Market Prices as a Moral Currency*

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Abstract

People's respect for occupations closely tracks income. Why do these moral judgments get outsourced to the market? This paper combines surveys and experiments to test the hypothesis that people wish to allocate respect according to occupations' contributions to the common good but face value uncertainty: it is difficult to place different work on a common value scale. Incomes, by contrast, offer a simple common currency that people may use to infer social contribution. In surveys spanning 250+ occupations, respect is strongly correlated with perceived social contribution, which in turn tracks income. Randomized wage information has larger effects on social contribution judgments when respondents are less familiar with an occupation's work, for instance because it lies further upstream in production networks. A market experiment offers causal evidence by manipulating value uncertainty: market earnings and prices shape perceived contributions substantially less strongly when work is expressed in a common currency. These findings suggest that, due to value uncertainty, market prices do not only coordinate production but also shape perceptions of moral worth. In a simple equilibrium model, this mechanism reverses the classic role of recognition as a compensating differential, thus amplifying labor misallocation towards high-paying jobs.

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That wealth and greatness are often regarded with the respect and admiration which are due only to wisdom and virtue ... has been the complaint of moralists in all ages.
Adam Smith, The Theory of Moral Sentiments, 1759

Not everything that's countable counts and not everything that counts is countable.
William Bruce Cameron, 1963

1 Introduction

An active social science literature argues that what matters to people is not just how much money they have but also how much respect or social esteem they receive.[1] This is relevant because there is large inequality in respect across different occupations (e.g., Ridgeway, 2014; Lamont, 2018). For example, Fukuyama (2018) and Sandel (2020) argue that inequality in the respect accorded to different kinds of work produces resentment and undermines the functioning of civil society.

Going back to classical thinkers such as Aristotle, Rousseau and Hegel, a prominent view in moral and political philosophy holds that the amount of respect an individual or occupation receives *should*, at least in part, reflect their contributions to the common good (e.g., Walzer, 1983; Sandel, 2005; Feldman and Skow, 2015). Here, contributions are understood to include everything that's valuable, from producing something useful to inventing a new product to offering services desired by others. For example, the work of an engineer may be more or less socially useful than that of a teacher.

Yet, if respect is (or should be) allocated based on perceived contributions to the common good, then what drives people's perceptions of who contributes? Going back to Adam Smith, multiple observers have noted that, empirically, perceived contributions and / or respect appear to track market outcomes such as incomes and wages (e.g., Ridgeway, 1991; Sandel, 2020). Indeed, an influential observation in sociology and philosophy is that market outcomes tend to get moralized in how they shape judgments about an individual's worth.[2] Sandel (2020) even argues that modern societies implicitly *equate* moral value and market value. Of course, the idea that respect and perceived contributions track incomes has a direct counterpart in neoclassical marginal-product theory, according to which market economies *do* produce a link between income and marginal social contributions (e.g., Clark, 1908; Mankiw, 2013).

[1] A widely-accepted distinction in philosophy is between *recognition respect* and *appraisal respect* (Darwall, 1977). The former captures the basic respect and dignity all humans are believed to deserve by virtue of being human. Appraisal respect, on the other hand, is respect accorded as a function of someone's qualities, character, conduct, or ability. In this paper, I study appraisal respect.

[2] In an influential review in sociology, Fourcade and Healy (2007) note that "prices and money carry particular information about the moral status and social positions of [market] participants." In philosophy, Fraser (2014) argues that market-based systems link market success with social worth.

At the same time, there are also good reasons why respect or perceived contributions might not track incomes. After all, a voluminous literature in philosophy argues that markets do not reward people fairly for their contributions (e.g. Olsaretti, 2004). Even economists have rejected a link between income and (perceived) contributions, either based on principled reason (Knight, 1923) or by pointing out that there are systematic differences between laypeople's and experts' understandings of basic market mechanisms (e.g., Caplan, 2002). Moreover, even modern neoclassical theory makes an ambiguous prediction because the respect derived from high perceived contributions can be viewed as a non-wage amenity that allows employers to pay lower wages and produces compensating differentials in equilibrium.

To quantify the potential links between income, perceived contributions and respect, I implemented two surveys. In a first, I asked respondents how much respect they think people in different occupations deserve for their work. Column (1) of Table 1 shows that, across 259 occupations, (log) median income in an occupation is significantly correlated with average respect ($r = 0.31$). This correlation also holds when controlling for workforce characteristics such as the share with a college degree.

However, this income 'effect' becomes substantially smaller or even disappears when controlling for an occupation's average perceived contribution. I ran a second survey asking a different set of respondents how much they think the work done by different occupations contributes to society as a whole. Strikingly, average respect and average perceived contributions exhibit a correlation of $r = 0.81$ even when they are elicited from different respondents, seemingly in line with the idea in philosophy that respect should track perceived contributions (compare the difference in R^2 between columns (1) and (3) in Table 1). Moreover, as shown in columns (4)–(5), this correlation partly or fully accounts for the income-respect link. Indeed, as columns (6)–(7) clarify, perceived contributions are themselves significantly correlated with median incomes ($r = 0.26$).

This paper asks: *why* do we seem to "outsource" moral judgments about others' worth to the market? And, how does this mechanism help us to understand the aggregate links between income, perceived contributions and labor allocations across occupations?

The central idea is that such outsourcing partly reflects *value uncertainty*: uncertainty about the relative contributions of different occupations. I take a broad interpretation of the origins of such evaluative uncertainty—it may arise because some occupations are highly unfamiliar, because some contributions are only accessible in qualitative rather than quantitative terms, because people do not know what they deem socially useful, because they find different types of contributions incommensurable, or because they cannot identify marginal contributions in the presence of production complementarities.

Regardless of the precise origins, at the core is a lack of measurability of social contributions. For instance, it is arguably non-trivial to put contributions as distinct as those

Table 1: Average respect, average perceived contributions and income across occupations

	Dependent variable: Occupation average...						
	Respect					Perc. contrib.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log median income	9.00***	14.14***		3.05***	0.67	10.29***	22.49***
	(1.81)	(2.76)		(1.11)	(1.59)	(2.26)	(3.82)
Average perceived contribution			0.60***	0.58***	0.60***		
			(0.03)	(0.03)	(0.03)		
Share with a college degree		-7.25**			4.11**		-18.96***
		(3.44)			(1.95)		(4.83)
Share female		4.90*			3.44**		2.44
		(2.51)			(1.61)		(3.62)
Share of Whites		0.06			0.04		0.02
		(0.07)			(0.04)		(0.10)
Average age		-0.37**			-0.00		-0.61***
		(0.14)			(0.09)		(0.20)
R^2	0.09	0.13	0.66	0.67	0.69	0.07	0.15
Observations	259	259	259	259	259	259	259

Notes. OLS estimates, robust standard errors in parentheses. An observation is an occupation. Average respect and average perceived contributions to society are measured in two separate surveys (*Respect-noinc* and *Contribution-noinc)* described in Section 3, on scales from 0 to 100. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

of an engineer and a teacher on a quantitative common subjective value scale. If social value is measured in output space, is an engineer's design drawing for a new bridge more or less valuable than a teacher's output of increasing the PISA math scores of 50 fourth-graders by three points? If social value is assessed in input space (perhaps akin to the labor theory of value), is the intellectual effort an engineer invests more or less valuable than a teacher's pedagogical skill and resilience in enduring noise?

Philosophers have long recognized this "incommensurability of value" (see Chang, 1997, for an overview). Prices, on the other hand, in a very literal sense bring different goods into a quantitative common currency that facilitates simple comparisons. To paraphrase William Bruce Cameron's opening quote, incomes may not count but are countable, whereas work contributions count but are not countable. People may thus rely on the simple common currency of market prices as a signal of social value and moral worth.

Model. To structure this idea and derive testable predictions, I present a simple general equilibrium model in which workers care about both money and the public's perception of their occupation's (marginal) social value. Social value is given by the sum of a market component and a non-market component (e.g., an externality). The agents in the model observe others' income, which—given competitive markets—reflects the market component of social value. Moreover, the agents observe a noisy signal of the total social value of each occupation's work, where the magnitude of noise reflects the degree of value uncertainty.

In this setup, I show that perceived contributions to the common good increase in random variation in income (i.e., variation that holds total contributions fixed). Most importantly, this income effect increases in the magnitude of value uncertainty.

Moreover, the model also sheds light on the (endogenous) across-occupation correlation between income and perceived contributions in equilibrium. Here, the positive causal income effect that operates through value uncertainty counteracts the standard labor economics effect that the esteem from higher perceived contributions acts as an amenity, which lowers wages in equilibrium. When value uncertainty is low, the latter effect dominates, such that income and perceived social contributions are negatively correlated (e.g., Frank, 2010). When value uncertainty is sufficiently large, on the other hand, the correlation becomes positive, thus potentially rationalizing the correlations in Table 1. I further show that value uncertainty also increases labor misallocation in equilibrium because it motivates people to enter high-paying occupations in order to benefit from the esteem that high perceived contributions provide. Thus, in this model, value uncertainty partly endogenizes the income-chasing effect of social recognition that many social scientists have emphasized (e.g., Frank, 1985; Fershtman et al., 1996).

Through two separate exercises, I test the model's main prediction that the strength of the income effect on perceived contributions increases in value uncertainty. First, through (motivating) surveys that randomize income information but rely on endogenous variation in respondents' value uncertainty across different occupations. Second, through a controlled main experiment in which I exogenously manipulate value uncertainty.

Motivating survey evidence. I elicit from 1,258 respondents how much they think the work done by people in different occupations contributes to society. Participants receive information about an example wage in the occupation, which is randomized to be the 10th, 50th or 90th percentile of the wage distribution. The hypothesis is that—looking within occupations—perceived social contributions respond more strongly to exogenous variation in perceived incomes when value uncertainty is higher. To quantify value uncertainty, I run a separate survey in which a different set of respondents rates how familiar they are with what people in an occupation do and how their work adds value to society.

The survey results show that perceived contributions increase in the exogenously-induced within-occupation variation in perceived incomes. Looking at heterogeneity, this income effect is most pronounced among respondents with above-median incomes.

Crucially from the perspective of this paper's research question, the income effect is significantly more pronounced for occupations about which value uncertainty is higher (about 90% larger for occupations with above- vs. below-average value uncertainty).

I provide some evidence on the determinants of value uncertainty. Based on Antràs et al. (2012), I construct an index of how 'upstream' the average worker in an occupation is. The idea is that when a social contribution is very indirect—it is hidden deep inside the economy's production network—, it is less easily recognized, producing greater value uncertainty. Consistent with this idea, I find that the upstream-ness index strongly predicts the survey-based measure of value uncertainty. Moreover, the upstream-ness measure predicts the strength of the income effect on perceived social contributions in much the same way as the survey-based measure.

Experimental evidence. Complementing this correlational survey analysis, the paper's main experiment traces the effect of exogenous manipulations of value uncertainty on the link between income and perceived social contributions.

In the experiment, groups of three participants ('Producers') interact in a market. Each Producer acts as a fictional farmer who can earn money by harvesting crop. Growing crop requires three inputs (soil, fertilizer and water) in a multiplicative (log Cobb-Douglas) production function. Each Producer is assigned to a different laborious work task through which they can produce one of the three required inputs. For instance, one Producer may be able to produce fertilizer by positioning sliders to a certain value, a second Producer may be able to produce soil by kicking a virtual ball, and a third Producer may be able to produce water by tracking a dot on a circle.

Each Producer can only produce one input, yet given the structure of the production function they require all three inputs to earn money. The Producers thus trade whatever they've produced in a competitive call market in which prices equilibrate supply and demand. Importantly, in this market, work has clear social value and externalities: because each Producer can only produce one type of input, they must rely on the other Producers to produce the other inputs they need to grow crop.

A separate participant (called Spectator) subsequently observes the outcomes of the market interaction: (i) how many work tasks each Producer completed; (ii) how many farming inputs this produced; and (iii) the realized market earnings (gross revenue) of each Producer. The Spectators are then asked to assess how much each Producer contributed to the market group as a whole. They do so in two ways. First, as in the surveys, by navigating a Likert scale that asks them to allocate 100 points between the Producers to express who contributed how much to the group. This outcome variable is not incentivized. Second, as a more ecological outcome that is also of relevance to the Producers, the Spectators write short messages to each Producer that express how the Spectator feels about that Producer's work effort and its consequences for the other Producers. The main advantages of this outcome measure are that it is somewhat naturalistic and incentivized because some Producers receive these messages.

From the perspective of the Spectators, both the labor inputs (different effort tasks) and the outputs (soil, water, fertilizer) are potentially difficult to compare, plausibly giving rise to value uncertainty. A first hypothesis is thus that the Spectators' decisions rely to a significant degree on (easily comparable) market earnings, rather than purely on the work completed by the Producers.

To study the causal effect of value uncertainty, I introduce two treatment manipulations. Both of these treatments manipulate the ease of comparability of the work done by the Producers. First, I study a treatment in which all Producers work on the same laborious work task, yet they still produce three different farming inputs that get traded in the market. The motivating idea behind this treatment is that the direct comparability of the self-imposed workloads makes it easier for the Spectators to assess work-related contributions to the group, thus reducing the need to rely on market earnings as a proxy for social contributions. The alternative hypothesis, of course, is that the Spectators rely on market earnings for reasons that have nothing to do with value uncertainty and comparability (such as social status or envy).

In a second treatment manipulation, the Producers all work on different work tasks, yet the Spectators observe the work completed by each Producer not on their original scale (e.g. number of sliders positioned) but expressed in terms of their typical completion time. While completion time is surely not a perfect measure of work contribution (some work tasks may be easier and / or more productive than others), it provides some comparability on a common 'value' scale, thus plausibly reducing value uncertainty and the need to rely on market earnings as a signal of contribution.

I find that the Spectators assign higher perceived contributions to Producers who have higher earnings in the market, holding fixed their work effort. Of course, in itself, this correlation isn't direct evidence for a role of value uncertainty.

Yet, directly testing the main research question, I find that these income effects are more pronounced when value uncertainty is exogenously higher. For example, the positivity of the Spectators' messages to the Producers responds less strongly to market earnings when the comparability of the work efforts is higher because they are expressed in the same currency. This is the case both in the treatment in which all Producers work on the same type of laborious task and in the treatment in which the work completed is expressed in terms of its average completion time. The quantitative magnitude of these effects is large. For example, on average, making the work contributions comparable cuts the regression coefficient of log market earnings in half.

In general, I do not take a stand on whether the implicit reliance on market earnings is a bias-producing heuristic or, rather, constrained-optimal given the presence of value uncertainty. However, given that the objective function for crop production is experimentally induced, I can analyze whether the Spectators rely *too much* on the market price. Under some assumptions, perceived contributions should not at all respond to variation in earnings that is induced by variation in prices. In the data, however, prices exert a strong effect on social contribution judgments, and this effect weakens substantially when the work efforts are experimentally induced to be more comparable.

Contributions and related literature. This paper speaks to the discussion about why the respect or esteem that is derived from perceived contributions is partly conferred based on incomes even when these do not necessarily track social contributions (e.g., Sandel, 2020). This issue has garnered great interest among social scientists because social fractures appear to be tied to a pronounced sense of disrespect (e.g., Fukuyama, 2018). The main contribution of this paper to this discussion is to highlight that high incomes produce perceived contributions (or respect) because it is difficult to place different work on a common value scale.[3] This is potentially related to Hayek's (1945) classic defense of the price system, which relies on the idea that prices efficiently aggregate dispersed factual information about preferences and scarcity. The argument presented here extends this insight to the moral domain. When individuals lack not only factual knowledge but also don't know what to value, market prices may (rationally or heuristically) resolve uncertainty about collective value.

This insight also sheds some light on the positive cross-sectional correlation between income and perceived contributions. To document this link, this paper is one of the first to measure the perceived social contribution of different occupations,[4] thus contributing to the vibrant economics literature on using surveys to study people's perceptions (e.g., Kuziemko et al., 2015; Stantcheva, 2023).

The general idea that people care a great deal about how much respect, recognition and esteem they receive has attracted much attention in the literature (e.g. Frank, 1985; Bénabou and Tirole, 2006; Bénabou and Henkel, 2025; Ellingsen and Johannesson, 2007). One line of this work focuses on the economic implications of the idea that people strategically take certain decisions to influence the inferences others draw about them, in contexts ranging from education to labor force participation to voting (e.g., DellaVigna et al., 2016; Bursztyn et al., 2018, 2025; Macchi, 2023; Braghieri, 2024). Another line highlights implications of pay transparency (e.g., Perez-Truglia, 2020; Bottan and Perez-Truglia, 2022). Dube et al. (2022) document that many Walmart workers would be willing to pay non-trivial amounts of money to receive more respect in the workplace.

Broadly related is also the literature on markets and morals recently reviewed by Weber (2025). This work studies whether market interactions affect values, using a com-

[3]A growing empirical literature studies the broad idea of value uncertainty (e.g., Butler and Loomes, 2007; Enke and Graeber, 2023; Augenblick et al., 2025), albeit in contexts that are very different from the one studied here. Chang et al. (2024) provide evidence that people overweight dimensions in which attributes are quantitative rather than qualitative. In my setting, different contributions appear to be partly incomparable even when all dimensions are quantitative because they live in different 'currencies.' Kamenica (2008) presents a model in which people learn their preferences from market prices.

[4]A sociology study on the UK elicits similar constructs (Newlands and Lutz, 2024). That paper also finds a high correlation between survey measures of occupational prestige and occupational social value.

bination of models (e.g., Tabellini, 2008), lab experiments (e.g., Hamman et al., 2010; Falk and Szech, 2013; Bartling et al., 2015; Weber and Zhang, 2023), field experiments (Jha and Shayo, 2019), and cross-cultural studies (e.g. Henrich et al., 2010; Enke, 2023).

Section 2 lays out a simple model. Section 3 presents the surveys and Section 4 the market experiments. Section 5 concludes.

2 Theoretical Framework and Predictions

I first lay out a simple rational-expectations general equilibrium model that illustrates how value uncertainty mediates the link between income[5] and perceived social contribution.[6] Because the main outcomes in the experiments and surveys are judgments of social contribution, I do not model the respect it may generate.[7] In the model, contributions are defined as social products and markets are competitive, which renders incomes informative about social contributions. For instance, traditional meritocratic "just-deserts" theories (e.g., Mankiw, 2013) argue that market outcomes are morally justified because they reflect individuals' productive contributions. Below in Section 2.5 I discuss how market prices may serve as heuristic signals of worth also when moral worth is not given by social products and / or when people are not fully rational.

As will become clear below, the model differs from the setup of the main market experiment in that workers choose *which* occupation to work in rather than *how much*. The upside of this approach is that the model not only sheds light on the causal impact of income on perceived contributions but also speaks to the broader cross-sectional correlations discussed in the Introduction, and resulting implications for labor misallocation.

2.1 Setup

Occupations and technology. There are two occupations $j \in \{1, 2\}$ and a unit mass of workers. Output in occupation j is $a_j L_j - \frac{b}{2} L_j^2$ with $b > 0$, so competitive wages equal marginal private products,

$$w_j = a_j - bL_j. \tag{1}$$

[5] I do not argue that market prices are the *only* quantity used, implicitly or explicitly, to infer social worth. Many occupations have quantitative markers that may be used to assess contributions within that occupation—for example, journal rankings or citation counts for scientists—but such markers are difficult to use in comparisons across occupations. Income, by contrast, provides a common currency.

[6] While the model defines 'contributions' in output space, philosophers also view labor inputs as contributions—a person might deserve respect either because they are talented and productive, or because they worked hard and made a meaningful contribution relative to their disadvantaged circumstances (e.g., Feinberg, 1970; Miller, 2001).

[7] Respect may depend on income not only through perceived social contribution, but also through channels such as status, admiration, envy, or resentment, making its modeling and analysis more complicated. For instance, Table 1 shows that income continues to be (weakly) correlated with respect also conditional on perceived contributions.

In addition, each worker in occupation j generates unpriced external social value v_j (positive or negative). The marginal social contribution of a worker in j is therefore

$$C_j = a_j - bL_j + v_j = w_j + v_j. \tag{2}$$

Fundamentals are mutually independent, both across occupations and between a_j and v_j. I assume $a_j \sim \mathbb{N}(\mu_a, \sigma_a^2/2)$ and $v_j \sim \mathbb{N}(\mu_v, \sigma_v^2/2)$. Because only cross-occupation differences matter, write $\Delta x \equiv x_1 - x_2$ for any variable and let $\sigma_x^2 \equiv \mathrm{Var}(\Delta x)$.

Preferences and labor supply. Worker i in occupation j receives

$$U_{ij} = w_j + \lambda P_j + \zeta_{ij}, \qquad 0 < \lambda < 1,$$

where P_j is the perceived social contribution of occupation j, defined below as the public's perception of C_j, and ζ_{ij} is an idiosyncratic taste for working in occupation j. Workers differ in these tastes: the difference $\zeta_{i1} - \zeta_{i2}$ is distributed uniformly on $[-h, h]$ with $h > 0$, independently of fundamentals and signals. Taste dispersion is what gives aggregate labor supply a finite slope: the more alike workers' tastes, the more sensitive the allocation is to differences in pay and perceived contribution.

Each worker chooses the occupation with the higher utility, so occupation 1 attracts exactly those workers with $\zeta_{i1} - \zeta_{i2} > -(\Delta w + \lambda \Delta P)$. Hence[8]

$$L_1 = \frac{1}{2} + \frac{\Delta w + \lambda \Delta P}{2h}, \qquad \text{equivalently} \qquad h\,\Delta L = \Delta w + \lambda\,\Delta P, \tag{3}$$

which says that the marginal worker is just indifferent between the two occupations.

Information and perceived contributions. The public does not observe (a_j, v_j). It observes two signals about each occupation:

$$\begin{aligned} &\textit{income signal:} \quad && y_j = w_j + u_j, \qquad && u_j \sim \mathbb{N}(0, \sigma_u^2/2) \\ &\textit{contribution signal:} \quad && s_j = C_j + \varepsilon_j, \qquad && \varepsilon_j \sim \mathbb{N}(0, \sigma_\varepsilon^2/2). \end{aligned}$$

[8] With Gaussian fundamentals, $|\Delta w + \lambda \Delta P|$ exceeds h with positive probability, in which case every worker would choose the same occupation and the expression for L_1 would leave $[0, 1]$; in the constrained model Bayesian posteriors would also reflect possible corner states even at interior realizations. Following the linear-quadratic-Gaussian tradition, I interpret ΔL as a local allocation index around the symmetric benchmark; the model characterizes local deviations, not global behavior. Relatedly, the unconditional moments in Propositions 2 and 4 integrate over this Gaussian, including realizations at which the linear supply rule would leave $[0, 1]$. They are to be read as the usual linear-quadratic-Gaussian approximations, exact in the limit of large taste dispersion h relative to σ_a and σ_v.

The income signal is a noisy observation of the occupation's pay. For ease of exposition, I here analyze the case of $\sigma_u^2 = 0$, meaning that income is perfectly observed. Appendix A.7 works out the general case. The comparative static that the empirical work targets is unchanged. The two cross-sectional results continue to hold provided the income signal is not too noisy relative to the dispersion in unpriced social value; Appendix A.7 gives the exact condition, which is implied by the condition under which the income-contribution correlation is negative at $\sigma_\varepsilon^2 = 0$ in the first place.

The observer also learns about the total contribution from inspecting the work itself—what people in the occupation do, what they produce, and how society benefits. Its noise σ_ε^2 is value uncertainty: the difficulty of placing work on a common value scale.

An occupation's perceived contribution is the public's posterior expectation of the marginal social contribution given the common information set $\Omega = \{y_1, y_2, s_1, s_2\}$,

$$P_j = \mathbb{E}\left[\, C_j \mid \Omega \,\right]. \tag{4}$$

Because primitives are symmetric and independent across occupations, differences in perceived contributions depend only on signal differences, $\Delta P = \mathbb{E}[\Delta C \mid \Delta y, \Delta s]$.

2.2 Equilibrium

Definition 1. *A (linear rational-expectations) equilibrium is a labor allocation, wages, and a perceived contributions function such that (i) labor supply satisfies* (3)*; (ii) wages satisfy* (1)*; (iii) P_j satisfies* (4)*, with beliefs consistent with the equilibrium mapping.*

Lemma 1 (Equilibrium)**.** *There exists a unique linear rational-expectations equilibrium. Define*

$$\theta \equiv \frac{h}{h+b}, \qquad \beta_y \equiv \frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + \sigma_v^2}.$$

The equilibrium is the joint solution of

$$\Delta L = \frac{\Delta a + \lambda \Delta P}{h+b}, \qquad \Delta w = \theta \Delta a - (1-\theta)\lambda \Delta P, \qquad \Delta P = \beta_y \Delta w + (1-\beta_y)\Delta s, \tag{5}$$

giving

$$\begin{aligned}
\Delta P^{eq} &= \frac{\theta\, \Delta a + \big(1-\beta_y\big)\big(\Delta v + \Delta\varepsilon\big)}{1+(1-\theta)\lambda}, \\
\Delta w^{eq} &= \frac{\theta\, \Delta a - (1-\theta)\lambda\big(1-\beta_y\big)\big(\Delta v + \Delta\varepsilon\big)}{1+(1-\theta)\lambda}, \\
\Delta L^{eq} &= \frac{(1+\lambda)\, \Delta a + \lambda\big(1-\beta_y\big)\big(\Delta v + \Delta\varepsilon\big)}{(h+b)\big(1+(1-\theta)\lambda\big)}.
\end{aligned}$$

Although equilibrium wages are correlated with unpriced social value through the compensating differential, this does not alter the posterior rule. Given the equilibrium mapping, observing (w_j, s_j) is equivalent to observing a_j and $s_j - w_j = v_j + \varepsilon_j$. Because a_j is independent of (v_j, ε_j), it contains no additional information about v_j conditional on $s_j - w_j$. Hence the income weight remains β_y.

Wages carry an *endogenous compensating differential*: a one-unit increase in relative perceived contribution lowers the relative wage by $(1-\theta)\lambda$ because it attracts workers down the demand curve, a standard non-wage amenity logic.

2.3 Changes in Income Holding Contributions Fixed

I first consider the causal effect of variation in income on perceived contributions, holding fixed true contributions.

Proposition 1 (Value uncertainty and the income effect). *Fix income and true social contribution as arguments of the perception rule and average over the direct-signal noise,*

$$\overline{P}\big(\Delta w, \Delta C\big) \equiv \mathbb{E}_{\Delta\varepsilon}\Big[\Delta P\big(\Delta w,\ \Delta C + \Delta\varepsilon\big)\Big] = \beta_y \Delta w + (1-\beta_y)\Delta C. \tag{6}$$

The causal effect of income on perceived contribution, holding true contribution fixed, is

$$\left.\frac{\partial \overline{P}\big(\Delta w, \Delta C\big)}{\partial\, \Delta w}\right|_{\Delta C} = \beta_y. \tag{7}$$

This effect is strictly increasing in value uncertainty, with $\beta_y = 0$ when $\sigma_\varepsilon^2 = 0$ and $\beta_y \to 1$ as $\sigma_\varepsilon^2 \to \infty$.

Expected perceived contributions (averaged across signal noise) are a convex combination of wages and true social contributions, where the weight on observed wages increases in value uncertainty. Perceived contributions load on income *only* because income reveals the market component of contribution; when the work itself can be assessed (σ_ε^2 small), income is redundant and receives no weight. As value uncertainty grows, the observable that is always "countable" (income) matters more. This is the main prediction the experiments and surveys laid out below are designed to test.

2.4 Endogenous Cross-Sectional Variation

The income-perceived contribution correlation. The comparative statics above gave the effect of income on perceived contributions, holding fixed true contributions. In the cross-section, however, income is an endogenous object. The sign of the endogenous across-occupation covariance between income and perceived contributions thus need not equal the positive (causal) income effect above. Indeed, recall from the discussion above that equilibrium wages themselves depend on perceived social contributions because perceived social contribution acts as a non-wage amenity and therefore generates an endogenous compensating wage differential.

Proposition 2 (Compensating differentials vs. the moral currency). *The equilibrium covariance between incomes and perceived contributions is given by*

$$\mathrm{Cov}(\Delta w^{eq}, \Delta P^{eq}) = \frac{\theta^2\sigma_a^2 - (1-\theta)\lambda \dfrac{\sigma_v^4}{\sigma_v^2+\sigma_\varepsilon^2}}{(1+(1-\theta)\lambda)^2}$$

and strictly increases in σ_ε^2. It is strictly positive as $\sigma_\varepsilon^2 \to \infty$. As long as $\lambda(1-\theta)\sigma_v^2 > \theta^2\sigma_a^2$, it is strictly negative at $\sigma_\varepsilon^2 = 0$.

If value uncertainty is small and there is sufficient variation in non-market social value v, income and perceived contributions are negatively correlated. As value uncertainty increases, people infer social contributions from income, producing a positive correlation despite the presence of the standard compensating differential effect.

Labor misallocation. Let welfare exclusive of perceived contributions utility be output plus non-market value plus the taste utility of the realized allocation. Because the aggregate taste utility of an allocation equals $-\frac{h}{4}(\Delta L)^2$ up to a constant, this is[9]

$$W(L_1, L_2) = \sum_{j=1}^{2}\left[a_j L_j - \frac{b}{2}L_j^2 + v_j L_j\right] - \frac{h}{4}(\Delta L)^2,$$

so that the first best and the equilibrium labor allocations are

$$\Delta L^{\mathrm{eff}} = \frac{\Delta a + \Delta v}{h+b}, \qquad \text{vs.} \qquad \Delta L^{\mathrm{eq}} = \frac{\Delta a + \lambda \Delta P^{eq}}{h+b}.$$

The allocation is efficient if and only if the equilibrium perceived contributions premium $\lambda\Delta P^{eq}$ replicates the unpriced externality Δv.

