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Experimental Evidence of Tax Salience and the Labor-Leisure Decision: Anchoring, Tax Aversion, or Complexity?

Andrew Hayashi,¹ Brent K. Nakamura,² and David Gamage³

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Abstract

Recent research in marketing and public economics suggests that consumers underestimate the effects of taxes and surcharges on total purchase prices when taxes and surcharges are made less salient. The leading explanation is that consumers anchor on base prices and underadjust for surcharges. We perform experiments that: (1) extend the tax salience and price partitioning literatures to the labor supply context; (2) test the anchoring hypothesis by examining the effects of positive and negative wage surcharges on willingness to work; and (3) test whether responses to price partitioning result from imperfect calculation of all-inclusive prices or from deeper preferences. We reject the anchoring hypothesis and find that subjects are less willing to work both when their wages are partitioned with positive and with negative surcharge components. We also find evidence that partitioned pricing effects result from cognitive limitations and possibly from responses to complexity.

Keywords: Experiment, Framing, Partitioned Pricing, Labor Supply, Taxation, Tax Salience

JEL Classification: C91, D03, H20, J22

1 Introduction

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A standard assumption in public economics is that agents fully optimize with respect to the actual economic tradeoffs they face, perfectly calculating the after-tax prices of the consumption, investment, and work alternatives available to them and maximizing their utility given those prices. A corollary of this assumption is that the formal description of these prices does not affect agents' choices. At the same time, it is well-known that preferences may be context-dependent and affected by the way alternatives are described or "framed." Although there is a robust marketing literature exploring the effects of price descriptions on consumer demand, empirical research in public finance has only recently begun to explore when and why individuals may fail to fully incorporate the effects of taxes into their evaluation of market alternatives when those effects are made less salient by the framing of the decision.⁴ Research in both areas has largely been focused on the effects of price framing on consumption decisions and, in particular, on whether sales taxes or other surcharges have the same effect on demand as economically equivalent increases in the "base price" of the good in question. There has been almost no research into the related question of how price framing and tax salience affect work decisions. Furthermore, psychological explanations for the cause of price framing effects remain elusive. Many hypothesize that these effects result from consumers' failure to accurately calculate the total price because consumers "anchor" on the base price and underestimate the effect of surcharges and taxes. Yet there is some evidence that framing effects remain even when all-inclusive prices are transparent, suggesting that consumers may have preferences for the price descriptions themselves.

This article reports the results from two experiments that, (1) examine the effect of wage framing on the willingness to work, (2) test the "anchoring" hypothesis, a leading candidate for explaining the pattern of previously observed price framing effects, and (3) shed light on the question of whether these effects arise from cognitive limitations or from preferences for the descriptive frames. We find that willingness to work is sensitive to wage framing, but that these effects disappear when all-inclusive wages are made transparent. We thus reject that these wage framing effects result from deep preferences regarding the wage descriptions. We also reject the anchoring hypothesis and suggest alternative explanations for the underlying cause of wage framing effects.

"Partitioned pricing," a pricing strategy in which a good or service's purchase price is divided into a base price and one more surcharges, is ubiquitous. For example, it is common for consumers to be presented with separate "shipping and handling" or delivery charges for shipped goods, or for baggage and fuel fees for airline tickets. Such charges could be included in a single, all-inclusive, price. Understanding the effects of partitioned price presentation has become an active area of empirical research in marketing, which has found that such prices tend to reduce consumers' perceptions of the total purchase costs and increase demand.⁵ Although this effect is fairly robust, its magnitude can vary with certain other contextual factors. For example, expressing surcharges in dollar terms tends to depress demand more than expressing equivalent surcharges as percentages (Morwitz et. al. 1998), and the effect of a surcharge on demand can depend on its size as a share of the overall purchase price (Sheng et. al. 2007 and Xia and Monroe 2004).

⁴ For a review of this literature and a discussion of its tax policy implications, see Gamage and Shanske (2011).

⁵ See, e.g., Hossain and Morgan (2006). For a review of the literature, see Morwitz et. al. (2009).

Although evidence documenting the effects of different price frames is accumulating, robust psychological explanations have not been forthcoming. In particular, it remains unsettled whether price framing effects result from cognitive limitations that prevent consumers from fully incorporating surcharges into their calculations of purchase prices (Morwitz et al. 1998). Under this view, it is often suggested that consumers use a decision heuristic, such as anchoring on the base price and insufficiently adjusting their calculation of the total purchase cost by the amount of the surcharges (Morwitz et al. 2009). If partitioned pricing effects result from cognitive limitations, then showing consumers the all-inclusive purchase price alongside the partitioned price would be expected to eliminate the effects of partitioned pricing. However, Xia and Monroe (2004) find that partitioning effects persist even when the all-inclusive price is visible.

Even if sellers present prices that include all surcharges they impose, the prices of their goods generally also have an additional component in the form of a tax. In some cases the all-inclusive price to the consumer is increased by a sales or personal property tax, and in other cases the all-inclusive price is reduced by a tax credit or deduction. In the last five years there have been a cluster of studies exploring whether consumers respond to the tax component of a price in the same way that they respond to changes in the base price. These studies have generally concluded that differences in the salience of taxes under certain presentations can lead to taxes being given less weight by consumers (Chetty et al. 2009, Finklestein 2009, Gallagher and Muehlegger 2008, Ott and Andrus 2000).⁶ If behavioral responses to prices are dependent on framing, including whether the tax component is more or less salient, then this has profound consequences for tax policy because it implies that the distortionary effects of taxes on individual behavior and the attendant negative welfare consequences are not just a function of the taxes themselves, but also of how they are implemented and described. To this end, research on tax framing and salience may guide the way toward increasing the efficiency of taxation.

This article adds to these literatures in three ways. First, empirical studies of the effects of price framing on individual behavior have been largely restricted to evaluations of the effects on consumer purchasing decisions; effects on labor supply have been almost entirely unexamined.⁷ We study how wage framing effects labor supply decisions.

Second, previous studies in marketing and public economics have focused on comparing an all-inclusive price to a low baseline price plus a surcharge.⁸ These studies have

⁶ Gamage and Shanske (2011) suggest that taxes imposed after purchase are likely to be less salient.

⁷ In two unpublished manuscripts, Blumkin et al. (2008) find that a wage tax has a greater impact on work effort than an economically equivalent consumption tax, and Fochmann and Weimann (2011) report evidence that lab subjects exerted more effort when their compensation was described as a higher wage subject to a tax than an economically equivalent lower wage that was not subject to a tax. They also report that a graphical presentation of the effect of the tax reduces these framing effects. Other studies have examined the related question of the effect of marginal/average tax rate confusion on labor/leisure choices (de Bartolome 1995, Liebman and Zeckhauser 2004, Feldman and Katuscak 2006, Chetty and Saez 2009).

⁸ In an unpublished manuscript, and the only paper of which we are aware that explores the symmetry of salience effects in any context, Feldman and Ruffle (2012) find that demand for a good is not significantly

generally found greater demand for a product when the price is partitioned, suggesting the hypothesis that people underestimate the effect of the surcharge on the total price for the good. In contrast, we compare an all-inclusive wage both to a high base wage minus a tax and to a low base wage plus a bonus. If subjects anchor on the base wage and underestimate the magnitude of supplemental payments like surcharges and taxes, they should be more likely to work when offered a high wage subject to a tax than when offered an economically equivalent wage with a lower base component.

Third, we test whether showing subjects the all-inclusive wage alongside the partitioned wage description eliminates the effects of wage partitioning. If subjects have preferences for the description of the wage itself, such as would be the case if they are particularly averse to having a component of their compensation deducted for “taxes,”⁹ then wage partitioning effects should persist even when the all-inclusive wage is apparent. On the other hand, if the effects derive from the complexity surrounding the all-inclusive wage when the wage is partitioned, the effects should disappear.

In both experiments we identify the effect of framing on labor supply decisions by presenting subjects with a series of economically identical work/leisure decisions, varying only the descriptions of the wages. Utilizing within- and between-subject designs that generated rich data-sets of individual choices, we find that subjects’ willingness to work varies with the presentation of the after-tax wage and that subjects are less willing to work *both* when their wage is described as a low base wage plus a bonus and as a high base wage minus a tax. Our results thus cast doubt on the anchoring hypothesis as an explanation for price partitioning effects. Furthermore, the effects of framing disappear when the net wage is revealed alongside the partitioned wage presentation, suggesting that the effects of framing are due to cognitive limitations rather than to actual preferences for wage descriptions.

