Lifting the Veil: The Benefits of Cost Transparency

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Abstract

Firms do not typically disclose information on their costs to produce a good to consumers. However, we provide evidence of when and why doing so can increase consumers’ purchase interest. Specifically, building on the psychology of disclosure and trust, we posit that cost transparency, insofar as it represents an act of intimate disclosure, fosters trust. In turn, this heightened trust enhances consumers’ willingness to purchase from that firm. This account was supported in four studies, conducted in the field and in the lab. A pre-registered field experiment indicated that diners were 21.1% more likely to buy a bowl of chicken noodle soup when a sign revealing the ingredients of the soup also included the cafeteria’s costs to make the soup (Study 1). Three subsequent lab experiments replicated and extended this basic effect, providing evidence of when and why it occurs (Studies 2-4). Taken together, these studies imply that the proactive revelation of costs can improve a firm’s bottom line.

Keywords: cost transparency, disclosure, trust, field experiment
INTRODUCTION

Cost transparency refers to the disclosure of the costs to produce a good or provide a service. It has been studied in operations and marketing within the context of supplier-firm relationships, whereby the two-way sharing of cost information between these parties facilitates collaboration on cost reduction measures (Lamming et al. 2002; Zhu 2004). We investigate cost transparency within a different context: consumer-firm relationships. Although information on the costs associated with making a good is not typically proactively shared with consumers, we provide evidence of when and why doing so can increase consumers’ purchase interest. Specifically, building on the psychology of disclosure and trust, we posit that cost transparency, insofar as it represents an act of intimate disclosure, fosters trust. In turn, this heightened trust enhances consumers’ willingness to purchase from that firm.

Cost, Operational, and Price Transparency

Cost transparency broadly refers to a firm’s disclosure of the costs that the firm incurs to provide a given product or service. In the present research, we operationalize cost transparency as the practice of revealing the unit costs of production.

Cost transparency is related to, but distinct from two other forms of transparency: operational transparency and price transparency. Operational transparency refers to a firm’s disclosure of its operating processes, not the costs associated with those processes (Buell et al. 2014). Specifically, operational transparency entails disclosure of the “behind-the-scenes” work that the firm is undertaking through its operating processes (Buell and Norton 2011).

Research has shown that consumers prefer service web sites that are operationally transparent relative to those that are not (Buell and Norton 2011). For example, the travel site
Kayak.com is beloved in part because of its operational transparency: the site discloses in real-time which airlines it is searching. Operational transparency increases consumer perceptions of the effort required to create the product (or, in the case of Kayak, to generate the quote), in turn heightening their sense of gratitude and willingness to pay (Buell and Norton 2011; Chinander and Schweitzer 2003; Gershoff et al. 2012; Morales 2005).

Therefore, not only do these two forms of transparency entail disclosure of different information (costs versus operational processes), we posit them to operate via different underlying psychological processes (by engendering trust in the case of cost transparency, and via an appreciation for firm effort in the case of operational transparency). The two are, however, related in the sense that revealing the costs associated with producing a good sometimes necessitates revealing information about operational processes. However, we document that disclosing costs has a distinct and separable effect on customer purchase intentions, over and above the revelation of operating processes.

Cost transparency is also distinct from price transparency. Whereas cost transparency entails disclosing the firm-side costs inherent in a price, price transparency entails disclosing and delineating the firm-side proceeds inherent in a price; for example, by dividing a price into gross retail proceeds, royalties, and taxes (Carter and Curry 2010). Similarly, price partitioning refers to revealing the price of the component parts of a product; for example, by dividing a product’s price into its base price and shipping and handling (Bertini and Wathieu 2008; Morwitz et al. 1998).

Price transparency and price partitioning have both been found to increase purchase intentions, and to do so via a cognitive process (Morwitz et al. 1998). Specifically, by dividing a price into several sub-components, each of which is necessarily smaller than the total price, small
prices are made salient. The result is that these tactics cause consumers to perceive prices to be relatively low, in turn increasing purchase intentions. In sum, cost transparency and price transparency entail disclosure of different information (costs versus proceeds inherent in a price) and we posit them to have different underlying mechanisms (enhanced trust for cost transparency and decreased price perceptions for price transparency). Next, we elucidate the theoretical underpinnings of our proposed process account of the effect of cost transparency on purchasing.

**Disclosure, Trust, and Liking**

A substantial body of work in social psychology and allied fields suggests that disclosure is associated with heightened relationship quality (Laurenceau et al. 1998). Clever experimental studies have shown that this relationship can be causal: inducing people to self-disclose causes others to like them (Aron et al. 1997; Sedikides et al. 1999).

What mechanism drives the capacity for self-disclosure to increase liking? Previous theorizing has invoked trust: self-disclosure has been argued to foster trust, which in turn is thought to be an ingredient that produces liking (Collins and Miller 1994; Wheeless and Grotz 1977). Consistent with this account, self-disclosure is correlated with trust (Awad and Krishnan 2006; Malhotra et al. 2004; Van Slyke et al. 2006). Experimental research goes further, providing causal evidence that abstaining from disclosure (for example, by opting out of answering survey questions) makes a person seem untrustworthy, in turn reducing others’ liking of them (John et al. 2016).

The present research is based on the premise that these relationship benefits of disclosure can manifest even when those disclosures are made by non-human entities; specifically, that they extend beyond person-to-person interactions to consumer-firm interactions. This premise stems
from the theory of social response, which posits that in responding to a stimulus that has human-like characteristics, people reflexively draw upon the same social behaviors as they would in a human-to-human interaction (Nass and Moon 2000; Reeves and Nass 1996). Consistent with this account, when a non-human entity engages in self-disclosure – a prototypically human activity – it can produce benefits similar to those of person-to-person self-disclosure. For example, people like computers that “disclose” information, such as a computer that outputs a system message that it “rarely gets to use its full potential” (Moon, 2000). Thus, we posit that when a firm “self-discloses,” it can enhance its relationships with its customers, just as when people self-disclose.

More comprehensively, we propose that akin to interpersonal disclosure, firm disclosure of cost information fosters consumers’ trust, in turn increasing purchase interest. We suggest that, regardless of whether the discloser is human, for this relationship to emerge – for self-disclosure to foster trust, and in turn, liking – at least two conditions must be met: the information must be sensitive in nature and disclosed voluntarily.

First, we propose that for disclosure to foster liking (via trust), the information divulged must be sensitive. By “sensitive,” in line with previous research on self-disclosure, we mean information that is perceived as risky for the discloser to reveal, in the sense that it makes the discloser vulnerable to experiencing negative consequences (Derlega et al. 1993; Kelly and McKillip 1996; Laurenceau et al. 1998; Moon 2000). For example, when a person discloses information about his emotions and feelings, this content is typically considered sensitive because it makes the discloser vulnerable to negative consequences such as embarrassment (Laurenceau et al. 1998). Analogously, a firm’s disclosure of cost information reveals information about its profit margins, which could make the firm vulnerable to negative consequences, such as consumer ire or supplier price increases. In this vein, one scenario study
found that when a firm disclosed competitors’ prices – even when those prices were relatively low – it instilled trust in consumers and increased stated purchase interest relative to nondisclosure (Trifts and Häubl 2003). Insofar as revealing competitors’ prices constitutes sensitive disclosure, this finding fits with the present perspective.

Consistent with this account, studies documenting that self-disclosure causes liking induce participants not simply to disclose, but to disclose sensitive information in particular (e.g., Aron et al. 1997; Sedikides et al. 1999). Similarly, it appears to be computers’ disclosures of sensitive information that causes human users to like those computers (Moon 2000). Recent research goes further, by directly comparing the effect of disclosing sensitive information versus non-sensitive information on trust: participants expressed greater trust for a business leader who revealed a personal weakness (e.g. “I’m quite shy. I am nervous about public speaking”) relative to when that same leader revealed non-sensitive information (e.g. “I like to climb mountains in Colorado”) (Jiang et al. working paper).