In this model, high incomes attract workers for two reasons, financial and higher perceived contributions utility. To assess the effects of value uncertainty on labor mismatch through the resulting 'income chasing,' I consider a compensated change in fundamentals,

$$\Delta a = q > 0, \qquad \Delta v = -q. \tag{8}$$

[9]Workers sort on tastes, so the further the allocation departs from the symmetric benchmark, the worse the average taste match of the marginal workers who have been drawn across. See Appendix A.

This change raises the market-valued component of occupation 1's productivity and lowers its unpriced component by the same amount. It therefore holds fixed the allocation-independent social return, $\Delta a + \Delta v = 0$, and leaves the efficient allocation symmetric, $\Delta L^{\text{eff}} = 0$.

However, the compositional change affects equilibrium perceived contributions and, thus, the labor allocation. To see this, note that expected perceived contributions can be expressed as a linear combination of Δa and Δv,

$$\mathbb{E}_\varepsilon\left[\Delta P^{eq}\right] = \frac{\theta\,\Delta a \;+\; \left(1-\beta_y\right)\Delta v}{1+(1-\theta)\lambda}.$$

Substituting the compositional change into this expression gives $\mathbb{E}_\varepsilon[\Delta P^{eq}] = \big(\beta_y - (1-\theta)\big)q\big/\big(1+(1-\theta)\lambda\big)$, and hence the following.

Proposition 3 (Value uncertainty and income chasing)**.** *Under the composition change* (8)*, expected entry into the higher-paying (high market productivity) occupation is*

$$\mathbb{E}_\varepsilon\left[\Delta L^{\text{eq}} - \Delta L^{\text{eff}}\right] = \frac{\left(1+\lambda\beta_y\right)q}{(h+b)\big(1+(1-\theta)\lambda\big)} \;>\; 0, \tag{9}$$

and it is strictly increasing in value uncertainty,

$$\frac{\partial}{\partial\sigma_\varepsilon^2}\mathbb{E}_\varepsilon\left[\Delta L^{\text{eq}} - \Delta L^{\text{eff}}\right] = \frac{\lambda\,q\,\sigma_v^2}{(h+b)\big(1+(1-\theta)\lambda\big)\big(\sigma_v^2+\sigma_\varepsilon^2\big)^2} \;>\; 0. \tag{10}$$

While the first part appears in several accounts (e.g. Fershtman et al., 1996), the key is the second part: greater value uncertainty raises the relative perceived contributions accorded to the better-paid (high a) occupation and therefore draws additional workers into it. Entry compresses the wage premium, but does not fully eliminate it because workers differ in their occupational tastes, so labor supply is not perfectly elastic.

Welfare. Proposition 3 conditions on a particular pair of occupations. Averaging instead over the distribution of fundamentals gives the expected welfare cost of the resulting misallocation. Since $W(\cdot)$ is a strictly concave quadratic in ΔL, this cost is

$$\text{DWL} = W\big(\Delta L^{\text{eff}}\big) - W\big(\Delta L^{\text{eq}}\big) = \frac{\big(\lambda\Delta P^{eq} - \Delta v\big)^2}{4(h+b)}.$$

Proposition 4 (Value uncertainty and deadweight loss)**.** *Let* $\Lambda \equiv \lambda\big/\big(1+(1-\theta)\lambda\big) < 1$.

Expected deadweight loss is

$$\mathbb{E}\big[\mathrm{DWL}\big] = \frac{\Lambda^2\theta^2\sigma_a^2 + \sigma_v^2\big[\,1-\Lambda(2-\Lambda)\big(1-\beta_y\big)\big]}{4(h+b)},$$

and it is strictly increasing in value uncertainty,

$$\frac{\partial\,\mathbb{E}\big[\mathrm{DWL}\big]}{\partial\,\sigma_\varepsilon^2} = \frac{\Lambda(2-\Lambda)\big(1-\beta_y\big)^2}{4(h+b)} \;>\; 0.$$

Intuitively, as value uncertainty grows, the weight $1-\beta_y$ that perceived contributions place on the non-market component falls to zero: recognition ceases to reward non-market social value, and the allocation of labor comes to be governed entirely by market income, which is socially inefficient.

2.5 Discussion

2.5.1 Summary and Link to Empirical Analyses

The model delivers four empirical implications. First, as a main comparative static, the model predicts that the effect of income on perceived social contributions—holding fixed true contributions—is increasing in value uncertainty. This is the prediction the surveys and experiments below are designed to test. In the surveys, I randomize income information within occupations, thus holding an occupation's true contributions fixed. In the experiment, subjects have full information about work effort and output; the empirical analysis leverages variation in income conditional on these contributions. As noted, one difference between the model and the market experiment is that workers do not choose an occupation but, rather, how much to work. However, this does not change the fundamental inference problem that social contributions may not be perfectly observed and that, in this case, incomes may be used as a signal.

Turning to cross-sectional implications, the model's second prediction is that, even though perceived contributions serve as a standard non-wage amenity, the cross-occupation correlation between income and perceived contributions is positive when value uncertainty is sufficiently high, thus reproducing the empirical regularity discussed in the Introduction. Third, holding social contribution fixed, value uncertainty draws labor into better-paid occupations and thus contributes to misallocation. Fourth, the welfare cost of that misallocation is itself increasing in value uncertainty.

2.5.2 Potential Sources of Value Uncertainty

I take a broad interpretation of 'value uncertainty' as reflected by σ_ε^2 in the model. (i) *Exchange rate uncertainty:* People might have a (potentially utilitarian) social welfare function with which they weight different contributions to society, but they may be uncertain about the relative weights ('exchange rate') between different contributions. For example, different contributions might be cognitively incommensurable and thus difficult to place on a common subjective value scale. (ii) *Normative ambiguity:* People may not have an internal social welfare function but exhibit normative ambiguity about how much they weight different contributions. (iii) *Output uncertainty:* People may be uncertain about what different occupations produce. Related, people may be uncertain about the marginal product of an occupation in the presence of production complementarities. (iv) *Input uncertainty:* People may partially judge the significance of a social contribution not by the output that was produced but, rather, by the input that was required to generate it. This is akin to the labor theory of value, according to which the value of a good is given by the labor required to produce it. (v) *Quantification uncertainty:* Even conditional on knowing (i) how much effort a contribution requires and (ii) what the produced output is, it may be difficult to quantify the contribution because it may be available in a qualitative rather than quantitative fashion. In the experiments and surveys reported below, multiple of these potential sources may be at play. My goal is not to tease them apart.

2.5.3 Alternative Reasons for Reliance on Income

The model laid out made two key assumptions. First, that social contributions equal marginal social products. Second, the agents in the model were fully rational and incomes objectively informative. Both of these assumptions may fail.

Many philosophers and ordinary people reject the idea that one's moral worth equals one's marginal social product. For example, a worker's marginal product is not only a product of individual effort but also reflects luck, such as the good or bad luck of being born with skills that are scarce or abundant in society. This is relevant because a large literature on fairness views documents that many people believe that others should not get rewarded for success that is due to luck (e.g., Cappelen et al., 2013; Almås et al., 2020). Under this view, income may not be objectively informative about social contributions.

However, people may heuristically infer social contributions from market prices even when moral worth does not equal the marginal social product (or when they are less than fully rational). In this case, one can think of people as "naïve neoclassical economists."

3 Motivating Survey Evidence

3.1 Design

The structure of all surveys is that participants are sequentially exposed to 30 occupations (one per screen) and make one judgment for each occupation. Across surveys, the nature of the judgment and the information available to participants varies. The 30 occupations any given participant encounters are randomly selected from a set of 259 occupations. These are all detailed occupations in the U.S. Bureau of Labor Statistics' May 2024 Occupational Employment and Wage Statistics (OEWS) that report a full wage distribution (10th, 50th, and 90th percentiles) and for which workforce demographics are available from the American Community Survey (IPUMS). Appendix D contains screenshots of all survey flows, including instructions and comprehension checks.

Survey *Contribution*. Participants are instructed to indicate on a 0-100 Likert scale how much they think the work done by people in an occupation contributes to society as a whole. The instructions clarify that "contributing to society does not necessarily mean charity or social work. Many occupations may contribute to society by producing goods or providing services that other people use." The instructions further emphasize that there are no right or wrong answers.

To assist their judgments, participants receive two pieces of information. First, a one-sentence description of the occupation that is given by a shortened version of official occupation descriptions of the Bureau of Labor Statistics (BLS). Descriptions were shortened using the Claude Sonnet 4-5 prompt in Appendix B.2. Second, respondents are informed of an example income people in this occupation may earn. The survey does not suggest that the example income is representative or random. In practice, participants are randomly shown the 10th, 50th or 90th percentile of the income distribution in each occupation, taken from the BLS. Figure 1 shows an example screenshot.

1,258 participants completed this study (I aimed for 1,200).

Surveys *Contribution-noinc* and *Respect-noinc*. The survey *Contribution-noinc* is identical to *Contribution*, except that no information about incomes in the occupation is provided.

Respect-noinc has an identical structure, except that it elicits respondents' respect for an occupation rather than perceptions of social contribution. Participants are instructed to indicate on a 0-100 Likert scale how much respect they think people in an occupation deserve for their work. The instructions clarify for participants that "respect means the degree of social regard or esteem people in an occupation deserve. It does not mean basic human dignity or politeness owed to everyone equally." This serves to clarify the

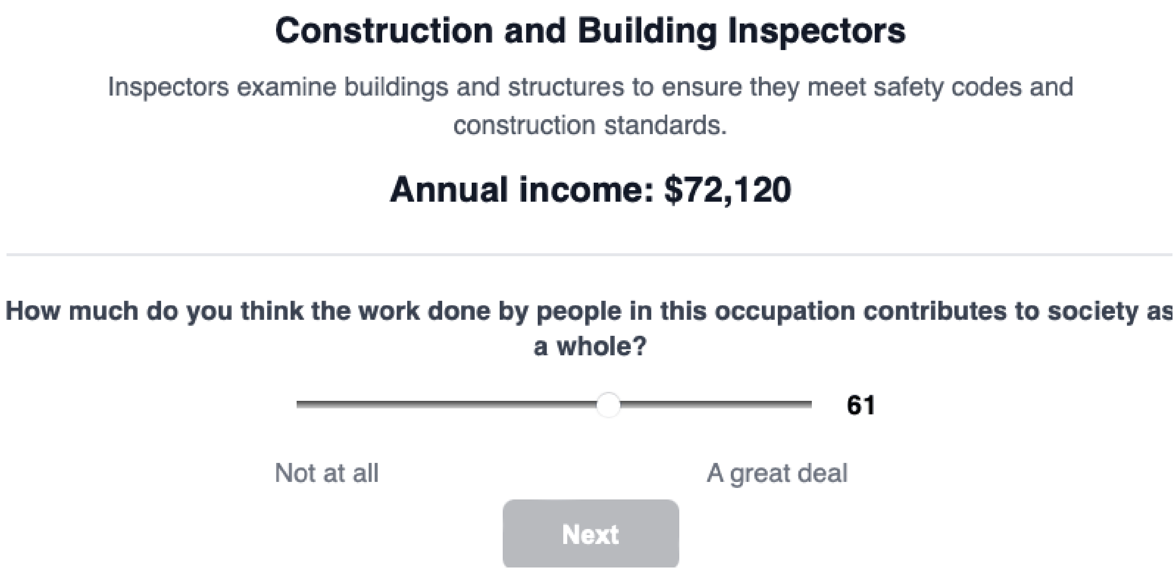

Figure 1: Example decision screen in survey *Contribution*.

distinction between recognition respect and appraisal respect. The instructions further emphasize that there are no right or wrong answers.

210 participants completed the *Respect-noinc* study and 209 the *Contribution-noinc* one (I aimed for 200 each).

Survey *Familiarity*. This survey asks participants to indicate on a 0-100 Likert scale how familiar they are with what people in an occupation do and how their work adds value. The instructions clarify that "familiarity with an occupation means, for example, knowing about: - The typical day-to-day tasks people in this profession perform; - The outputs or deliverables this profession produces; - Who uses or benefits from these outputs, and why they matter."

No income information is provided. 310 participants completed this study. On average, the occupation-level average familiarity measure is based on 35 ratings (median is 37).

Construction of value uncertainty measures. The first measure of value uncertainty is the negative of average familiarity with an occupation, elicited as described above.

Second, I make use of a measure of the 'upstream-ness' of occupations in economic production networks. Intuitively, occupations that are more upstream may be associated with greater value uncertainty, for two reasons. First, they may be less familiar. Second, their contributions to the common good are likely more indirect and thus more difficult to understand. Antràs et al. (2012) develop a measure of upstreamness of different industries, which I convert into an occupation-level measure as the employment-weighted average of the upstreamness of the industries in which it is employed, using the occupation-by-industry employment distribution from the 2002 OES industry files.[10]

In what follows, for ease of interpretation, I standardize all uncertainty measures into the unit interval.

Logistics. All surveys were conducted on the *Prolific* platform. All prospective participants had to successfully complete comprehension checks upon reading the survey instructions, see the appendix for details.

To ensure that judgments are based on deliberation, and to prevent excessive speeding through the survey, participants were required to spend at least 12 seconds on each occupation (i.e., on each of the 30 decision screens). The median response time across all surveys was 14 seconds per occupation. Participants received a flat payment of $3.50 for participating.

Screening out potential bots or AI users. To ensure high data quality and screen out potential bots, I follow some of the most impactful procedures recommended in Celebi et al. (2026). First, at the beginning of the study, prospective participants were asked to record a video of themselves to allow me to verify that they are human. Second, I administered a short writing task towards the end of the study that asked subjects to describe their reasoning and motivations in the study in 3-4 sentences. I flag a participant as a potential AI user if the keystroke logger recorded any of the following: at least one paste event, at least one large cursor jump (consistent with a paste), or fewer than 0.3 keystrokes per character in the final response (indicating the text was not typed out character-by-character). Third, I implemented a ReCaptcha test—that cannot be completed by conventional AI systems—both at the beginning and in the middle of the survey.

Summary statistics. Respect and perceived social contributions vary widely across occupations. Average respect in the *Respect-noinc* survey is 68 (out of 100), with a standard deviation of 11 and an interquartile range of [62, 78]. The distribution of average perceived contributions is very similar regardless of whether or not income information is provided (surveys *Contribution* and *Contribution-noinc*), with a mean of approximately 63 and a standard deviation of 15.

The level of familiarity with the work and work contributions of an occupation also varies to a great degree across occupations. In the *Familiarity* survey, the mean and median occupation-level ratings are 61, with a standard deviation of 15 and an interquartile range of [50,73]. Several occupation-level workforce characteristics are correlated with the survey-based measure of value uncertainty: average age ($r = 0.16$, $p < 0.05$), share

[10]I bridge the 2002 occupation codes to the 2024 codes by exact SOC-code match where possible (599 of 831 occupations), then by exact occupation-title match, and finally by the employment-weighted average within the same four-digit SOC minor group for occupations that were newly created or split.

female ($r = -0.34$, $p < 0.01$), percent white ($r = 0.21$, $p < 0.01$), share with a four-year college degree ($r = 0.09$, $p = 0.15$), and log median income ($r = 0.34$, $p < 0.01$). Thus, respondents are on average less familiar with the work done by high-income professions. This is intuitive and motivates the analysis of the link between value uncertainty and the upstream-ness of an occupation below (many higher-paying occupations are relatively upstream in production networks).

3.2 Income, Respect and Social Contributions

To motivate the experimental manipulations of income and value uncertainty conducted in the other studies in this paper, I begin by analyzing the data from the surveys *Respect-noinc* and *Contribution-noinc*, which provide no income information. I compute average respect and average perceived contributions to society for each occupation and correlate them with each other and with median income (which, if it matters, must be retrieved from memory by the survey participants).

Table 1 in the Introduction shows the results. Respect for an occupation is significantly correlated with log median incomes ($r = 0.31$, $p < 0.01$). While the sign of this correlation is in line with the hypotheses and arguments of sociologists and philosophers, it is arguably far from obvious to an economist. After all, labor economics models might predict a correlation of the opposite sign when respect is viewed as a non-wage amenity that allows employers to pay lower wages.

Correlations between average respect and workforce demographics are weaker. The correlation with the share with a four-year college degree is $r = 0.17$ ($p < 0.01$), though the partial correlation conditional on median income is negative, partial $r = -0.07$ ($p = 0.29$).

The respect-income correlation becomes substantially smaller (or even disappears) when I control for average perceived contributions to society. Indeed, average respect and average perceived contributions are highly correlated ($r = 0.81$, $p < 0.01$), even though they were elicited from separate sets of respondents, and even though no income cue was provided in either survey. Figure 2 visualizes this correlation. To illustrate, occupations that receive high respect and are rated as strongly contributing to society include, for example, registered nurses, firefighters, paramedics, pharmacists, civil engineers and aircraft mechanics. Occupations that score low on both ratings include, for example, telemarketers, sales agents, bartenders, actuaries, fashion designers, insurance underwriters and bill collectors.

Perceived contributions, in turn, are also significantly correlated with log median incomes ($r = 0.26$), compare columns (6)–(7) of Table 1. This isn't a trivial result–for instance, the share of the workforce with a four-year college degree is essentially un-

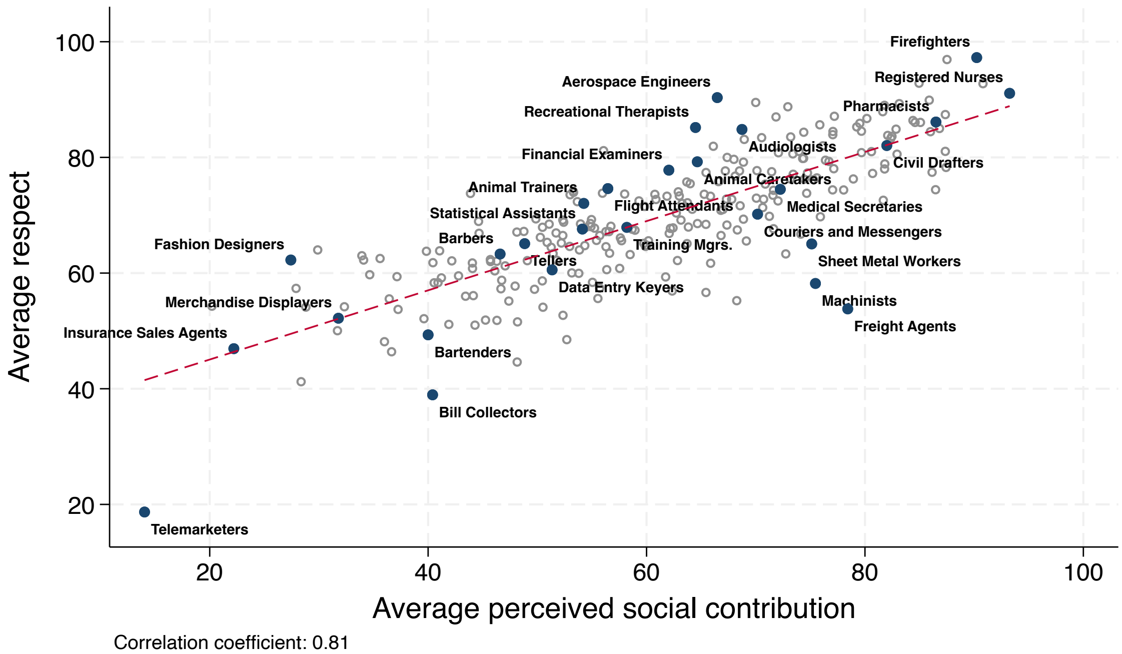

Figure 2: Average respect and perceived contributions to society. Each dot is an occupation. Average respect and perceived contributions are measured in separate surveys (*Respect-noinc* and *Contribution-noinc*).

correlated with average perceived contributions ($r = 0.02$), and the partial correlation conditional on median income is negative, partial $r = -0.24$ ($p < 0.01$).

Thus, this motivating survey evidence is suggestive of two ideas that motivate the subsequent analysis. First, that respect for an occupation is tightly linked to its perceived social contribution. And second, that the income-respect link may reflect a link between incomes and perceived social contributions.

3.3 Randomized Income Information and Value Uncertainty

As a first step towards understanding why income is linked to perceived contributions, I analyze the data from the *Contribution* survey that exogenously manipulates income information. The main caveat in interpreting this study is that the variation in value uncertainty is across occupations and thus endogenous. In the data, the summary measure of value uncertainty is high for occupations such as rail-track laying and maintenance equipment operators, actuaries, materials engineers, chemical technicians and engineers, and operations research analysts. Value uncertainty is low for barbers, registered nurses, paramedics, retail salespersons, childcare workers and veterinerians.

Denote by $c_{o,i}$ the perceived social contribution of occupation o as rated by respondent i, by $y_{o,i}$ the income of occupation o that is displayed to respondent i, by σ_o an occupation-level measure of value uncertainty, and by $\mathbb{1}_i$ and $\mathbb{1}_o$ respondent and occupation fixed

Table 2: Randomized income information and perceived contributions within occupations

	Dependent variable: Perceived contribution					
	(1)	(2)	(3)	(4)	(5)	(6)
Log income	1.12*		1.23***		0.83	
	(0.59)		(0.44)		(0.54)	
Log income × Value uncertainty (survey)	2.72**					
	(1.13)					
Income percentile		0.01		0.01**		0.01
		(0.01)		(0.00)		(0.01)
Income percentile × Value uncertainty (survey)		0.03***				
		(0.01)				
Log income × Upstreamness			2.87***			
			(0.97)			
Income percentile × Upstreamness				0.04***		
				(0.01)		
Log income × Value uncertainty (summary index)					3.26***	
					(1.05)	
Income percentile × Value uncertainty (summary index)						0.04***
						(0.01)
Adjusted R^2	0.54	0.54	0.54	0.54	0.54	0.54
Observations	37740	37740	37740	37740	37740	37740

Notes. OLS estimates, robust standard errors (in parentheses) are two-way clustered at the respondent and occupation level. The summary index of value uncertainty is the average of the z-scores of the survey-based value uncertainty (familiarity) measure and the upstreamness measure. All regressions include occupation fixed effects and respondent fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Data from *Contribution* survey.

effects, respectively. I analyze the data through regressions of the following form:

$$c_{o,i} = \alpha + \beta_1 y_{o,i} + \beta_2 y_{o,i}\sigma_o + \sum_i \delta_i \mathbb{1}_i + \sum_o \gamma_o \mathbb{1}_o + \epsilon_{i,o} \,, \tag{11}$$

where $\epsilon_{i,o}$ is a noise term that is two-way clustered at the respondent and occupation level. The main hypothesis is that $\beta_2 > 0$, meaning that the link between income and perceived social contributions is stronger (within occupation) when value uncertainty is higher.

Table 2 summarizes the results. Column (1) shows the results using the income data that was shown on respondents' screens (a Dollar value), whereas column (2) uses the underlying within-occupation income percentile (10%, 50%, 90%). Recall that the income information provided is random within each occupation. All specifications include occupation fixed effects (to leverage the exogenous variation in displayed income) and respondent fixed effects (to account for cross-respondent differences in, for example, scale use or overall level of respect).

Throughout, the results show that exogenous within-occupation variation in displayed income is more strongly linked to perceived social contributions among occupations that are associated with higher value uncertainty.

Figure 3 visualizes these patterns. The top panel shows a binned scatter plot of average perceived contributions against within-occupation income percentiles (the ultimate unit of randomization), split by above / below average value uncertainty. In terms of magnitudes, we see that moving from the 10th to the 90th percentile of the income distribution is associated with a ~ 2.55 point increase in perceived social contributions for above-median value uncertainty occupations, but only a ~ 1.34 point increase for below-median ones.

The bottom panel of Figure 3 complements this binned scatter by showing a coefficient plot separately by value uncertainty quintile. We see that the mediating 'effect' of value uncertainty does not depend on the median split per se.

Respondent heterogeneity. Appendix Table 4 reports a heterogeneity analysis that studies which respondents react most strongly to the exogenous income information. The most consistent and interesting pattern is that high-income respondents react significantly more to the randomized income information in rating social contributions.

3.4 Value Uncertainty and Economic Production Networks

Value uncertainty is plausibly in part driven by the difficulty of figuring out how exactly the work done by a occupation contributes to overall production and welfare. To take a simple example, it is easier to appreciate the social contribution of a service such as receiving a hair cut than it is to appreciate how the work of an engineer who optimizes the production efficiency within a firm that delivers scissors to hair salons contributes to society. More generally, the 'upstream-ness' of an industry and, as a result, of occupations may be a significant driver of value uncertainty.

Indeed, the survey-based measure of value uncertainty is strongly correlated ($r = 0.44$, $p < 0.01$) with the occupation-level measure of upstream-ness that I computed based on Antràs et al. (2012), see Appendix Figure 7.

Columns (3) and (4) of Table 2 show that when I use upstream-ness as an alternative measure of value uncertainty, it also significantly predicts the link between randomized income information and perceived contributions.

Finally, given the strong correlation between the survey-based measure and the upstream-ness measure, and given that both are likely measured with some error, I compute their first principal component (i.e., the average of their z-scores) as a third summary measure of value uncertainty. Columns (5) and (6) of Table 2 show that this measure likewise significantly predicts the magnitude of the income effect.

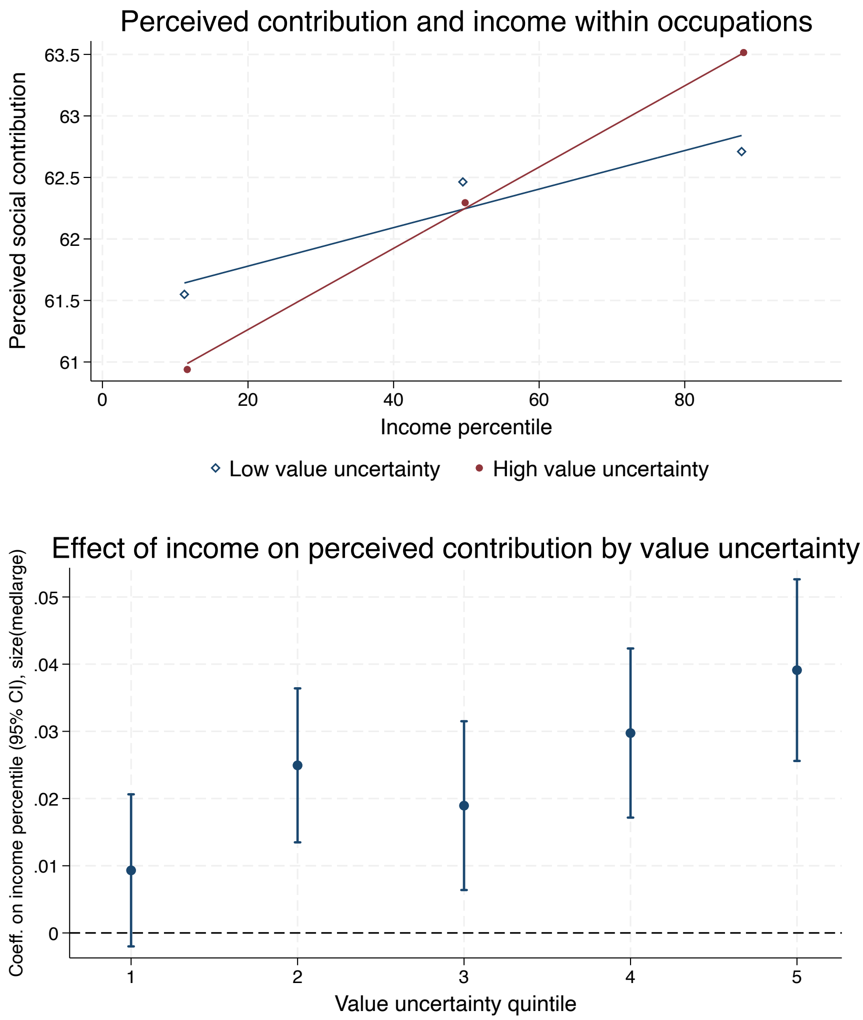

Figure 3: Top panel: Perceived contributions as a function of within-occupation income percentile, split by above / below average value uncertainty. Binned scatter plot, controlling for occupation and respondent fixed effects. Bottom panel: Coefficient plot for regression of perceived contributions on income percentile, interacted with fixed effects for each value uncertainty quintile (controlling for occupation and respondent fixed effects). The coefficient for the first quintile shows the main effect of income percentile, while the other coefficients show the main effect plus the respective interaction coefficients. Whiskers show 95% confidence intervals, computed using two-way clustering at the respondent and occupation level. Data from survey *Contribution*.

3.5 Robustness

Respondent-level patterns: AI use / no response variation. Appendix Table 5 reports a first set of robustness checks. First, I exclude respondents from the analysis who plausibly use AI to generate their responses. I collect two indicators for potential AI use. First, respondents are directly asked at the end of the study whether they made use of AI in completing the survey. Second, at the end of the study, respondents were asked to write 3-4 sentences about which considerations determined their judgments. I use the keystroke-logger criterion described above (a paste event, a large cursor jump, or fewer than 0.3 keystrokes per character) to flag a respondent as a potential AI user. Using these criteria, 4.5% of respondents were flagged. As a second robustness check, I exclude respondents from the sample who exhibit no variation in their social contribution ratings across the 30 occupations they encountered (0.5% of respondents).

Appendix Table 5 shows that the results are similar when I exclude either or both of these groups of respondents from the analysis.

Occupation-level characteristics. Given the correlational nature of the analysis, Appendix Table 6 assesses the potential impact of occupation-level omitted variables. I consider several workforce characteristics that may be correlated with value uncertainty: average age, share female, share White, share with a college degree and log median income. Some of these variables are likely to be bad controls. For example, median income and upstream-ness are significantly correlated ($r = 0.19$, $p < 0.01$), meaning that income may inadvertently pick up a true effect of value uncertainty.