Lab experiments have become a valuable tool for testing hypotheses in various areas of public economics such as public goods,¹⁰ tax compliance,¹¹ distributional preferences,¹² and behavioral responses to taxation.¹³ This paper is a contribution to that growing literature. The chief advantages of experimental economic methods are control and flexibility over the independent variables of interest and the opportunity for replication studies. It would be extremely difficult to find any circumstance outside the laboratory in which the framing of economically equivalent wage offers varied exogenously in a way that would allow a researcher to identify the effect of that framing. Examining the effect of wage framing in a lab allows us to do this.

different when the price is described as a high price subject to a “deduction” than when the all-inclusive price is provided.

⁹ Previous studies have documented some evidence in favor of this “tax aversion” hypothesis – e.g., Hardisty, Johnson, and Weber (2010).

¹⁰ See, e.g., Ledyard (1995) for a summary of voluntary contributions experiments and Noussair and Tucker (2007) for a recent contribution on the effect of the public observation of contribution decisions.

¹¹ See, e.g., Alm, Jackson and McKee (1993); Alm, McClelland, Schulze (1999) on the role of social norms and participation in the budgeting process in facilitating compliance, and Kastlunger et. al. (2011) on the effect of monetary rewards on compliance.

¹² See, e.g., Engelmann and Strobel (2007), Ackert et. al. (2007).

¹³ See, e.g., Swenson (1988), Sutter and Weck-Hannemann (2003) and Sillamaa (1999).

The paper proceeds as follows. Section 2 describes our experimental procedures and designs. Section 3 describes and analyzes our results. Section 4 concludes and discusses possible explanations for wage framing effects consistent with our experimental results.

2 Material and Methods

2.1 Experimental Design

We conducted two experiments designed to identify the effect of different wage framings on the binary decision to choose work rather than a leisure activity and to test the anchoring hypothesis as an explanation for those effects.¹⁴ Our first experiment (“Experiment 1”) tested the effect of the wage partitioning on the binary decision to choose work rather than a leisure activity. Our second experiment (“Experiment 2”) was designed to build on Experiment 1 by testing the effects of partitioned pricing across a wider set of wage offers. The design of Experiment 2 also allowed us to test whether our observed effects of wage framing resulted from cognitive limitations or from preferences for particular wage descriptions. In both experiments, the order of conditions was randomized by subject.

2.1.1 Experiment 1 Design

In Experiment 1, we presented subjects with four rounds of economically identical work/leisure decisions. The only difference across the rounds was in how the subjects’ compensation was described. In each round, subjects chose between a work task of alphabetizing words for nine minutes and a “leisure” task of watching any of a pre-selected set of popular YouTube videos. Each round was nine minutes, including the time subjects had to pick the work or leisure task.

Subjects who chose the leisure task became eligible to receive a flat payment of \$10.00 in that round. Subjects who chose to work were presented with a sequence of screens, each of which listed fifteen words in randomized order. The subjects were instructed to alphabetize those words by placing a number beside each word, corresponding to its alphabetical ordering. Subjects could complete a maximum of ten screens, potentially alphabetizing as many as 150 words. If subjects chose to work, they received a net wage of \$0.60 for each of the first twenty words alphabetized correctly and \$0.09 for each correctly alphabetized word thereafter. Subjects who chose the work task were guaranteed a minimum payment of \$5.00 for that round, even if they failed to alphabetize any words correctly. Across the four rounds, the only thing that varied was the description of the subject’s net wage. At the end of the experiment, one round was chosen at random to be paid out per the instructions given to subjects.

¹⁴ Data collected in the two experiments also allows us to analyze the effect of wage framing on the amount and productivity of work done by the subjects. Although analysis of this dimension produced some suggestively interesting results, there was not enough variation in the productivity of the subjects who chose to work to facilitate robust analysis of these effects.

The four conditions in Experiment 1 were: (1) flat tax, (2) progressive tax, (3) bonus, and (4) no tax (baseline) conditions. In the flat tax condition, the wage schedule was composed of a declining gross wage with a flat tax of 40%. The schedule in the progressive tax condition was described as a fixed gross wage with a 40% tax rate on earnings from alphabetizing the first twenty words and a 91% tax rate on correctly alphabetized words after the twentieth. The bonus condition described the schedule as a declining gross wage and a declining per word bonus payment for each word correctly alphabetized. The wage schedule in the no tax condition was described solely in terms of the payment the subject would receive for each word alphabetized. Table 1, appearing in Section 3, summarizes the wage schedule descriptions in the four conditions. Screen shots of the presentation of each tax condition are provided in Appendix 1. Although the after-tax wage schedule was identical in all conditions, the gross wage schedule is uniformly higher (or at least as high) in the progressive tax condition as compared to the flat tax condition, in the flat tax as compared to the no tax condition, and in the no tax as compared to the bonus condition.

The conditions were chosen to correspond to familiar forms of taxation; the U.S. federal tax system contains elements of each. Social Security and Medicare payroll taxes are withheld from employees at a flat rate of 7.65%¹⁵ up to a threshold wage level above which only the Medicare tax is imposed; the U.S. federal income tax statutory rates are progressive, increasing with income; and the bonus condition resembles the federal Earned Income Tax Credit (EITC), which is designed to increase earnings among low income families by providing a wage subsidy in the form of refundable tax credits.¹⁶

2.1.2 Experiment 2 Design

In Experiment 2, subjects also proceeded through four rounds. At the beginning of each round, subjects were presented with five “job offers,” one after another, so that each subject encountered a total of twenty job offers during the experiment. The offers were drawn in random order, without replacement, from a list of twenty offers. In each round, a subject viewed and then indicated whether he or she would like to accept each of five job offers received in that round. The decision to accept a job offer indicated the subject’s willingness to work for the specified wage and made him or her eligible to perform an alphabetizing work task (the same task used in Experiment 1). As in Experiment 1, the alphabetizing work task paid subjects according to the number of words they correctly alphabetized, with a \$5.00 minimum payment. If a subject declined a job offer, indicating a preference for the leisure task over work on the terms of that offer, he or she become eligible for a period of leisure (the same YouTube video watching leisure as in Experiment 1) and a flat payment of \$10.00. After a subject selected a work or leisure preference for the fifth and final offer in a given round, one of the five job offers from that round was selected at random and used to assign the subject to the work or leisure task. Each round lasted 10 minutes. At the end of the experiment, one round was chosen at random to be paid out.

¹⁵ This is the employee contribution. The employer contribution is identical, and the total FICA rate is 15.30% for both employees and self-employed persons.

¹⁶ For a summary of the empirical literature on the labor supply effect of the EITC see Eissa and Hoynes (2006).

In contrast to Experiment 1, in which all four job offers provided the same net wage, there was some variation in the net wage across job offers. Three of the job offers provided a flat, per-word net wage of \$0.06; five offers provided a per-word wage of \$0.12; seven offers provided a per-word wage of \$0.18; and five offers provided a per-word wage of \$0.24. As in Experiment 1, the conditions were chosen to correspond to familiar forms of taxation and to explore any effects of imposing taxes in both percentage and numerical dollar amount terms. Each job offer belonged to one of five tax conditions: (1) baseline (no tax), (2) bonus, (3) excise tax, (4) income tax, and (5) tax credit. Each condition presented subjects with different wage frames. The wage schedule in the baseline condition was described solely in terms of the payment the subject would receive for each word alphabetized. The schedule in the bonus condition was described as a per word payment plus a per word bonus for each word correctly alphabetized. The schedule in the excise tax condition was described as a payment per word with a deduction of a flat amount per word. The wage schedule in the income tax condition was described as a payment per word less a percentage tax imposed at a specified rate. The tax credit wage schedule was described as a payment per word with a refundable credit provided to the subject at a specified percentage rate. Table 4, in Section 3, summarizes the description of each of these wage offers. Example screen shots of one type of wage schedule from each condition are provided in Appendix 2.

Subjects in Experiment 2 were also randomly assigned to one of two pricing conditions for the experiment. In the partitioned price condition the wage was described in terms of its component parts: a gross wage and a (possibly negative) surcharge. In the inclusive price condition the net wage associated with each job offer was provided alongside the partitioned wage description. Thus, the experiment utilizes within-subject variation to identify the effect of changes in wage framing on labor supply and between-subject variation to identify the dependence of these effects on the availability of the net wage.