Second, we posit that for disclosure to foster liking (via trust), it must be done voluntarily and proactively, as opposed to forcibly or reactively, by regulation or requirement. Indeed, although people are viewed as untrustworthy, and in turn, disliked, when they opt out of answering questions, this effect is restricted to cases in which that abstention is volitional, as opposed to incidental - for example, when it is the result of a computer glitch (John et al. 2016). Analogously, we propose that cost transparency needs to be voluntarily instated by the firm, as opposed to mandated, for it to enhance trust, and in turn, increase purchase interest. In this vein, firms that voluntarily disclose unsavory information – such as adverse side effects of their products – are seen as more trustworthy than when those disclosures come from a third-party, such as the news media (Fennis and Stroebe 2014).
This prediction, that costs must be voluntarily disclosed by the firm for the posited benefits to be realized, also helps to distinguish our account from one of mere cost salience. Previous work has found that making costs salient by cueing consumers to think about costs can increase purchase interest (Bolton et al. 2003). This work is rooted in the principle of dual entitlement (Kahneman et al. 1986): although consumers believe that firms are entitled to make a profit, they also believe that they are entitled to a reasonable price. Hence, when consumers perceive a firm to be making unreasonably large profits, they are less willing to buy from the “offending” firm because they deem its prices unfair (Bazerman 1985; Kőszegi and Rabin 2006; Gneezy et al. 2014). However, because consumers do not routinely think about firms’ (often considerable) costs, they are prone to overestimating profits, and hence to erroneously conclude the firm to be taking unreasonably large profits. Thus, making consumers more aware of firms’ costs may correct consumers’ false beliefs that profits are unreasonably large, causing consumers to perceive prices as fairer, in turn spurring purchase interest.

Like increasing cost salience, we posit cost transparency to also increase purchase interest. However, we posit it to operate not by disabusing false beliefs about profitability (as in mere cost salience), but rather, via enhanced trust, which, unlike merely making costs salient, requires the firm’s voluntary revelation of such costs. If there is something special about a firm’s voluntary disclosure of costs, above and beyond making prices seem fair, then additional variance in purchase interest should be explained via consumer trust in the firm.

Moreover, there is a situation in which mere cost salience versus cost transparency make different predictions regarding the effect of disclosing costs on purchase interest. Cost salience should foster purchase interest when consumers are prone to thinking firms are taking unreasonably high profits, as when prices are surprisingly high. Since consumers do not typically
think about firms’ costs, when they encounter an unexpectedly high price, they are likely to infer the high price is a reflection of high margins (as opposed to high costs). By this account, when consumers encounter surprisingly low prices, they are less prone to infer unreasonably high profits; as a result, in such cases, revealing reasonable margins (via cost transparency), should have little or no effect on purchase interest. By contrast, if, as we posit, a firm’s voluntary revelation of its costs increases trust, then it should increase purchase interest both when prices are surprisingly high as well as when prices are surprisingly low.

Overview of Predictions and Experiments

We predict that cost transparency can increase sales. Second, we predict that cost transparency is a form of sensitive disclosure and so its positive effect on sales will be mediated by consumers’ trust in the firm. Third, we predict that the beneficial effect of cost transparency will manifest only when the firm’s disclosure of costs is voluntary (as opposed to mandated by law). Finally, we predict that the beneficial effect of cost transparency on purchasing will arise even when prices are surprisingly low (in contrast to a mere cost salience account). We test these predictions across a variety of instantiations of cost transparency and across a variety of brands and product categories, both in the lab and in the field.

We begin with anecdotal field evidence consistent with the basic prediction that cost transparency increases sales. We then report four controlled experiments. Study 1 is a field experiment showing that cost transparency can increase sales. Guided by our theoretical framework, Studies 2-4 shed light on when and why the beneficial effect of cost transparency emerges. Specifically, after a pre-test confirming that cost transparency is indeed perceived as a form of sensitive disclosure, Study 2 shows that its tendency to increase purchase interest is
mediated by firm trustworthiness. Next, Study 3 demonstrates the critical role of the voluntary nature of the disclosure, showing that cost transparency boosts purchase interest only when instated voluntarily by the firm, as opposed to involuntarily (e.g., as required by law). Finally, Study 4 shows that cost transparency increases purchase interest even when prices are unexpectedly low – a result not predicted by a mere cost salience account. Study 4 also provides converging evidence for the trust mechanism underlying the beneficial effect of cost transparency, showing that it explains variance above and beyond perceptions of price fairness.

We report all manipulations and measures. We did not analyze the data until after data collection had been completed for all studies. We set the desired number of participants at the outset of each experiment. No data were excluded unless explicitly indicated.

ANECDOTAL EVIDENCE

On December 2, 2013, a privately-held online retailer launched a holiday gift shop with an email to its mailing list promoting a leather wallet offered in five colors (burgundy, black, grey, bone, and tan), priced at $115.00. On January 28, 2014, in an effort to boost post-holiday sales, the retailer decided to add an infographic to the wallets’ online product detail pages that included, among other information, the costs incurred to produce the wallet (the infographic is included in the Online Appendix). As the wallets differed only in color, the company intended to use the same infographic for every wallet in the line.

But what the company intended to do was not what actually happened. Serendipitously (for us at least), the company inadvertently failed to introduce the infographic for two of the wallet colors (bone and tan). Thus, the infographic was implemented for only three of the five wallet colors (burgundy, black, and grey), a mistake that was overlooked for five weeks, creating
a natural experiment enabling us to test the impact of cost transparency on sales.

We used a difference-in-differences approach to compare the daily sales between the treatment and control groups before versus after the infographic was introduced. By doing so, we isolated the effect of the infographic on the daily count of wallets sold in each category. We analyzed the sales performance of five color combinations over a 92-day period ($N = 460$) starting with the launch of the holiday gift shop on December 2, 2013 and ending on March 6, 2014. We did so by modeling the daily number of units sold per color combination as a function of the time period and treatment classification of the product group. When controlling for color popularity and page view implications of stock-outs, there was a significant interaction between time and treatment: specifically, the post-holiday sales decline was smaller in the treatment condition relative to the control (coefficient = 0.660; $p < 0.05$ two-tailed). The infographic containing cost transparency therefore buffered against the post-holiday sales decline.

Under the most conservative assumption of full substitution – that all of the incremental customers who bought wallets under infographic exposure would have otherwise bought a wallet in the control condition in the absence of such exposure – the best estimate provided by the fully-specified version of this model is that the infographic, which included cost information, increased the percentage of total sales represented by the treated wallets by 15.7% ($p < .01$ two-sided) (See Online Appendix for a detailed write-up of the anecdotal evidence).

Though consistent with our prediction that cost transparency can increase sales, this anecdotal evidence is not definitive. For one, the novelty of the infographic may have directed consumers’ attention to the wallets, and so perhaps it was merely increased salience that spurred sales. Moreover, the infographic, in addition to providing cost information, also featured other information, notably favorable competitive benchmark information – competitors’ markups were
much higher than that of the target firm.

Therefore, as described next, Study 1 was a field experiment that provided a cleaner test of the effect of cost transparency on sales. In addition, in the Online Appendix we report an MTurk version of the anecdotal field study with a more precise manipulation of cost transparency. Specifically, in the MTurk version, participants saw a screenshot of the online retailer’s wallet product view and indicated their interest in buying the wallet. For half of participants, the screenshot also contained the same cost transparency information as in the field study, but without the additional confounding information. We measured willingness to buy the wallet by asking: “Given the opportunity, how likely would you be to purchase this product?” (7-point response scale: 1 = Not at all likely to 7 = Very likely). Consistent with the anecdotal field evidence, willingness to buy was greater in the cost transparency condition relative to the control condition ($M_{\text{cost}} = 2.69, \text{SD} = 1.81; M_{\text{control}} = 2.26, \text{SD} = 1.72; t(322) = 2.20, p = 0.014)$.