The results, reported in Appendix Table 6, are similar to the baseline results reported in Table 2 in terms of quantitative magnitude. Unsurprisingly given multicollinearity issues that potentially arise from the correlation between the characteristics and value uncertainty, the level of statistical significance in these robustness analyses generally drops by one level compared to the baseline analysis (e.g. from 1% to 5% level of significance). Perhaps more informative, none of the occupation-level workforce characteristics is consistently correlated with the effect of the randomized income information on social contribution judgments. This suggests that at least this limited set of observables does not spuriously drive the results.

4 Main Experiments

The main objective of the market experiment is to trace the effect of exogenous manipulations of value uncertainty on the degree to which people rely on income to judge social contributions.

4.1 Experiment Design

The main experiment consists of a market in which groups of three participants—called Producers—interact by producing output goods and trading them. A Spectator observes the outcomes of the production phase and the market interactions, and judges how much each Producer contributed to the market group as a whole. The main interest of this paper is in the decisions of the Spectators (the social contribution judgments). To avoid deception, the Producers exist, but their only purpose is to supply production and earnings data that the Spectators can judge. I have thus not devoted much attention to analyzing the decisions of the Producers.

Producers. Every Producer acts as a farmer who owns a plot of land on which they grow a crop, and each unit of crop harvested is worth \$1. Growing the crop requires three complementary inputs—water (measured in gallons), soil (cubic tons), and fertilizer (pounds)—combined according to

$$\text{Harvest} = \ln\Big[(\text{Water}/2) \times (\text{Soil}/15) \times (\text{Fertilizer}/250) + 1\Big]. \tag{12}$$

Because the inputs enter multiplicatively, all three are essential: with zero of any one, the harvest is zero, and each input becomes more productive the more of the others is used.

Crucially, each Producer can produce only *one* of the three inputs, and does so through a distinct computerized real-effort task. The work tasks are standard in the literature. All of them are cumbersome but not intrinsically difficult.

A first task consists of positioning sliders to target values. A second task is to track a moving dot in a circle with the cursor. The third task consists of kicking a virtual ball by hitting the space bar. Appendix C.1 provides more details and shows a screenshot of each of the three tasks.

Each input can be produced by only one Producer. The matching of work tasks to input types is randomized and varies across market groups. Since a Producer needs all three inputs to grow crops but can produce only their own, they must buy the other two in the market. Each Producer's work therefore has social value to the group: if a Producer produces nothing, the others cannot obtain that input and cannot grow crop.

How Producers earn money and interact in the market. To purchase the necessary inputs to grow crop, the Producers interact in a market. To do so, each Producer submits four schedules that determine their supply and demand: how many units of their *own* input they are willing to produce at each possible price (a supply schedule, required to be weakly increasing in price), and how many units of water, soil, and fertilizer they are willing to *buy* at each price (three demand schedules, required to be weakly decreasing in price).

For each input, the market price is set to the level at which total demand across the three Producers equals supply, so every unit produced is sold—there is no unpaid work.[11]

[11] I computationally determine the equilibrium market prices across the three markets as follows. For each of the three inputs I clear the market on a fixed grid of six candidate prices (\$0.01, \$0.025, \$0.05, \$0.10, \$0.20, \$0.40). At each price, total demand is the sum of the three Producers' demands for that input, and supply is the quantity offered by the single Producer who produces it. The clearing price is the highest price at which total demand is at least supply and supply is positive; the traded quantity is that Producer's supply at that price. If no such price exists, the market does not clear and no units of that input

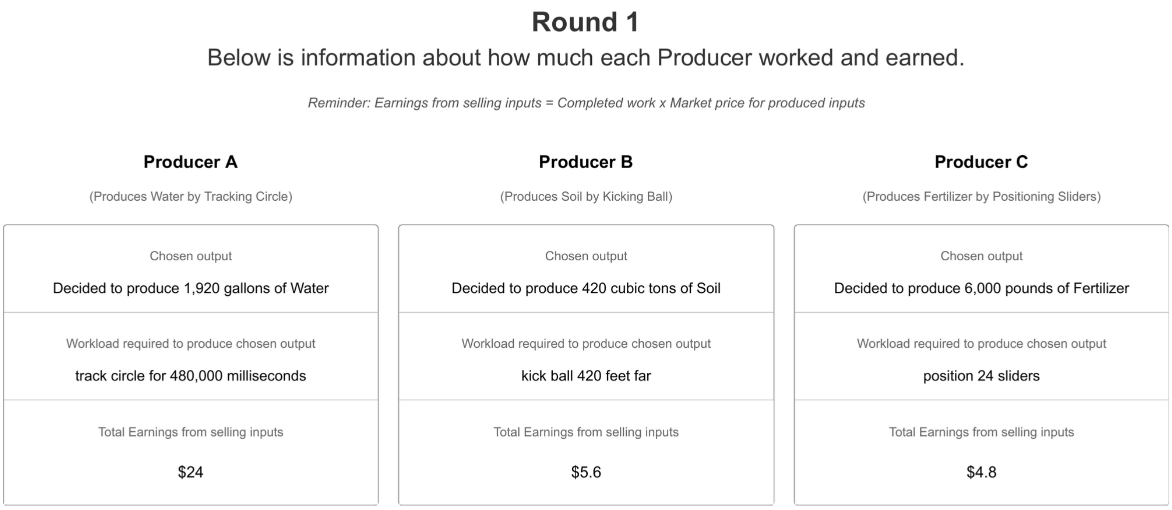

Figure 4: Information shown to Spectators in the *Baseline* treatment of the market experiment. The point-allocation and message fields, described in the text, appear below and are omitted here.

A Producer's market earnings equal the number of units they produced times the market price of that input. To support the market transactions, Producers start with a $5 budget (keeping whatever they do not spend).

Each Producer's final earnings are given by (i) their market earnings (earnings from selling their input minus money spent on purchasing inputs); (ii) their harvest; and (iii) whichever part of their budget they do not spend.

Spectators. A separate set of participants take the role of *Spectator*, recruited to judge the contributions of three Producers who have already completed the market experiment. For each of the three Producers, the Spectator observes the task the Producer worked on, how much work the Producer chose to complete and the resulting amount of farming input produced, and the Producer's earnings from selling their production in the market. In this design, the income 'signal' that Spectators can rely on is each Producer's earnings rather than the market price for each input.

In each round the Spectator makes two decisions. First, to allocate 100 points across the three Producers to indicate how much the Spectator thinks each Producer contributed to the group. The interface forces respondents to allocate exactly 100 points.

Second, to write a brief message (at least 30 words) to each Producer conveying how they feel about that Producer's decisions and their consequences for the group. To keep these judgments consequential and naturalistic, one in fifty Spectators is randomly selected, and one of their messages is chosen at random and actually delivered to the Producer it was addressed to as a Prolific message.

trade. Because a Producer cannot spend more than their $5 budget on inputs, when the demanded bundle would exceed the budget at the clearing prices I ration purchases by ranking the Producer's individual willingness-to-pay units (implied by their demand schedule) and filling them from highest to lowest until the budget is exhausted.

Each Spectator evaluates three different market groups (on three subsequent decision screens). Figure 4 shows an example screenshot. Here, the earnings displayed on the screen are proceeds from selling the farming input (gross revenue), rather than net revenue from buying and selling. This is deliberate and corresponds to reality, where people may judge others' social contributions based on their gross income, rather than based on their income net of expenditures on other people's goods and services.

These two Spectator outputs are the main outcome measures: the point allocation is a direct measure of perceived contribution, and the positivity of the written message (coded by an LLM following the prompt displayed in Appendix C.2) serves as a naturalistic analogue.

Notice that, as in all Spectator experiments in the literature, the earnings of the Spectators do not depend on their decisions. However, their decisions are (probabilistically) still consequential in the sense that a message they drafted was sent to the relevant Producer.

Prior to making their judgments, Spectators are required to familiarize themselves with each work task by working on it for 20 seconds.

The instructions and comprehension check quiz for the Spectators largely mirror those of the Producers. Crucially, both instructions and comprehension quiz note that—while each Producer acts individually and earnings are not pooled—the Producers are nonetheless reliant on each other because they cannot effectively produce crop if they cannot purchase the required inputs from the other Producers. The instructions thus highlight that the Producers' production decisions have externalities.

Treatments to manipulate value uncertainty. The description above refers to the *Baseline* treatment. Intuitively, Spectators may exhibit significant value uncertainty about how much each Producer contributed to the group because their work contributions are difficult to bring into a common currency of value. For instance, considering the example in Figure 4, is tracking a circle for 480,000ms more or less work than kicking a virtual ball 420 feet far or positioning 24 sliders? Similarly, is producing 1,920 gallons of water more or less valuable than producing 420 cubic tons of soil or 6,000 pounds of fertilizer?

Arguably, in the face of such incomparability (or even incommensurability) the simple common currency of market earnings (from selling outputs) is an attractive heuristic to judge social contributions. At the same time, there are also many other potential reasons for why the Spectators may rely on earnings information even when value uncertainty plays no role. For instance, higher earnings typically reflect higher equilibrium prices and thus higher demand or scarcity. Alternatively, the Producers may rate social contributions based on social status considerations that are directly tied to market earnings (see Ball et al., 2001, for evidence from an experimental market).

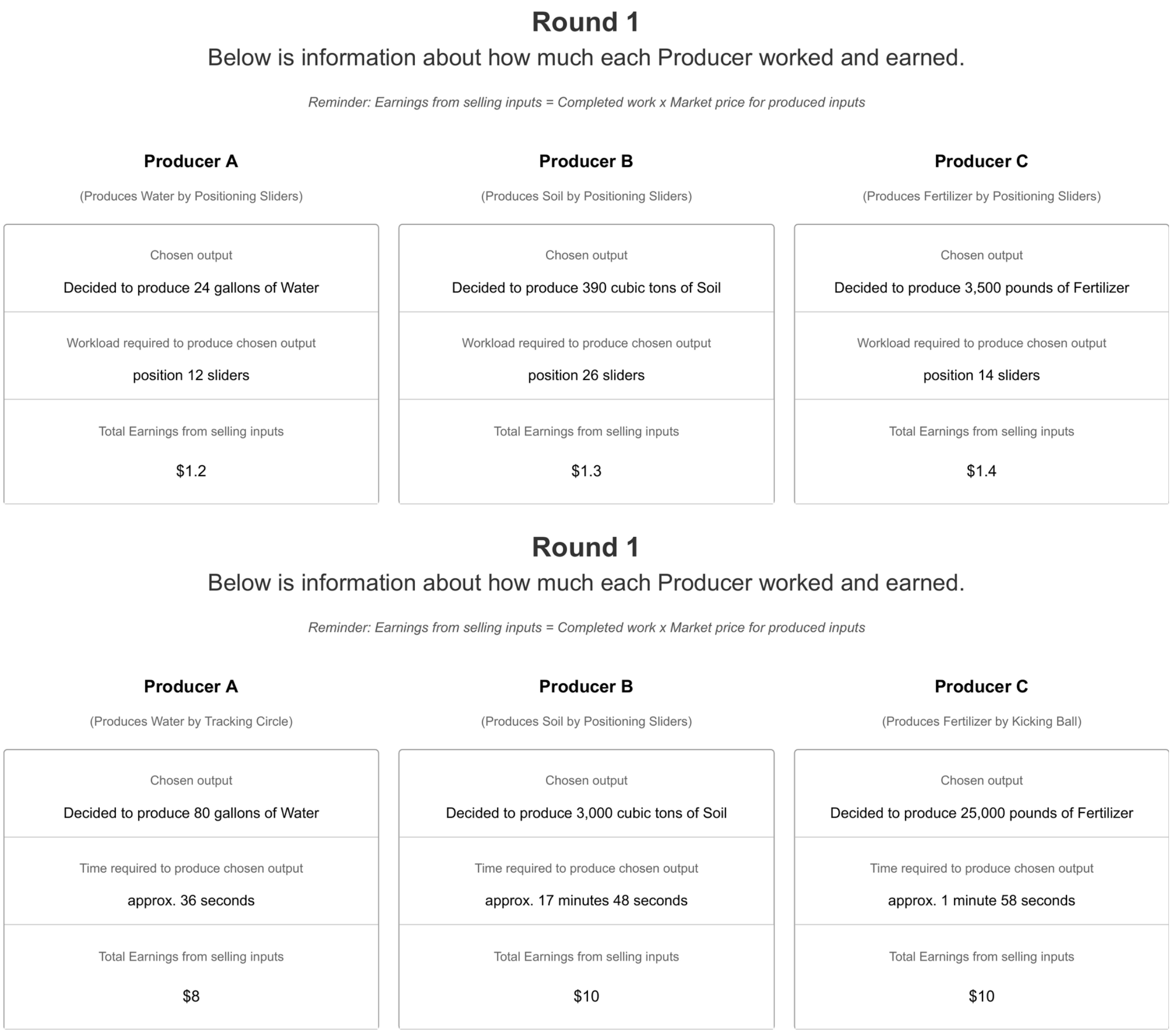

Figure 5: Information shown to Spectators in the *Same tasks* treatment (top panel) and the *Time displayed* treatment (bottom panel) of the market experiment. The point-allocation and message fields appear below and are omitted here.

To manipulate value uncertainty, I introduce two treatment variations that affect the ease of comparability of the work contributions. First, in treatment *Same tasks*, all Producers produce farming inputs by working on the same real effort task. In this setup, each Producer's work output (water, soil, fertilizer) is still difficult to compare, but the work effort required to produce them is now directly comparable. Thus, if people judge social contributions partially based on work inputs (akin to the labor theory of value), this treatment may reduce the heuristic reliance on market earnings. The top panel of Figure 5 shows a screenshot of a Spectator decision screen.

Second, in treatment *Time displayed*, the Spectators receive information about the typical time required to complete each Producer's chosen output level, rather than information about how many effort tasks were completed. The bottom panel of Figure 5 shows an example screenshot. Thus, again, the work inputs are expressed in a common currency that may make it easier for Spectators to judge the work contributions themselves rather than the resulting earnings.

Logistics and incentives. As noted above, my main interest in this paper is how Spectators judge social contributions as a function of perceived market earnings. To economize on research budget, the study thus runs in two parts to make the Spectators' decisions incentive-compatible without requiring all Producers to actually complete their chosen workload.

To achieve this, the Producer experiment consisted of two parts, spread over two sessions one week apart. In Part 1, Producers only read the experimental instructions, complete comprehension quizzes and make their supply and demand decisions, in return for a $6 completion fee. One week later, a randomly selected subset of Producers is invited back to actually perform the workload they committed to and to receive their market earnings plus harvest payout. A returning Producer's actual workload is their submitted supply evaluated at the market-clearing price.

Because each Producer has an equal chance of being selected to return, their decisions are incentive compatible. At the same time, this mechanism allows me to collect data on a large number of markets (which I need to feed into the Spectator side of the experiment) without paying each Producer substantial amounts of money for completing their chosen workload.

Each Producer plays three rounds of the market experiment, across which they produce a different farming input using a different work task. Similarly, each Spectator evaluates three market groups.

In total, I created 150 unique market groups based on 171 distinct Producers. The market groups weren't formed at random (and this was never suggested to the Spectators). Rather, they were matched to generate meaningful variation in prices and resulting earnings.

The study was run on the online platform Prolific. I aimed for 250 Spectators per treatment and ultimately ended up with 265 in *Baseline*, 246 in *Time displayed* and 267 in *Same tasks*. They each earned a participation fee of $2.50 upon passing comprehension checks and finishing the study.

Screenshots of all experimental materials used, including comprehension quizzes, are in Appendix D.

Screening out potential bots or AI users. To ensure high data quality and screen out potential bots, I follow procedures akin to the ones outlined above for the survey portion of this project.

4.2 Summary Statistics and Examples

4.2.1 Producer Experiment

The Producers exhibit large variation in how much they choose to work and in how much they earn in the market. Among the Producers whose data are used in the Spectator experiment, the median Producer chose a workload amounting to 43 seconds, with a mean of 156 seconds and a standard deviation of 399. The market earnings have a median of \$2.40, with mean \$4.30 and standard deviation \$8.90.

4.2.2 Spectator Experiment

In the Spectator experiment, the data show significant variation in the two measures of perceived contribution. The point allocation measure has a mean of 33.33 (mechanically) with a standard deviation of 17, while the text score has a mean of 3.5 with a standard deviation of 1.2. The median text length is 33 words, with a mean of 35 and a standard deviation of 7.

Conditional on Spectator fixed effects, the point allocation and text-based measures of perceived contribution exhibit a partial correlation of $r = 0.66$ (the raw correlation is $r = 0.58$). The median response time on each decision screen—which requires completion of the point allocation task and writing three short texts—is 281 seconds.

I interpret these numbers as suggesting that the Spectators invested significant effort into their decisions and completed them in an internally consistent fashion (cf. the high correlation between point allocation and text score).

To illustrate the text-based measure, the messages below are examples that the language model scored at the extremes of the scale.

Scored highly positive (positivity $= 5$*):*

> "You chose the highest workload and produced a large amount of fertilizer. Because producers depend on one another for inputs they cannot make themselves, your effort likely helped support the overall productivity of the group. I view your decision as a strong contribution to the market and group's success."

Scored neutral/mixed (positivity $= 3$*):*

> "You made a helpful contribution by producing fertilizer, which the group needs to grow crops. However, your workload was still much smaller than Producer B's, so your overall contribution was moderate by comparison."

Scored highly negative (positivity $= 1$*):*

"Not so great. It seems that everyone was giving great effort, at least a little effort, except for you. Everyone else made sure to contribute so that everyone could come out ahead but you have held everyone back. Do better."

4.3 Results

Each Spectator made nine point allocation decisions (three Producers in three markets each). Empirically, these allocation decisions reflect a combination of the Producers' work effort and their market earnings. To analyze the Spectator decisions in a single set of regressions (across all Producers), I normalize the work effort of each Producer across work tasks by expressing the chosen workload (i.e., the workload that is required to deliver the Producer's chosen supply level) in terms of its average completion time. Notice that this normalization isn't a pure design choice but, rather, reflects how long subjects took to complete the different tasks, on average.

Denote by $c_{i,j,g,t}$ a measure of perceived social contribution of Spectator i about Producer j who works on real-effort task t in market group g, by $y_{j,g,t}$ the (log) market earnings of Producer j in market group g who works on task t, and by $e_{j,g,t}$ their normalized work effort. Further denote by d a dummy for a treatment that reduces value uncertainty, and by $\mathbb{1}$ with subscripts i, g and t fixed effects for Spectator, market group, and real-effort task type, respectively. I analyze the data through regressions of the following form:

$$\begin{aligned} c_{i,j,g,t} = \alpha + \beta_1 y_{j,g,t} + \beta_2 e_{j,g,t} + \beta_3 y_{j,g,t} d + \beta_4 e_{j,g,t} d + \\ + \sum_i \delta_i \mathbb{1}_i + \sum_t \gamma_t \mathbb{1}_t + \sum_g \omega_g \mathbb{1}_g + \epsilon_{i,j,g,t} \;, \end{aligned} \tag{13}$$

where $\epsilon_{i,j,g,t}$ is a noise term that is two-way clustered at the Spectator and market group level. The main hypothesis is that $\beta_3 < 0$, meaning that the link between income and perceived social contributions is weaker when value uncertainty is experimentally reduced. An ancillary hypothesis is that $\beta_4 > 0$, meaning that the Spectator's judgments place higher weight on the work inputs when value uncertainty is reduced.

Table 3 summarizes the results. Columns (1)–(3) analyze the Spectators' point allocation decisions that directly represent judgments about how much each Producer is perceived to have contributed to the group. Column (1) shows that these judgments strongly increase in both Producer earnings and Producer work effort (measured in seconds).

Column (2) shows that these effects strongly vary by treatment. Relative to treatment *Baseline*, Spectator judgments in *Same tasks* and *Time displayed* rely significantly less on earnings but significantly more on work effort. Column (3) pools treatments *Same tasks* and *Time displayed* together, again confirming that relative to the *Baseline* treatment the

Table 3: Earnings and perceived contributions across treatments in the market experiment

	Dependent variable: Perceived social contribution					
	Point allocation (0-100)			Text (1-5)		
	(1)	(2)	(3)	(4)	(5)	(6)
Log earnings	7.14***	11.40***	10.73***	0.43***	0.59***	0.57***
	(0.97)	(0.90)	(0.92)	(0.05)	(0.05)	(0.05)
Log normalized work effort (seconds)	8.07***	4.59***	5.20***	0.35***	0.27***	0.28***
	(0.64)	(0.57)	(0.59)	(0.03)	(0.03)	(0.03)
Log earnings × *Time displayed*		-4.35***			-0.17***	
		(1.22)			(0.06)	
Log earnings × *Same tasks*		-7.96***			-0.29**	
		(2.26)			(0.13)	
Log norm. work effort × *Time displayed*		2.83***			0.06*	
		(0.80)			(0.04)	
Log norm. work effort × *Same tasks*		6.84***			0.16***	
		(1.08)			(0.06)	
Log earnings × *Same tasks / Time displayed*			-5.36***			-0.21***
			(1.39)			(0.08)
Log norm. work effort × *Same tasks / Time displayed*			4.23***			0.10**
			(0.77)			(0.04)
R^2	0.36	0.38	0.38	0.46	0.46	0.46
Observations	7002	7002	7002	7002	7002	7002

Notes. OLS estimates, robust standard errors (in parentheses) are two-way clustered at the Spectator and market group level. All regressions include Spectator fixed effects, market group fixed effects and work task fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Data from market experiments.

two treatments that are designed to reduce value uncertainty reduce reliance on earnings. In terms of quantitative magnitudes, consider column (3) for illustration. Making the work efforts comparable cuts the earnings coefficient in half (by 5.36 from a baseline of 10.73) and increases the work effort coefficient by 81% (by 4.23 from a baseline of 5.20).

Figure 6 visualizes these results. The figure shows a binned scatter plot of perceived social contributions (measured by point allocations) as a function of log market earnings, separately by treatment.[12] This is an added variable (partial correlation) plot that controls for the covariates in column (2) of Table 3.

Columns (4)–(6) of Table 3 analyze the positivity of the messages sent by the Spectators to the Producers. The results are similar, in particular that both treatment manipulations reduce the effect of market earnings.

The effect of the treatment manipulations on the reliance on market earnings in assessing contributions to the group is also mirrored by the results of a post-experimental questionnaire. Here, I asked Spectators to rate the importance of each of several potential reasons for their evaluations on a 0-100 Likert scale, one of them being the Producers' incomes. Relative to the baseline treatment, the self-reported importance of income for the Spectators' decisions (point allocation and text response) decreases by 11 points in

[12]Appendix Figure 11 plots perceived contributions as a function of work effort.

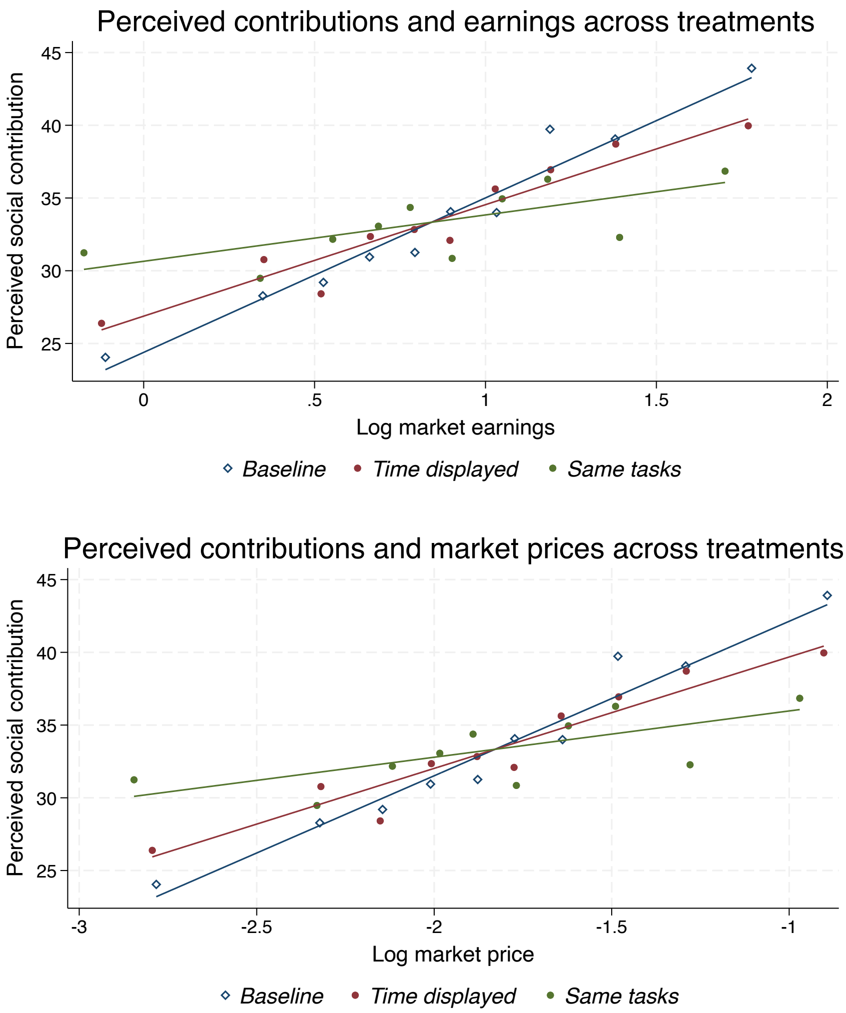

Figure 6: Binned scatter plots of perceived contributions (point allocation) as a function of log market earnings (top panel) or log market prices (bottom panel) by treatment. Earnings are given by the amount of money earned from selling one's input (gross revenue). The top panel controls for the covariates in column (2) of Table 3, and the bottom panel for log quantity produced, spectator fixed effects, market group fixed effects and work task fixed effects.

the *Same tasks* treatment ($p < 0.01$) and by 6 points in the *Time displayed* treatment ($p < 0.05$). Thus the Spectators appear to have some awareness that they rely more strongly on the earnings information when the work effort contributions are more difficult to compare and put on a common value scale.

4.4 'Mistakes' and Over-Reliance on the Market Price?

Recall that, in principle, both Producers and Spectators knew the conversion rate between the three farming inputs as far as the amount of crop produced is concerned. Because total harvest produced is given by (12), repeated here for convenience,

$$\text{Harvest} = \ln\Big[(\text{Water}/2) \times (\text{Soil}/15) \times (\text{Fertilizer}/250) + 1\Big] ,$$

one unit of water produced has the same effect on total production as 7.5 units of soil or 125 units of fertilizer produced. Given these known conversion rates, the Spectators could, in principle, assess social contributions on the production side, i.e., based on the farming inputs produced by each Producer, without relying on the market price at all. Intuitively, the market price only scales the magnitude of transfers across the Producers but does not affect the amount of harvest produced. Moreover, within each real-effort task the exchange rate between one unit of effort task completed and the amount of soil / water / fertilizer produced was constant.

Given these design choices, the regressions reported above actually directly reveal the effect of the market price. To see this, note that, according to equation (13), the Spectator's predicted judgment of the social contribution of Producer j who works on task t and produces $q_{j,t}$ units of the farming input is given by

$$\begin{aligned} c_{i,j,g,t} &= \beta_1 \text{ Log earnings}_{j,g,t} + \beta_2 \text{ Log normalized work effort}_{j,g,t} \\ &= \beta_1 \ln(q_{j,g,t}\, p_{g,t}) + \beta_2 \ln(q_{j,g,t}\, \alpha_t) = \beta_1 \ln(p_{g,t}) + (\beta_1 + \beta_2) \ln(q_{j,g,t}) + \beta_2 \ln(\alpha_t) , \end{aligned}$$

where α_t is a conversion rate between number of real effort tasks solved, time required, and associated output (farming inputs) produced.

Thus, the coefficient of log earnings reported in Table 3 directly identifies the coefficient of the market price, while the coefficient of log output (farming inputs) produced is given by the sum of the coefficients of log earnings and log normalized work effort.[13]

The bottom panel of Figure 6 visualizes the effect of the market price on point allocations (and visually shows the equivalence to the effect of market earnings).

Thus, Table 3 shows that subjects in the baseline treatment respond more to prices than subjects in the treatments that are designed to reduce value uncertainty.

Of course, the mistakes-framing behind these analyses rests on two strong assumptions. First, that the Spectators assess social contributions exclusively based on the output side rather than the potential differential cumbersomeness of the real effort tasks. Second, that the Spectators actually remember the conversion rates between the different farmings inputs in the harvest production function when making their decisions.

However, regardless of whether it is viewed as revealing objective mistakes, this analysis shows that market prices (not just earnings) exert a strong effect on perceived social contributions—that they act as a 'moral currency'—and that this effect is substantially

[13]In Table 3, the coefficient of $\ln(\alpha_t)$ gets absorbed by the effort task fixed effects.

smaller when value uncertainty is lower.

4.5 Robustness

Earnings shares and effort shares. The baseline analysis leverages the level of earnings and work effort as explanatory variables. Appendix Table 8 instead uses the earnings share and effort share within the market group. The results are very similar.

AI use. Akin to the survey portion of the study, I again attempt to identify potential AI users by analyzing the written messages. Akin to the survey study, I flag a Spectator as a potential AI user if the keystroke logger recorded, on any of their nine messages, at least one large cursor jump or fewer than 0.3 keystrokes per character (3% of Spectators were flagged). Appendix Table 9 shows that excluding these Spectators from the analysis does not affect the results.

5 Conclusion

This paper has argued that the inherent difficulty of placing different work contributions on a common subjective value scale is a reason for why perceived social contributions greatly vary with incomes. Given that respect for occupations is very strongly correlated with perceived contributions, this suggests that value uncertainty also shapes the distribution of respect. Indeed, the account presented here may help to shed light on the positive cross-sectional correlation between income and perceived contributions or respect.