2.2 Procedures

In both experiments, subjects were recruited from a subject pool maintained by the U.C. Berkeley Experimental and Social Science Laboratory (the “X-Lab”). The X-Lab handles subject payout and recruitment for UC Berkeley researchers in addition to providing individual computer workstations isolating subjects from one another. Experiment 1 was conducted in six sessions over two days in May and October 2009 using the Z-Tree program for ready-made economics experiments (Fischbacher 2007). Our analysis is based on data collected from 150 subjects across the two days.¹⁷ The mean payoff for the first experiment was \$16.32. Experiment 2 was conducted in six sessions over three days in March 2012 using the Z-Tree program. We collected data from 148 subjects across the three days and the mean payoff was \$14.55.¹⁸ Nearly all of the subjects in the X-Lab’s recruitment pool are undergraduate students at UC Berkeley,¹⁹ which is reflected in our sample; more than 90% of the subjects in Experiment 1, and 95% of the subjects in Experiment 2, were undergraduates.

¹⁷ Although 164 subjects participated in the experiment, due to technical difficulties, we were only able to retrieve data for 150 subjects.

¹⁸ Although 176 subjects participated in the experiment, due to technical difficulties, we were only able to retrieve data for 148 subjects.

¹⁹ The rest of the subject pool consists of University of California, Berkeley staff and alumni.

The procedures used in both experiments followed nearly identical scripts. In each session, the subjects were brought into the laboratory and randomly appointed seats. Subjects were separated by partitions and no communication was permitted between them during the entirety of the experiment. Each subject was seated in front of a laptop computer running the Z-Tree program and was provided with headphones so he or she could watch YouTube videos and perform the work tasks without disturbing the other subjects or being observed by them.

Before beginning both experiments, the experimenter read the instructions (a copy of which was provided to each subject) and subjects were given the opportunity to ask clarifying questions. Subjects were given one minute to look over the YouTube videos available for the leisure task. For Experiment 1, once the experiment began, each subject proceeded through the four conditions, the order of which was randomized by subject, before answering a series of demographic questions and survey questions from the canonical framing literature designed to collect additional information about subjects' susceptibility to framing effects. For Experiment 2, once the experiment began, each subject proceeded through the four conditions consisting of five job offers each, with the order of the job offers randomized, before answering similar survey questions. No practice rounds preceded either experiment and both lasted approximately one hour. At the end of both experiments, one round was randomly chosen to be paid out and subjects were paid by check.

Appendix 1 contains all condition-specific and survey language shown to subjects, a further explanation of the rationale behind the non-demographic survey questions, and the actual screens shown to subjects during the course of the experiment during Experiment 1. Appendix 2 contains an example of the language shown to subjects for each framing condition and an example of the job offer screens shown to subjects in the partitioned price and inclusive price conditions from Experiment 2. Each subject participated in the experiment only once.

3 Results

Experiment 1

Subjects in Experiment 1 were presented with four work/leisure decisions, identical in the net wage and varying only in how the wage was described. The characteristics of the wage offers made in the four decisions are shown in Table 1. The purpose of the experiment was to test the null hypothesis of equality in the proportion of subjects working in all four conditions under conditions in which any differences could be attributed solely to variation in the wage-schedule description. A simple comparison of these proportions suggests that wage description affects the willingness to work.

Table 1: Wage Schedule Summary for All Conditions

Condition	Min. Income	Words 1-20			Words 21-150			Max. Gross Income	Max. Net Income
		Gross Wage	Tax	Net Wage	Gross Wage	Tax	Net Wage		
Leisure	\$10.00	---	---	---	---	---	---	---	---
Flat	\$5.00	\$1.00	40%	\$0.60	\$0.15	40%	\$0.09	\$39.50	\$23.70
No Tax	\$5.00	\$0.60	\$0.00	\$0.60	\$0.09	\$0.00	\$0.09	\$23.70	\$23.70
Prog. Tax	\$5.00	\$1.00	40%	\$0.60	\$1.00	91%	\$0.09	\$150.00	\$23.70
Bonus	\$5.00	\$0.20	-\$0.40	\$0.60	\$0.06	-\$0.03	\$0.09	\$11.80	\$23.70

As Table 2 shows, 87% of subjects chose the work task in the flat tax condition, 83% chose to work in the no tax condition, 80% chose to work in the progressive tax condition, and only 55% of our sample chose to work in the bonus condition. Table 2 reports the results from two-tailed equality of proportions tests between the four conditions. These tests indicate that subjects were less likely to work in the bonus condition than any of the other conditions, a difference that is statistically significantly different from the other conditions at the $< 1\%$ level and is also of a significant magnitude; 25% fewer subjects worked in the bonus condition than in the progressive tax condition and 32% fewer subjects worked in the bonus condition than in the flat tax condition. We cannot reject the null hypothesis that subjects were equally likely to work in the other conditions at conventional levels of significance.

Table 2: Equality of Proportions Test Statistics

Treatment	Work Rate	Flat Tax	Baseline	Prog. Tax	Bonus
Flat Tax	0.867	---	0.961	1.549	6.087**
Baseline (no tax)	0.827		---	0.593	5.228**
Progressive Tax	0.800			---	4.678**
Bonus	0.547				---

** denotes significant at $< 1\%$ level.

Our strategy for identifying the effect of framing on subjects' willingness to work relies on the assumption that there are no differences between the conditions other than the description of the wage schedules. One variable that might affect the willingness of a subject to work in a given condition is the order in which that subject encountered the condition. Although the randomization process was largely successful in ensuring that individual conditions were uniformly distributed across rounds, the effect of order on work-rates suggests that the interpretation of variation at the individual level must be carefully interpreted to avoid confounding the effect of a condition with condition order. Table 3 reports the estimated coefficients for the various tax conditions, controlling for the round in which the condition was

encountered, using a linear probability model and a logit model with random individual effects. Controlling for the session round, the effect of the bonus condition persists.

Table 3: Effect of Wage Description on Work Choice

	Linear Prob.	Logit
Flat Tax Condition	0.058 (0.04)	0.434 (0.324)
Progressive Tax Condition	-0.018 (0.04)	-0.128 (0.309)
Bonus Condition	-0.266 (0.05)**	-1.389 (0.278)**
Round 2	-0.146 (0.04)**	-1.247 (0.361)**
Round 3	-0.261 (0.05)**	-1.873 (0.357)**
Round 4	-0.195 (0.04)**	-1.520 (0.356)**
Constant	0.967 (0.03)**	2.807 (0.346)**
N	600	600
R ²	0.136	0.129

** denotes significant at 1% level. Robust standard errors in parentheses.

As noted above, one possible explanation for why partitioned prices affect demand is that individuals use a heuristic that “anchors” on the base price and tends to undercompensate for the effect of any surcharges in calculating the all-inclusive price. In the context of Experiment 1, this view would predict that successively fewer subjects would work in the progressive tax, flat tax, no tax, and bonus conditions. Consistent with this view we find that subjects are least willing to work in the bonus condition, which has the lowest base price; however, we do not find that the willingness to work is *higher* in the flat tax or progressive tax conditions, as would be predicted under this view.

Experiment 2

Experiment 2 was conducted to collect additional evidence on the viability of the anchoring hypothesis and to test whether the effect of wage framing on the willingness to work is a result of the failure to perceive net wages or actual preferences for the wage descriptions themselves. Table 4 lists the description of each of the twenty wage offers faced by subjects in Experiment 2. The “P.Wage” column shows the share of subjects who faced a partitioned wage and accepted the offer. The “I.Wage” column shows the share of subjects who were shown the all-inclusive wage (as well as the partitioned wage) and accepted the offer. These summary

statistics provide the first evidence of our central finding: Subjects are most willing to work when their net wage is transparent. Any additional complexity in the wage description in the form of either a low base wage plus a surcharge or a high base wage less a tax, decreases work participation.