**STUDY 1: FIELD EXPERIMENT**

Study 1 was a pre-registered field experiment in which we tested the effect of cost transparency on sales.\(^1\) Relative to the anecdotal evidence presented in the introduction, conducting a field experiment allows for cleaner identification of the effect, while enabling the deliberate design of stimuli that expressly rule out competing explanations.

**Method**

We partnered with the dining services organization of a large university in the Northeastern United States, identifying the costs of producing a 16-ounce bowl of chicken

\(^1\) Pre-registration: https://aspredicted.org/see_one.php?a_id=7937.
noodle soup priced at $4.95, an item that was available for lunchtime purchase in the dining hall on a daily basis. Cost components included: chicken breast ($0.21/bowl), chicken broth ($0.12/bowl), noodles ($0.26/bowl), carrots ($0.07/bowl), celery ($0.16/bowl), parsley ($0.07/bowl), and labor ($3.23/bowl).

Next to the chicken noodle soup, customers saw one of two different signs: control versus cost transparency. Both signs were titled “What goes into a 16 oz. (large) bowl of our Chicken Noodle Soup?” and both listed the chicken noodle soup components described above. However, the cost transparency (i.e., treatment) condition additionally included the cost for each component, as well as the total cost (i.e., the sum of the individual cost components) of $4.12 (Figure 1).

As described in the pre-registration, we ran the field experiment over five consecutive weeks, from January 22 to February 27, 2018, dividing each weekday lunch period into two single-hour shifts, from 11:30-12:30pm and from 12:35-1:35pm. Therefore, excluding holidays, during which the dining hall was closed, our period of analysis included the transactions from 50 hours of lunchtime sales ($N = 9,227$). Every day, we showed both signs, one per shift, and alternated which was shown in each shift. We included a five-minute changeover period between shifts, corresponding with the approximate throughput time of lunchtime customers in the cafeteria. This design feature enabled us to provide a clean link between the experimental manipulation that was on display when each diner was choosing their lunch and the sales that resulted from it.

**Empirical Approach**

We used logistic regression to model the probability that a given customer included a
bowl of chicken noodle soup in their purchase, as a function of the signage condition, the time of day, and the day of week:

\[
Pr(CNS_{it}) = f(\delta_0 + \delta_1 \text{TREATMENT}_{it} + X_i + Z_t + \epsilon_{it})
\]

We conducted this estimation with robust standard errors, clustered by day. Because we had a directional prediction – that cost transparency would increase the probability of chicken noodle soup purchases – we pre-registered and conducted one-tailed tests.

Results

As shown in Table 1, the cost transparency treatment was associated with an increase in the probability that a customer would purchase chicken noodle soup (coefficient = 0.198, \(p < 0.05\) one-tailed). Relative to base rates, cost transparency was associated with a 21.1% increase in the probability that a customer would buy a bowl of chicken noodle soup, with the probability increasing from 2.3% to 2.8% per customer. These results provide converging evidence of the potential for cost transparency to increase sales.

STUDY 2: THE MEDIATING ROLE OF TRUST

Study 1 suggests that cost transparency can increase purchasing. In Study 2, we sought to replicate and extend this result by testing whether it is mediated by consumer trust toward the firm.

Study 2 also included a pilot study testing whether cost transparency is perceived as a type of sensitive disclosure. This is because our conceptual account is predicated on the idea that it is sensitive disclosures in particular that foster trust, and in turn, liking (which we operationalize here as increased purchase interest). Therefore, the pilot study assessed whether
consumers view firms’ disclosure of costs as sensitive relative to other disclosures: operational transparency, price transparency, and competitor pricing.

We predicted that cost transparency would be viewed as more sensitive than both operational transparency and price transparency. We also predicted that disclosure of competitors’ prices would be viewed as more sensitive than operational transparency and price transparency, though not as sensitive as cost transparency – a prediction stemming from research showing that disclosing competitors’ prices increases trust (Trifts and Häubl 2003), which is consistent with our conceptual account.

Pilot Study

Based on how previous research has defined the construct of disclosure sensitivity (Derlega et al. 1993; Kelly and McKillop 1996; Laurenceau et al. 1998; Moon, 2000), participants ($N = 196, M_{age} = 34.3, 52\%$ male), who were recruited on the Amazon Mechanical Turk platform (MTurk), were told: “In this survey, we are interested in your judgments of the sensitivity of information that a company might divulge to consumers. By ‘sensitive’ we mean information that is risky for the company to disclose, in the sense of making it vulnerable to negative consequences arising from that disclosure.”

Subsequently, participants rated the sensitivity of five different types of firm disclosures. Specifically, participants were asked, “How vulnerable, if at all, would a company be making itself if it disclosed to consumers…”: “the price of the products it sells?” (control); “the work it does to produce the products it sells?” (operational transparency); “the taxes included in the price of the products it sells?” (price transparency); “competitors’ prices – i.e., what competitors charge consumers for the same products?” (competitor pricing); “the cost of producing the
products it sells?” (cost transparency) (5-point response scale: 1 = Not at all vulnerable, 2 = Somewhat vulnerable, 3 = Vulnerable, 4 = Very vulnerable, and 5 = Extremely vulnerable). The order of administration was counterbalanced to account for the possibility of order effects.

A repeated measures ANOVA revealed significant differences in perceived vulnerability as a function of disclosure type ($F(5, 780) = 2868.17, p < 0.01$). First, we tested whether cost transparency is perceived as more sensitive relative to the other disclosure types. Indeed it was: cost transparency was perceived as more sensitive relative to every other type of disclosure ($M_{{cost}} = 3.28, SD = 1.11$; vs. $M_{{control}} = 2.11, SD = 1.35$; $t(195) = 10.76, p < 0.01$; vs. $M_{{price\_transparency}} = 2.15, SD = 1.23, t(195) = 10.61, p < 0.01$; vs. $M_{{operational\_transparency}} = 2.59, SD = 1.17; t(195) = 7.02, p < 0.01$; vs. $M_{{competitor\_prices}} = 2.84, SD = 1.97; t(195) = 4.56, p < 0.05$).

Also consistent with our account, although revealing competitor prices was deemed less sensitive than cost transparency, it was seen as more sensitive than all other types of disclosures (vs. control: $t(195) = 6.83, p < 0.01$; vs. price transparency: $t(195) = 7.12, p < 0.01$; vs. operational transparency: $t(195) = 2.38, p < 0.05$). Finally, perhaps reflective of the fact that operational transparency is a form of disclosure, it was perceived as more sensitive than the control (operational vs. control: $t(195) = 4.49, p < 0.01$), though not nearly as sensitive as cost transparency.

Method

Design and Procedure. Participants recruited from MTurk ($N = 612, M_{{age}} = 35.2, 55.1\%$ male) were randomized to one of two conditions varying in cost transparency: no transparency, which served as the control condition, versus cost transparency. In the control condition, participants were shown a graphic depicting the front and back of a chocolate bar package
We worked with a chocolate manufacturer and retailer to develop a package for a fictitious brand called “Cocoa Passion” with realistic cost information. In the control condition, a description of the bar, flavors, ingredients, and nutrition facts were listed on the packaging. In the cost transparency condition, the packaging also provided the following unit cost information on the six cost components (Online Appendix): $0.29 (beans), $0.03 (sugar), $1.39 (cocoa butter), $0.17 (packaging), $0.90 (labor), and $0.11 (utilities). The total cost of these components, $2.89, was also featured.

Dependent Measures. We first measured trust by asking: “How trustworthy would you consider the firm?” (7-point response scale: 1 = Not at all trustworthy to 7 = Very trustworthy (John et al. 2016)). On the subsequent screen, we measured willingness to buy by asking: “Given the opportunity, how likely would you be to purchase this product?” (7-point response scale: 1 = Not at all likely to 7 = Very likely).

This and all subsequent experiments included demographics (age, gender, education, income). The effects are substantively equivalent when these variables are taken into account, and hence, we do not discuss them further.