Arguably, especially in the modern economy, many work contributions are highly specialized and opaque, rendering it everything but obvious how they contribute to the common good. A simple implication of the results in this paper is that if we desire the allocation of perceived worth to be based on assessments of work contributions rather than monetary outcomes, we may need to find ways to reduce evaluative uncertainty about what people in different occupations do and how their work adds value.

I here conclude with a few speculative extensions and discussions that could be explored in future work.

Preferences for redistribution? A large economics literature studies the determinants and consequences of preferences for redistribution (Alesina and Giuliano, 2011). The mechanism identified in this paper might also speak to discussions in this literature. If value uncertainty leads people to believe that the rich contribute more to the common good, then this may reduce demand for redistribution.

Time variation? Various observers have lamented that the importance of market success and money as a 'moral currency' in determining an individual's perceived moral worth has increased over time (e.g., Sandel, 2020; Goodhart, 2020). From the perspective of this paper, one mechanism that may have contributed to this pattern is that value uncertainty may have increased over time. First, occupational specialization is more pronounced today, potentially increasing uncertainty about what others do and how they contribute. Second, social, occupational and geographic sorting has increased over time (e.g., Bishop, 2009; Moretti, 2012; Putnam, 2000; Autor and Dorn, 2013). This may have led to lower familiarity with others' contributions, thus—per the results in this paper—potentially leading to a greater reliance on market prices.

A value uncertainty penalty? This paper has focused on the effect of value uncertainty as a *mediator* for the income effect on perceived contributions. Yet, in principle, value uncertainty could also exert a *level effect* on perceived contributions and, by extension, on equilibrium wages. More concretely, suppose that people's perceived social contributions (or the respect they accord) is not given by their 'best guess' (their mean posterior belief, as in Section 2), but, instead, by their best guess minus an uncertainty penalty. For instance, people might be reluctant to assign the esteem derived from high perceived social contributions to occupations about which they know very little. For example, survey reports of perceived contributions could be given by $R_j = \mathbb{E}[C_j] - \alpha \text{Var}[C_j]$, reflecting a value uncertainty penalty. In this scenario, occupation-level perceived contributions should be negatively correlated with value uncertainty about that occupation, holding fixed other occupation-level observables. Appendix Table 7 shows that this is the case (the raw correlation is $r = -0.14$, $p < 0.05$).

Continuing the argument, if value uncertainty produced lower perceived social contributions then—following the compensating differential logic of the model in Section 2—it should also produce higher wages. Intuitively, if workers receive lower esteem from their work, they will require higher wages in compensation. Appendix Table 7 shows that value uncertainty is indeed strongly correlated with log median wages (raw $r = 0.34$, $p < 0.01$), also conditional on workforce controls.

Of course, these aggregate correlations in survey data are only suggestive of the possibility of a value uncertainty penalty because the patterns could be equally well-explained by correlated fundamentals (high uncertainty occupations having higher market productivity but lower non-market products). Future work could thus helpfully study the potential level effects of value uncertainty.

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ONLINE APPENDIX

A Proofs for Section 2

Notation and standing assumptions. The primitives are $a_j \sim \mathbb{N}(\mu_a, \sigma_a^2/2)$, $v_j \sim \mathbb{N}(\mu_v, \sigma_v^2/2)$ and $\varepsilon_j \sim \mathbb{N}(0, \sigma_\varepsilon^2/2)$ for $j = 1, 2$, all mutually independent, with $\sigma_a^2 > 0$ and $\sigma_v^2 > 0$. Independence holds both across occupations and across the three families, so market productivity and unpriced social value are uncorrelated.[14] For any variable x write $\Delta x \equiv x_1 - x_2$ and $\bar{x} \equiv x_1 + x_2$ (a sum, not an average), so that

$$\Delta a \sim \mathbb{N}\big(0, \sigma_a^2\big), \qquad \Delta v \sim \mathbb{N}\big(0, \sigma_v^2\big), \qquad \Delta\varepsilon \sim \mathbb{N}\big(0, \sigma_\varepsilon^2\big), \tag{14}$$

consistent with the convention $\sigma_x^2 \equiv \mathrm{Var}(\Delta x)$ in the text. Throughout,

$$\theta = \frac{h}{h+b} \in (0,1), \qquad \kappa \equiv 1 - \theta = \frac{b}{h+b}, \qquad m \equiv 1 + \kappa\lambda > 1, \qquad \Lambda \equiv \frac{\lambda}{m},$$

and $\beta_y = \sigma_\varepsilon^2/(\sigma_\varepsilon^2 + \sigma_v^2)$, $\varphi \equiv 1 - \beta_y = \sigma_v^2/(\sigma_\varepsilon^2 + \sigma_v^2)$. Since $\lambda < 1$ and $m > 1$ we have $\Lambda < \lambda < 1$; note that $\lambda < 1$ is not needed for the fixed point to exist—$m > 0$ suffices—but only to obtain $\Lambda < 1$, on which the welfare results rely.

Three standard properties of the normal distribution are used repeatedly.

(F1) For i.i.d. normal X_1, X_2, the sum $X_1 + X_2$ and the difference $X_1 - X_2$ are uncorrelated and jointly normal, hence independent. Applied to a, v and ε separately, $(\bar{a}, \bar{v}, \bar{\varepsilon})$ is independent of $(\Delta a, \Delta v, \Delta\varepsilon)$, and $\Delta a, \Delta v, \Delta\varepsilon$ are mutually independent.

(F2) If (Z, X) is jointly normal with $\mathrm{Var}(X) > 0$, then $\mathbb{E}[Z \mid X] = \mathbb{E}[Z] + \mathrm{Cov}(Z,X)\mathrm{Var}(X)^{-1}\big(X - \mathbb{E}[X]\big)$.

(F3) If (Z, X) is independent of Y, then $\mathbb{E}[Z \mid X, Y] = \mathbb{E}[Z \mid X]$.

A.1 The labor-market and welfare blocks

Lemma 2 (Labor supply). *Take (w_1, w_2, P_1, P_2) as given and write $\Delta U \equiv \Delta w + \lambda\Delta P$. If each worker chooses the occupation maximizing $U_j + \zeta_{ij}$, with $\zeta_{i1} - \zeta_{i2}$ uniform on $[-h, h]$ independently of everything else, then $h\,\Delta L = \Delta U$. Moreover the aggregate taste utility of the realized allocation equals $-\frac{h}{4}(\Delta L)^2$ up to a constant, so the welfare function W in the text is the sum of output, non-market value, and taste utility.*

Proof. Worker i chooses occupation 1 iff $x_i \equiv \zeta_{i1} - \zeta_{i2} > -\Delta U$, so for $|\Delta U| \le h$, $L_1 = \frac{1}{2} + \frac{\Delta U}{2h}$ and $\Delta L = 2L_1 - 1 = \Delta U/h$. For the second claim, aggregate utility including tastes is $U_2 + \mathbb{E}[\zeta_{i2}] +$

[14] This is used in Proposition 2; the proof there records what changes if it fails.

$\mathbb{E}\big[\max\{0, \Delta U + x_i\}\big]$ with

$$\mathbb{E}\big[\max\{0, \Delta U + x_i\}\big] = \int_{-\Delta U}^{h} \frac{\Delta U + x}{2h}\, dx = \frac{(\Delta U + h)^2}{4h} = \frac{\Delta U^2}{4h} + \frac{\Delta U}{2} + \frac{h}{4}.$$

Since $U_2 + \frac{\Delta U}{2} = \frac{U_1+U_2}{2}$, subtracting the part attributable to w and P, namely $L_1U_1 + L_2U_2 = \frac{U_1+U_2}{2} + \frac{\Delta L}{2}\Delta U$, and substituting $\Delta U = h\,\Delta L$ leaves $\frac{h}{4}(\Delta L)^2 - \frac{h}{2}(\Delta L)^2 = -\frac{h}{4}(\Delta L)^2$ up to a constant. □

Lemma 3 (Labor-market block). *If $h\Delta L = \Delta w + \lambda \Delta P$ and $w_j = a_j - bL_j$ with $L_1 + L_2 = 1$, then*

$$\Delta L = \frac{\Delta a + \lambda \Delta P}{h+b}, \qquad \Delta w = \theta\, \Delta a - \kappa\lambda\, \Delta P, \qquad \bar{w} = \bar{a} - b. \tag{15}$$

Proof. Differencing the wage equation gives $\Delta w = \Delta a - b\Delta L$; substituting into the supply condition yields $(h+b)\Delta L = \Delta a + \lambda\Delta P$, and back-substituting gives $\Delta w = \theta \Delta a - \kappa\lambda\Delta P$. Summing the wage equation over j and using $L_1 + L_2 = 1$ gives $\bar{w} = \bar{a} - b$, which holds in *any* allocation: the sum of wages depends only on $\bar{a}$ and so reveals nothing about differences. □

Lemma 4 (Welfare and deadweight loss). *With $L_1 + L_2 = 1$, welfare W is a strictly concave quadratic in ΔL, maximized at $\Delta L^{\text{eff}} = (\Delta a + \Delta v)/(h+b)$, and for any ΔL,*

$$W\big(\Delta L^{\text{eff}}\big) - W\big(\Delta L\big) = \frac{h+b}{4}\Big(\Delta L - \Delta L^{\text{eff}}\Big)^2. \tag{16}$$

Proof. Substituting $L_j = \frac{1 \pm \Delta L}{2}$ and $L_1^2 + L_2^2 = \frac{1}{2}(1 + (\Delta L)^2)$,

$$W = \underbrace{\frac{\bar{a}+\bar{v}}{2} - \frac{b}{4}}_{\text{constant in } \Delta L} + \frac{(\Delta a + \Delta v)\,\Delta L}{2} - \frac{h+b}{4}(\Delta L)^2.$$

The leading coefficient is $-\frac{h+b}{4} < 0$; the first-order condition gives ΔL^{eff}, and completing the square gives (16). □

A.2 Proof of Lemma 1

Since $\sigma_u^2 = 0$, the income signal is $y_j = w_j$ and the public's information is $\Omega = (w_1, w_2, s_1, s_2)$. By an equilibrium we mean a triple $(\Delta L, \Delta w, \Delta P)$ such that (i) $h\Delta L = \Delta w + \lambda \Delta P$; (ii) $w_j = a_j - bL_j$ with $L_1 + L_2 = 1$; (iii) $P_j = \mathbb{E}[C_j \mid \Omega]$ with $C_j = w_j + v_j$, so that $\Delta P = \mathbb{E}[\Delta C \mid \Omega]$; and (iv) ΔP is an affine function of $(\Delta a, \Delta v, \Delta\varepsilon)$.

Condition (iv) defines the class of linear rational-expectations equilibria studied here, and the class is closed under the equilibrium map: if ΔP is affine in the fundamentals then so are wages and the allocation by Lemma 3, the signals are jointly normal with ΔC, and by (F2) the posterior in (iii) is again affine. What follows establishes existence and uniqueness within this class; it does not rule out nonlinear equilibria, for which the normal projection in (F2) would not apply.

Proof of Lemma 1. **Step 1: only differences matter.** Let $\Delta t \equiv \Delta s - \Delta w$ and $\bar{t} \equiv \bar{s} - \bar{w}$. Since

$s_j = w_j + v_j + \varepsilon_j$,

$$\Delta t = \Delta v + \Delta\varepsilon, \qquad \bar{t} = \bar{v} + \bar{\varepsilon}, \qquad \bar{w} = \bar{a} - b. \tag{17}$$

Observing Ω is the same as observing $(\bar{w}, \bar{t}, \Delta w, \Delta t)$, the two lists being related by an invertible linear map. By (F1), $(\bar{w}, \bar{t})$ depends only on $(\bar{a}, \bar{v}, \bar{\varepsilon})$ and is therefore independent of $(\Delta C, \Delta w, \Delta t)$, all functions of the differences by (iv) and Lemma 3. Hence by (F3),

$$\Delta P = \mathbb{E}\big[\Delta C \mid \Omega\big] = \mathbb{E}\big[\Delta C \mid \Delta w, \Delta t\big], \tag{18}$$

which is the formal content of the claim in the text that differences in perceived contributions depend only on signal differences.

Step 2: the public knows Δa, so the only unknown is Δv. By (iv) and (18) write $\Delta P = p_0 + p_1 \Delta w + p_2 \Delta t$. Substituting into $\Delta w = \theta \Delta a - \kappa\lambda\Delta P$,

$$\big(1 + \kappa\lambda p_1\big)\Delta w = \theta\, \Delta a - \kappa\lambda p_0 - \kappa\lambda p_2\, \Delta t. \tag{19}$$

The coefficient $1 + \kappa\lambda p_1$ cannot vanish: otherwise $\theta \Delta a = \kappa\lambda p_0 + \kappa\lambda p_2 \Delta t$ almost surely, impossible since Δa and Δt are independent and non-degenerate and $\theta > 0$. So (19) can be solved for Δa, and observing $(\Delta w, \Delta t)$ is the same as observing $(\Delta a, \Delta t)$: the public infers the productivity difference exactly by inverting the wage equation, $\theta \Delta a = \Delta w + \kappa\lambda\Delta P$. Because Δw is observed and $\Delta C = \Delta w + \Delta v$,

$$\Delta P = \Delta w + \mathbb{E}\big[\Delta v \mid \Delta a, \Delta t\big]. \tag{20}$$

By (F1) Δa is independent of $(\Delta v, \Delta t)$, so (F3) gives $\mathbb{E}[\Delta v \mid \Delta a, \Delta t] = \mathbb{E}[\Delta v \mid \Delta t]$: knowing productivity is of no help in judging unpriced value. Since $(\Delta v, \Delta t)$ is jointly normal with mean zero, $\mathrm{Var}(\Delta t) = \sigma_v^2 + \sigma_\varepsilon^2$ and $\mathrm{Cov}(\Delta v, \Delta t) = \sigma_v^2$, (F2) gives

$$\mathbb{E}\big[\Delta v \mid \Delta t\big] = \frac{\sigma_v^2}{\sigma_v^2 + \sigma_\varepsilon^2}\, \Delta t = \varphi\, \Delta t, \tag{21}$$

and substituting into (20) with $\Delta t = \Delta s - \Delta w$,

$$\Delta P = \Delta w + \varphi\big(\Delta s - \Delta w\big) = \beta_y\, \Delta w + \big(1 - \beta_y\big)\, \Delta s, \tag{22}$$

the perception equation in the statement of the Lemma.

Step 3: solving the fixed point. Combining $\Delta P = \Delta w + \varphi(\Delta v + \Delta\varepsilon)$ with $\Delta w = \theta \Delta a - \kappa\lambda\Delta P$ gives $m\, \Delta P = \theta \Delta a + \varphi(\Delta v + \Delta\varepsilon)$. Since $m > 0$ this has the unique solution

$$\Delta P^{eq} = \frac{\theta\, \Delta a + \big(1 - \beta_y\big)\big(\Delta v + \Delta\varepsilon\big)}{m}, \tag{23}$$

and substituting back,

$$\Delta w^{eq} = \frac{\theta\, \Delta a - \kappa\lambda\big(1-\beta_y\big)\big(\Delta v + \Delta\varepsilon\big)}{m}, \tag{24}$$

$$\Delta L^{eq} = \frac{\Delta a + \lambda \Delta P^{eq}}{h+b} = \frac{(1+\lambda)\,\Delta a + \lambda\big(1-\beta_y\big)\big(\Delta v + \Delta\varepsilon\big)}{(h+b)\,m}, \tag{25}$$

the last line using $m + \lambda\theta = 1 + \lambda$ because $\kappa + \theta = 1$.

Step 4: existence and uniqueness. Take (23)–(25) as the candidate; (i), (ii) and (iv) hold by construction. For (iii), (24) gives $\Delta a = \big[m\, \Delta w^{eq} + \kappa\lambda\varphi\, \Delta t\big]/\theta$, so observing $(\Delta w^{eq}, \Delta t)$ is again the same as observing $(\Delta a, \Delta t)$, and Step 1 with (21) yields $\mathbb{E}[\Delta C \mid \Omega] = \Delta w^{eq} + \varphi \Delta t = \big[\theta \Delta a + \varphi \Delta t\big]/m = \Delta P^{eq}$, using $m - \kappa\lambda = 1$. The same argument applied to sums delivers $P_j = \mathbb{E}[C_j \mid \Omega]$ occupation by occupation: $\bar{w}$ is observed and $\bar{t} = \bar{v} + \bar{\varepsilon}$, so (F2) gives $\mathbb{E}[\bar{v} \mid \Omega] = \mathbb{E}[\bar{v}] + \varphi(\bar{t} - \mathbb{E}[\bar{t}])$ with the same weight φ, sums and differences carrying the same variance ratio; combining the sum and difference blocks recovers P_1 and P_2. For uniqueness, Steps 1–2 used only (i)–(iv) and force $\Delta P = \Delta w + \varphi \Delta t$, which together with the wage equation has the unique solution of Step 3. Hence the equilibrium is unique within the class of linear rational-expectations equilibria. □

A.3 Proof of Proposition 1

Proof. By (22) the observer's perception rule is $\Delta P = \beta_y \Delta w + (1-\beta_y)\Delta s$ with $\Delta s = \Delta C + \Delta\varepsilon$. Treating Δw and ΔC as fixed arguments and averaging over the direct-signal noise, which has mean zero,

$$\overline{P}\big(\Delta w, \Delta C\big) \equiv \mathbb{E}_{\Delta\varepsilon}\Big[\Delta P\big(\Delta w, \Delta C + \Delta\varepsilon\big)\Big] = \beta_y \Delta w + (1-\beta_y)\Delta C,$$

so $\partial \overline{P}/\partial \Delta w|_{\Delta C} = \beta_y$.[15] Finally

$$\frac{\partial \beta_y}{\partial \sigma_\varepsilon^2} = \frac{\sigma_v^2}{\big(\sigma_\varepsilon^2 + \sigma_v^2\big)^2} > 0$$

since $\sigma_v^2 > 0$, with $\beta_y = 0$ at $\sigma_\varepsilon^2 = 0$ and $\beta_y \to 1$ as $\sigma_\varepsilon^2 \to \infty$. □

A.4 Proof of Proposition 2

Proof. Write $X \equiv \theta \Delta a$ and $Y \equiv \varphi(\Delta v + \Delta\varepsilon)$, so that by (23)–(24), $\Delta P^{eq} = (X+Y)/m$ and $\Delta w^{eq} = (X - \kappa\lambda Y)/m$. By (F1) Δa is independent of $(\Delta v, \Delta\varepsilon)$, so $\mathrm{Cov}(X, Y) = 0$ and

$$m^2\, \mathrm{Cov}\big(\Delta w^{eq}, \Delta P^{eq}\big) = \mathrm{Cov}\big(X - \kappa\lambda Y, X + Y\big) = \mathrm{Var}(X) - \kappa\lambda \mathrm{Var}(Y),$$

[15] The averaging is over $\Delta\varepsilon$ only, with Δw and ΔC held fixed as arguments; it is not a conditional expectation in the equilibrium distribution. The distinction matters: in equilibrium Δw^{eq} and ΔC both depend on $\Delta\varepsilon$, so conditioning on them also conditions on the noise, and $\mathbb{E}[\Delta P^{eq} \mid \Delta w^{eq}, \Delta C] \neq \beta_y \Delta w^{eq} + (1-\beta_y)\Delta C$ in general. The object here is the observer-side response to an exogenous change in displayed income holding the work fixed, which is what the randomized-income surveys and the market experiment manipulate; the endogenous equilibrium distribution is the subject of Propositions 2–4.

with $\mathrm{Var}(X) = \theta^2\sigma_a^2$ and $\mathrm{Var}(Y) = \varphi^2(\sigma_v^2+\sigma_\varepsilon^2) = \sigma_v^4/(\sigma_v^2+\sigma_\varepsilon^2)$, which gives the stated formula.[16] Differentiating,

$$\frac{\partial}{\partial \sigma_\varepsilon^2}\mathrm{Cov}\big(\Delta w^{eq}, \Delta P^{eq}\big) = \frac{\kappa\lambda\,\sigma_v^4}{m^2\big(\sigma_v^2+\sigma_\varepsilon^2\big)^2} > 0,$$

so the covariance strictly increases. As $\sigma_\varepsilon^2 \to \infty$ the second term vanishes and the covariance tends to $\theta^2\sigma_a^2/m^2 > 0$. At $\sigma_\varepsilon^2 = 0$ it equals $(\theta^2\sigma_a^2 - \kappa\lambda\sigma_v^2)/m^2$, which is strictly negative exactly when $\lambda(1-\theta)\sigma_v^2 > \theta^2\sigma_a^2$. □

A.5 Proof of Proposition 3

Proof. Set $\Delta a = q > 0$ and $\Delta v = -q$, so $\Delta a + \Delta v = 0$ and $\Delta L^{\text{eff}} = 0$ by Lemma 4. Averaging (23) over $\Delta\varepsilon$ and using $\varphi = 1-\beta_y$, $\kappa = 1-\theta$,

$$\mathbb{E}_\varepsilon\big[\Delta P^{eq}\big] = \frac{\theta q - \varphi q}{m} = \frac{\big(\beta_y - \kappa\big)q}{m}, \qquad \text{so} \qquad \mathbb{E}_\varepsilon\big[\Delta L^{eq}\big] = \frac{q + \lambda\,\mathbb{E}_\varepsilon[\Delta P^{eq}]}{h+b} = \frac{\big(1+\lambda\beta_y\big)q}{(h+b)\,m}$$

by Lemma 3, because $m - \lambda\kappa = 1$. Since $\Delta L^{\text{eff}} = 0$ this is also the expected allocation error, and it is strictly positive. Only β_y depends on σ_ε^2, so

$$\frac{\partial}{\partial \sigma_\varepsilon^2}\mathbb{E}_\varepsilon\big[\Delta L^{eq} - \Delta L^{\text{eff}}\big] = \frac{\lambda q}{(h+b)m}\cdot\frac{\partial \beta_y}{\partial \sigma_\varepsilon^2} = \frac{\lambda\, q\,\sigma_v^2}{(h+b)\,m\,\big(\sigma_v^2+\sigma_\varepsilon^2\big)^2} > 0.$$

□

Remark 1 (Why a compensated composition change is needed)**.** *If instead $\Delta v = 0$ and $\Delta a > 0$, then $\mathbb{E}_\varepsilon[\Delta L^{eq} - \Delta L^{\text{eff}}] = \Lambda\theta\,\Delta a/(h+b)$, which is strictly positive but does not depend on σ_ε^2. Value uncertainty changes the relative weight placed on the market and unpriced components of contribution, so it can move the allocation only when there is an unpriced component whose weight can be attenuated; varying Δa alone changes market productivity and the primitive social return together, leaving nothing to attenuate. The compensated change holds fixed the allocation-independent social return $\Delta a + \Delta v$ while changing its composition, and it is this margin that lets value uncertainty affect the allocation. It does not hold the realized marginal contribution fixed: since $\Delta a + \Delta v = 0$, equilibrium entry gives $\Delta C = \Delta a - b\Delta L + \Delta v = -b\Delta L \neq 0$.*

A.6 Proof of Proposition 4

Proof. By Lemma 3, $\Delta L^{eq} - \Delta L^{\text{eff}} = (\lambda\Delta P^{eq} - \Delta v)/(h+b)$, so (16) gives $\mathrm{DWL} = (\lambda\Delta P^{eq} - \Delta v)^2/[4(h+b)]$. Substituting (23) and $\Lambda = \lambda/m$,

$$\lambda\Delta P^{eq} - \Delta v = \Lambda\theta\,\Delta a + \big(\Lambda\varphi - 1\big)\Delta v + \Lambda\varphi\,\Delta\varepsilon,$$

[16] The step $\mathrm{Cov}(X,Y) = 0$ is where independence of a and v is used. If instead $\mathrm{Cov}(\Delta a, \Delta v) = \sigma_{av} \neq 0$, the covariance acquires the extra term $(1-\kappa\lambda)\,\theta\,\varphi\,\sigma_{av}/m^2$ and the stated formula fails.

whose three terms are independent with mean zero by (F1), so

$$\mathbb{E}\Big[\big(\lambda\Delta P^{eq}-\Delta v\big)^2\Big]=\Lambda^2\theta^2\sigma_a^2+\big(\Lambda\varphi-1\big)^2\sigma_v^2+\Lambda^2\varphi^2\sigma_\varepsilon^2.$$

The identity $\varphi^2\sigma_\varepsilon^2=\sigma_v^2\varphi(1-\varphi)$ collapses the last two terms to $\sigma_v^2\big[\Lambda^2\varphi^2-2\Lambda\varphi+1+\Lambda^2\varphi-\Lambda^2\varphi^2\big]=\sigma_v^2\big[1-\Lambda\varphi(2-\Lambda)\big]$, which gives the stated expression. Differentiating with $\partial\varphi/\partial\sigma_\varepsilon^2=-\varphi^2/\sigma_v^2$,

$$\frac{\partial\,\mathbb{E}[\mathrm{DWL}]}{\partial\sigma_\varepsilon^2}=\frac{\Lambda(2-\Lambda)\,\varphi^2}{4(h+b)},$$

strictly positive because $\varphi>0$ and $0<\Lambda<1$, the latter from $\Lambda=\lambda/m<\lambda<1$. □

A.7 The general case $\sigma_u^2>0$

Let $y_j=w_j+u_j$ with $u_j\sim\mathbb{N}(0,\sigma_u^2/2)$ independent of everything else, so $\Delta u\sim\mathbb{N}(0,\sigma_u^2)$ with $\sigma_u^2>0$. Write

$$A\equiv\theta\Delta a,\quad \xi\equiv A+\Delta v,\quad \sigma_A^2\equiv\theta^2\sigma_a^2,\quad \sigma_\xi^2\equiv\sigma_A^2+\sigma_v^2,\quad D\equiv\big(\sigma_A^2+\sigma_u^2\big)\big(\sigma_\xi^2+\sigma_\varepsilon^2\big)-\sigma_A^4,$$

and let $H\equiv\sigma_A^2\sigma_u^2/(\sigma_A^2+\sigma_u^2)$ denote the parallel combination of the two variances, equal to 0 when income is observed exactly and rising to σ_A^2 as the income signal becomes uninformative. Both cross-sectional comparative statics below are governed by the size of σ_v^2 relative to H.

Proposition 5 (Noisy income signal). *There is a unique linear rational-expectations equilibrium, in the sense of condition (iv) in Appendix A.2. It satisfies $m\,\Delta P^{eq}=b_1(A+\Delta u)+b_2(\xi+\Delta\varepsilon)$ with*

$$b_1=\frac{\sigma_A^2\sigma_\varepsilon^2}{D},\qquad b_2=\frac{\sigma_A^2\sigma_v^2+\sigma_\xi^2\sigma_u^2}{D},\qquad b_1+b_2=1-\frac{\sigma_u^2\sigma_\varepsilon^2}{D}\le 1.$$

The coefficient on observed income in the perception equation is

$$\beta_y^{\mathrm{gen}}=\frac{\sigma_A^2\sigma_\varepsilon^2}{c_0+c_1\sigma_\varepsilon^2},\qquad c_0\equiv\sigma_A^2\sigma_v^2+\sigma_u^2\sigma_\xi^2,\qquad c_1\equiv\sigma_A^2+\sigma_u^2m,$$

strictly increasing in σ_ε^2, equal to 0 at $\sigma_\varepsilon^2=0$, converging to $\sigma_A^2/c_1<1$, and reducing to β_y as $\sigma_u^2\to 0$. Propositions 2–4 continue to hold, with one qualification. The covariance is

$$\mathrm{Cov}\big(\Delta w^{eq},\Delta P^{eq}\big)=\frac{b_1\sigma_A^2+b_2\big(\sigma_A^2-\kappa\lambda\sigma_v^2\big)}{m^2}=\frac{\sigma_A^4\sigma_\varepsilon^2+c_0\big(\sigma_A^2-\kappa\lambda\sigma_v^2\big)}{m^2\big[c_0+(\sigma_A^2+\sigma_u^2)\sigma_\varepsilon^2\big]},$$

whose derivative in σ_ε^2 equals $c_0\big[\kappa\lambda\sigma_v^2(\sigma_A^2+\sigma_u^2)-\sigma_A^2\sigma_u^2\big]/(m^2D^2)$. It is therefore increasing in value uncertainty if and only if $\kappa\lambda\,\sigma_v^2>H$, a condition implied by, but weaker than, $\kappa\lambda\sigma_v^2>\sigma_A^2$, under which the covariance is negative at $\sigma_\varepsilon^2=0$. Hence whenever the covariance starts out negative it is strictly increasing and crosses zero exactly once, as in Proposition 2; if it starts out positive it may decrease, though its limit $\sigma_A^4/\big[m^2(\sigma_A^2+\sigma_u^2)\big]$ remains strictly positive. Noisy income introduces a *second attenuation force: as the direct signal deteriorates, observers lean more on income, but income is itself an imperfect signal. Next, under $\Delta a = q$, $\Delta v = -q$,*

$$\frac{\partial}{\partial \sigma_\varepsilon^2}\mathbb{E}\big[\Delta L^{eq} - \Delta L^{\text{eff}}\big] = \frac{\lambda\, q\, c_0\big[\sigma_A^2 + \sigma_u^2(1-\theta)\big]}{(h+b)\, m\, D^2} > 0,$$

so Proposition 3 survives unconditionally. Finally, expected deadweight loss is

$$\mathbb{E}\big[\text{DWL}\big] = \frac{\Lambda^2\big(b_1+b_2\big)^2\sigma_A^2 + \Lambda^2 b_1^2\sigma_u^2 + \big(\Lambda b_2 - 1\big)^2\sigma_v^2 + \Lambda^2 b_2^2\sigma_\varepsilon^2}{4(h+b)}, \qquad \text{sign}\,\frac{\partial\,\mathbb{E}\big[\text{DWL}\big]}{\partial \sigma_\varepsilon^2} = \text{sign}\big[(2-\Lambda)\,\sigma_v^2 - \Lambda H\big].$$

The bracket does not involve σ_ε^2, so expected deadweight loss is monotone in value uncertainty over its entire range: strictly increasing when $(2-\Lambda)\sigma_v^2 > \Lambda H$ and strictly decreasing otherwise. Setting $\sigma_u^2 = 0$ gives $H = 0$, and both conditions hold for every parameter value, recovering Propositions 2 and 4.