Table 4: Descriptions of Wage Offers and Work Rates by Information Treatment

Offer Type	Wage Description					Work Rates		
	Gross Wage	Bonus	Tax Rate	Excise Tax	Net Wage	P.Wage	I.Wage	Difference
Baseline	0.06	0.00	0.00	0.00	0.06	0.25	0.27	0.02
Baseline	0.12	0.00	0.00	0.00	0.12	0.42	0.49	0.07
Baseline	0.18	0.00	0.00	0.00	0.18	0.75	0.72	-0.03
Baseline	0.24	0.00	0.00	0.00	0.24	0.88	0.82	-0.06
Bonus	0.06	0.06	0.00	0.00	0.12	0.42	0.43	0.01
Bonus	0.10	0.08	0.00	0.00	0.18	0.64	0.75	0.11
Bonus	0.06	0.12	0.00	0.00	0.18	0.65	0.75	0.09
Bonus	0.06	0.18	0.00	0.00	0.24	0.74	0.91	0.17
Excise Tax	0.30	0.00	0.00	0.24	0.06	0.26	0.35	0.09
Excise Tax	0.30	0.00	0.00	0.18	0.12	0.35	0.43	0.08
Excise Tax	0.30	0.00	0.00	0.12	0.18	0.51	0.75	0.24
Excise Tax	0.30	0.00	0.00	0.06	0.24	0.68	0.84	<u>0.15</u>
Income Tax	0.30	0.00	80%	0.00	0.06	0.20	0.39	<u>0.19</u>
Income Tax	0.30	0.00	60%	0.00	0.12	0.30	0.43	0.13
Income Tax	0.30	0.00	40%	0.00	0.18	0.55	0.66	0.11
Income Tax	0.30	0.00	20%	0.00	0.24	0.68	0.86	0.18
Tax Credit	0.06	0.00	100%	0.00	0.12	0.43	0.51	0.07
Tax Credit	0.06	0.00	200%	0.00	0.18	0.57	0.70	0.13
Tax Credit	0.10	0.00	-80%	0.00	0.18	0.45	0.73	0.28
Tax Credit	0.06	0.00	300%	0.00	0.24	0.70	0.82	0.13

Bold denotes significant at 1% level, underline denotes significant at 5% level.

The final column of Table 4 shows that the subjects shown the all-inclusive wage were more likely to work than the subjects who saw only the partitioned wage for eighteen of the twenty wage offers. The only two offers that were accepted at a higher rate by the subjects viewing only partitioned wages were offers of the “baseline” type, which had neither taxes nor surcharges and for which we thus would not expect to observe significant differences between the two groups. As expected, these differences in work rates in the baseline condition were not statistically significant. Using simple equality of proportions tests, the difference in the work rates between partitioned price and inclusive price subjects is significant at the 5% level for six of the offers. The largest differences in work rates across the two pools of subjects seem to be clustered where the stakes are highest, at net wages of \$0.18 or \$0.24 per word. Table 4 also

shows that, for any given offer type, the share of subjects accepting each offer was monotonically increasing in the net wage for both partitioned price and inclusive price subjects. That is, labor supply was always increasing in the net wage for a given offer type.

Figure 1 illustrates the differences in work rates across the bonus, excise tax, income tax and tax credit conditions, depicting how those rates vary with the net wage and with assignment to partitioned wage or inclusive wage treatments. Subjects were more likely to work in all conditions, for all net wages, when the inclusive wage prices were provided.

Figure 1: Work Rates by Net Wage, Offer Type and Price Presentation

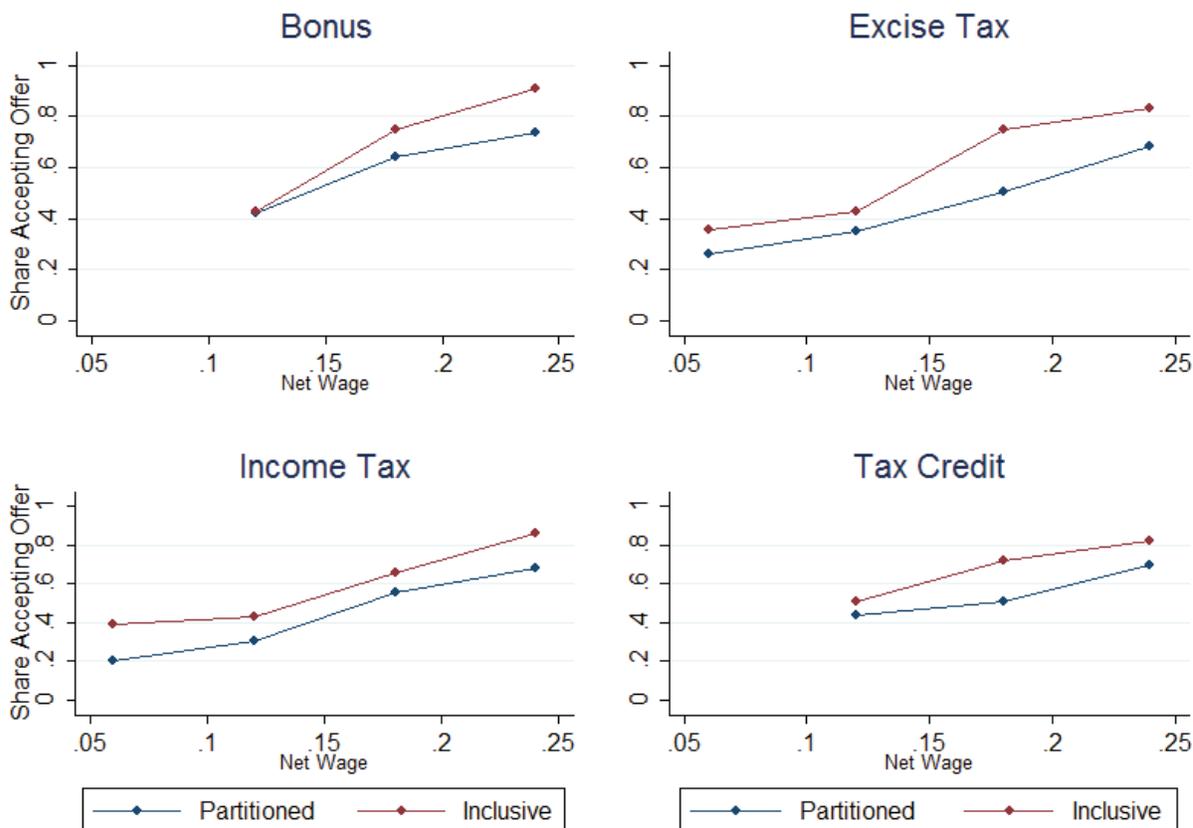


Table 5 reports the estimated coefficients from linear probability and logit regressions estimating the effect of net wages and wage descriptions on whether subjects worked, run separately for subjects viewing partitioned prices and subjects viewing inclusive prices. In light of the results from Experiment 1 about the importance of ordering effects, 19 individual dummy variables are included to control for the order in which the offer was made. Estimates of the coefficients on these variables are suppressed. Subjects that observed only the partitioned prices were less likely to work in every condition as compared to the baseline condition, effects that are significant at the 1% level for the excise tax, income tax, and tax credit conditions. These effects disappear entirely for subjects that viewed the inclusive prices.

Table 5: Effects of Wage Description by Price Presentation

	Partitioned Price		Inclusive Price	
	Linear	Logit	Linear	Logit
Net wage	2.923 (0.256)**	13.282 (1.088)**	3.04 (0.296)**	14.435 (1.057)**
Bonus	-0.052 (0.029)	-0.258 (0.183)	0.040 (0.029)	0.157 (0.181)
Excise Tax	-0.123 (0.034)**	-0.585 (0.187)**	0.012 (0.025)	0.064 (0.181)
Income Tax	-0.147 (0.029)**	-0.711 (0.184)**	0.004 (0.030)	0.020 (0.182)
Tax Credit	-0.135 (0.042)**	-0.640 (0.182)**	0.025 (0.030)	0.083 (0.183)
Constant	0.257 (0.072)**	-1.057 (0.331)**	0.206 (0.075)**	-1.333 (0.348)**
N	1,380	1,380	1,580	1,580
R ²	0.152	0.118	0.156	0.124

** denotes significant at 1% level. Robust standard errors in parentheses. Regressions include dummy variables for the order of particular offers. Estimated coefficients for these variables are omitted. These regressions were run on all 20 offers, but results are robust to each combination of the two Bonus offers and two Tax Credit offers made at a net wage of \$0.18.

