 / 4

In Set 1, your budget is 50 cents (\$0.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 9 cents (\$0.09)
- "Product that does not impact the donation:" Price of 11 cents (\$0.11)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x



Set 1, Market 4 / 4

In Set 1, your budget is 50 cents (\$0.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 9 cents (\$0.09)
- "Product that does not impact the donation:" Price of 13 cents (\$0.13)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 2

Set 2 consists of 4 markets.

In all the markets in Set 2, your budget will be 150 cents (\$1.50).

80

Set 2, Market 1 / 4

In Set 2, your budget is 150 cents (\$1.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 7 cents (\$0.07)
- "Product that does not impact the donation:" Price of 10 cents (\$0.10)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" **xx%** Your earnings in this market: **xx cents** Reduction of the donation to charity: **xx cents** Units of the "Product that reduces the donation by 10 cents:" **x.x** Units of the "Product that does not impact the donation:" **x.x**

Set 2, Market 2 / 4

In Set 2, your budget is 150 cents (\$1.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 9 cents (\$0.09)
- "Product that does not impact the donation:" Price of 11 cents (\$0.11)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x



Set 2, Market 3 / 4

In Set 2, your budget is 150 cents (\$1.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 9 cents (\$0.09)
- "Product that does not impact the donation:" Price of 13 cents (\$0.13)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 2, Market 4 / 4

In Set 2, your budget is 150 cents (\$1.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 7 cents (\$0.07)
- "Product that does not impact the donation:" Price of 9 cents (\$0.09)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" **xx%** Your earnings in this market: **xx cents** Reduction of the donation to charity: **xx cents** Units of the "Product that reduces the donation by 10 cents:" **x.x** Units of the "Product that does not impact the donation:" **x.x**

Set 3

Set 3 consists of 4 markets.

In all the markets in Set 3, your budget will be 250 cents (\$2.50).

Set 3, Market 1 / 4

In Set 3, your budget is 250 cents (\$2.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 7 cents (\$0.07)
- "Product that does not impact the donation:" Price of 10 cents (\$0.10)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 3, Market 2 / 4

In Set 3, your budget is 250 cents (\$2.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 7 cents (\$0.07)
- "Product that does not impact the donation:" Price of 9 cents (\$0.09)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 3, Market 3 / 4

In Set 3, your budget is 250 cents (\$2.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 9 cents (\$0.09)
- "Product that does not impact the donation:" Price of 13 cents (\$0.13)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

 \square

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

->

Set 3, Market 4 / 4

In Set 3, your budget is 250 cents (\$2.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 9 cents (\$0.09)
- "Product that does not impact the donation:" Price of 11 cents (\$0.11)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 4

Set 4 consists of 4 markets.

In all the markets in Set 4, your budget will be 350 cents (\$3.50).

85

Set 4, Market 1 / 4

In Set 4, your budget is 350 cents (\$3.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 7 cents (\$0.07)
- "Product that does not impact the donation:" Price of 10 cents (\$0.10)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" **xx%** Your earnings in this market: **xx cents** Reduction of the donation to charity: **xx cents** Units of the "Product that reduces the donation by 10 cents:" **x.x** Units of the "Product that does not impact the donation:" **x.x**

Set 4, Market 2 / 4

In Set 4, your budget is 350 cents (\$3.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 9 cents (\$0.09)
- "Product that does not impact the donation:" Price of 13 cents (\$0.13)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 4, Market 3 / 4

In Set 4, your budget is 350 cents (\$3.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 7 cents (\$0.07)
- "Product that does not impact the donation:" Price of 9 cents (\$0.09)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 4, Market 4 / 4

In Set 4, your budget is 350 cents (\$3.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 9 cents (\$0.09)
- "Product that does not impact the donation:" Price of 11 cents (\$0.11)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 5

Set 5 consists of 2 markets.

In all the markets in Set 5, your budget will be 350 cents (\$3.50).

Set 5, Market 1 / 2

In Set 5, your budget is 350 cents (\$3.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 14 cents (\$0.14)
- "Product that does not impact the donation:" Price of 10 cents (\$0.10)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 5, Market 2 / 2

In Set 5, your budget is 350 cents (\$3.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 7 cents (\$0.07)
- "Product that does not impact the donation:" Price of 9 cents (\$0.09)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation	Product not impacting donation
Your share of the "Product that does NOT impact the donation:" $xx\%$	
Your earnings in this market: xx cents	
Reduction of the donation to charity: xx cents	
Units of the "Product that reduces the donation by 10 cents:" x.x	
Units of the "Product that does not impact the donation:" x.x	

Set 6

Set 6 consists of 2 markets.

In all the markets in Set 6, your budget will be 50 cents (\$0.50).

Set 6, Market 2 / 2

In Set 6, your budget is 50 cents (\$0.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 7 cents (\$0.07)
- "Product that does not impact the donation:" Price of 9 cents (\$0.09)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" xx% Your earnings in this market: xx cents Reduction of the donation to charity: xx cents Units of the "Product that reduces the donation by 10 cents:" x.x Units of the "Product that does not impact the donation:" x.x

Set 6, Market 1 / 2

In Set 6, your budget is 50 cents (\$0.50).

In this market, the prices of both product types are as follows:

- "Product that reduces the donation by 10 cents (\$0.10):" Price of 12 cents (\$0.12)
- "Product that does not impact the donation:" Price of 10 cents (\$0.10)

Please choose how many units of the "product that reduces the donation by 10 cents" and how many units of the "product that does not impact the donation" you want to purchase, by clicking on the slider below. The numbers below the slider will update to show your earnings and impact on the charity.

Product reducing donation

Product not impacting donation

Your share of the "Product that does NOT impact the donation:" **xx%** Your earnings in this market: **xx cents** Reduction of the donation to charity: **xx cents** Units of the "Product that reduces the donation by 10 cents:" **x.x** Units of the "Product that does not impact the donation:" **x.x**

Final Question

What was your household's total income over the past 12 months? Income includes wages, salary, commissions, bonuses, tips, interest and dividend payments, as well as self-employment income.



Final screen

Thank you for your participation in this study. You will receive the bonus payment, which results from your choices, through Prolific in the next 10 working days.

If you would like to see the final donation amount, how it was determined, and a proof of the donation after the conclusion of the study, please send an e-mail to studycontactproof@gmail.com with the subject, "COTAP Donation Prolific Study." You will receive information on the donation once we conclude the study.