Proof. Step 1 of Lemma 1 applies unchanged, with $\bar{y} = \bar{a} - b + \bar{u}$ and $\bar{s} = \bar{a} - b + \bar{v} + \bar{\varepsilon}$ both functions of sums only (so that $\bar{t} \equiv \bar{s} - \bar{y} = \bar{v} + \bar{\varepsilon} - \bar{u}$), so again only differences matter. Income is no longer observed exactly, so in place of Step 2 note that, because ΔP is a function of the observables, so are

$$x_1 \equiv \Delta y + \kappa\lambda\Delta P = A + \Delta u, \qquad x_2 \equiv \Delta s + \kappa\lambda\Delta P = \xi + \Delta\varepsilon,$$

using $\Delta w = A - \kappa\lambda\Delta P$ and $\Delta s = \Delta w + \Delta v + \Delta\varepsilon$; conversely $(\Delta y, \Delta s)$ is recovered from $(x_1, x_2, \Delta P)$, so observing $(\Delta y, \Delta s)$ is the same as observing (x_1, x_2). Since $\Delta C = \xi - \kappa\lambda\Delta P$ and ΔP is observed, $m\Delta P = \mathbb{E}[\xi \mid x_1, x_2]$. Now (ξ, x_1, x_2) is jointly normal with mean zero,

$$\text{Var}\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} \sigma_A^2 + \sigma_u^2 & \sigma_A^2 \\ \sigma_A^2 & \sigma_\xi^2 + \sigma_\varepsilon^2 \end{pmatrix}, \qquad \text{Cov}\big(\xi, (x_1, x_2)\big) = \big(\sigma_A^2,\ \sigma_\xi^2\big),$$

where $\text{Cov}(\xi, x_1) = \sigma_A^2$ uses independence of Δa, Δv and Δu, and the determinant D is positive. Applying (F2) and simplifying with $\sigma_\xi^2 - \sigma_A^2 = \sigma_v^2$ gives b_1 and b_2; subtracting, $D - \big(\sigma_A^2\sigma_\varepsilon^2 + \sigma_A^2\sigma_v^2 + \sigma_\xi^2\sigma_u^2\big) = \sigma_u^2\sigma_\varepsilon^2$, which gives $b_1 + b_2 \le 1$. Substituting x_1, x_2 back in terms of the observables, $\big[1 + \kappa\lambda(1 - b_1 - b_2)\big]\Delta P = b_1\Delta y + b_2\Delta s$, where the bracket is at least 1; this pins down ΔP uniquely and gives $\beta_y^{\text{gen}} = \sigma_A^2\sigma_\varepsilon^2/\big[D + \kappa\lambda\sigma_u^2\sigma_\varepsilon^2\big]$, and expanding D yields $c_0 + c_1\sigma_\varepsilon^2$. Then $\partial\beta_y^{\text{gen}}/\partial\sigma_\varepsilon^2 = \sigma_A^2 c_0/(c_0 + c_1\sigma_\varepsilon^2)^2 > 0$; setting $\sigma_u^2 = 0$ gives $c_0 = \sigma_A^2\sigma_v^2$, $c_1 = \sigma_A^2$ and hence β_y.

The covariance follows as in Appendix A.4 from $\text{Var}(m\Delta P) = b_1\sigma_A^2 + b_2\sigma_\xi^2$ and $\text{Cov}(A, m\Delta P) = (b_1 + b_2)\sigma_A^2$. For the misallocation claim, averaging over $(\Delta u, \Delta\varepsilon)$ gives $\mathbb{E}[m\Delta P] = (b_1 + b_2)A + b_2\Delta v$, so under $\Delta a = q$, $\Delta v = -q$, $\mathbb{E}[\Delta L^{eq} - \Delta L^{\text{eff}}] = \frac{q}{h+b}\big[1 + \lambda\big((b_1 + b_2)\theta - b_2\big)/m\big]$. Writing $b_2 = c_0/D$ and $b_1 + b_2 = 1 - \sigma_u^2\sigma_\varepsilon^2/D$, differentiation gives $\partial(b_1 + b_2)/\partial\sigma_\varepsilon^2 = -\sigma_u^2 c_0/D^2$ and $\partial b_2/\partial\sigma_\varepsilon^2 = -c_0(\sigma_A^2 + \sigma_u^2)/D^2$, so $\partial\big[(b_1 + b_2)\theta - b_2\big]/\partial\sigma_\varepsilon^2 = c_0\big[\sigma_A^2 + \sigma_u^2(1-\theta)\big]/D^2 > 0$, which gives the stated derivative.

For the deadweight loss, $m\Delta P^{eq} = (b_1 + b_2)A + b_1\Delta u + b_2\Delta v + b_2\Delta\varepsilon$, so

$$\lambda\Delta P^{eq} - \Delta v = \Lambda(b_1 + b_2)A + \Lambda b_1\Delta u + \big(\Lambda b_2 - 1\big)\Delta v + \Lambda b_2\Delta\varepsilon,$$

whose four terms are independent with mean zero by (F1); (16) then gives the stated expression. Differentiating in σ_ε^2 and clearing strictly positive factors, the numerator is $\lambda\, c_0\, D\big[\sigma_v^2(\sigma_A^2 + \sigma_u^2)(2m - \lambda) - \lambda\sigma_A^2\sigma_u^2\big]$, and dividing the bracket by $m(\sigma_A^2 + \sigma_u^2) > 0$ turns it into $(2 - \Lambda)\sigma_v^2 - \Lambda H$, which is free of σ_ε^2. Setting $\sigma_u^2 = 0$ gives $H = 0$ and the bracket reduces to $(2 - \Lambda)\sigma_v^2 > 0$. $\square$

B Additional Materials for Surveys

B.1 Additional Figures and Tables

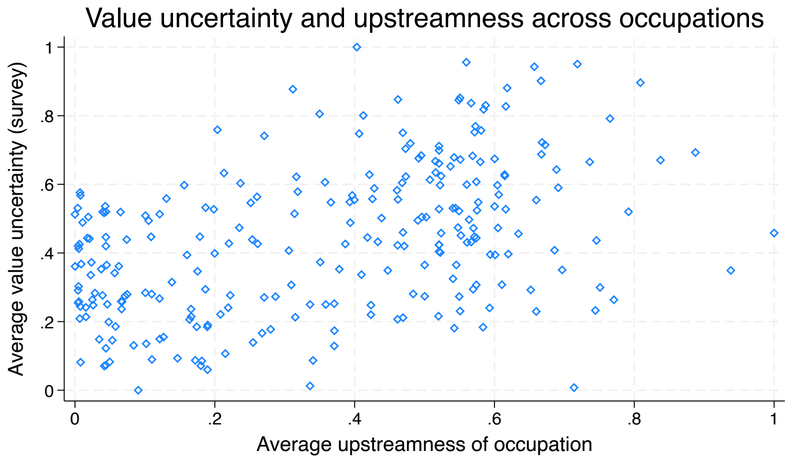


Figure 7: Average value uncertainty and occupation upstream-ness. Each dot is an occupation.

B.2 AI Prompt to Shorten BLS Descriptions

You will receive an occupation title and its BLS description.

Task: Write exactly 1 sentence that summarizes what people in this occupation do.

Constraints:

- Keep it plain and accessible for a general audience.
- Do not use jargon or acronyms.
- Do not mention income, salary, or wages.
- Do not mention BLS, SOC codes, or statistics.
- Be factual and neutral in tone.
- The sentence should be self-contained.
- Under no circumstances should the description exceed 18 words.

Respond with JSON only: "short$_d escription$" : "..."

Table 4: Randomized income information: Heterogeneity analysis

	Dependent variable: Perceived contribution	
	(1)	(2)
Log income	-2.55*	
	(1.52)	
Income percentile		0.01
		(0.02)
Log income × Respondent high income	2.21***	
	(0.53)	
Log income × Respondent college educated	0.51	
	(0.54)	
Log income × Respondent conservative	1.84***	
	(0.54)	
Log income × Respondent high age	-0.89	
	(0.57)	
Log income × Respondent female	-0.22	
	(0.60)	
Income percentile × Respondent high income		0.01*
		(0.01)
Income percentile × Respondent college educated		0.00
		(0.01)
Income percentile × Respondent conservative		0.01
		(0.01)
Income percentile × Respondent high age		-0.01
		(0.01)
Income percentile × Respondent female		-0.01
		(0.01)
Adjusted R^2	0.55	0.55
Observations	37350	37350

Notes. OLS estimates, robust standard errors (in parentheses) are two-way clustered at the respondent and occupation level. All regressions include occupation fixed effects and respondent fixed effects. All variables except for binary ones are split at the median. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Data from *Contribution* survey.

Table 5: Randomized income information and perceived contributions within occupations: Robustness against AI use

	Dependent variable: Perceived contribution					
Exclude from sample	AI use		No variation		Both	
	(1)	(2)	(3)	(4)	(5)	(6)
Log income	0.97*		0.83		0.97*	
	(0.54)		(0.53)		(0.54)	
Log income × Value uncertainty (summary index)	2.92***		3.25***		2.91***	
	(1.05)		(1.04)		(1.05)	
Income percentile		0.01		0.01		0.01
		(0.01)		(0.01)		(0.01)
Income percentile × Value uncertainty (summary index)		0.04***		0.04***		0.04***
		(0.01)		(0.01)		(0.01)
Adjusted R^2	0.55	0.55	0.54	0.54	0.55	0.55
Observations	36000	36000	37680	37680	35940	35940

Notes. OLS estimates, robust standard errors (in parentheses) are two-way clustered at the respondent and occupation level. Columns (1)–(2) exclude respondents who are flagged as potential AI users, either because they self-reported AI use or because a writing task flagged them. Columns (3)–(4) exclude respondents whose social contribution ratings exhibit no variation. Columns (5)–(6) exclude both groups of respondents. The summary index of value uncertainty is the average of the z-scores of the survey-based value uncertainty (familiarity) measure and the upstreamness measure. All regressions include occupation fixed effects and respondent fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Data from *Contribution* survey.

Table 6: Randomized income information and perceived contributions within occupations: Robustness

	Dependent variable: Perceived contribution					
	(1)	(2)	(3)	(4)	(5)	(6)
Log income	-0.36		-5.61		-0.77	
	(11.06)		(10.51)		(10.64)	
Income percentile		-0.02		-0.08		-0.03
		(0.11)		(0.11)		(0.11)
Log income × Value uncertainty (survey)	2.31^{*}					
	(1.23)					
Income percentile × Value uncertainty (survey)		0.02^{*}				
		(0.01)				
Log income × Upstreamness			2.53^{**}			
			(1.05)			
Income percentile × Upstreamness				0.02^{**}		
				(0.01)		
Log income × Value uncertainty (summary index)					3.06^{**}	
					(1.19)	
Income percentile × Value uncertainty (summary index)						0.03^{**}
						(0.01)
Log income × Average age	0.08		0.08		0.08	
	(0.06)		(0.06)		(0.06)	
Log income × Share female	-0.77		-0.34		-0.28	
	(1.06)		(1.10)		(1.08)	
Log income × Share White	0.03		0.03		0.03	
	(0.03)		(0.03)		(0.03)	
Log income × Share college degree	-0.75		-1.31		-0.98	
	(1.24)		(1.16)		(1.18)	
Log income × Log median income	-0.33		0.18		-0.30	
	(0.99)		(0.94)		(0.96)	
Income percentile × Average age		0.00		0.00		0.00
		(0.00)		(0.00)		(0.00)
Income percentile × Share female		-0.01		-0.01		-0.01
		(0.01)		(0.01)		(0.01)
Income percentile × Share White		0.00^{*}		0.00^{*}		0.00^{*}
		(0.00)		(0.00)		(0.00)
Income percentile × Share college degree		0.00		-0.00		0.00
		(0.01)		(0.01)		(0.01)
Income percentile × Log median income		-0.00		0.00		-0.00
		(0.01)		(0.01)		(0.01)
Adjusted R^2	0.54	0.54	0.54	0.54	0.54	0.54
Observations	37740	37740	37740	37740	37740	37740

Notes. OLS estimates, robust standard errors (in parentheses) are two-way clustered at the respondent and occupation level. The summary index of value uncertainty is the average of the z-scores of the survey-based value uncertainty (familiarity) measure and the upstreamness measure. All regressions include occupation fixed effects and respondent fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Data from *Contribution* survey.

Table 7: Value uncertainty and aggregate outcomes

	Dependent variable:								
	Log median income			Ave. respect			Ave. perceived contribution		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Value uncertainty (survey)	0.62***	0.28***	0.24***	-10.74***	-19.83***	-14.30***	-9.89**	-23.36***	-19.40***
	(0.11)	(0.07)	(0.08)	(3.17)	(3.24)	(3.11)	(4.17)	(4.09)	(4.87)
Share with a college degree		0.93***	0.67***		-9.30***	-8.06*		-21.38***	-20.25***
		(0.05)	(0.13)		(3.38)	(4.27)		(4.66)	(5.83)
Share female		-0.38***	-0.26***		1.52	2.75		-1.54	2.97
		(0.05)	(0.10)		(2.46)	(3.95)		(3.56)	(5.26)
Share of Whites		0.00*	0.00		0.09	0.07		0.06	0.08
		(0.00)	(0.00)		(0.07)	(0.07)		(0.10)	(0.11)
Average age		0.01***	0.01**		-0.31**	-0.16		-0.54***	-0.34
		(0.00)	(0.00)		(0.13)	(0.17)		(0.18)	(0.28)
Log median income					17.97***	13.24***		27.01***	21.86***
					(2.72)	(3.85)		(3.67)	(5.28)
Occupation category FE	No	No	Yes	No	No	Yes	No	No	Yes
R^2	0.12	0.66	0.86	0.04	0.24	0.73	0.02	0.23	0.73
Observations	259	259	259	259	259	259	259	259	259

Notes. OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Data from market experiments.

C Additional Materials for Market Experiments

C.1 Work Tasks

Producers produce their assigned input by completing one of three computerized real-effort tasks, shown in Figures 8–10. In the *slider task*, the Producer drags sliders on a grid to match randomly assigned target values. In the *circle-tracking task*, the Producer keeps the cursor on a dot that travels around a circle. In the *ball-kick task*, the Producer repeatedly presses the space bar to kick a virtual ball as far as possible. Each task runs for a fixed time, and its score—the number of sliders matched, the milliseconds of cursor contact, or the feet the ball is kicked—determines how many units of the Producer's assigned input are produced. The assignment of tasks to input types (water, soil, fertilizer) is randomized across market groups. In the *Baseline* and *Time displayed* conditions the three Producers in a group each work on a different task, whereas in the *Same task* condition all three work on the same task.

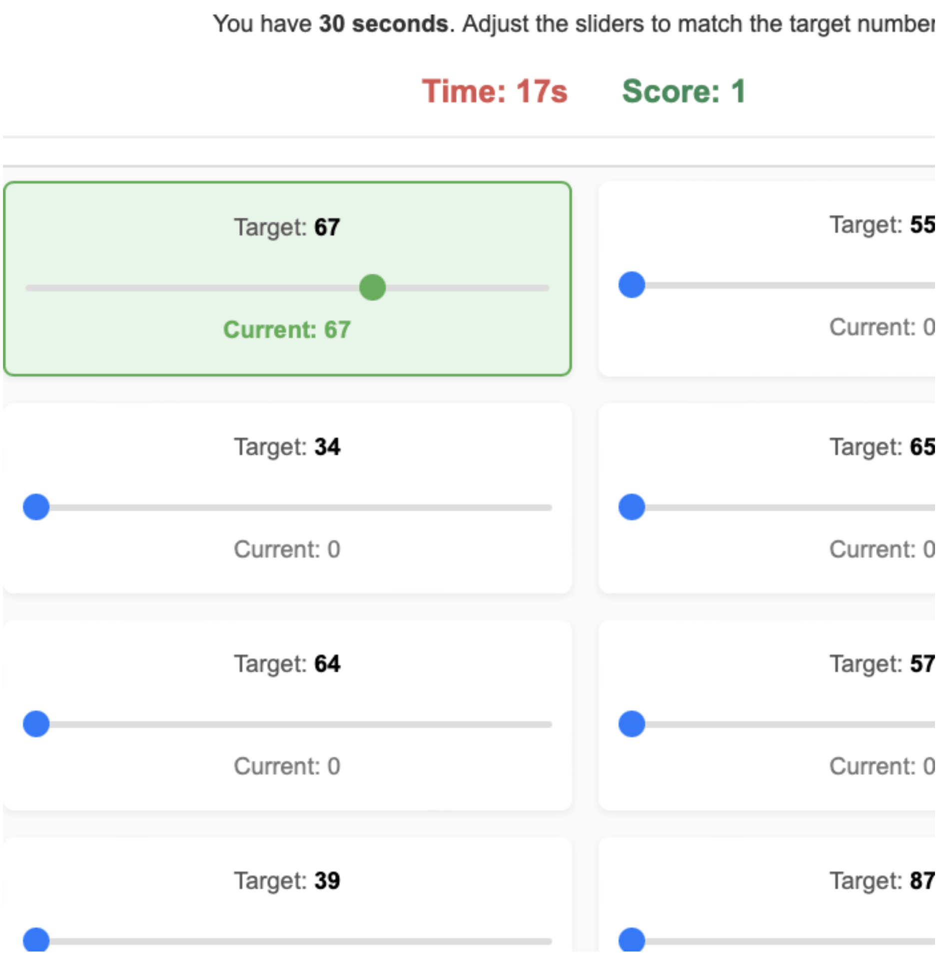


Figure 8: Slider task: the Producer drags sliders to match randomly assigned target values.

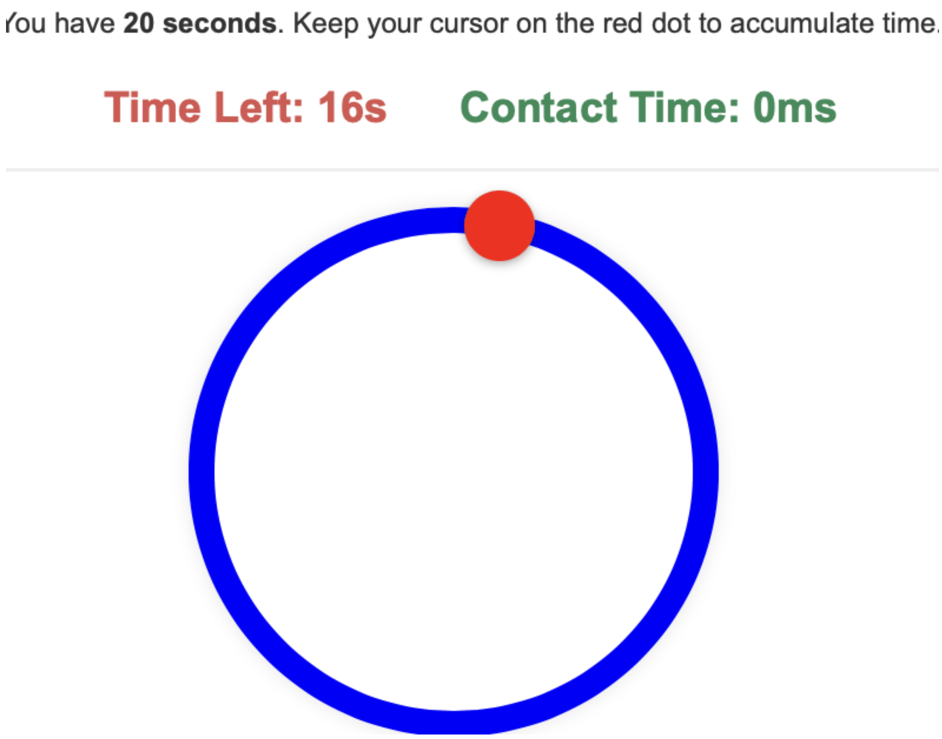


Figure 9: Circle-tracking task: the Producer keeps the cursor on a dot moving around a circle.

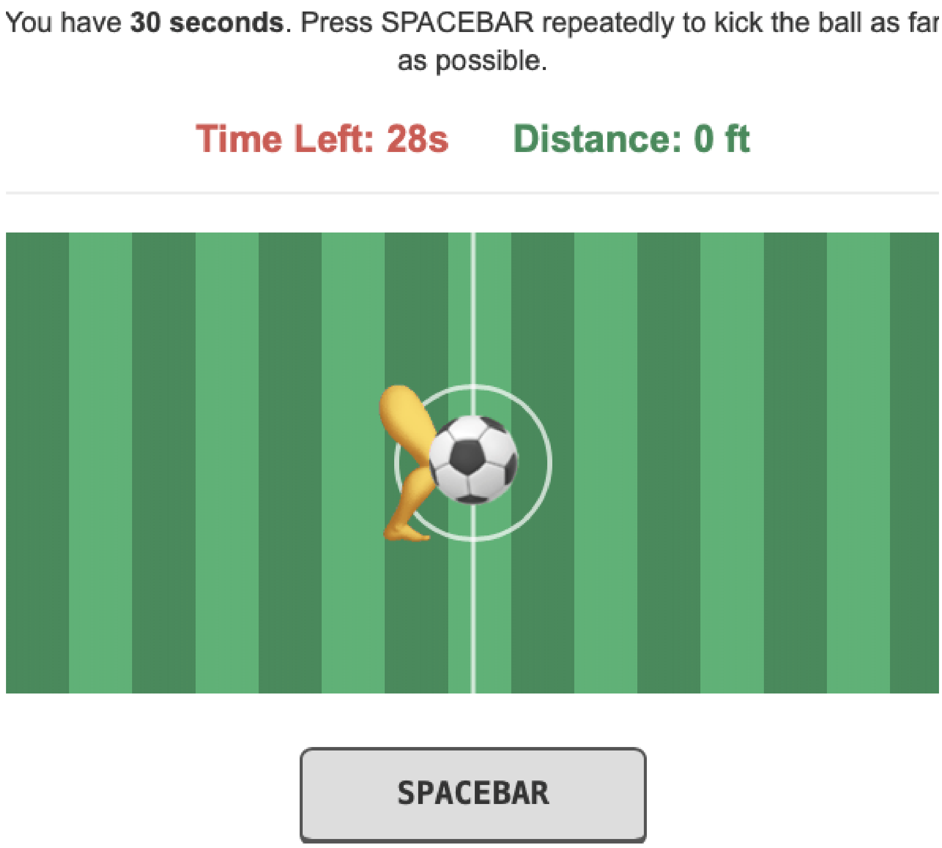


Figure 10: Ball-kick task: the Producer repeatedly presses the space bar to kick a virtual ball as far as possible.

C.2 LLM Prompt to Label Positivity of Messages

Each free-text message a Spectator wrote to a Producer was assigned a positivity score by a large language model (OpenAI's `gpt-5.2`). Messages were scored one at a time, and the model's integer response on a 1–5 scale is the positivity measure used in the analysis. The exact prompt was:

> You are a research assistant coding messages from a behavioral economics experiment.
>
> *Context:*
>
> - In the experiment, three "Producers" do effortful tasks (e.g., kicking a virtual ball, tracing a moving circle, positioning sliders) to produce one of three inputs (water, soil, or fertilizer) that are needed to grow crops.
> - The three Producers' efforts are complementary: growing crops requires all three inputs, so each Producer relies on the other Producers producing and selling their inputs in a market.
> - Another participant, the "Spectator," sees how much each Producer chose to work, the inputs they produced, and how much they earned from selling those inputs in the market.
> - The Spectator then writes a free-text message (at least 30 words) directly to one Producer, explaining how they feel about that Producer's decisions and their consequences for the group.
>
> Your job is to read ONE such message (addressed to one Producer) and rate the overall POSITIVITY of the message.
>
> *Definition:* Positivity is the extent to which the message expresses positive emotion, affirmation, encouragement, optimism, warmth, or praise toward the Producer. The opposite is negative emotion: criticism, disappointment, anger, hostility, complaining, or discouragement.
>
> Use this 1–5 scale:
>
> 1 = Strongly negative, hostile, or harshly critical
>
> 2 = Moderately negative, disappointed, or discouraging
>
> 3 = Neutral or mixed (about equal positive and negative content)
>
> 4 = Moderately positive, warm, or appreciative
>
> 5 = Strongly positive, enthusiastic, or highly encouraging
>
> *Coding rules:*
>
> - Focus on emotional tone, not on whether the Spectator's beliefs are factually correct, useful, or actionable.
> - Ignore spelling, grammar, or writing quality.

- Do not infer sarcasm unless it is very explicit.

Output requirement: Return ONLY a single integer from 1 to 5, with no words, no explanation, no punctuation, and no other characters. The next input you receive will be the Spectator's message to rate.

C.3 Additional Figures and Tables

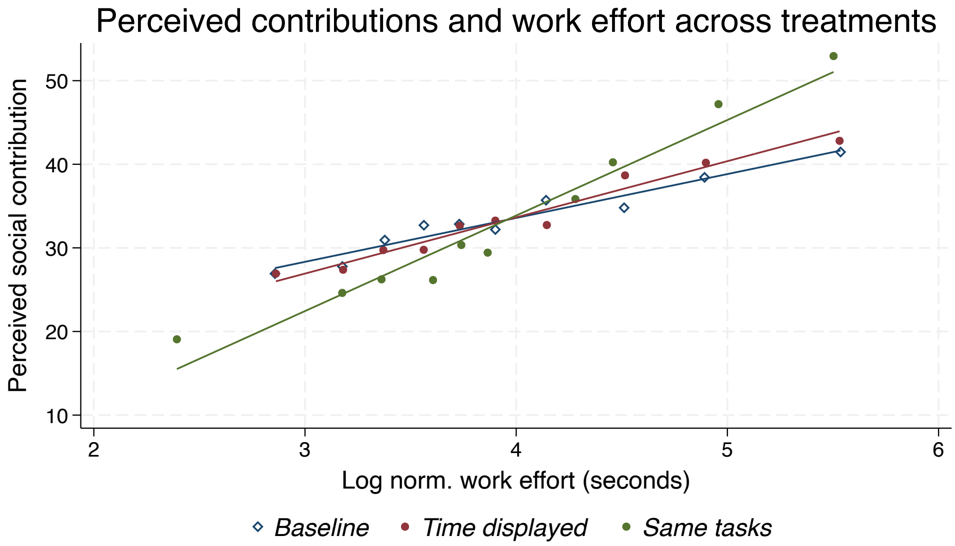


Figure 11: Perceived contributions (point allocation) as a function of normalized work effort by treatment. Binned scatter plot, controlling for the covariates in column (2) of Table 3.

Table 8: Robustness: Earnings and effort shares in the market experiment

	Dependent variable: Perceived social contribution					
	Point allocation (0-100)			Text (1-5)		
	(1)	(2)	(3)	(4)	(5)	(6)
Earnings share in market	31.80***	45.00***	42.83***	1.76***	2.26***	2.20***
	(2.78)	(3.05)	(3.03)	(0.16)	(0.19)	(0.19)
Work effort share in market	32.46***	17.64***	20.27***	1.33***	0.98***	1.05***
	(2.60)	(2.30)	(2.38)	(0.12)	(0.12)	(0.13)
Earnings share × *Time displayed*		-13.28***			-0.54**	
		(4.23)			(0.25)	
Earnings share × *Same tasks*		-27.07***			-0.99**	
		(5.61)			(0.40)	
Work effort share × *Time displayed*		11.65***			0.26	
		(3.22)			(0.16)	
Work effort share × *Same tasks*		32.00***			0.78***	
		(3.63)			(0.26)	
Earnings share × *Same tasks / Time displayed*			-16.98***			-0.68**
			(4.13)			(0.28)
Work effort share × *Same tasks / Time displayed*			18.50***			0.43***
			(3.11)			(0.16)
R^2	0.37	0.41	0.40	0.45	0.45	0.45
Observations	7002	7002	7002	7002	7002	7002

Notes. OLS estimates, robust standard errors (in parentheses) are two-way clustered at the Spectator and market group level. All regressions include Spectator fixed effects, market group fixed effects and work task fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Data from market experiments.

Table 9: Robustness against AI use in the market experiment

	Dependent variable: Perceived social contribution					
	Point allocation (0-100)			Text (1-5)		
	(1)	(2)	(3)	(4)	(5)	(6)
Log earnings	7.20***	11.56***	10.93***	0.43***	0.59***	0.58***
	(0.97)	(0.91)	(0.92)	(0.05)	(0.05)	(0.05)
Log normalized work effort (seconds)	8.09***	4.56***	5.14***	0.36***	0.26***	0.28***
	(0.64)	(0.59)	(0.60)	(0.03)	(0.03)	(0.03)
Log earnings × *Time displayed*		-4.64***			-0.19***	
		(1.22)			(0.06)	
Log earnings × *Same tasks*		-8.06***			-0.30**	
		(2.30)			(0.13)	
Log norm. work effort × *Time displayed*		3.04***			0.08**	
		(0.81)			(0.04)	
Log norm. work effort × *Same tasks*		6.86***			0.18***	
		(1.08)			(0.06)	
Log earnings × *Same tasks / Time displayed*			-5.58***			-0.23***
			(1.40)			(0.08)
Log norm. work effort × *Same tasks / Time displayed*			4.35***			0.11***
			(0.78)			(0.04)
R^2	0.36	0.39	0.38	0.46	0.46	0.46
Observations	6795	6795	6795	6795	6795	6795

Notes. OLS estimates, robust standard errors (in parentheses) are two-way clustered at the Spectator and market group level. All regressions include Spectator fixed effects, market group fixed effects and work task fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Data from market experiments, excluding Spectators who were flagged as potential AI users in a writing task at the end of the study.