Taken together with the unconditional mean work rates reported in Table 4, the regression estimates in Table 5 strongly suggest that the effects of wage framing on work rates result from cognitive limitations. When the inclusive wage is provided alongside the partitioned wage, so that the net return to work is fully transparent, wage partitioning (in the form of higher wages subject to an income or excise tax or lower wage subject to a bonus payment or tax credit) has no effect on work rates.²⁰

4 Discussion

The effect of partitioned pricing on consumer purchasing decisions has been well documented; demand is generally greater when consumers are presented with a low base price plus a surcharge than when they are presented with an all-inclusive price equal to the sum of the two. A plausible hypothesis arising from this evidence is that consumers anchor their estimate of the inclusive price on the low base price and do not fully adjust for the presence of surcharges.

²⁰ We have conducted preliminary analysis on the relationship between subjects' behavior in the experiments and their responses to the survey questions. Although there are some suggestive correlations that we intend to follow up on in subsequent work, the relationships themselves do not admit of any straightforward interpretation.

Building on this literature, we find strong evidence that partitioned pricing also affects labor supply decisions, at least in our laboratory setting. However, the direction of the partitioned pricing effects we observe for labor supply decisions conflicts with the anchoring hypothesis. Whereas the anchoring hypothesis would predict that willingness to participate in the labor force would be greater when wages are presented as a higher base wage minus a tax, we find that partitioned pricing *reduces* work effort both when wages are presented as a lower base wage plus a bonus or a tax credit and when wages are presented as a higher base wage minus a tax.

An alternative hypothesis forwarded to explain partitioned pricing effects is that some individuals may have preferences with respect to actual price descriptions. Most notably, there is some evidence in support of the tax aversion hypothesis – that some individuals dislike surcharges described as taxes more than equivalent surcharges that are not described as taxes. Yet if partitioned pricing effects result from subjects’ actual preferences with respect to price descriptions, then these effects should persist even when subjects are shown the all-inclusive price along with the partitioned price components. In contrast to this prediction, the wage partitioning effects in our experiment disappeared when subjects were shown the all-inclusive wage along with the partitioned wage components. We can thus infer that the wage framing effects observed in our experiment result from cognitive limitations rather than from the subjects’ preferences with respect to the wage descriptions themselves.

The partitioned pricing effects observed in our experiment may be a function of the complexity of the wage description. In both experiments, we found that making the wage description more complex (either by partitioning the wage into a higher base wage minus a tax or into a lower base wage plus a bonus or a tax credit) yielded lower work rates, and we found no evidence of partitioned wages generating higher work rates. We note, however, that our results are somewhat inconclusive about which kinds of partitioned wages are especially disfavored. In Experiment 1, we reject the null hypothesis of equal work rates across price frames only for the bonus condition. However, in Experiment 2, we find evidence of lower work rates for both income and excise tax offer types and for the tax credit offer types, but we cannot reject the null hypothesis for the bonus condition, although the estimated effect is negative.²¹ As discussed in the Introduction, the marketing literature has already identified some of the ways that partitioned pricing effects can be affected by apparently innocuous factors, such as whether surcharges are expressed in terms of dollars or percentages of the base price (Morwitz et al. 1998) or the size of the surcharge (Morwitz et al. 2009). Rather than chance variation, it is possible that differences in the experimental designs made the bonus condition especially disfavored in Experiment 1 or less disfavored in Experiment 2.

In any case, we find our experimental results to be persuasive evidence against both the anchoring hypothesis and the tax aversion hypothesis (as well as against other alternative hypotheses relating to subjects having preferences with respect to the actual wage descriptions). The price partitioning effects observed in our experiments appear to be a function of complexity in the wage description reducing work effort. Yet, having rejected the dominant hypotheses in

²¹ Based on our results suggesting complexity as a mechanism underlying individual labor supply responses for the excise tax, income tax, and tax credit conditions, we suspect that with more statistical power we may have observed a significant result for the bonus condition. This is an important area for further research, particularly when considering that bonuses are a common component of employment compensation packages.

the existing literature for explaining price partitioning, we are left searching for alternative hypotheses to explain our experimental results.

Looking only to our own experimental results, we might infer that the experimental subjects were simply averse to complexity in the wage descriptions – perhaps either because the subjects disliked complexity in and of itself or because the complexity engendered suspicion and led the subjects to suspect that the aggregate wages were lower than they actually were. Either of these hypotheses about complexity aversion would explain our experimental results, but both of these hypotheses are at odds with the literature on consumer purchasing decisions. With respect to consumer purchasing decisions, complexity in the price descriptions has been shown to increase demand when the complexity takes the form of a lower base price plus a surcharge. Looking at both our experimental results and the broader literature on consumer purchasing decisions, it would appear that if individuals are complexity averse then they are only complexity averse in their capacities as sellers (of labor) and not in their capacities as consumers.

It might well be that individuals are complexity averse only with respect to labor supply decisions; or it could be that the anchoring hypothesis only applies to consumer purchasing decisions (and not to labor supply decisions) and that the effects of anchoring dominate any complexity aversion that individuals might otherwise exhibit with respect to consumer purchasing decisions. Labor supply decisions and consumer purchasing decisions are sufficiently different that price partitioning might operate differently across the two contexts.

Alternatively, the effects of price complexity might be a result of individuals' having scarce cognitive resources. If dealing with complicated price descriptions imposes a cognitive load on individuals, this may interfere with the individuals' exercise of willpower and self-control. We generally assume that individuals desire to choose leisure over labor and to purchase goods, and that they are only deterred from doing so by the costs in terms of foregone wages or money spent, respectively. If adding complexity to the price descriptions imposes a cognitive load on individuals, then complexity may interfere with the individuals' exercise of willpower, thus making the individuals more likely to choose leisure or to purchase goods – the actions they would prefer to take if not deterred by the prices. This hypothesis explains both our experimental results and the results of the consumer purchasing literature. Nevertheless, further research will be needed to conclusively determine exactly what it is about complexity that reduces work effort and whether or not the same factors create price partitioning effects in the labor supply context as in the consumer purchasing context.

To the extent that our results persist outside the lab, they may have implications for the design of both tax systems and of government programs created to increase labor-force participation. Most forms of income taxes and payroll taxes add complexity to net wage calculations, often significantly so. Our results suggest that complex forms of taxation may discourage work effort more than do less complex alternatives. Similarly, our results suggest that government programs designed to increase labor force participation – such as the Earned Income Tax Credit (EITC) – may be more effective when government subsidies are made simple such as

by building the amount of the subsidies directly into wages.²² In this regard, our findings complement Chetty and Saez’s (2009) evidence that educating taxpayers about the EITC increases the labor-supply effects of the EITC. Both our experiments and Chetty and Saez’s study suggest that clarifying the effect of wage subsidies on the “bottom line” return-to-work can increase labor supply. For taxes about which individuals are already aware, our results suggest the further, perhaps surprising, conclusion that providing individuals with clear information about the effect of taxes and other deductions from wages on net compensation might also increase work effort.

²² The subsidies provided by the EITC are not directly added to the wages received from work; individuals must instead apply for the EITC subsidies separately. In contrast, direct wage subsidies – such as those proposed by Phelps (1997) – are built directly into the wages individuals receive for work.

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Author Biographies

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Appendix 1: Experiment 1 Materials

Flat Tax Condition Screen

Please choose whether you would like to perform the "work" task of alphabetizing words or the "leisure" task of watching entertaining videos. Once you have made your selection, you will not be able to switch to the other task during this round. This round will last nine minutes, and you will have the opportunity to make a new selection between the work and leisure task at the beginning of each round.

If you choose the work task, you will be presented with a series of screens, each of which has 15 words that were chosen by a random word generator. You will be asked to place these words in alphabetical order by entering a number beside each word that corresponds to its alphabetical rank. For example, the words: "anger, light, bottle" would be ranked 1, 3, 2, respectively. If you choose the leisure task, you will be able to choose from a number of popular YouTube videos to watch.

If you select the work task, your earnings will depend on how many words you correctly alphabetize. You will receive **\$1.00** for each of the first twenty words you correctly alphabetize. After that, you will receive **\$0.15** for each additional word that you correctly alphabetize.

If you choose the work task, **40%** of your earnings will be deducted at the end of the round as a tax, leaving you with 60% of your initial earnings as the actual amount you will receive.