Results

Willingness to Buy. Cost transparency increased willingness to buy relative to the control condition ($M_{cost} = 4.27, SD = 2.00; M_{control} = 3.74, SD = 2.04; t(610) = 3.26, p < 0.01)$.

Trust in Firm. Trust was greater in the cost transparency condition relative to the control condition ($M_{cost} = 5.27, SD = 1.38; M_{control} = 4.82, SD = 1.38; t(610) = 4.02, p < 0.01$).

Mediation Analysis. Cost transparency predicted both trust ($\beta = 0.45, p < 0.01$) and willingness to buy ($\beta = 0.53, p < 0.01$). When trust and cost transparency were both included in
the model predicting willingness to buy, trust remained significant ($\beta = 0.80, p < 0.01$), but cost transparency was reduced to non-significance ($\beta = 0.17, p = 0.21$) providing support for mediation. We used a bootstrap procedure to construct bias-corrected confidence intervals for the indirect effect based on 5,000 resamples (Preacher and Hayes 2008). The 95% bias-corrected confidence interval excluded zero (0.18, 0.55), suggesting a significant mediation effect.

In sum, consistent with Study 1, Study 2 indicated that cost transparency increased purchase interest, and that this effect was mediated by consumers’ trust in the firm.

**STUDY 3: VOLUNTARY DISCLOSURE**

Taken together, Studies 1 and 2 provide evidence that cost transparency, insofar as it represents a form of sensitive disclosure, can increase purchase interest, and that it does so via consumer perceptions of firm trustworthiness. Stemming from this account, Study 3 tested the prediction that disclosure needs to be voluntary for cost transparency to increase purchase interest. To test this implication, we showed participants a simulated retail website page for a firm selling a t-shirt. We assessed participants’ propensity to purchase a shirt from a firm as a function of whether and why it had disclosed its costs.

Specifically, in the required condition, the firm disclosed its costs because regulation required it. In the voluntary disclosure condition, the firm voluntarily disclosed its costs. In the control condition, no cost information was provided. Relative to the control condition, we predicted cost transparency to increase purchase interest only when instated voluntarily, and not when instated involuntarily.

Study 3 also tested whether a benefit of (voluntary) cost transparency can be observed using a simpler operationalization of cost transparency. Specifically, in the preceding
experiments, we operationalized cost transparency by providing the costs associated with each component of producing the good, as well as the total cost (i.e., the sum of the individual cost components). In Study 3, we tested whether merely disclosing the total costs to create the good – absent disclosure of the individual components and their associated costs – can be sufficient to increase purchase interest.

Method

Design and Procedure. Participants recruited from MTurk ($N = 454$, $M_{age} = 37.0$, 46% male) first indicated their gender and were then shown a simulated retail product page for a $15 t-shirt (worn by a model of their same gender).

Between-subjects we varied whether and why the retailer had disclosed its costs. In the involuntary transparency condition, an infographic (Online Appendix) indicated that the total cost of manufacturing the shirt was $6.70. Additional text stated that “Due to regulations in the country in which this brand is based, this t-shirt company is forced to disclose its costs to customers. If regulation didn’t require it, this company would choose to NOT disclose its costs to its customers.” The voluntary transparency condition included the same cost transparent infographic but provided a different rationale: “Due to the desire to be transparent to its customers, this t-shirt company voluntarily discloses its costs to its customers.” The control condition had no cost transparency information (See Online Appendix for stimuli).

Dependent Measure. We measured willingness to buy by asking: “Given the opportunity, how likely would you be to purchase this shirt from this t-shirt company?” (7-point response scale: 1 = Not at all likely to 7 = Very likely). After the dependent measure, this and the subsequent experiment included comprehension checks assessing whether participants correctly
identified the condition-specific information they had seen. We always report the results using the full sample – i.e., regardless of whether participants passed the comprehension check – however, all reported results hold when restricting the dataset to those who passed the comprehension checks.

Results

**Willingness to Buy.** A one-way ANOVA revealed significant differences in willingness to buy as a function of the transparency manipulation ($F(2, 453) = 3.95, p < 0.05$). Follow-up pairwise comparisons indicated that as predicted, willingness to buy was significantly higher in the voluntary transparency condition relative to both the control condition ($M_{voluntary} = 4.38, SD = 1.75; M_{control} = 3.92, SD = 1.88; t(298) = 2.22, p < 0.05$) and the involuntary transparency condition ($M_{involuntary} = 3.86, SD = 1.77; t(309) = 2.63, p < 0.01$). Willingness to buy was equivalent in the control and involuntary transparency conditions ($t(295) = 0.28, p = 0.78$).

In sum, Study 3 suggests that for cost transparency to increase purchase interest, it must be done voluntarily.

**STUDY 4: COST TRANSPARENCY VERSUS MERE COST SALIENCE**

In Study 4, we tested the specificity of our account of cost transparency and trust, namely that it explains variance not accounted for by perceptions of price fairness. Specifically, we measured perceived price fairness (the mediator implied by a cost salience account), and trust in the firm (our hypothesized mediator). We predicted that the positive effect of cost transparency on purchase interest will be mediated by trust, and that this mediation will hold controlling for perceived price fairness.
In addition, Study 4 exploited a circumstance in which these accounts make different predictions of the effect of cost transparency on purchase interest. When consumers encounter surprisingly low prices, they are unlikely to expect the firm to be making an unreasonably high profit. As a result, if the observed effects are simply a product of making costs salient, then revealing reasonable margins should have little or no effect on purchase interest when prices are lower than expectations. By contrast, we predicted that a firm’s voluntary revelation of its costs increases trust, and that this should subsequently increase purchase interest both when prices are surprisingly high as well as when prices are surprisingly low.

In Study 4, participants estimated the price of a travel package. Next, its actual price was revealed, which we manipulated to be either higher or lower than the participant’s estimate. Participants were subsequently shown a screenshot from the tour operator’s website, which included the content of the initial description. For half of the participants, the screenshot also included transparency into the tour operator’s costs of providing each part of the described experience. Hence, the study had a 2(Price: Higher than estimate vs. lower than estimate) x 2(Cost transparency: transparency vs. no transparency) between-subjects design.

**Pilot Study**

To establish tour package prices that were higher and lower than participant expectations, we conducted a pre-test (N = 626, Mage = 37.7, 52.5% male) with participants recruited from the Amazon Mechanical Turk platform. These participants read the description of a travel package for a guided six-night trip to Washington, D.C. consisting of: admissions and guided tours for a list of popular sites and attractions, 6 nights of accommodations, select breakfasts, lunches, and dinners, bottled water on excursions, welcome and farewell receptions, and gratuities.
Participants estimated the total price of the tour. The average estimate was $1,306.25 (SD = $1,438.05), with a 25th percentile estimate of $750.00 and a 75th percentile estimate of $1,600.00.

Method

Design and Procedure. We created a simulated online tour website called “D.C. Tours,” which featured a description of the six-night travel package described above. Based on the distribution of participant price estimates in the pre-test, the D.C. Tours website priced the tour at either $750.00 or $1,600.00, and either provided a description of the tour package or a description of the tour package with cost transparency.

The tour package was described and a new set of participants recruited from MTurk (N = 1,202, Mage = 34.6, 47.1% male) estimated its price (M = $1,349.73, SD = $1,044.33). Those whose estimates were between $750.00 and $1,600.00 (N = 513, Mage = 37.5, 45.2% male) were randomly assigned to one of the four experimental conditions. Those whose estimates were not within this range (N = 689, Mage = 34.8, 48.6% male) were excluded from further participation; they were directed to a demographics page.

Price Manipulation. Participants retained in the study were reminded of their estimate, and based on random assignment, were either told that the actual price of the travel package was $750.00 (lower than their estimate) or $1,600.00 (higher than their estimate).

Cost Transparency Manipulation. Participants were shown a screenshot from the “D.C. Tours” website. Those randomly assigned to the control condition were told: “on its website, shown below, the tour operator lists each component of the tour. That is, prospective clients can see each component of the tour.” The screenshot featured a photo of the U.S. Capitol building, reiterated the price, as assigned above, and the features included in the travel package (See
Online Appendix).