D Screenshots of Study Interfaces

This appendix reproduces the participant-facing screens of every study. Because the studies share a common structure, one full reference flow is shown per family—the *Contribution* survey and the *Baseline* Spectator condition—and for the remaining surveys and treatments only the screens that differ from that reference are reproduced. Each screen is shown in full; screens longer than one page are split at paragraph breaks and labelled "part k of n."

D.1 Screens Common to All Studies

Every study opened with the same browser check, human-verification and consent screens, and embedded a reCaptcha at the midpoint. They are reproduced once here and are not repeated for the individual studies below.

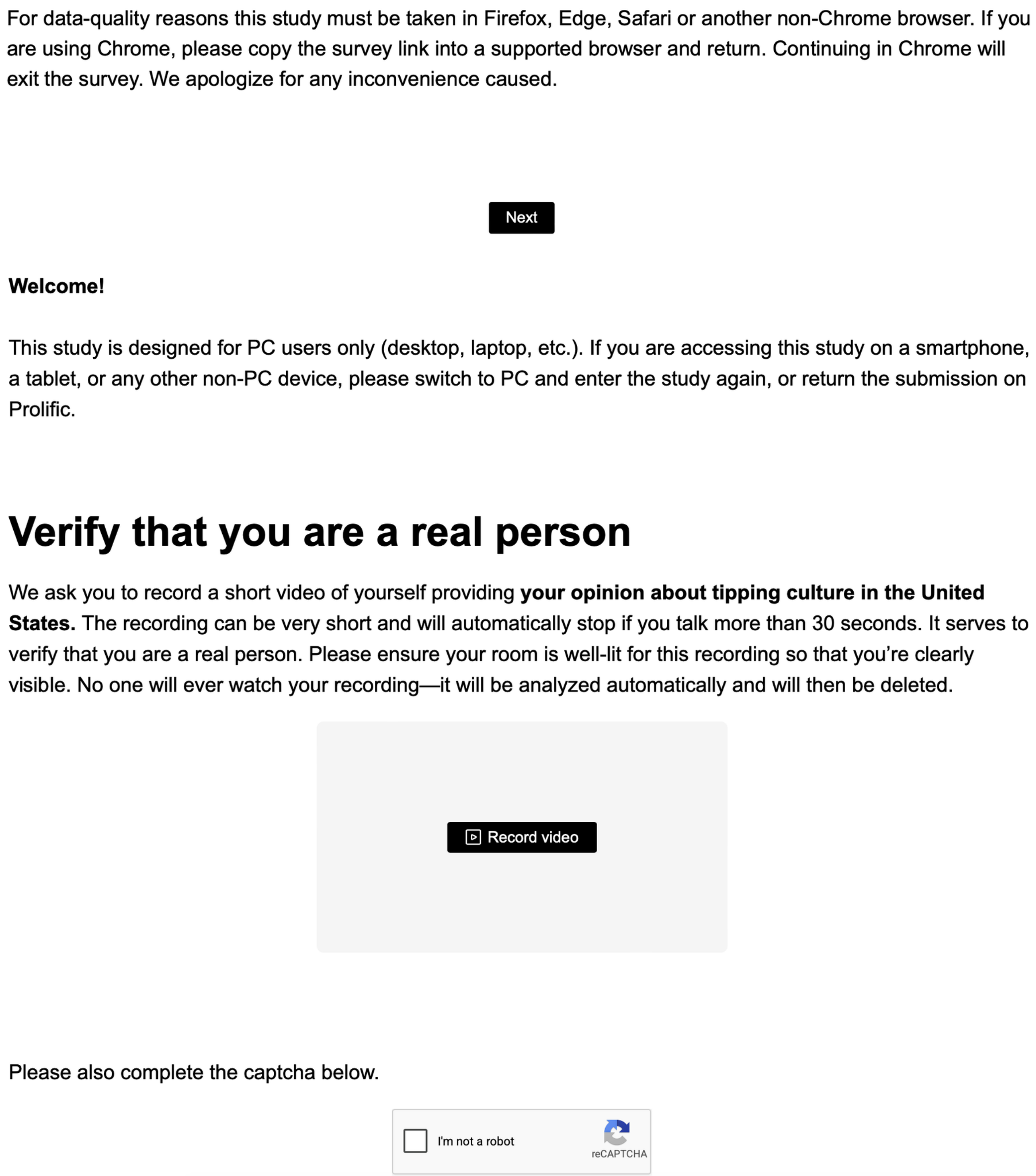
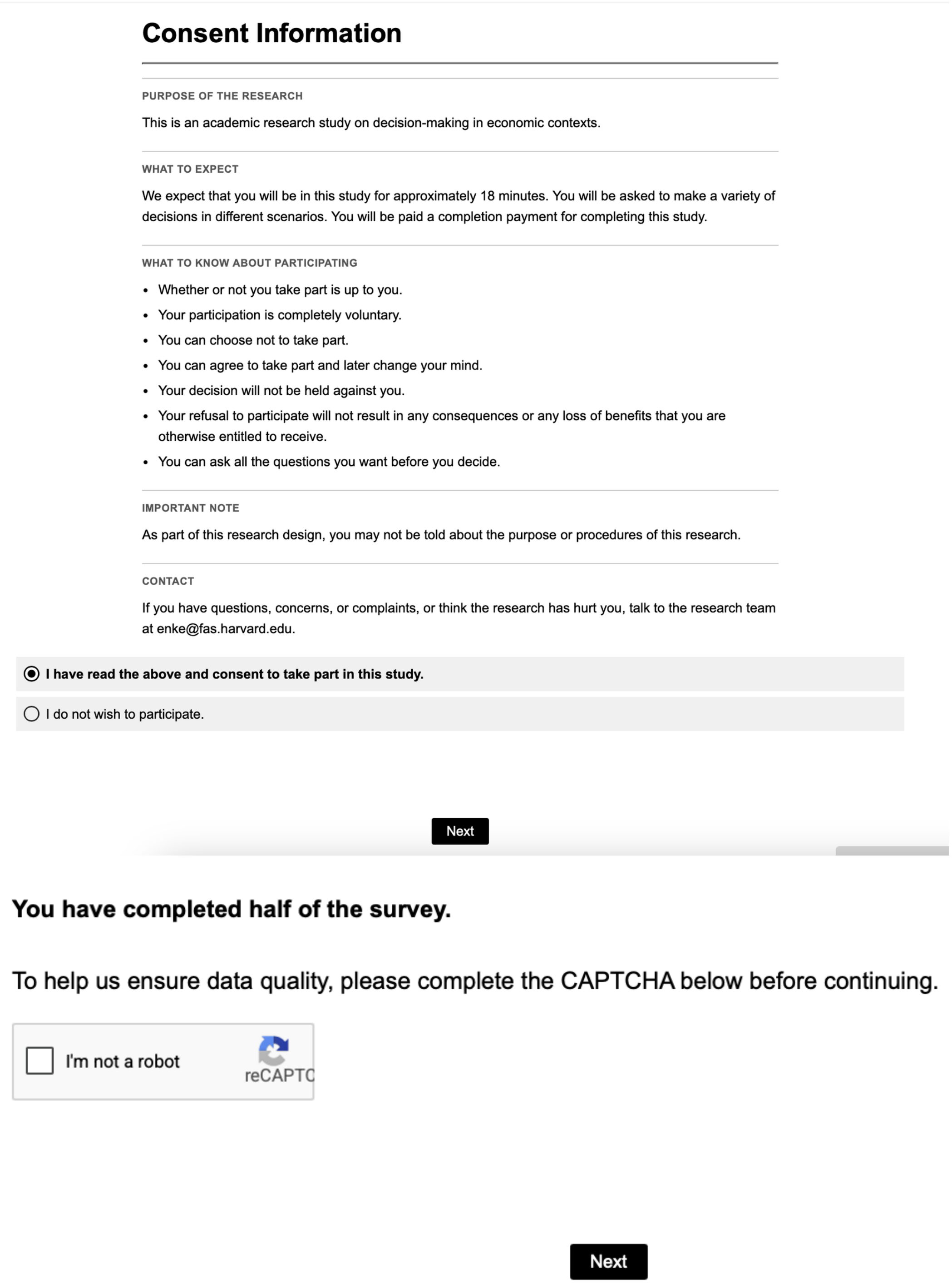


Figure 12: Opening screens shown in every survey and experiment. Top: browser compatibility notice. Bottom: welcome screen with the video-based human verification and reCaptcha described in Section 3.



Consent Information

PURPOSE OF THE RESEARCH

This is an academic research study on decision-making in economic contexts.

WHAT TO EXPECT

We expect that you will be in this study for approximately 18 minutes. You will be asked to make a variety of decisions in different scenarios. You will be paid a completion payment for completing this study.

WHAT TO KNOW ABOUT PARTICIPATING

- Whether or not you take part is up to you.
- Your participation is completely voluntary.
- You can choose not to take part.
- You can agree to take part and later change your mind.
- Your decision will not be held against you.
- Your refusal to participate will not result in any consequences or any loss of benefits that you are otherwise entitled to receive.
- You can ask all the questions you want before you decide.

IMPORTANT NOTE

As part of this research design, you may not be told about the purpose or procedures of this research.

CONTACT

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team at enke@fas.harvard.edu.

◉ **I have read the above and consent to take part in this study.**

◯ I do not wish to participate.

Next

You have completed half of the survey.

To help us ensure data quality, please complete the CAPTCHA below before continuing.

☐ I'm not a robot reCAPTC

Next

Figure 13: Top: consent screen. Bottom: the reCaptcha administered at the midpoint of each study.

D.2 Occupation Surveys

D.2.1 Survey *Contribution* (reference flow)

This is the full participant-facing flow of the *Contribution* survey. The remaining surveys share this structure; for those, only the screens that differ are reproduced in Appendix D.2.2.

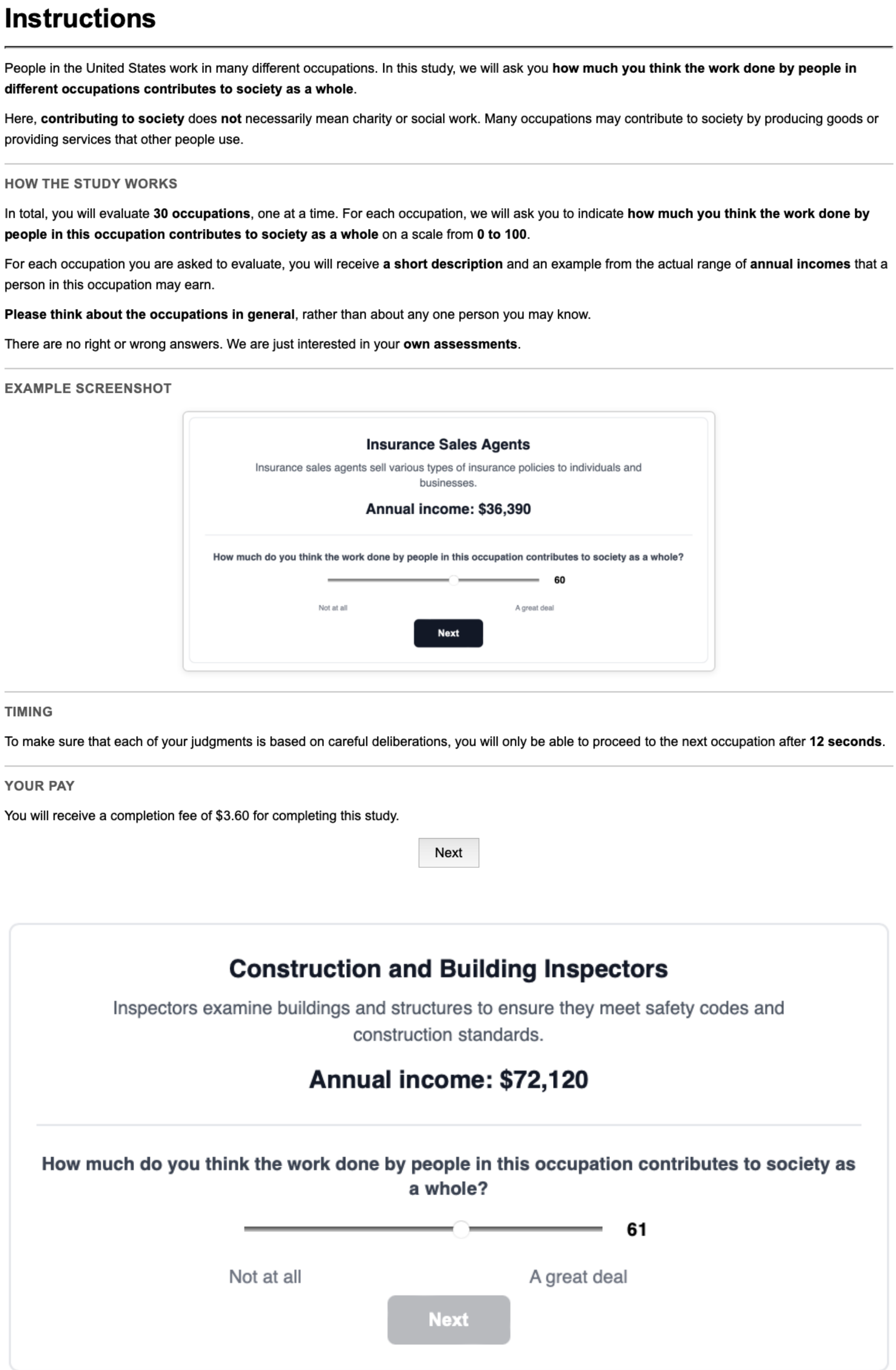
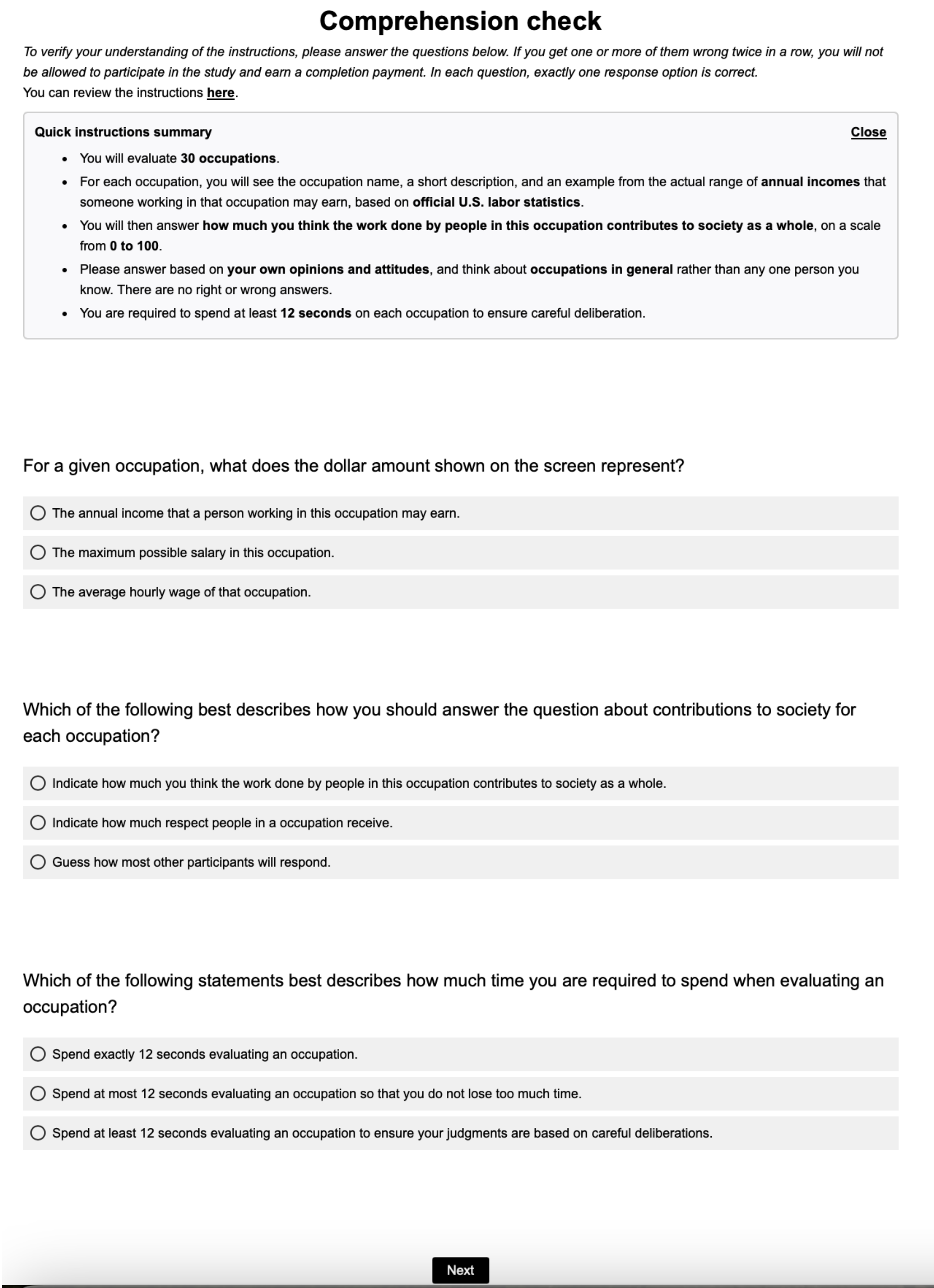


Figure 14: Survey *Contribution*. Top: instructions. Bottom: an occupation decision screen, showing the one-sentence BLS occupation description and the randomly drawn example income (10th, 50th or 90th percentile).



Comprehension check

To verify your understanding of the instructions, please answer the questions below. If you get one or more of them wrong twice in a row, you will not be allowed to participate in the study and earn a completion payment. In each question, exactly one response option is correct.

You can review the instructions **here**.

Quick instructions summary **Close**

- You will evaluate **30 occupations**.
- For each occupation, you will see the occupation name, a short description, and an example from the actual range of **annual incomes** that someone working in that occupation may earn, based on **official U.S. labor statistics**.
- You will then answer **how much you think the work done by people in this occupation contributes to society as a whole**, on a scale from **0 to 100**.
- Please answer based on **your own opinions and attitudes**, and think about **occupations in general** rather than any one person you know. There are no right or wrong answers.
- You are required to spend at least **12 seconds** on each occupation to ensure careful deliberation.

For a given occupation, what does the dollar amount shown on the screen represent?

- ○ The annual income that a person working in this occupation may earn.
- ○ The maximum possible salary in this occupation.
- ○ The average hourly wage of that occupation.

Which of the following best describes how you should answer the question about contributions to society for each occupation?

- ○ Indicate how much you think the work done by people in this occupation contributes to society as a whole.
- ○ Indicate how much respect people in a occupation receive.
- ○ Guess how most other participants will respond.

Which of the following statements best describes how much time you are required to spend when evaluating an occupation?

- ○ Spend exactly 12 seconds evaluating an occupation.
- ○ Spend at most 12 seconds evaluating an occupation so that you do not lose too much time.
- ○ Spend at least 12 seconds evaluating an occupation to ensure your judgments are based on careful deliberations.

Next

Figure 15: Survey *Contribution*: comprehension check. Participants had to answer every item correctly to proceed.

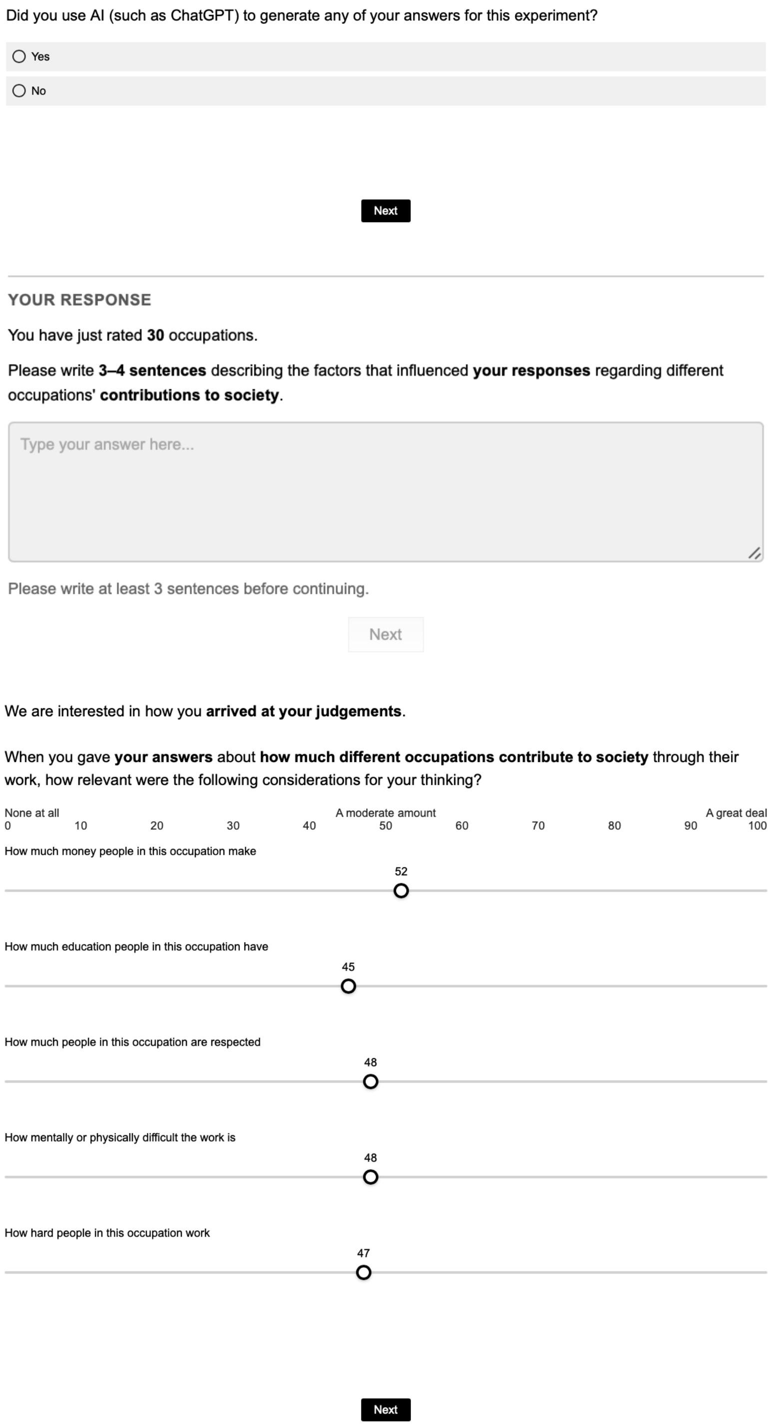


Figure 16: Survey *Contribution*, end-of-survey questions. Top: self-reported AI use. Middle: free-text question about the considerations behind the ratings (also the writing task used for the keystroke-based AI screen). Bottom: self-reported importance of various considerations.

Before you finish, please share a few details about yourself.

All your data will be kept completely confidential.

What is your sex?

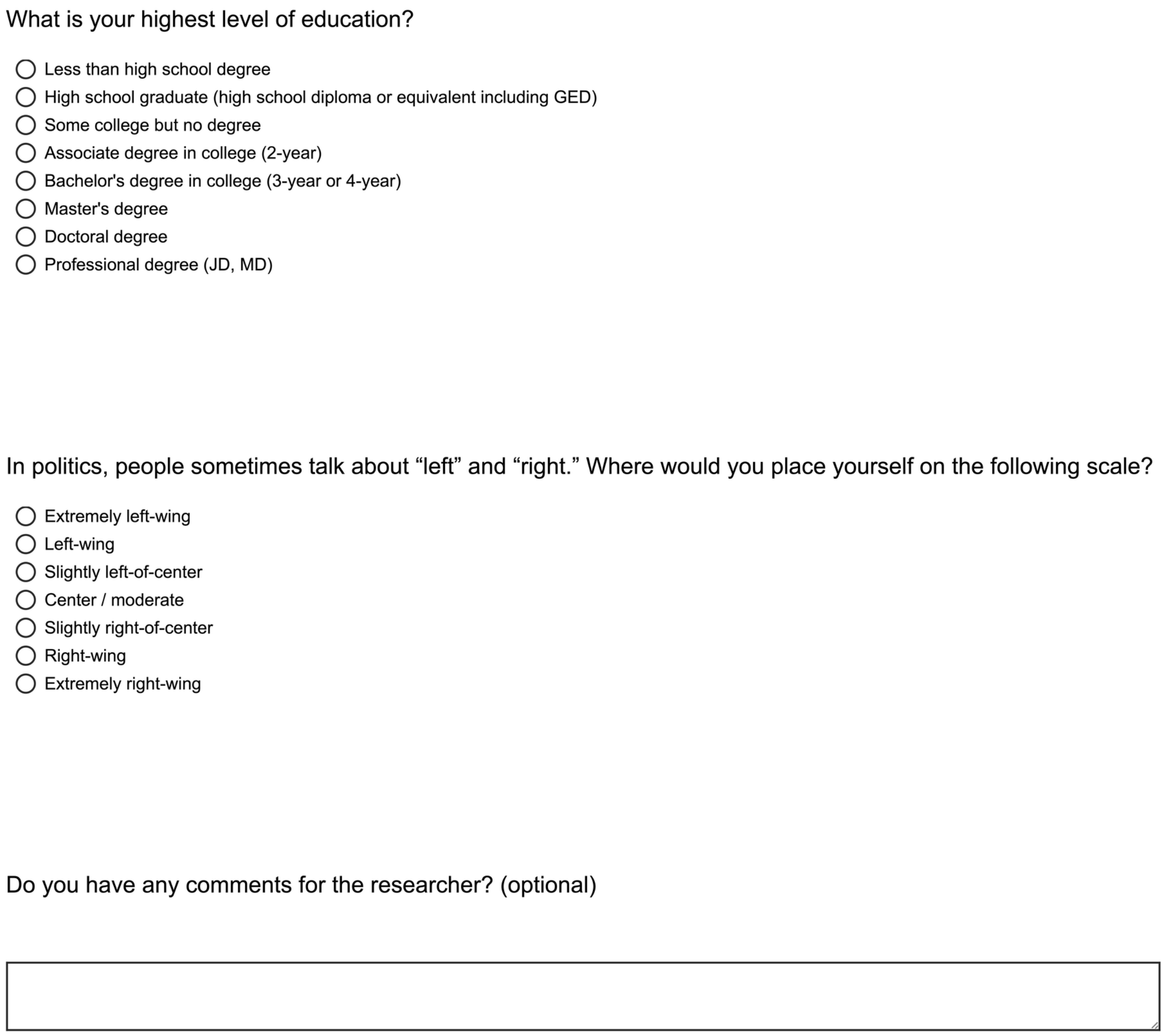
- ○ Male
- ○ Female

How old are you?

What is your annual household income before taxes?

- ○ Less than $10,000
- ○ $10,000 to $19,999
- ○ $20,000 to $29,999
- ○ $30,000 to $39,999
- ○ $40,000 to $49,999
- ○ $50,000 to $59,999
- ○ $60,000 to $69,999
- ○ $70,000 to $79,999
- ○ $80,000 to $89,999
- ○ $90,000 to $99,999
- ○ $100,000 to $149,999
- ○ $150,000 or more

Figure 17: Survey *Contribution*: demographic questions (part 1 of 2). Identical across all four surveys.


What is your highest level of education?

- Less than high school degree
- High school graduate (high school diploma or equivalent including GED)
- Some college but no degree
- Associate degree in college (2-year)
- Bachelor's degree in college (3-year or 4-year)
- Master's degree
- Doctoral degree
- Professional degree (JD, MD)

In politics, people sometimes talk about “left” and “right.” Where would you place yourself on the following scale?

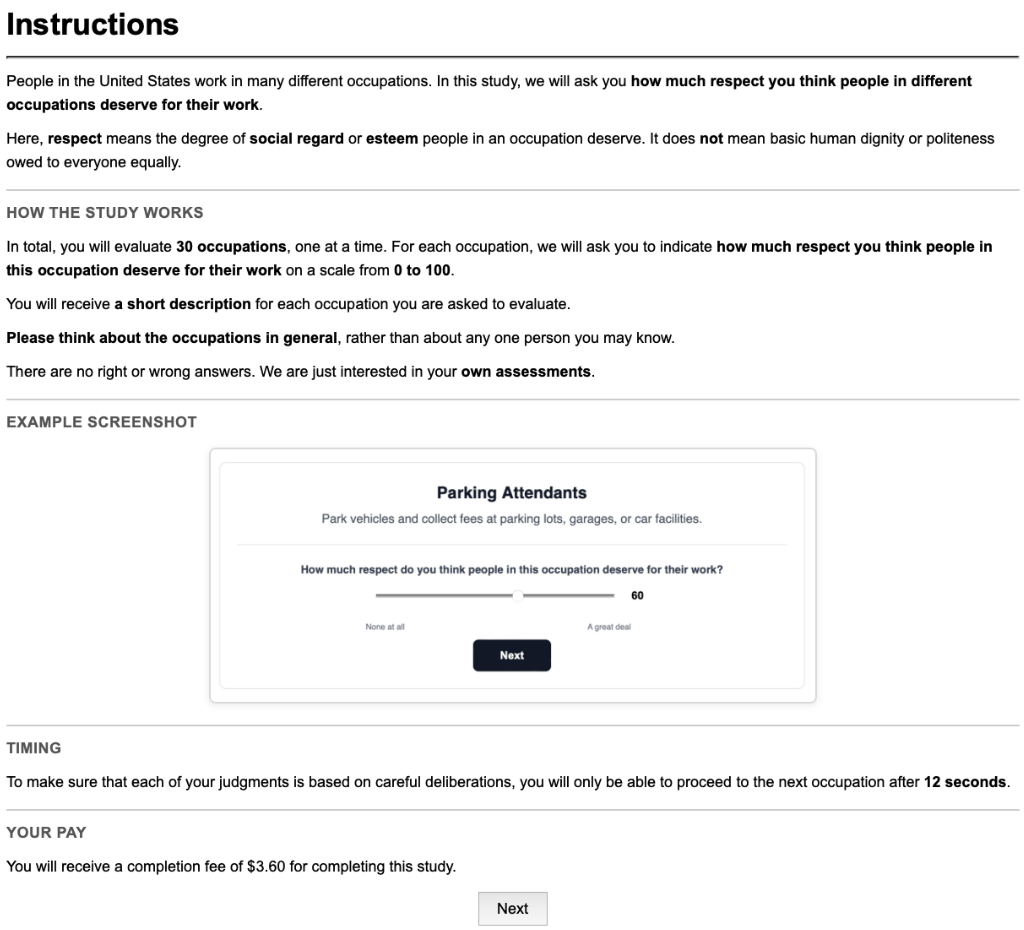
- Extremely left-wing
- Left-wing
- Slightly left-of-center
- Center / moderate
- Slightly right-of-center
- Right-wing
- Extremely right-wing

Do you have any comments for the researcher? (optional)

Figure 18: Survey *Contribution*: demographic questions (part 2 of 2).