You are guaranteed a minimum payment of **\$5** if you choose to work. So, if you earn less than \$5 (after tax), you will receive \$5 from working. If you earn more than \$5, you will keep how much you earned.

There are ten alphabetizing screens in this section, with 15 words on each screen. So, the most that you can earn by performing the work task in this round, before the 40% tax is deducted, is **\$39.50**.

If you select the leisure task, you will be paid a flat sum of **\$10.00** for this round. There is no tax on your earnings from the leisure task.

Now, please select either the work task or the leisure task.

Work Task

Leisure Task

No Tax Condition Screen

Please choose whether you would like to perform the "work" task of alphabetizing words or the "leisure" task of watching entertaining videos. Once you have made your selection, you will not be able to switch to the other task during this round. This round will last nine minutes, and you will have the opportunity to make a new selection between the work and leisure task at the beginning of each round.

If you choose the work task, you will be presented with a series of screens, each of which has 15 words that were chosen by a random word generator. You will be asked to place these words in alphabetical order by entering a number beside each word that corresponds to its alphabetical rank. For example, the words: "anger, light, bottle" would be ranked 1, 3, 2, respectively. If you choose the leisure task, you will be able to choose from a number of popular YouTube videos to watch.

If you select the work task, your earnings will depend on how many words you correctly alphabetize. You will receive **\$0.60** for each of the first twenty words you correctly alphabetize. After that, you will receive **\$0.09** for each additional word that you correctly alphabetize.

There is no tax for this round.

You are guaranteed a minimum payment of **\$5** if you choose to work. So, if you earn less than \$5 (after tax), you will receive \$5 from working. If you earn more than \$5, you will keep how much you earned.

There are ten alphabetizing screens in this section, with 15 words on each screen. So, the most that you can earn by performing the work task in this round is **\$23.70**.

If you select the leisure task, you will be paid a flat sum of **\$10.00** for this round. There is no tax on your earnings from the leisure task.

Now, please select either the work task or the leisure task.

Work Task

Leisure Task

Bonus Condition Screen

Please choose whether you would like to perform the "work" task of alphabetizing words or the "leisure" task of watching entertaining videos. Once you have made your selection, you will not be able to switch to the other task during this round. This round will last nine minutes, and you will have the opportunity to make a new selection between the work and leisure task at the beginning of each round.

If you choose the work task, you will be presented with a series of screens, each of which has 15 words that were chosen by a random word generator. You will be asked to place these words in alphabetical order by entering a number beside each word that corresponds to its alphabetical rank. For example, the words: "anger, light, bottle" would be ranked 1, 3, 2, respectively. If you choose the leisure task, you will be able to choose from a number of popular YouTube videos to watch.

If you select the work task, your earnings will depend on how many words you correctly alphabetize. You will receive **\$0.20** for each of the first twenty words you correctly alphabetize. After that, you will receive **\$0.06** for each additional word that you correctly alphabetize.

If you choose the work task, you will also receive a bonus on top of your earnings. You will receive an extra **\$0.40** for each of the first twenty words you correctly alphabetize and an extra **\$0.03** for each word you correctly alphabetize after that.

You are guaranteed a minimum payment of **\$5** if you choose to work. So, if you earn less than \$5 (after bonus), you will receive \$5 from working. If you earn more than \$5, you will keep how much you earned.

There are ten alphabetizing screens in this section, with 15 words on each screen. So, the most that you can earn by performing the work task in this round, excluding the bonus, is **\$11.80**.

If you select the leisure task, you will be paid a flat sum of **\$10.00** for this round. There is no bonus for choosing the leisure task.

Now, please select either the work task or the leisure task.

Work Task

Leisure Task

Progressive Tax Screen

Please choose whether you would like to perform the "work" task of alphabetizing words or the "leisure" task of watching entertaining videos. Once you have made your selection, you will not be able to switch to the other task during this round. This round will last nine minutes, and you will have the opportunity to make a new selection between the work and leisure task at the beginning of each round.

If you choose the work task, you will be presented with a series of screens, each of which has 15 words that were chosen by a random word generator. You will be asked to place these words in alphabetical order by entering a number beside each word that corresponds to its alphabetical rank. For example, the words: "anger, light, bottle" would be ranked 1, 3, 2, respectively. If you choose the leisure task, you will be able to choose from a number of popular YouTube videos to watch.

If you select the work task, your earnings will depend on how many words you correctly alphabetize. You will receive **\$1.00** for each word you correctly alphabetize.

If you choose the work task, a tax will be deducted from your earnings at the end of the round. For the first \$20.00 you earn, the tax rate will be **40%**, so you will only receive 60% of the first \$20.00 you earn as payment. For anything you earn above \$20.00, the tax rate will be **91%**, so you will receive only 9% of anything you earn above \$20.00.

You are guaranteed a minimum payment of **\$5** if you choose to work. So, if you earn less than \$5 (after tax), you will receive \$5 from working. If you earn more than \$5, you will keep how much you earned.

There are ten alphabetizing screens in this section, with 15 words on each screen. So, the most that you can earn by performing the work task in this round, before the tax is deducted, is **\$150.00**.

If you select the leisure task, you will be paid a flat sum of **\$10.00** for this round. There is no tax on your earnings from the leisure task.

Now, please select either the work task or the leisure task.

Work Task

Leisure Task

Leisure Task Screen

You have selected the leisure task. This round will last 9 minutes and each of the videos is of a different length, so choose the videos you would like to watch appropriately.

In order to watch the videos, hold down the "alt" button next to the space bar and, while still holding down the "alt" button, tap the "tab" button (next to the letter "Q") once and then release the "alt" key. This will bring you to a screen with a list of popular YouTube videos. Click on the name of a video to watch it.

At the end of this 9 minute round, you will be asked to return to this screen, which you will do by repeating the above instructions. Press and hold the "alt" key, and while holding it down, tap the "tab" key once and then release the "alt" key.

Once you have returned to this screen and the end of the round, please hit the "END SECTION" button and wait.

End Section

Work Task Screen

You have selected the work task of alphabetizing words. To the right of each word on the list below is a box in which you can input a number. You should number the words from 1 to 15 based on their alphabetical order. For example, the words: "anger, light, bottle" would be ranked 1, 3, 2, respectively. Once you have finished alphabetizing the words on the screen, press the "OK" button, and you will be given a new screen of words to alphabetize. If at any point you would like to stop alphabetizing words in this period, press the "STOP WORK" button and you will be taken to a screen where you will wait for everyone else to finish the round.

STOP WORK

closest	<input type="text"/>	faucet	<input type="text"/>	teasing	<input type="text"/>
dentist	<input type="text"/>	inner	<input type="text"/>	authorization	<input type="text"/>
glory	<input type="text"/>	psychologist	<input type="text"/>	quiet	<input type="text"/>
menacing	<input type="text"/>	unreliable	<input type="text"/>	superficial	<input type="text"/>
kangaroo	<input type="text"/>	reluctant	<input type="text"/>	yearn	<input type="text"/>

OK

Payout Screen

Thank you for your participation in this experiment. Below you can see (1) the round of the experiment that was chosen to be paid out, (2) whether you chose the leisure task or the work task in that round, (3) how many words you correctly alphabetized in that round (if you chose the work task), and (4) how much money you will receive today. Please click the "OK" button when you are done with this screen.

	The round that will be paid out is:	1
	In the round that will be paid out you chose the:	Leisure Task
The number of words you correctly alphabetized (if you chose the work task in the above round):		0
	The amount of money you will receive today is:	10.00

OK

Please choose whether you would like to perform the "work" task of alphabetizing words or the "leisure" task of watching entertaining videos. Once you have made your selection, you will not be able to switch to the other task during this round. This round will last nine minutes, and you will have the opportunity to make a new selection between the work and leisure task at the beginning of each round.

If you choose the work task, you will be presented with a series of screens, each of which has 15 words that were chosen by a random word generator. You will be asked to place these words in alphabetical order by entering a number beside each word that corresponds to its alphabetical rank. For example, the words: "anger, light, bottle" would be ranked 1, 3, 2, respectively. If you choose the leisure task, you will be able to choose from a number of popular YouTube videos to watch.

If you select the work task, your earnings will depend on how many words you correctly alphabetize. You will receive **\$1.00** for each word you correctly alphabetize.