The other half of participants, randomly assigned to the cost transparency condition, was told: “on its website, shown below, the tour operator voluntarily posts their costs of providing each component of the tour. That is, prospective clients can see how much each component costs the tour operator. Below, you can see how much it costs the tour operator to provide each component, in red beside each component.” Participants in this condition saw a website that was identical to those in the control condition, except for the addition of costs for each component, and the total cost. Costs were scaled identically as a percentage of tour price in both price conditions, such that total costs were equal to 80% of the quoted price, and the company in both cases earned a gross profit margin of 20% (See Online Appendix).

Dependent Measures. On the following screens, participants were asked in randomized order: “How likely would you be to buy this tour?” (Willingness to buy: 1 = Not at all likely to 7 = Very likely); “How trustworthy is this tour operator?” (Trust: 1 = Not at all trustworthy to 7 = Very trustworthy); and “How fair is the price of the tour?” (Price fairness: 1 = Not at all fair to 7 = Very fair (Bolton et al. 2003)). The order of administration was counterbalanced to account for the possibility of order effects.

Results

Willingness to Buy. A 2(Price: Higher than estimated vs. Lower than estimated) x 2(Cost transparency: Transparency vs. No transparency) ANOVA on willingness to buy revealed, not surprisingly, a main effect of price: willingness to buy was higher when prices were lower than expected relative to when they were higher than expected ($F(1,509) = 74.76, p < 0.01$). More importantly, there was a main effect of cost transparency ($F(1, 509) = 11.67, p < 0.01$):
willingness to buy was higher in the presence of cost transparency. The interaction was not significant \((F(1, 509) = 0.33, p = 0.57)\), indicating that cost transparency increased willingness to buy both when prices were higher than participant estimates \((M_{\text{cost}} = 3.72, SD = 2.00; M_{\text{control}} = 3.06, SD = 1.80; t(253) = 2.79, p < 0.01)\) and lower than participant estimates \((M_{\text{cost}} = 5.06, SD = 1.83; M_{\text{control}} = 4.59, SD = 1.90; t(256) = 2.03, p = 0.04)\) (Figure 2). This latter result – that cost transparency increased willingness to buy even when prices were surprisingly low – is noteworthy because it is inconsistent with a dual entitlement explanation, whereas it is consistent with our account of cost transparency.

(Insert Figure 2 about here)

**Trust.** A 2(Price: Higher than estimated vs. Lower than estimated) x 2(Cost transparency: Transparency vs. No transparency) ANOVA on trust revealed a main effect of price: trust was higher when prices were lower than expected relative to when they were higher than expected \((F(1,509) = 15.95, p < 0.01)\). More importantly, there was a main effect of cost transparency \((F(1, 509) = 19.82, p < 0.01)\), such that trust was higher in the presence of cost transparency. The interaction was not significant \((F(1, 509) = 0.57, p = 0.45)\), indicating that cost transparency increased trust both when prices were low \((M_{\text{cost}} = 5.64, SD = 1.13; M_{\text{control}} = 5.17, SD = 1.08; t(256) = 3.44, p < 0.01)\) as well as when prices were high \((M_{\text{cost}} = 5.21, SD = 1.35; M_{\text{control}} = 4.90, SD = 1.23; t(253) = 1.84, p = 0.05)\).

**Price Fairness.** A 2(Price: Higher than estimated vs. Lower than estimated) x 2(Cost transparency: Transparency vs. No transparency) ANOVA on price fairness revealed a main effect of price: prices were perceived as fairer when they were lower than expected relative to when they were higher than expected \((F(1,509) = 137.33, p < 0.01)\). There was also a main effect of cost transparency \((F(1, 509) = 8.27, p < 0.01)\). Importantly, the interaction was significant
Cost transparency did not increase price fairness relative to the control condition when prices were lower than expected ($M_{cost} = 6.19$, $SD = 1.13$; $M_{control} = 6.22$, $SD = 0.97$; $t(256) = 0.24$, $p = 0.81$). Cost transparency only increased price fairness when prices were higher than expected ($M_{cost} = 5.23$, $SD = 1.44$; $M_{control} = 4.56$, $SD = 1.47$; $t(253) = 3.70$, $p < 0.01$). In other words, consistent with the dual entitlement account, the positive effect of cost transparency on price fairness was contingent on price.

**Mediation Analysis.** Cost transparency predicted trust in the firm ($\beta = 0.39$, $p < 0.01$), price fairness perceptions ($\beta = 0.32$, $p = 0.01$) and willingness to buy ($\beta = 0.57$, $p < 0.01$). First, we tested whether trust mediated the effect of cost transparency on willingness to buy even when controlling for price fairness perceptions. We used a bootstrap procedure to construct bias-corrected confidence intervals for the indirect effect based on 5,000 resamples, with transparency as the independent variable, trust as the mediator, price fairness as a covariate, and willingness to buy as the dependent variable (Preacher and Hayes 2008). The 95% bias-corrected confidence interval excluded zero (0.03, 0.18). Thus, trust explains variance in the relationship between cost transparency and increased purchase interest beyond that accounted for by price fairness alone.

**Moderated Mediation Analysis.** As an additional test of our conceptual model, we also conducted a moderated mediation analysis, with cost transparency as the independent variable, trust and price fairness as the two mediators, and willingness to buy as the dependent variable. Consistent with our account, tour price moderated the effect of cost transparency on trust and price fairness. A 5,000-sample bootstrap analysis revealed that the 95% bias-corrected confidence interval of the indirect effect via trust excluded the zero for both participants who saw the low price (0.07, 0.32), and for those who saw the high price (0.01, 0.27). The test of the equality of both indirect effects was not significant as the 95% bias-corrected confidence interval
included zero (-0.22, 0.10), indicating that the indirect effect was not attenuated by the cost transparency manipulation. For price fairness, the indirect effect excluded the zero only for participants who saw the high price point (0.20, 0.71), but not for those who saw the low price point (-0.19, 0.15). The test of the equality was significant as the 95% bias-corrected confidence interval excluded zero (0.17, 0.78), indicating that the indirect effect via price fairness was attenuated by cost transparency.

In sum, consistent with a cost salience account, Study 4 shows that price fairness is partly responsible for the effect of cost transparency on purchase interest, specifically when prices are higher than expected. Importantly however, it does not fully explain the effect of cost transparency on purchase interest. Consistent with our theoretical account, additional variance is explained by firm trustworthiness. The benefit of cost transparency also persists when prices are surprisingly low. Therefore, Study 4 provides evidence that cost transparency’s ability to boost sales does not lay merely in the increased focus it draws to firms’ costs, but by means of the trust it engenders.

GENERAL DISCUSSION

We began with anecdotal field evidence consistent with the basic prediction that cost transparency increases sales. We then reported four controlled experiments. Study 1 was a pre-registered field experiment showing that cost transparency can increase sales. Three subsequent lab experiments (Studies 2-4) shed light on when and why the beneficial effect of cost transparency emerges. Specifically, after a pre-test confirming that cost transparency is indeed perceived as a form of sensitive disclosure, Study 2 showed that its tendency to increase purchase interest is mediated by firm trustworthiness. Next, Study 3 showed that for cost
transparency to boost purchase interest, it needs to be instated voluntarily by the firm, as opposed to involuntarily. Finally, Study 4 showed that cost transparency increases purchase interest even when prices are unexpectedly low – a result not predicted by a mere cost salience account. Study 4 also provided converging evidence for the trust mechanism underlying the beneficial effect of cost transparency, showing that it explains variance above and beyond perceptions of price fairness.

Attesting to the robustness of the beneficial effect of cost transparency on purchase interest, it emerged under different instantiations of cost transparency; for example, when only total costs were revealed, as well as when they were further broken down into their constituent costs. We also demonstrated the effect relative to different baselines; for example, relative to no transparency (Studies 2 and 3) and also relative to the disclosure of inputs, as in our field experiment. Further, we demonstrated the effect across a variety of different brands and product and service categories, including wallets, chicken noodle soup, chocolate, travel packages, and t-shirts.