D.2.2 Surveys *Respect-noinc*, *Contribution-noinc* and *Familiarity*: differences only

These three surveys use the flow above. Only the instructions and the judgment screen differ, and both are reproduced below. The comprehension check is reworded to match each survey's judgment task; the transition, end-of-survey and demographic screens are identical to the reference flow and are not repeated. Note that no income information appears on any of the three judgment screens.



Instructions

People in the United States work in many different occupations. In this study, we will ask you **how much respect you think people in different occupations deserve for their work**.

Here, **respect** means the degree of **social regard** or **esteem** people in an occupation deserve. It does **not** mean basic human dignity or politeness owed to everyone equally.

HOW THE STUDY WORKS

In total, you will evaluate **30 occupations**, one at a time. For each occupation, we will ask you to indicate **how much respect you think people in this occupation deserve for their work** on a scale from **0 to 100**.

You will receive **a short description** for each occupation you are asked to evaluate.

Please think about the occupations in general, rather than about any one person you may know.

There are no right or wrong answers. We are just interested in your **own assessments**.

EXAMPLE SCREENSHOT

Parking Attendants

Park vehicles and collect fees at parking lots, garages, or car facilities.

How much respect do you think people in this occupation deserve for their work?

60

None at all

A great deal

Next

TIMING

To make sure that each of your judgments is based on careful deliberations, you will only be able to proceed to the next occupation after **12 seconds**.

YOUR PAY

You will receive a completion fee of $3.60 for completing this study.

Next

Figure 19: Survey *Respect-noinc*. Top: instructions, which distinguish appraisal respect from basic human dignity. Bottom: judgment screen.

Instructions

People in the United States work in many different occupations. In this study, we will ask you **how much you think the work done by people in different occupations contributes to society as a whole**.

Here, **contributing to society** does **not** necessarily mean charity or social work. Many occupations may contribute to society by producing goods or providing services that other people use.

HOW THE STUDY WORKS

In total, you will evaluate **30 occupations**, one at a time. For each occupation, we will ask you to indicate **how much you think the work done by people in this occupation contributes to society as a whole** on a scale from **0 to 100**.

For each occupation you are asked to evaluate, you will receive **a short description**.

Please think about the occupations in general, rather than about any one person you may know.

There are no right or wrong answers. We are just interested in your **own assessments**.

EXAMPLE SCREENSHOT

Recreation Workers

Recreation workers organize and lead group activities like sports, arts, games, and social events at various facilities.

How much do you think the work done by people in this occupation contributes to society as a whole?

60

Not at all A great deal

Next

TIMING

To make sure that each of your judgments is based on careful deliberations, you will only be able to proceed to the next occupation after **12 seconds**.

YOUR PAY

You will receive a completion fee of $3.60 for completing this study.

Next

Bill and Account Collectors

Contact customers with overdue accounts to collect payments and maintain records of collection activities.

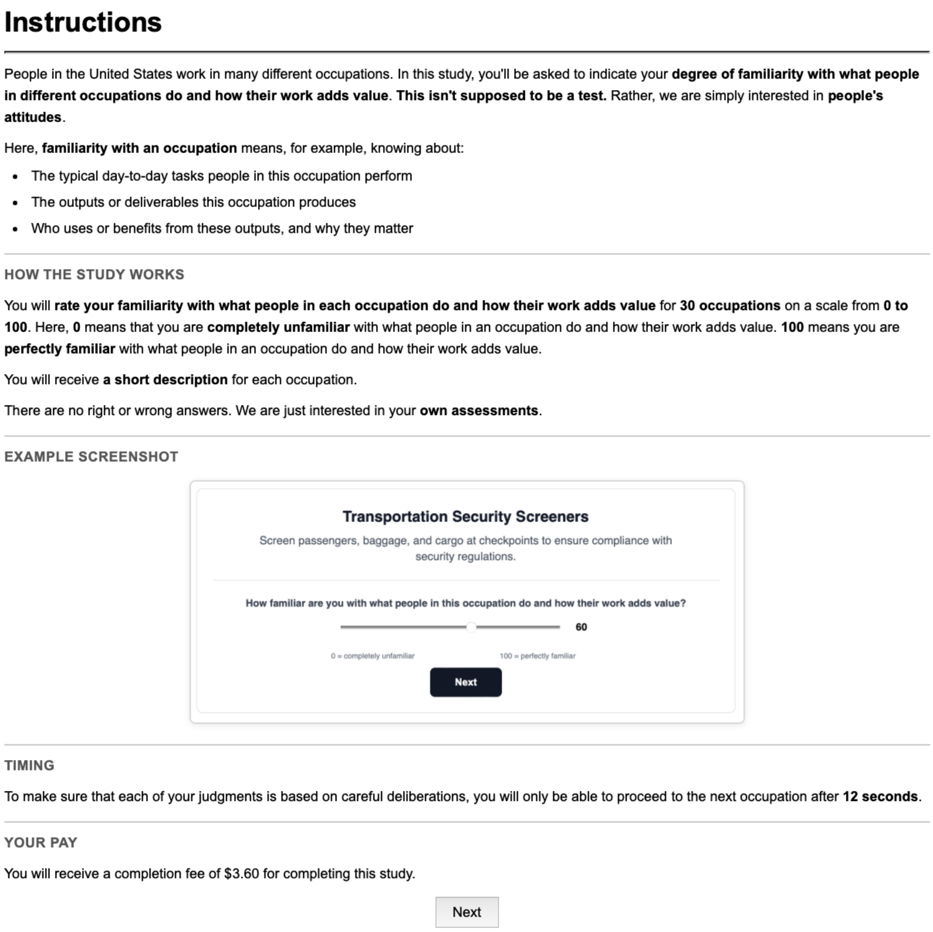
How much do you think the work done by people in this occupation contributes to society as a whole?

78

Not at all A great deal

Next

Figure 20: Survey *Contribution-noinc*. Top: instructions. Bottom: judgment screen, identical to the *Contribution* screen except that no example income is shown.



Instructions

People in the United States work in many different occupations. In this study, you'll be asked to indicate your **degree of familiarity with what people in different occupations do and how their work adds value**. **This isn't supposed to be a test.** Rather, we are simply interested in **people's attitudes**.

Here, **familiarity with an occupation** means, for example, knowing about:

- The typical day-to-day tasks people in this occupation perform
- The outputs or deliverables this occupation produces
- Who uses or benefits from these outputs, and why they matter

HOW THE STUDY WORKS

You will **rate your familiarity with what people in each occupation do and how their work adds value** for **30 occupations** on a scale from **0 to 100**. Here, **0** means that you are **completely unfamiliar** with what people in an occupation do and how their work adds value. **100** means you are **perfectly familiar** with what people in an occupation do and how their work adds value.

You will receive **a short description** for each occupation.

There are no right or wrong answers. We are just interested in your **own assessments**.

EXAMPLE SCREENSHOT

TIMING

To make sure that each of your judgments is based on careful deliberations, you will only be able to proceed to the next occupation after **12 seconds**.

YOUR PAY

You will receive a completion fee of $3.60 for completing this study.

Next

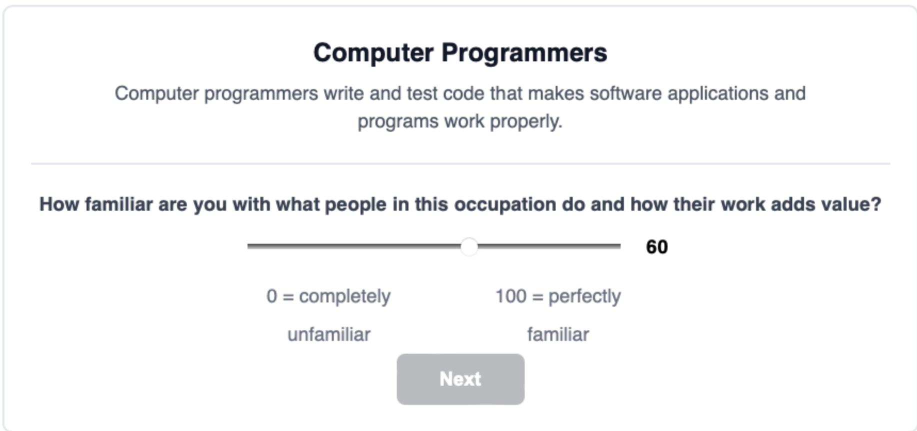
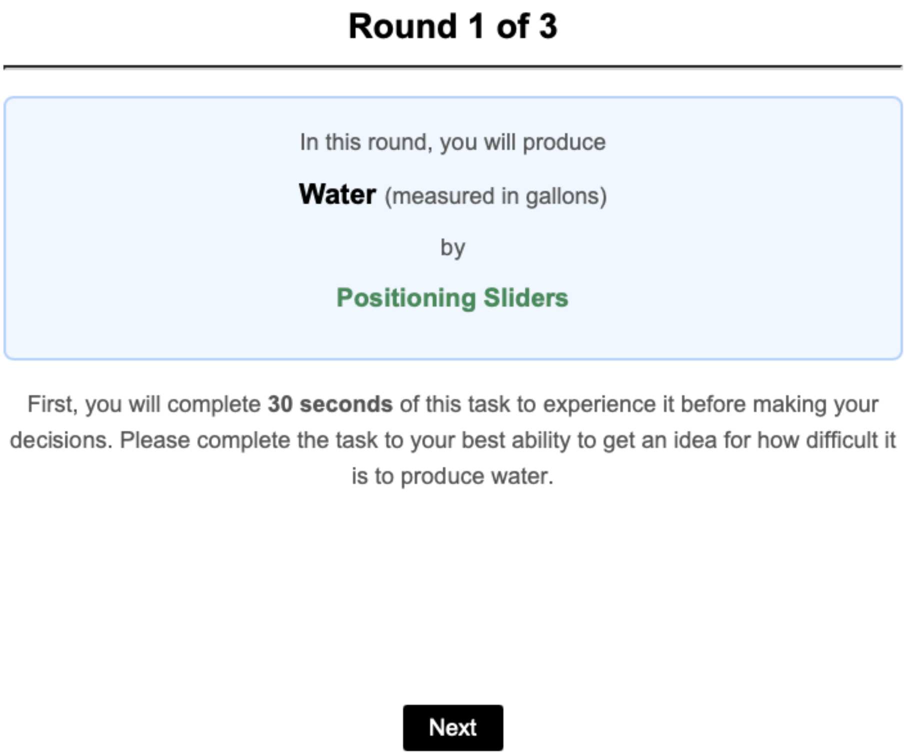


Figure 21: Survey *Familiarity*. Top: instructions. Bottom: judgment screen. This survey supplies the survey-based measure of value uncertainty.

D.3 Market Experiment

D.3.1 Producer stage

The Producer instructions mirror the Spectator instructions reproduced in Appendix D.3.2, with the addition of the supply and demand elicitation shown below; they and the Producer comprehension quiz are in the replication package. The work tasks themselves are shown in Figures 8–10.



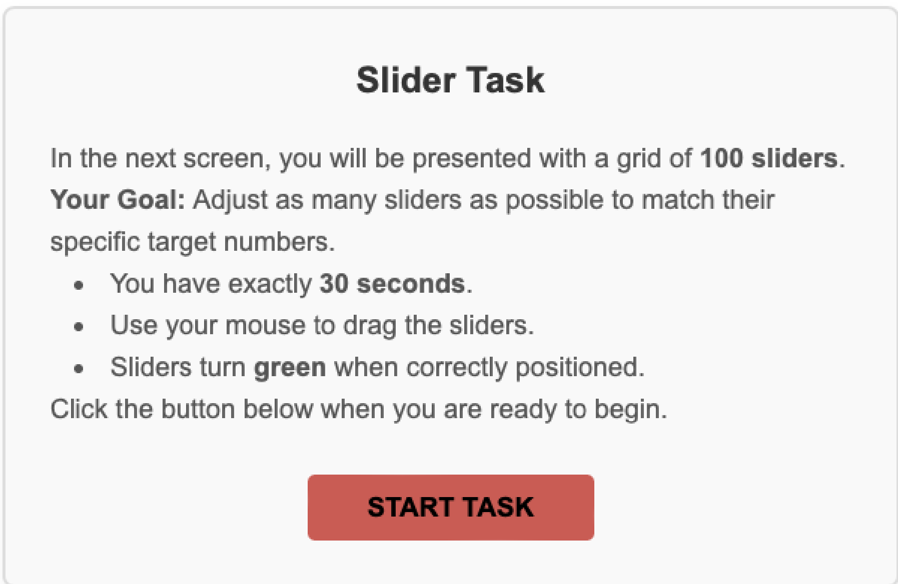
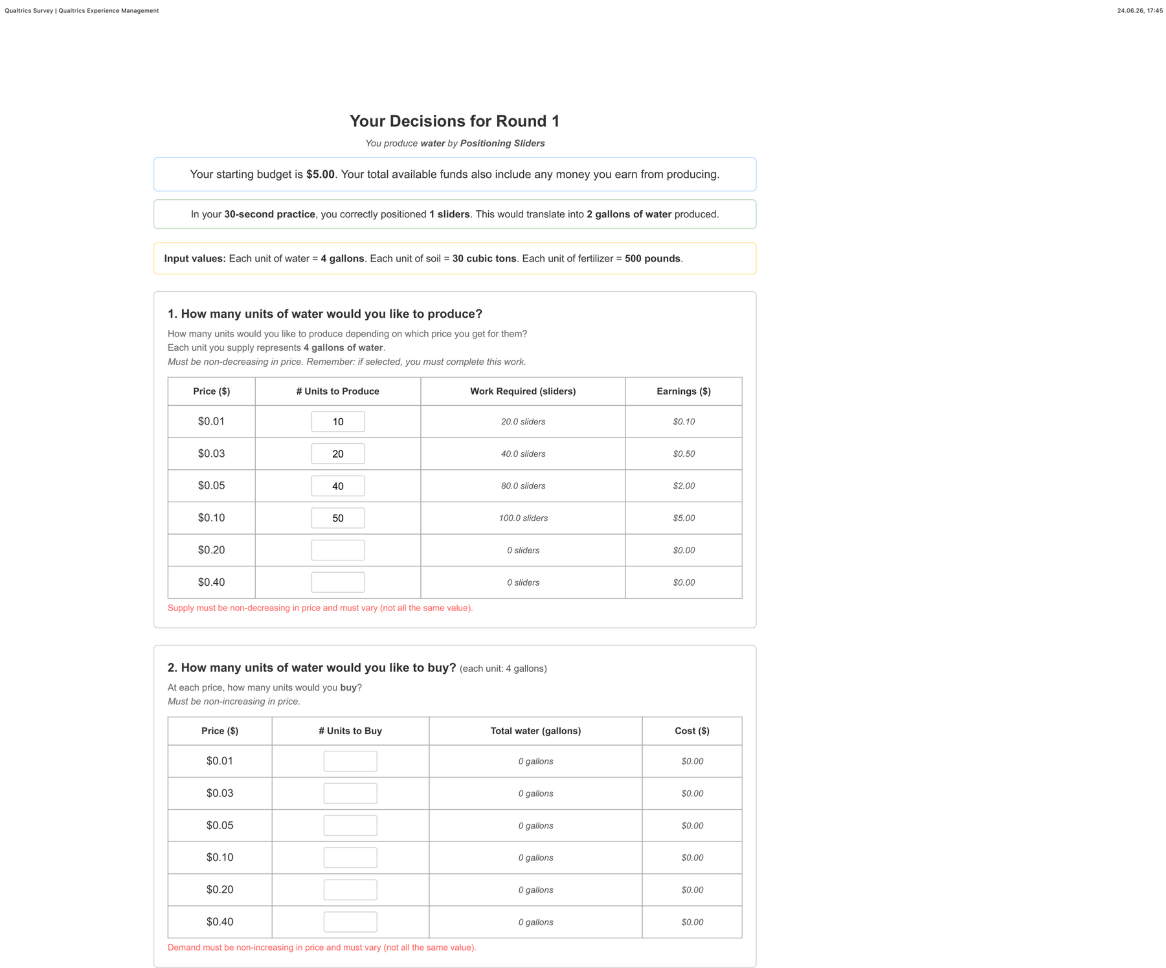


Figure 22: Producer stage. Top: round introduction, announcing which input the Producer produces and through which work task. Bottom: task explainer shown before the 30-second familiarisation round.



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Your Decisions for Round 1

*You produce **water** by **Positioning Sliders***

Your starting budget is **$5.00**. Your total available funds also include any money you earn from producing.

In your **30-second practice**, you correctly positioned **1 sliders**. This would translate into **2 gallons of water** produced.

Input values: Each unit of water = **4 gallons**. Each unit of soil = **30 cubic tons**. Each unit of fertilizer = **500 pounds**.

1. How many units of water would you like to produce?

How many units would you like to produce depending on which price you get for them?
Each unit you supply represents **4 gallons of water**.
Must be non-decreasing in price. Remember: if selected, you must complete this work.

Price ($)	# Units to Produce	Work Required (sliders)	Earnings ($)
$0.01	10	*20.0 sliders*	*$0.10*
$0.03	20	*40.0 sliders*	*$0.50*
$0.05	40	*80.0 sliders*	*$2.00*
$0.10	50	*100.0 sliders*	*$5.00*
$0.20		*0 sliders*	*$0.00*
$0.40		*0 sliders*	*$0.00*

Supply must be non-decreasing in price and must vary (not all the same value).

2. How many units of water would you like to buy? (each unit: 4 gallons)

At each price, how many units would you **buy**?
Must be non-increasing in price.

Price ($)	# Units to Buy	Total water (gallons)	Cost ($)
$0.01		*0 gallons*	*$0.00*
$0.03		*0 gallons*	*$0.00*
$0.05		*0 gallons*	*$0.00*
$0.10		*0 gallons*	*$0.00*
$0.20		*0 gallons*	*$0.00*
$0.40		*0 gallons*	*$0.00*

Demand must be non-increasing in price and must vary (not all the same value).

Figure 23: Producer stage: supply and demand elicitation (part 1 of 2). The Producer states how many units of their own input they are willing to produce at each of the six candidate prices.

3. How many units of soil would you like to buy? (each unit: 30 cubic tons)

At each price, how many units would you **buy**?

Must be non-increasing in price.

Price ($)	# Units to Buy	Total soil (cubic tons)	Cost ($)
$0.01		*0 cubic tons*	*$0.00*
$0.03		*0 cubic tons*	*$0.00*
$0.05		*0 cubic tons*	*$0.00*
$0.10		*0 cubic tons*	*$0.00*
$0.20		*0 cubic tons*	*$0.00*
$0.40		*0 cubic tons*	*$0.00*

Demand must be non-increasing in price and must vary (not all the same value).

4. How many units of fertilizer would you like to buy? (each unit: 500 pounds)

At each price, how many units would you **buy**?

Must be non-increasing in price.

Price ($)	# Units to Buy	Total fertilizer (pounds)	Cost ($)
$0.01		*0 pounds*	*$0.00*
$0.03		*0 pounds*	*$0.00*
$0.05		*0 pounds*	*$0.00*
$0.10		*0 pounds*	*$0.00*
$0.20		*0 pounds*	*$0.00*
$0.40		*0 pounds*	*$0.00*

Demand must be non-increasing in price and must vary (not all the same value).

Reminder: One of the three rounds will be randomly selected to determine your actual workload and earnings.

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Figure 24: Producer stage: supply and demand elicitation (part 2 of 2), showing the three demand schedules. Supply schedules were required to be weakly increasing and demand schedules weakly decreasing in price.

D.3.2 Spectator experiment — *Baseline* (reference flow)

This is the full Spectator flow in the *Baseline* treatment. The two treatments that reduce value uncertainty differ from it only in the screens reproduced in Appendices D.3.3 and D.3.4.

Instructions

In this study, you have the **role of a Spectator**. You will judge the work contributions of **three other participants** who have the role of **Producers**, and provide each of them with feedback.

These Producers **already made their decisions in a past experiment**. Your job is simply to evaluate them.

A **main feature** of this past experiment is that the **earnings of each Producer depend on something that only the other Producers can produce**. Therefore, the **work effort of each Producer matters for the financial outcomes of all Producers**.

Here's what the Producers do:

1. Each Producer owns a **plot of land** on which they can grow crop. At the end of the study, crop gets exchanged into Dollars. Growing crops requires **three inputs**: **water**, **soil** and **fertilizer**.
2. Growing crops requires **all three inputs**. However, each Producer can produce **only one** of the required inputs by working on a work task. Thus, if a Producer would like to use inputs that they cannot produce themselves, they need to rely on the other Producers to produce those inputs, and to sell them in a market.
3. The Producers **sell the inputs to each other in a market**. In this market, prices reflect the supply and demand for each input. Inputs that are in higher demand and / or lower supply cost more.
4. A Producer's **earnings from selling inputs** equal what they've produced times the market price that emerges.

Each Producer acts in isolation and gets paid only based on their own crops. **The Producers are not a team.** Nonetheless, the Producers rely on each other because each Producer can only produce a single input.

You will observe what each Producer did. You will then do two things:

1. **First,** you will judge how much each Producer contributed to the group as a whole.
2. **Second,** you will send each Producer a message in which you let them know how you feel about their decisions and how these decisions affected the group. There is a chance that each of these messages will be sent to the Producer it was written for.

You will do this for **three rounds**, each evaluating a different set of Producers.

Growing crops:

Each Producer tries to harvest crops, which are grown using **water** (in gallons), **soil** (in cubic tons) and **fertilizer** (in pounds) as follows:

$$\textbf{Total harvest} = \ln[\,(\text{Water used} \div 2) \times (\text{Soil used} \div 15) \times (\text{Fertilizer used} \div 250) + 1\,]$$

(where ln is the natural logarithm; the +1 keeps the harvest at 0 or above)

Important: growing crops requires **all three inputs**, and the productivity of each input **increases in the amount of the other inputs** that are used.

Example. Suppose a Producer uses 10 gallons of water. Then, their total harvest strongly differs according to how much soil and fertilizer they use, as illustrated in the following table:

Water used	Soil used	Fertilizer used	Harvest
10 gallons	0 cubic tons	0 pounds	0
10 gallons	30 cubic tons	1,000 pounds	3.71
10 gallons	75 cubic tons	2,500 pounds	5.53
10 gallons	150 cubic tons	5,000 pounds	6.91

As you can see, a Producer needs all three inputs to be successful. However, because each Producer can only produce one type of input, they need to rely on the other Producers to produce and sell the other inputs.

Each unit of crop harvested gets exchanged into money at the end of the experiment (**1 unit = $1**).

The Producers can work on tasks to produce the different inputs.

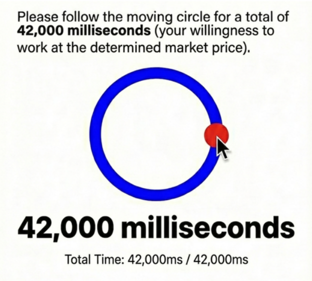
Figure 25: Spectator experiment, *Baseline*: instructions (part 1 of 4). The production function and the mutual dependence of the three Producers.

<u>The work tasks and what they deliver:</u>

Each Producer produces a different input using a specific task. These three tasks are not identical.

Producer A produces **water** (measured in gallons).

He does this by **Tracking a Moving Circle**. He must follow a slowly moving circle with the mouse cursor. **Tracking 1000 milliseconds** produces **4 gallons** of Water.



Producer B produces **soil** (measured in cubic tons).

He does this by **Kicking a Virtual Ball**. Each tap on the space bar pushes the ball forward by between 1 and 3 feet. **Kicking it 30 feet far** produces **30 cubic tons** of Soil.

Producer C produces **fertilizer** (measured in pounds).

He does this by **Positioning Sliders**. Each correctly set slider matches a randomly assigned target value. **Positioning 1 slider** produces **250 pounds** of Fertilizer.

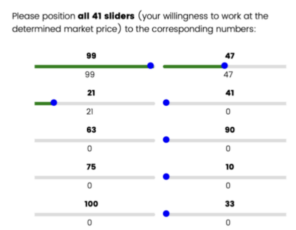


Figure 26: Spectator experiment, *Baseline*: instructions (part 2 of 4). The three work tasks and the inputs they deliver.

How the market works:

All inputs that a Producer produces get sold in the market, and the Producer who produced an input gets the price in return.

The way the market works is that we assess total demand and supply for each input. To do this, each Producer fills out four lists.

1. How many units of their own input they would be willing to **produce** at different prices.
2. How much **water** they would be willing to **buy** at different prices.
3. How much **soil** they would be willing to **buy** at different prices.
4. How much **fertilizer** they would be willing to **buy** at different prices.

From the lists above, the study leader determines the demand and supply in each of these markets based on how much the Producers are willing to buy and sell, and at what price.

How prices and earnings are determined:

The market price is then given by the price at which total demand (from the Producers) equals supply.

The earnings of each Producer from selling inputs are given by

Earnings from selling = # Inputs produced × Market price of that input

Each Producer starts out with a **budget of $5**. Whatever amount they don't use to buy inputs they can take home. In addition, they get to keep the profit from harvesting crops (if any).

Your decisions:

You will observe each Producer's earnings from selling inputs.

You will also see **how much work each Producer chose to complete**, and the inputs they produced.

You will then be asked to do **two things** in each round:

1. **Allocate 100 points** between the Producers to indicate how much you think each of them contributed to the group.
2. **Write a brief message** (at least 30 words) to each Producer to let them know how you feel about their decisions and how these decisions affected the group as a whole.

At the end of the study, 1 in 50 participants in this experiment will be selected at random. From each selected participant, one of the messages they wrote will be picked at random and sent to the Producer it was addressed to as a Prolific message.

Example

Here's an example of a decision screen:

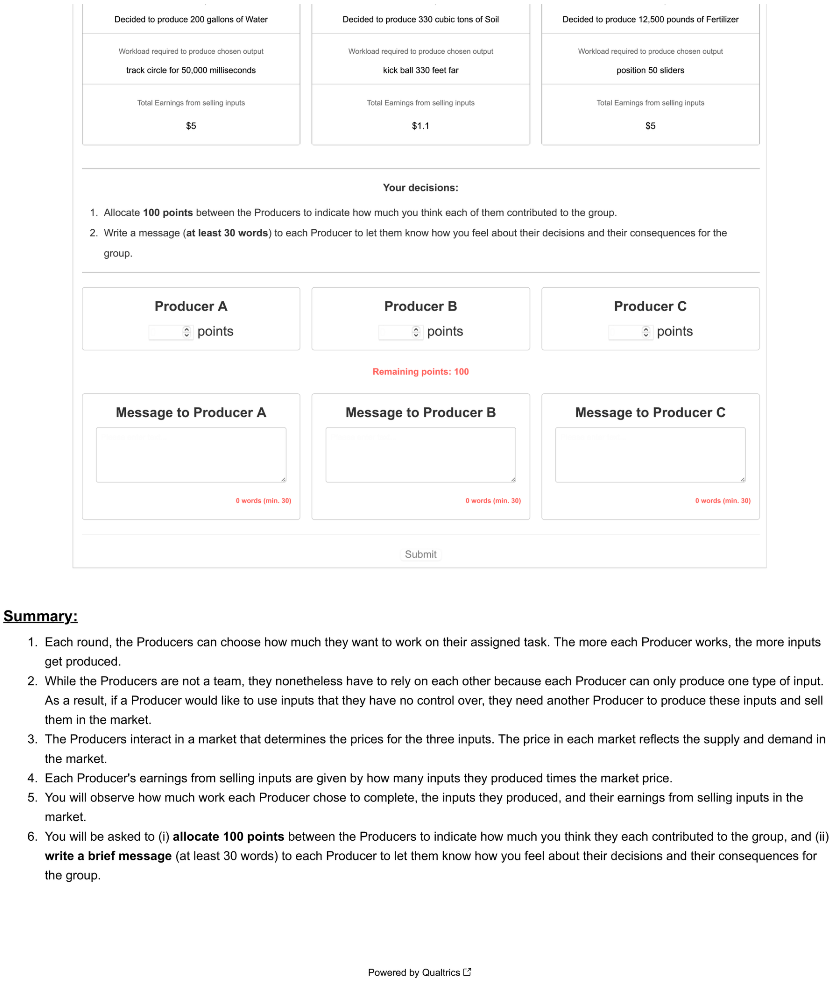
Round 1

Below is information about how much each Producer worked and earned.