If you choose the work task, a tax will be deducted from your earnings at the end of the round. For the first \$20.00 you earn, the tax rate will be **40%**, so you will only receive 60% of the first \$20.00 you earn as payment. For anything you earn above \$20.00, the tax rate will be **91%**, so you will receive only 9% of anything you earn above \$20.00.

You are guaranteed a minimum payment of **\$5** if you choose to work. So, if you earn less than \$5 (after tax), you will receive \$5 from working. If you earn more than \$5, you will keep how much you earned.

There are ten alphabetizing screens in this section, with 15 words on each screen. So, the most that you can earn by performing the work task in this round, before the tax is deducted, is **\$150.00**.

If you select the leisure task, you will be paid a flat sum of **\$10.00** for this round. There is no tax on your earnings from the leisure task.

Now, please select either the work task or the leisure task.

Work Task

Leisure Task

Post-Experimental Subject Survey

Question 1: “What is your major?”

1= Science; 2 = Business; 3 = Social Science; 4 = Other

Question 2: “What is your gender?”

1 = Female; 2 = Male

Question 3: “What year are you?”

1 = Freshman; 2 = Sophomore; 3 = Junior; 4 = Senior; 5 = Other

Survey Questions 4 and 5

This pair of questions reproduced below is taken from Tversky and Kahneman (1986: S263-S264). For our purposes, the important thing to note is that Options A and B are economically equivalent in both Questions 4 and 5 and that Option B first-order stochastically dominates Option A. Although the decision problems are formally identical, this dominance is less transparent in Question 5. 81.3% of our subjects chose Option B in Question 4, but 57.3% of our respondents chose Option A in Question 5 (58% of the Tversky and Kahneman subjects chose option A). Thus, at least 38.6% of the subjects in our sample chose Option B in Question 4 and Option A in Question 5, exhibiting a reversal in preferences attributable solely to the change in the description of the options.

Question 4: “Consider the following two lotteries, described by the percentage of marbles of different colors in each box and the amount of money you would win or lose depending on the color of a randomly drawn marble. Which lottery do you prefer?”

Option A

90% White	6% Red	1% Green	1% Blue	2 % Yellow
\$ 0	Win \$45	Win \$30	Lose \$15	Lose \$15

Option B

90% White	6% Red	1% Green	1% Blue	2 % Yellow
\$ 0	Win \$45	Win \$45	Lose \$10	Lose \$15

Responses

Response Number	Response Text	Respondents	% of Total Respondents
1	Prefer Option A	5	3.3
2	Prefer Option B	122	81.3
3	Prefer Neither	23	15.3

Question 5: “Consider the following two lotteries, described by the percentage of marbles of different colors in each box and the amount of money you would win or lose depending on the color of a randomly drawn marble. Which lottery do you prefer?”

Option A

90% White	6% Red	1% Green	3% Yellow
\$ 0	Win \$45	Win \$30	Lose \$15

Option B

90% White	7% Red	1% Green	2 % Yellow
\$ 0	Win \$45	Lose \$10	Lose \$15

Responses

Response Number	Response Text	Respondents	% of Total Respondents
1	Prefer Option A	86	57.33
2	Prefer Option B	48	32.0
3	Prefer Neither	16	10.7

Survey Questions 6, 7, and 8

These three questions are also taken verbatim taken from Tversky and Kahneman (1986: S268-S269). The distribution of our responses closely matches that found in Tversky and Kahneman (1986: S269). The majority of our respondents (52.0%) were risk averse in Question 6, preferring to take the certainty of a lower life expectancy on average over the expectation of a longer life expectancy offered in Treatment A. When compared to Tversky and Kahneman’s physician-subjects the percentage of our subjects preferring the certainty of Treatment B is slightly lower, i.e. 65% to 52.0%, however, if we include one half of the “Prefer Neither” responses (8.7%) into the “Prefer Option B” responses, we end up closer, i.e. 65% to 56.4%, to the Tversky and Kahneman numbers.

For our purposes, it is important to note that Questions 7 and 8 are identical in terms of the set of outcomes. Subjects who prefer Treatment A in Question 7 should prefer Treatment A in Question 8. For Question 7, we observe similar responses to Tversky and Kahneman: 68% of Tversky and Kahneman’s subjects, and 61.3% of our respondents, preferred Treatment A. For Question 8 we also find results consistent with those of Tversky and Kahneman. In total, 54.7% (58.7% if one half of the “No Preferences” responses are grouped in with the “Treatment B” responses”) expressed a preference for Option B.²³ Thus, comparing choices across these two questions, at least 16% of our subjects exhibited a preference reversal between Treatments A and B, attributable to the different description of the treatments.

Question 6: “In the treatment of tumors there is sometimes a choice between two types of therapies: (i) a radical treatment such as extensive surgery, which involves some risk of imminent death, (ii) a moderate treatment, such a limited surgery or radiation therapy. Each of the following problems describes the possible outcome of two alternative treatments, for three different cases. In considering each case, suppose the patient is a 40-year-old male. Assume that without treatment death is imminent (within a month) and that only one of the treatments can be applied. Please indicate the treatment you would prefer in each case.”

Treatment A: 20% Chance of imminent death and 80% chance of normal life, with an expected longevity of 30 years.

²³ 68% of Tversky and Kahneman’s respondents expressed this preference.

Treatment B: Certainty of a normal life, with an expected longevity of 18 years.

Responses

Response Number	Response Text	Respondents	% of Total Respondents (1 Missing)
1	Prefer Option A	58	38.67
2	Prefer Option B	78	52.0
3	Prefer Neither	13	8.7

Question 7: “In the treatment of tumors there is sometimes a choice between two types of therapies: (i) a radical treatment such as extensive surgery, which involves some risk of imminent death, (ii) a moderate treatment, such a limited surgery or radiation therapy. Each of the following problems describes the possible outcome of two alternative treatments, for three different cases. In considering each case, suppose the patient is a 40-year-old male. Assume that without treatment death is imminent (within a month) and that only one of the treatments can be applied. Please indicate the treatment you would prefer in each case.”

Treatment A: 80% Chance of imminent death and 20% chance of normal life, with an expected longevity of 30 years.

Treatment B: 75% Chance of imminent death and 25% chance of normal life, with an expected longevity of 18 years.

Responses

Response Number	Response Text	Respondents	% of Total Respondents
1	Prefer Option A	92	61.3
2	Prefer Option B	31	20.7
3	Prefer Neither	27	18.0

Question 8: “Consider a new case where there is a 25% chance that the tumor is treatable and a 75% chance that it is not. If the tumor is not treatable, death is imminent. If the tumor is treatable, the outcomes of the treatment are as follows.”

Treatment A: 20% Chance of imminent death and 80% chance of normal life, with an expected longevity of 30 years.

Treatment B: Certainty of a normal life, with an expected longevity of 18 years.

Responses

Response Number	Response Text	Respondents	% of Total Respondents
1	Prefer Option A	56	37.3
2	Prefer Option B	82	54.7
3	Prefer Neither	12	8.0

Appendix 2: Experiment 2 Materials

Language Shown to All Subjects

You will receive five job offers in this round of the experiment and have a chance to accept or reject each one. One of these five offers will be randomly selected at the end of the round. If you accepted the offer that is selected then you will perform a work task as described below. If you declined the offer that is selected then you will enjoy a period of leisure spent watching entertaining videos. The work and leisure activities each last 6 minutes.

THE EXPERIMENTER WILL KEEP TRACK OF THE TIME AND WILL INSTRUCT YOU ON WHEN TO BEGIN AND WHEN THE ROUND IS OVER. IF YOU ARE IN A WORK TASK, PLEASE STOP WORK BY HITTING THE "OK" BUTTON TO SUBMIT YOUR WORDS AND THEN THE "STOP WORK" BUTTON TO MOVE ON TO THE NEXT ROUND.

Because only one offer will be randomly selected at the end of the round, you should treat each offer individually, as if it were the only offer you will receive.

If you perform the work task you will be presented with a series of ten screens, each of which displays 15 randomly chosen words. You will be asked to place these words in alphabetical order by entering a number beside each word that corresponds to its alphabetical rank. For example, the words: "anger, light, bottle" would be ranked 1, 3, 2, respectively. If you declined the job offer that is randomly selected at the end of this round, you will be able to choose from a number of popular YouTube videos to watch.