Limitations

From a practical standpoint, there are several caveats a firm would need to consider before deciding to reveal its costs. For one, firms may not want to disclose costs if cost structure is a competitive advantage. Moreover, a firm’s suppliers may not allow the firm to make public the costs associated with certain components. Thus, there could be strategic risks or contractual barriers to disclosure.

Even if firms have the desire to disclose costs, it may be infeasible for them to do so. The present research focuses on a set of contexts where unit costs can be readily calculated and
explained. However, disclosing the unit costs associated with the production of a single good might be infeasible for companies that are not vertically integrated. And, for goods and services that are dependent on high fixed costs (e.g., research and development, overhead, constant labor costs), imputing unit costs may be complicated or even confusing to consumers. For example, imputing research and development costs on a per unit basis in a pharmaceutical context may require many assumptions, and potentially customer education on how the sales of successful pharmaceuticals subsidize the production costs of less popular products and the costs of early-stage trials (and failures).

**Opportunities for Future Research**

Central to our account is the notion that cost transparency is a form of sensitive disclosure. Therefore, future research might investigate factors that modulate whether cost transparency is perceived as a sensitive disclosure, and in turn, its effectiveness. For example, different types of costs may be perceived as differentially sensitive, and in turn, may have different effects on purchasing. In addition, stemming from the comparative nature of human judgment (Fox and Tversky 1995, Hsee et al. 1999, Ariely et al. 2003), perceived sensitivity may be affected by whether other firms disclose – or do not disclose. Indeed, prior research suggests that a given disclosure is perceived as more revelatory if others abstain from making the same disclosure (Acquisti et al. 2012). Thus, it is plausible that when other firms disclose costs, consumers may be less likely to perceive cost transparency as a sensitive disclosure. Thus, future research could explore competitive dynamics, and whether perceived sensitivity is dampened when other firms disclose – or do not disclose – sensitive cost information. In the same vein, future research could
explore what would happen if consumers evaluated two or more products sold by the same firm, with varying levels of transparency.

More broadly, to the extent that our research highlights the potential benefits of making a firm’s sensitive information – such as its costs and profit margins – transparent to customers, future research could investigate how the transparency of other types of sensitive information affects trust and performance. Like costs and profits, there are many categories of information that are privately held by companies and are traditionally considered taboo when communicating with customers. For example, disclosing confidential information regarding internal algorithms may fly in the face of conventional wisdom and practice. One might even envision situations in which price and operational transparency may be seen as particularly sensitive, such as when they are the basis of competitive advantage, or when consumers question the performance of the operation.

Future research might also explore situations in which cost transparency might backfire. For example, prior literature suggests that trustworthiness is related to the credibility of the source, particularly in the context of online retailers communicating with consumers (Trifts and Häubl 2003). Thus, it is plausible that if consumers perceive the disclosed costs as unrealistic, incomplete, or otherwise misleading, it could activate feelings of suspicion or persuasion knowledge, decreasing purchasing.

Future research might also explore additional, complementary mechanisms of the beneficial effect of cost transparency on purchasing. For example, in addition to trust, the literature hints that firm disclosures can increase purchase interest via increased perceptions of firm competence (Trifts and Häubl 2003). Such an explanation is consistent with research on environmental disclosures: when companies voluntarily reveal their emissions, customers
perceive that the company must be performing well relative to industry competitors. As a result, the firm’s market share increases, regardless of the firm’s actual relative performance (Kalkanci and Plambeck 2016).

Conclusion

In closing, we note that although firms typically treat their costs as tightly-guarded secrets, the present research points to a potential upside of revealing them. Just as when people reveal sensitive information, when firms do so, it can engender trust and deepen the relationships among companies and consumers. We welcome further research into these dynamics, which may open the door to improved outcomes for consumers and firms alike.
REFERENCES


Kahneman D, Knetsch JL, and Thaler R (1986) Fairness as a constraint on profit seeking:


Malhotra NK, Kim SS, and Agarwal J (2004) Internet users' information privacy concerns (IUIPC):


### Table 1: Field experiment (Study 1). Probability of a diner purchasing chicken noodle soup, attributable to the treatment condition, modelled by logistic regression. Model additionally includes time fixed effects. *\( p < 0.10 \), **\( p < 0.05 \), ***\( p < 0.01 \), one-tailed. Robust standard errors, clustered by day, are shown in parentheses. As reported in the exposition, an examination of the marginal effects revealed that relative to base rates, cost transparency was associated with a 21.1% increase in the probability that a customer would buy a bowl of chicken noodle soup, with the per-customer probability increasing from 2.3% (in the control condition) to 2.8% (in the transparency treatment condition).

<table>
<thead>
<tr>
<th></th>
<th>Purchased Chicken Noodle Soup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparency</td>
<td>0.198**</td>
</tr>
<tr>
<td></td>
<td>(0.115)</td>
</tr>
<tr>
<td>Monday indicator</td>
<td>0.307</td>
</tr>
<tr>
<td></td>
<td>(0.312)</td>
</tr>
<tr>
<td>Tuesday indicator</td>
<td>0.355</td>
</tr>
<tr>
<td></td>
<td>(0.349)</td>
</tr>
<tr>
<td>Wednesday indicator</td>
<td>0.376</td>
</tr>
<tr>
<td></td>
<td>(0.362)</td>
</tr>
<tr>
<td>Thursday indicator</td>
<td>0.241</td>
</tr>
<tr>
<td></td>
<td>(0.347)</td>
</tr>
<tr>
<td>Constant</td>
<td>-4.423***</td>
</tr>
<tr>
<td></td>
<td>(1.038)</td>
</tr>
<tr>
<td>Observations</td>
<td>9,227</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.036</td>
</tr>
</tbody>
</table>
Control sign

Cost transparency sign (treatment condition)

Figure 1: Stimuli used in Study 1 – i.e., the signs that were placed adjacent to the chicken noodle soup in the control versus treatment conditions.
Figure 2: The positive effect of cost transparency on purchase interest held across prices, as did the positive effect on trust. The positive effect on price fairness perceptions only held when price was higher than expectations (Study 4).
On December 2, 2013, a privately-held online retailer launched a holiday gift shop with a single email to its mailing list, promoting a leather wallet offered in five colors (burgundy, black, grey, bone, and tan) and priced at $115.00. At the end of January, in an effort to boost post-holiday sales, the retailer decided to add a cost transparency infographic to the online product detail pages of each of the wallet’s five color combinations. As the wallets differed only in color, the company intended to use the same infographic for every wallet in the line.

But what the company intended to do was not what actually happened. Serendipitously (for us at least), the company inadvertently failed to introduce the infographic for two of the wallet colors (bone and tan). Thus, the infographic was implemented for only three of the five wallet colors (burgundy, black, and grey), a mistake that was overlooked for five weeks, creating a natural experiment enabling us to test the impact of cost transparency on sales.

Procedure

Operationalization of Cost Transparency. Along with the total cost to produce the wallet, the infographic broke the total cost into its components, delineating the specific costs associated with the given materials and processes required to produce and import the wallet: leather ($14.68), construction ($38.56), duties ($4.26) and transportation ($1.00). The infographic also included additional benchmark information stating that the wallet had a 1.9x markup, compared to the 6x markup charged by a competitor (Appendix Figure 1).

Empirical Approach. The inadvertent provision of cost information for some, but not all, of the wallet colors served as an exogenous shock that created sets of comparable treatment (cost transparent) and control (nontransparent) products (i.e., wallets). This treatment provides a conservative test of cost transparency since customers browsing multiple wallet colors may have been exposed to the infographic and (correctly) inferred that the same cost information applied to all colors. While the benefits of the infographic likely accrued to both groups, our identification comes from the fact that every customer who browsed wallets in the treatment group was exposed to the infographic, while customers who browsed wallets in the control group may not have been exposed.