Reminder: Earnings from selling inputs = Completed work x Market price for produced inputs

Producer A	Producer B	Producer C
(Produces Water by Tracking Circle)	(Produces Soil by Kicking Ball)	(Produces Fertilizer by Positioning Sliders)
Chosen output	Chosen output	Chosen output

Figure 27: Spectator experiment, *Baseline*: instructions (part 3 of 4). How the market clears, and what the Spectator is asked to do.



Decided to produce 200 gallons of Water	Decided to produce 330 cubic tons of Soil	Decided to produce 12,500 pounds of Fertilizer
Workload required to produce chosen output track circle for 50,000 milliseconds	Workload required to produce chosen output kick ball 330 feet far	Workload required to produce chosen output position 50 sliders
Total Earnings from selling inputs $5	Total Earnings from selling inputs $1.1	Total Earnings from selling inputs $5

Your decisions:

1. Allocate **100 points** between the Producers to indicate how much you think each of them contributed to the group.
2. Write a message (**at least 30 words**) to each Producer to let them know how you feel about their decisions and their consequences for the group.

Producer A	Producer B	Producer C
points	points	points

Remaining points: 100

Message to Producer A	Message to Producer B	Message to Producer C
0 words (min. 30)	0 words (min. 30)	0 words (min. 30)

Submit

Summary:

1. Each round, the Producers can choose how much they want to work on their assigned task. The more each Producer works, the more inputs get produced.
2. While the Producers are not a team, they nonetheless have to rely on each other because each Producer can only produce one type of input. As a result, if a Producer would like to use inputs that they have no control over, they need another Producer to produce these inputs and sell them in the market.
3. The Producers interact in a market that determines the prices for the three inputs. The price in each market reflects the supply and demand in the market.
4. Each Producer's earnings from selling inputs are given by how many inputs they produced times the market price.
5. You will observe how much work each Producer chose to complete, the inputs they produced, and their earnings from selling inputs in the market.
6. You will be asked to (i) **allocate 100 points** between the Producers to indicate how much you think they each contributed to the group, and (ii) **write a brief message** (at least 30 words) to each Producer to let them know how you feel about their decisions and their consequences for the group.

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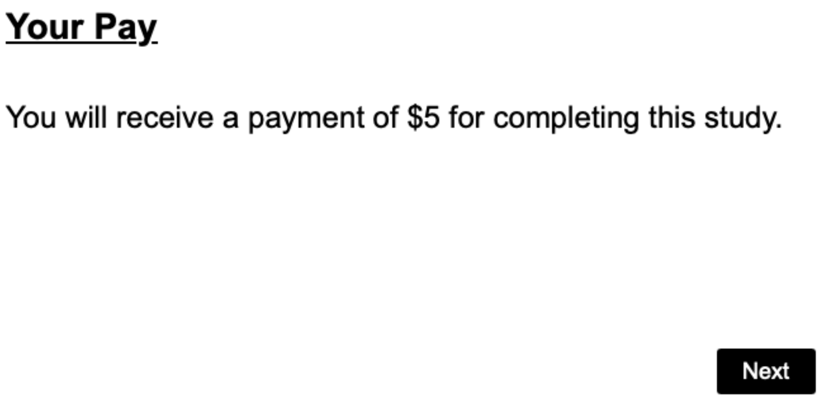

Your Pay

You will receive a payment of $5 for completing this study.

Next

Figure 28: Spectator experiment, *Baseline*. Top: instructions (part 4 of 4), including the point allocation and message fields. Bottom: pay screen.

Comprehension check

To verify your understanding of the instructions, please answer the questions below. If you get one or more of them wrong twice in a row, you will not be allowed to participate in the study and earn a completion payment. In each question, exactly one response option is correct.

You can review the instructions **here**.

What is your main task in this study?

- ◯ To assess who made the most money.
- ◯ To assess who produced the most of a single input (for example, the most water).
- ◯ To assess whose work contributed most to the group.

Which of the following statements is correct?

- ◯ The Producers act jointly as a team and share their accumulated earnings.
- ◯ The actions of one Producer have no effect on the final outcomes of the other Producers.
- ◯ The Producers do not act as a team and get paid purely based on their own earnings. However, the Producers' outcomes still depend on what other Producers do because growing crops requires inputs that they cannot produce themselves.

Which statement is correct?

- ◯ Each Producer is assigned a work task to work on
- ◯ Each Producer can select a work task they want to work on
- ◯ Each Producer can work on multiple work tasks

Which statement is correct?

- ◯ Each Producer can complete as much work (and produce as many units of their input) as they'd like.
- ◯ Each Producer is encouraged to complete a certain minimum requirement.
- ◯ Each Producer is mandated to complete a certain minimum requirement.

How are the market prices determined?

- ◯ The study leader sets the market prices
- ◯ They are determined by supply and demand in each market — i.e., by how much of each input the Producers produce, and how much of each input the Producers would like to buy at a given price.

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Figure 29: Spectator experiment, *Baseline*: comprehension check.

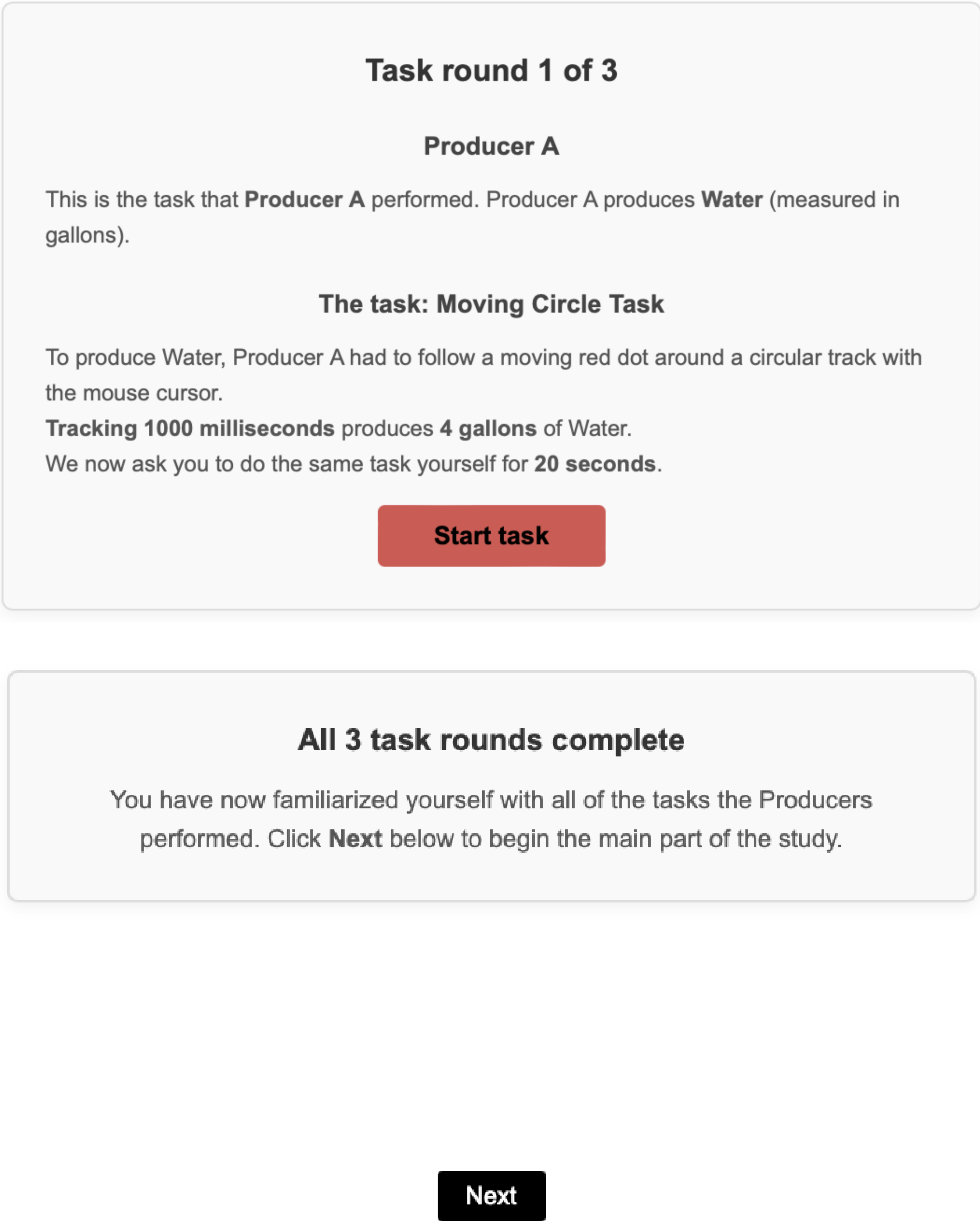


Figure 30: Spectator experiment, *Baseline*. Top: introduction to one of the three task familiarisation rounds, in which the Spectator works on each task for 20 seconds. Bottom: completion screen. The task interfaces are shown in Figures 8–10.

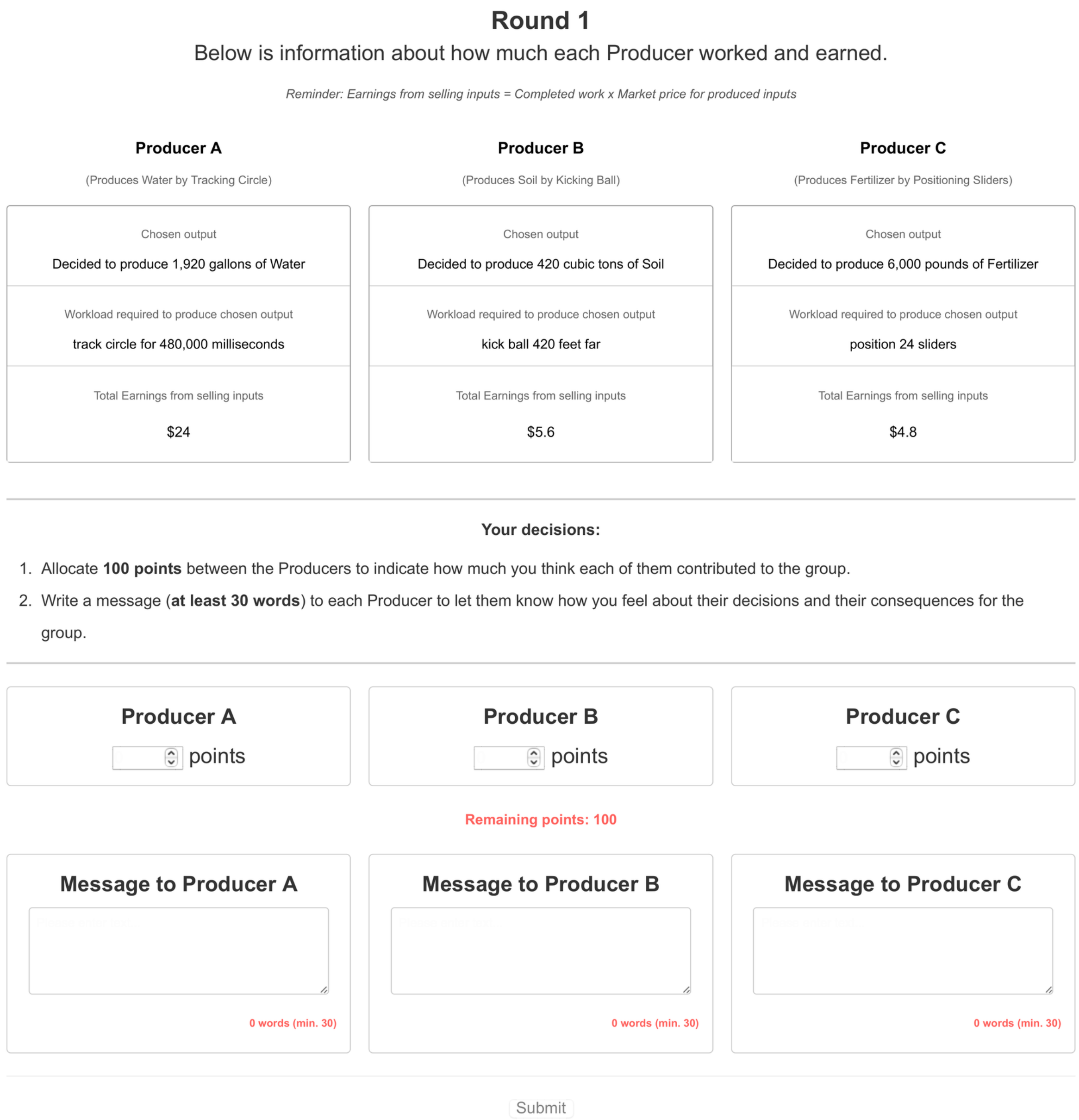
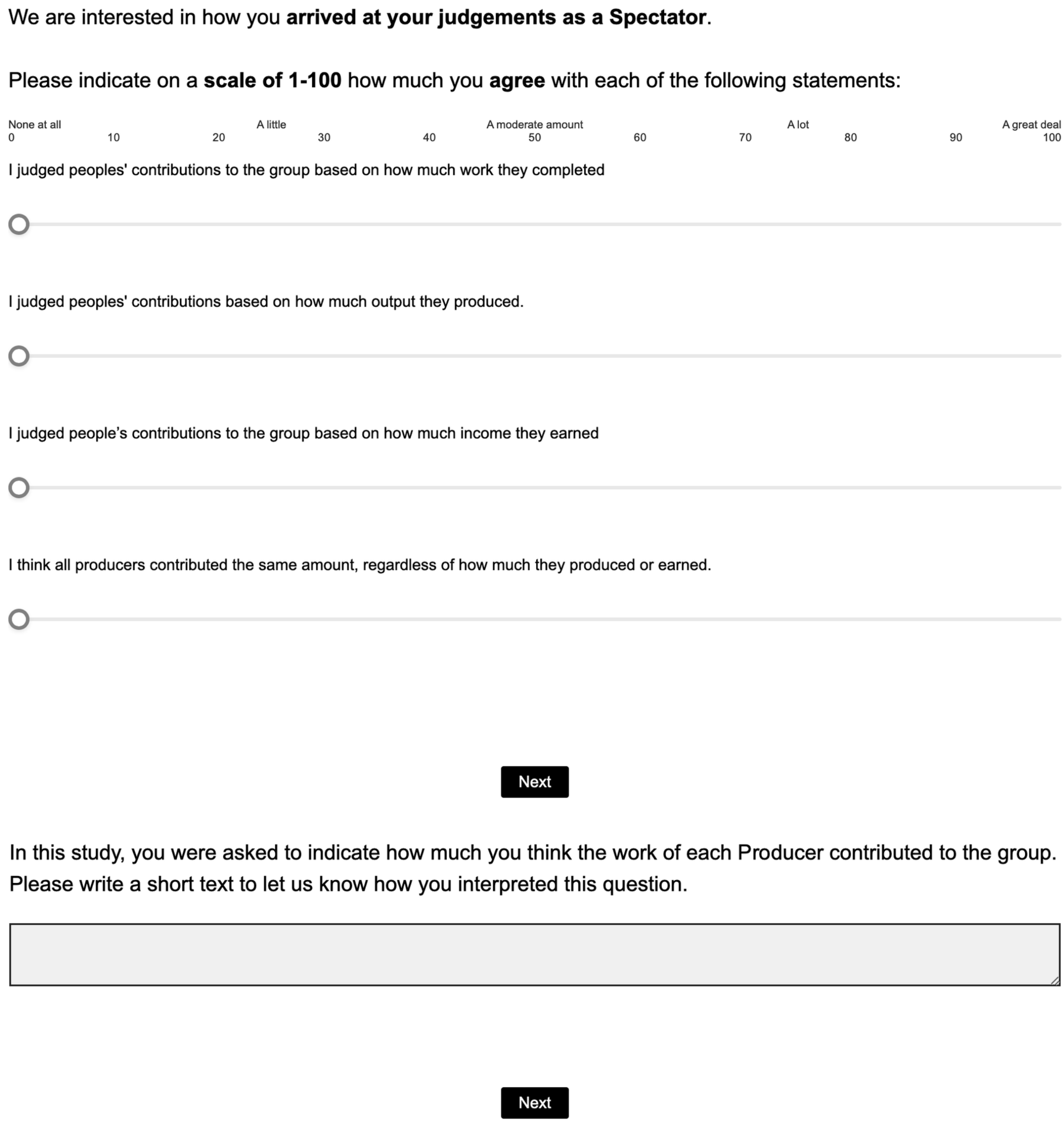


Figure 31: Spectator experiment, *Baseline*: decision screen. For each Producer the Spectator sees the chosen output, the workload required to produce it on that Producer's own task scale, and earnings from selling the input, and then allocates 100 points and writes a message to each Producer.


We are interested in how you **arrived at your judgements as a Spectator**.

Please indicate on a **scale of 1-100** how much you **agree** with each of the following statements:

None at all		A little			A moderate amount			A lot		A great deal
0	10	20	30	40	50	60	70	80	90	100

I judged peoples' contributions to the group based on how much work they completed

I judged peoples' contributions based on how much output they produced.

I judged people's contributions to the group based on how much income they earned

I think all producers contributed the same amount, regardless of how much they produced or earned.

Next

In this study, you were asked to indicate how much you think the work of each Producer contributed to the group. Please write a short text to let us know how you interpreted this question.

Next

Figure 32: Spectator experiment, *Baseline*: post-experimental questionnaire. Top: self-reported importance of various considerations, including the Producers' incomes. Bottom: free-text question.

D.3.3 Spectator experiment — *Time displayed*: differences only

Identical to the *Baseline* flow except that the two instruction passages describing what the Spectator will observe read: "You will also see how much time it will approximately take the Producers to complete their chosen workload, and the inputs they produced. The work time estimate is based on typical completion times and on the Producer's chosen workload," and "You will observe how much time it will approximately take the Producers to complete their chosen workload, the inputs they produced, and their earnings from selling inputs in the market." Only the decision screen differs visually.

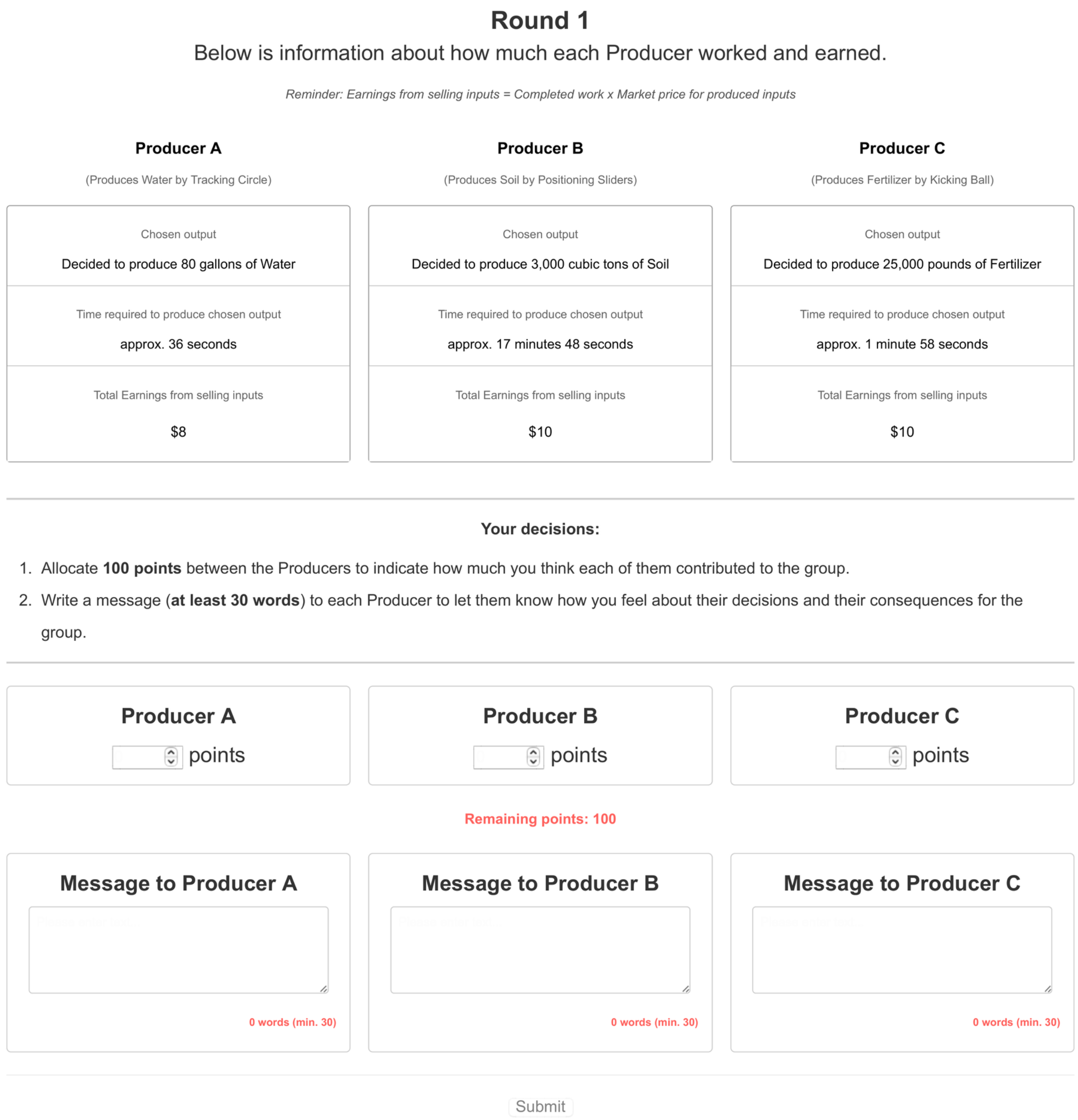


Figure 33: Spectator experiment, *Time displayed*: decision screen. Workloads are expressed in typical completion time rather than on each task's own scale, placing the three Producers' work inputs in a common currency.

D.3.4 Spectator experiment — *Same tasks*: differences only

Identical to the *Baseline* flow except that all three Producers are described as producing their input by positioning sliders. The familiarisation rounds and the decision screen change as a result; all other screens are unchanged.

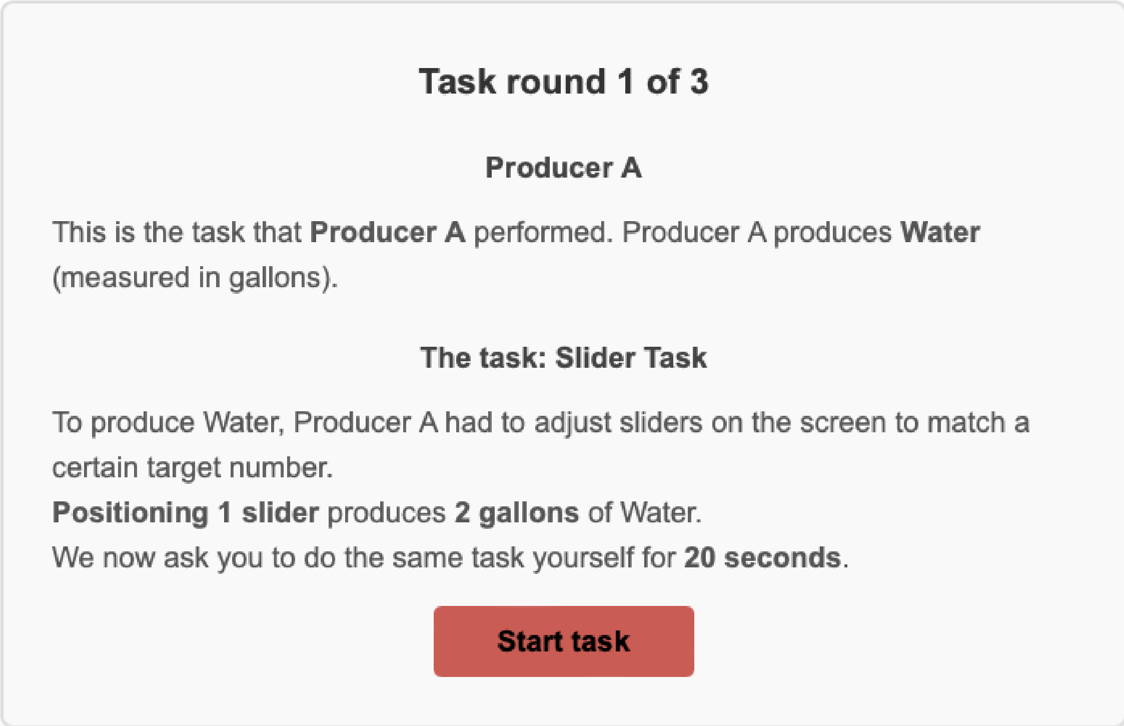
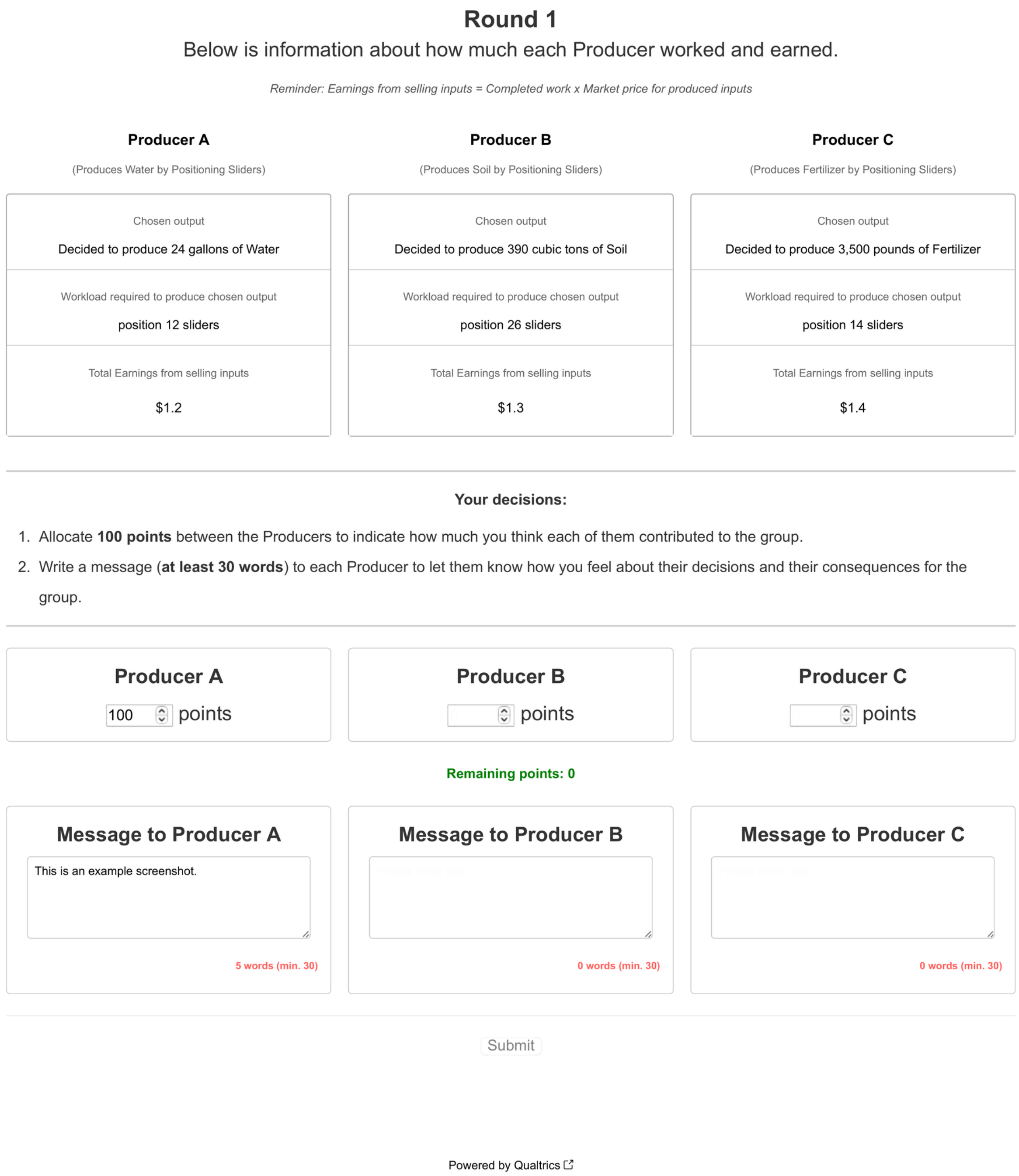


Figure 34: Spectator experiment, *Same tasks*: familiarisation round introduction. All three Producers work on the slider task, so the Spectator familiarises with that task only.



Round 1

Below is information about how much each Producer worked and earned.

Reminder: Earnings from selling inputs = Completed work x Market price for produced inputs

	Producer A	Producer B	Producer C
	(Produces Water by Positioning Sliders)	(Produces Soil by Positioning Sliders)	(Produces Fertilizer by Positioning Sliders)
Chosen output	Decided to produce 24 gallons of Water	Decided to produce 390 cubic tons of Soil	Decided to produce 3,500 pounds of Fertilizer
Workload required to produce chosen output	position 12 sliders	position 26 sliders	position 14 sliders
Total Earnings from selling inputs	$1.2	$1.3	$1.4

Your decisions:

1. Allocate **100 points** between the Producers to indicate how much you think each of them contributed to the group.
2. Write a message (**at least 30 words**) to each Producer to let them know how you feel about their decisions and their consequences for the group.

Producer A 100 points

Producer B points

Producer C points

Remaining points: 0

Message to Producer A

This is an example screenshot.

5 words (min. 30)

Message to Producer B

0 words (min. 30)

Message to Producer C

0 words (min. 30)

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Figure 35: Spectator experiment, *Same tasks*: decision screen. All three Producers' workloads are stated in sliders positioned, so the work inputs are directly comparable while the outputs (water, soil, fertilizer) are not.