There are four rounds in this experiment. At the end of the experiment, one of those rounds will be selected at random and your earnings in that round will be paid to you.

Example Language Shown to Subjects for Baseline, Bonus, Excise Tax, Income Tax, and Tax Credit Conditions

1. Baseline (no tax):
 - A. No Net Wage: If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.12** per word you correctly alphabetize. No tax will be deducted from your total earnings.
 - B. Net Wage Displayed: If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.12** per word you correctly alphabetize. No tax will be deducted from your total earnings. Thus, for each word you correctly alphabetize, you will earn \$ 0.12.
2. Bonus:
 - A. No Net Wage: If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.10** per word you correctly alphabetize. No tax will be deducted from your total earnings. You will receive a bonus for each word you correctly alphabetize. The per word bonus is \$ 0.08.

- B. Net Wage Displayed: If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.10** per word you correctly alphabetize. No tax will be deducted from your total earnings. You will receive a bonus for each word you correctly alphabetize. The per word bonus is \$ 0.08. Thus, after the bonus is applied, for each word you correctly alphabetize, you will earn \$ 0.18.
3. Excise tax:
- A. No Net Wage: If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.30** per word you correctly alphabetize. A tax will be deducted from your total earnings and used to defray costs of the experiment. This tax will be imposed at a per word rate of \$ 0.24.
- B. Net Wage Displayed: If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.30** per word you correctly alphabetize. A tax will be deducted from your total earnings and used to defray costs of the experiment. This tax will be imposed at a per word rate of \$ 0.24. Thus, after taxes, for each word you correctly alphabetize, you will earn \$ 0.06.
4. Income tax:
- A. No Net Wage: If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.30** per word you correctly alphabetize. A tax will be deducted from your total earnings and used to defray costs of the experiment. This tax will be imposed at a rate of 80%.
- B. Net Wage Displayed: If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.30** per word you correctly alphabetize. A tax will be deducted from your total earnings and used to defray costs of the experiment. This tax will be imposed at a rate of 80%. Thus, after taxes, for each word you correctly alphabetize, you will earn \$ 0.06.
5. Tax credit:
- A. No Net Wage: If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.06** per word you correctly alphabetize. You will receive a tax credit based upon your total earnings. This tax credit will be calculated at a rate of 100%.
- B. Net Wage Displayed: If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.06** per word you correctly alphabetize. You will receive a tax credit based upon your total earnings. This tax credit will be calculated at a rate of 100%. Thus, after the tax credit is applied, for each word you correctly alphabetize, you will earn \$ 0.12.

Job Offer

If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.24** per word you correctly alphabetize. No tax will be deducted from your total earnings. Thus, for each word you correctly alphabetize, you will earn **\$ 0.24**. You are guaranteed a minimum payment of **\$5.00** if you choose to work. So, if your net earnings (after subsidy and tax) are less than \$5.00, you will receive \$5.00. If you earn more than \$5, you will keep how much you earned.

If you decline this job offer and choose the leisure activity instead, and this offer is randomly selected at the end of this round, you will be eligible for payment of a flat sum of **\$10.00**. There is no subsidy or tax on your earnings from the leisure task.

Now, please indicate whether you accept or decline this job offer.

ACCEPT JOB OFFER-ELIGIBLE FOR WORK

DECLINE JOB OFFER-ELIGIBLE FOR LEISURE

Bonus Condition Screen

Job Offer

If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.06** per word you correctly alphabetize. No tax will be deducted from your total earnings. You will receive a bonus for each word you correctly alphabetize. The per word bonus is **\$ 0.18**.

You are guaranteed a minimum payment of **\$5.00** if you choose to work. So, if your net earnings (after subsidy and tax) are less than \$5.00, you will receive \$5.00. If you earn more than \$5, you will keep how much you earned.

If you decline this job offer and choose the leisure activity instead, and this offer is randomly selected at the end of this round, you will be eligible for payment of a flat sum of **\$10.00**. There is no subsidy or tax on your earnings from the leisure task.

Now, please indicate whether you accept or decline this job offer.

ACCEPT JOB OFFER ELIGIBLE FOR WORK

DECLINE JOB OFFER ELIGIBLE FOR LEISURE

Excise Tax Condition Screen

Job Offer

If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.30** per word you correctly alphabetize. A tax will be deducted from your total earnings and used to defray costs of the experiment. This tax will be imposed at a per word rate of **\$0.12**. Thus, after taxes, for each word you correctly alphabetize, you will earn **\$0.18**.

You are guaranteed a minimum payment of **\$5.00** if you choose to work. So, if your net earnings (after subsidy and tax) are less than \$5.00, you will receive \$5.00. If you earn more than \$5, you will keep how much you earned.

If you decline this job offer and choose the leisure activity instead, and this offer is randomly selected at the end of this round, you will be eligible for payment of a flat sum of **\$10.00**. There is no subsidy or tax on your earnings from the leisure task.

Now, please indicate whether you accept or decline this job offer.

ACCEPT JOB OFFER-ELIGIBLE FOR WORK

Work Task

DECLINE JOB OFFER-ELIGIBLE FOR LEISURE

Leisure Task

Income Tax Condition Screen

Job Offer

If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.30** per word you correctly alphabetize. A tax will be deducted from your total earnings and used to defray costs of the experiment. This tax will be imposed at a rate of **60%**. Thus, after taxes, for each word you correctly alphabetize, you will earn **\$0.12**.

You are guaranteed a minimum payment of **\$5.00** if you choose to work. So, if your net earnings (after subsidy and tax) are less than \$5.00, you will receive \$5.00. If you earn more than \$5, you will keep how much you earned.

If you decline this job offer and choose the leisure activity instead, and this offer is randomly selected at the end of this round, you will be eligible for payment of a flat sum of **\$10.00**. There is no subsidy or tax on your earnings from the leisure task.

Now, please indicate whether you accept or decline this job offer.

ACCEPT JOB OFFER-ELIGIBLE FOR WORK

Work Task

DECLINE JOB OFFER-ELIGIBLE FOR LEISURE

Leisure Task

Tax Credit Condition Screen

Job Offer

If you accept this job offer, your earnings will depend on how many words you correctly alphabetize. You will earn a wage of **\$0.10** per word you correctly alphabetize. You will receive a tax credit based upon your total earnings. This tax credit will be calculated at a rate of **80%**. You are guaranteed a minimum payment of **\$5.00** if you choose to work. So, if your net earnings (after subsidy and tax) are less than \$5.00, you will receive \$5.00. If you earn more than \$5, you will keep how much you earned.

If you decline this job offer and choose the leisure activity instead, and this offer is randomly selected at the end of this round, you will be eligible for payment of a flat sum of **\$10.00**. There is no subsidy or tax on your earnings from the leisure task.

Now, please indicate whether you accept or decline this job offer.

ACCEPT JOB OFFER-ELIGIBLE FOR WORK

Work Task

DECLINE JOB OFFER-ELIGIBLE FOR LEISURE

Leisure Task

Leisure Task Screen

You have selected the leisure task. This round will last 6 minutes and each of the videos is of a different length, so choose the videos you would like to watch appropriately.

In order to watch the videos, hold down the "alt" button next to the space bar and, while still holding down the "alt" button, tap the "tab" button (next to the letter "Q") once and then release the "alt" key. This will bring you to a screen with a list of popular YouTube videos. Click on the name of a video to watch it.

At the end of this 9 minute round, you will be asked to return to this screen, which you will do by repeating the above instructions. Press and hold the "alt" key, and while holding it down, tap the "tab" key once and then release the "alt" key.

Once you have returned to this screen and the end of the round, please hit the "END SECTION" button and wait.

End Section

Work Task Screen

You have selected the work task of alphabetizing words. To the right of each word on the list below is a box in which you can input a number. You should number the words from 1 to 15 based on their alphabetical order. For example, the words "anger, light, bottle" would be ranked 1, 3, 2 respectively. Once you have finished alphabetizing the words on the screen, press the "OK" button, and you will be given a new screen of words to alphabetize. If at any point you would like to stop alphabetizing words in this period, press the "STOP WORK" button and you will be taken to a screen where you will wait for everyone else to finish the round.

STOP WORK

menacing

teasing

glory

superficial

dentist

unreliable

authorization

quiet

kangaroo

psychologist

closest

faucet

reluctant

inner

yeam

OK