We used a difference-in-differences approach to compare the daily sales between the treatment and control groups before versus after the infographic was introduced. By doing so, we isolated the effect of cost transparency on the daily count of wallets sold in each category. We analyzed the sales performance of five color combinations over a 92-day period (N = 460) starting with the launch of the site on December 2, 2013 and ending on March 6, 2014. The infographic was introduced on January 28, 2014.

We estimated the following linear fixed effect specification, using a Newey West estimator for standard errors that accounts for autocorrelation and heteroskedasticity within colors with a small number of products (Newey and West 1987; Schaffer 2010):

2 We did not use clustered standard errors because clustering requires a large number of clusters – far more than the five product colors we have in our dataset – to approach the true variance of the error term. Using a Newey West estimator enabled us to leverage our fairly long panel of sales data on each wallet color to generate a consistent estimator that accounts for the autocorrelation and heteroskedasticity within each wallet.
In the specification above, $\text{COUNT}_{c,t}$ represents the count of wallets sold for color $c$ on day $t$. $\text{POST}_{t}$ is a dummy variable denoting observations after the introduction of the infographic. Although the cost transparency treatment is subsumed by the color fixed effect (i.e., burgundy, black, and gray color fixed effects perfectly identify the wallets that received the cost transparency treatment), $\beta_{c, \text{POST}_{t} \times \text{TREATMENT}_{c}}$ is a dummy variable that specifically highlights observations in the cost transparency treatment conditions after the introduction of the infographic and is the focal independent variable of our analysis.

Because cost transparency was implemented by wallet color, and there were only five colors, we also controlled for possible confounders: a proxy for time-varying color popularity – the number of views each wallet color’s page received; and a proxy for time-varying inventory levels – for a given color on a particular day, the complete absence of both page views and sales. Controlling for these variables was important because they could be independently correlated with both the treatment and outcome.

In the case of popularity, more popular colors (which are viewed by customers more frequently) could happen to have received the treatment. Popularity would also be logically correlated with sales (popular items sell better). Hence, the model includes variables representing the number of views each wallet color’s page received ($\text{VIEWS}_{c,t}$) as well as the square of this number ($\text{VIEWS}^2_{c,t}$), to accommodate a non-linear relationship between page views and online sales (sales rise in page views at a diminishing rate). By controlling for daily page views, we account for time-varying differences in the item’s popularity; for example, if a particular wallet’s color made it an especially attractive Christmas gift.

Similarly, we also included inventory proxies as covariates to control for the effect of stock-outs. Stock-outs are negatively correlated with sales, because a company cannot sell items it does not have in inventory, and stock-outs are also plausibly correlated with the treatment, since some colors are likely to be more popular than others, and may therefore be more prone to stock-outs. Although the company did not keep historical records of its inventory position over time, two sets of variables proxy for the effects of stock-outs. The first reflects the page view implication of stock-outs, capturing the complete lack of page views on any given day ($\text{NOVIEWS}_{c,t}$), as well as on the preceding day ($\text{NOVIEWS}_{c,t-1}$). When the product was out of stock on the company’s website, a “SOLD OUT” message blacked out the product on search results pages, reducing the likelihood that a customer would view the page. The second proxy variable reflects the sales implication of stock-outs, capturing the complete absence of sales on the preceding day ($\text{NOSALE}_{c,t-1}$).

By controlling directly for each item’s time-varying popularity, as well as proxies for the retailer’s daily inventory position on each item, our focal coefficients distinctly reveal the effect of cost transparency on the probability of converting a browser to a buyer, holding constant these time-varying factors.
Appendix Figure 2: Anecdotal Field Evidence. Average daily unit sales by treatment versus control, collapsed across days (Panel A). Dashed vertical line indicates the date the cost transparency infographic was added. Average daily unit sales by treatment versus control (Panel B). Sales figures withheld to protect confidential company information.
Results and Discussion

Appendix Figure 2 above depicts the average daily unit sales as a function of the treatment over the period of analysis (units are withheld to protect confidential company data). Overall, sales declined over the period, reflecting diminished demand in the post-holiday season. More importantly however, there was an interaction between time and treatment: specifically, the post-holiday sales decline was smaller in the treatment condition relative to the control condition. Cost transparency therefore helped sales by serving as a buffer against the post-holiday sales decline.

<table>
<thead>
<tr>
<th></th>
<th>(1) Daily Unit Sales</th>
<th>(2) Daily Unit Sales</th>
<th>(3) Daily Unit Sales</th>
<th>(4) Daily Unit Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post</td>
<td>-0.945***</td>
<td>-0.921***</td>
<td>-0.959***</td>
<td>-0.850***</td>
</tr>
<tr>
<td></td>
<td>(0.273)</td>
<td>(0.258)</td>
<td>(0.257)</td>
<td>(0.238)</td>
</tr>
<tr>
<td>Post × Treatment</td>
<td>0.523</td>
<td>0.579*</td>
<td>0.660**</td>
<td>0.582*</td>
</tr>
<tr>
<td></td>
<td>(0.331)</td>
<td>(0.330)</td>
<td>(0.328)</td>
<td>(0.311)</td>
</tr>
<tr>
<td>Views</td>
<td>0.0591*</td>
<td>0.0488</td>
<td>0.0451</td>
<td>0.0451</td>
</tr>
<tr>
<td></td>
<td>(0.0312)</td>
<td>(0.0316)</td>
<td>(0.0316)</td>
<td>(0.0302)</td>
</tr>
<tr>
<td>Views²</td>
<td>-0.0002*</td>
<td>-0.0002</td>
<td>-0.0002</td>
<td>-0.0002</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0001)</td>
<td>(0.0001)</td>
<td>(0.0001)</td>
</tr>
<tr>
<td>No views</td>
<td></td>
<td>-0.321**</td>
<td>-0.300**</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.153)</td>
<td>(0.152)</td>
<td></td>
</tr>
<tr>
<td>Lagged no views</td>
<td></td>
<td>-0.158</td>
<td>-0.113</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.180)</td>
<td>(0.183)</td>
<td></td>
</tr>
<tr>
<td>Lagged no sale</td>
<td></td>
<td></td>
<td>-0.460***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.142)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>460</td>
<td>460</td>
<td>460</td>
<td>460</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.044</td>
<td>0.050</td>
<td>0.052</td>
<td>0.067</td>
</tr>
</tbody>
</table>

Appendix Table 1: Field Evidence. Units sold on a daily basis, by transparency condition. Treatment variable subsumed by fixed effects estimation. Fixed effects coefficients withheld to protect confidential company information. *p<0.10, **p<0.05, ***p<0.01, two-tailed. Robust Newey West standard errors, accounting for autocorrelation and heteroskedasticity within colors, shown in parentheses.
In Appendix Table 1, Column (1) presents the base specification in which the daily number of units sold per color combination is modeled as a function of the time period and treatment classification of the product group. Once confounds are controlled, the treatment effect of cost transparency emerges as significant. Specifically, the positive treatment effect is demonstrated in Column (2) when controlling for color popularity (coefficient = 0.579; \( p < 0.10 \) two-tailed); in Column (3) when further controlling for the page view implications of stock-outs (coefficient = 0.660; \( p < 0.05 \) two-tailed); and in Column (4) when further controlling for the sales implications of stock-outs (coefficient = 0.579; \( p < 0.10 \) two-tailed).

Under the most conservative assumption of full substitution – that all of the incremental customers who bought wallets in the treatment condition would have otherwise bought a wallet in the control condition in the absence of the treatment – we calculate that the cost transparency infographic increased daily unit sales on a per-color basis by 22.0% relative to average sales across the period of observation. As a robustness test of the significance of the effect, we perform an additional analysis, which is described below.

**Robustness Check**

To account for the substitution patterns among wallets in the treatment and control categories, we create an additional set of specifications that capture the daily percentage of all wallets sold that correspond with the treatment category, \( TSALES_{PCT} \). Importantly, we note that the ratio of wallets sold in the treatment and control conditions was time-invariant prior to the introduction of cost transparency.

To facilitate our analysis, we also created an aggregated set of control variables consistent with those described above, which reflect total page views and total page views squared in each category, \( TVIEWS_t, TVIEWS^2_t, CVIEWS_t, \) and \( CVIEWS^2_t \), the percentage of colors in each category with no visits, \( TNOVIEWSt \) and \( CNOVIEWSt \), the one-day lagged percentage of colors in each category with no visits, \( TNOVIEWSt-1 \) and \( CNOVIEWSt-1 \), and the one-day lagged percentage of colors in each category with no sales, \( TNOSALEt-1 \) and \( CNOSALEt-1 \). We estimate the following linear specification with robust standard errors:

\[
TSALES_{PCT} = f \left( \gamma_0 + \gamma_1 POST_t + \gamma_2 TVIEWS_t + \gamma_3 TVIEWS^2_t + \gamma_4 CVIEWS_t + \gamma_5 CVIEWS^2_t + \gamma_6 TNOVIEWSt + \gamma_7 CNOVIEWSt + \gamma_8 TNOVIEWSt-1 + \gamma_9 CNOVIEWSt-1 + \gamma_{10} TNOSALEt-1 + \gamma_{11} CNOSALEt-1 + \epsilon_t \right)
\]

---

3 Given that sales in the control and treatment conditions are not completely independent, customers may substitute a purchase of one wallet color for another. Hence, the magnitude of the effects calculated through conventional difference-in-difference calculations would be overstated if any substitution occurs. The conservative estimate of a 22.0% increase in sales assumes 100% substitution. If on the other hand, every incremental customer who purchased a wallet in the treatment condition would have not purchased a wallet in the absence of the treatment (i.e., 0% substitution), then cost transparency increased sales by 44.0%. Therefore, under both conservative and liberal assumptions about substitution, the cost transparency treatment had a significant positive effect on sales.
<table>
<thead>
<tr>
<th></th>
<th>(1) Treatment Sales %</th>
<th>(2) Treatment Sales %</th>
<th>(3) Treatment Sales %</th>
<th>(4) Treatment Sales %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post</td>
<td>0.126***</td>
<td>0.117**</td>
<td>0.138***</td>
<td>0.157***</td>
</tr>
<tr>
<td></td>
<td>(0.047)</td>
<td>(0.048)</td>
<td>(0.051)</td>
<td>(0.052)</td>
</tr>
<tr>
<td>Treatment: Visits</td>
<td>0.002</td>
<td>0.004</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.008)</td>
<td>(0.008)</td>
<td></td>
</tr>
<tr>
<td>Treatment: Visits(^2)</td>
<td>-0.000</td>
<td>-0.000</td>
<td>-0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td></td>
</tr>
<tr>
<td>Control: Visits</td>
<td>-0.008**</td>
<td>-0.005</td>
<td>-0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>Control: Visits(^2)</td>
<td>0.000*</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td></td>
</tr>
<tr>
<td>Treatment: No visits %</td>
<td></td>
<td>0.131</td>
<td>0.181</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.130)</td>
<td>(0.131)</td>
<td></td>
</tr>
<tr>
<td>Control: No visits %</td>
<td></td>
<td>0.140</td>
<td>0.128</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.095)</td>
<td>(0.093)</td>
<td></td>
</tr>
<tr>
<td>Treatment: Lagged no visits %</td>
<td>-0.070</td>
<td>-0.021</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.116)</td>
<td>(0.116)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control: Lagged no visits %</td>
<td>0.142</td>
<td>0.149</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.095)</td>
<td>(0.096)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment: Lagged no sales %</td>
<td>-0.169</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.105)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control: Lagged no sales %</td>
<td>-0.077</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.068)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.662***</td>
<td>0.713***</td>
<td>0.608***</td>
<td>0.681***</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.058)</td>
<td>(0.085)</td>
<td>(0.090)</td>
</tr>
<tr>
<td>Observations</td>
<td>92</td>
<td>92</td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.063</td>
<td>0.114</td>
<td>0.134</td>
<td>0.165</td>
</tr>
</tbody>
</table>

Appendix Table 2: Daily percentage of wallet sales attributable to the treatment condition (as a percentage of all wallets sold). Robust standard errors shown in parentheses.
The results of this supplemental analysis are shown in Appendix Table 2. In all columns, the variable of interest is the coefficient on $POST_t$, which indicates the change in the percentage of sales coming from colors in the treatment category after the introduction of cost transparency. In Column (1) the base specification reveals that the percentage of wallets sold in the treatment category, relative to the sales of all wallets, rises 12.6% following the introduction of cost transparency (coefficient = 0.126; $p < 0.01$ two-tailed).

Columns (2-4) reveal that this significant increase in sales percentage is robust to the inclusion of controls for the number of times products in the treatment and control conditions were visited during the day, the percentage of colors in each category that received no visits on the focal or preceding day, and the percentage of colors in each category that resulted in no sales on the previous day. The best estimate provided by the fully-specified version of this model (Column 4), is that cost transparency increased the percentage of total sales represented by the treated wallets by 15.7% ($p<0.01$ two-sided).
Appendix Figure 1: Stimuli from firm described in anecdotal evidence. Portions of this graphic have been recreated from the original, both to protect the identity of the retailer, and to improve the legibility of the text.
ONLINE MTURK EXPERIMENT: REPLICATION OF ANECDOTAL EVIDENCE

The anecdotal evidence, a natural experiment involving a real online retailer, provides preliminary evidence of cost transparency’s capacity to boost sales. Cost transparency was applied to some, but not all wallets, which provided a natural experiment opportunity to exploit. However, the information presented for the treatment versus control wallets differed in additional ways beyond our conceptual definition of cost transparency: the treatment wallets also included competitive benchmarks. This study addresses this imprecision in an online experiment using the same interface as the anecdotal evidence but modified to distill the critical ingredients of cost transparency which we posit to be causally responsible for boosting purchase interest.

Method

Design and Procedure. Participants ($N = 322$, $M_{age} = 36.8$, 51% male) completed this experiment on Amazon’s Mechanical Turk (Mturk) in exchange for a small fixed payment. Participants were randomly assigned to one of two experimental conditions: no transparency, which served as our control condition, or cost transparency (Appendix Figure 3). In the control condition, participants saw a screen shot of the nontransparent wallets from the anecdotal evidence. In the cost transparency condition, the product page also included nearly identical cost information as the field study: materials ($11.00$), hardware ($3.60$), labor ($38.56$), duties ($4.21$) and transportation ($1.00$). Notably, unlike the anecdotal evidence, the infographic did not include the sum of the costs or competitive benchmark information and is therefore a purer representation of cost transparency.

Dependent Measures. Participants indicated their willingness to buy the wallet by responding to the item: “Given the opportunity, how likely would you be to purchase this product?” (7-point response scale; 1 = Not at all likely to 7 = Very likely).

Results

Willingness to buy. Consistent with the anecdotal evidence, willingness to buy was greater in the cost transparency condition relative to the control condition ($M_{cost} = 2.69$, $SD = 1.81$; $M_{control} = 2.26$, $SD = 1.72$; $t(322) = 2.20$, $p = .014$).
Appendix Figure 3: Chocolate package designs presented as stimuli. All participants saw the same ‘front’ packaging (A), and either control (B) or cost transparency (C) ‘back’ packaging (Study 2).
Appendix Figure 4: Example of the simulated t-shirt website when total cost was disclosed (screens were matched to the gender of the participant) (Study 3).
A. $750 (lower than estimated) price, no cost transparency

B. $750 (lower than estimated) price, with cost transparency

C. $1,600 (higher than estimated) price, no cost transparency

D. $1,600 (higher than estimated) price, with cost transparency

Appendix Figure 5: Simulated tour website accompanied by disclosure of costs (Study 4).