Optimal Defaults in Consumer Markets

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Abstract

The design of default rules in consumer contracts involves an aspect that does not normally arise in other contexts. Unlike commercial parties, consumers have only limited information about the content of the default rule and how it fits with their preference. Default rules deal with technical aspects that consumers rarely experience and over which their preferences are defined only crudely. This paper develops a model in which consumers are uninformed about their preferences, but can acquire such information and then choose a contract term that best matches their preferences. The paper explores the optimal design of default rules in such environments, and how it differs from the existing economic theory of default rules.

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Introduction

The design of default rules for contracts is one of the most important and thoroughly studied areas in the economics analysis of contract law. The fundamental insight on which the vast literature in this area rests is the saving of transactions costs. Properly designed default rules save the parties the cost of drafting their own terms or, worse, of opting out of poorly designed, unwanted default arrangements. We argue in this article that this transactions-cost framework has been poorly applied to the area of consumer contracts, and we offer a way to enrich and adapt it to the optimal design of default rules for business-to-consumer (B2C) transactions.

The scenario motivating this transactions-costs account is one of a negotiated agreement, in which parties bargain over the terms, reach an understanding, and then proceed to memorialize the contract. Having to write down not only the expressly agreed-upon terms but also a massive list of contingent terms governing issues such as warranties, remedies, excuses, performance, and dispute resolution would unduly raise the cost of contracting. For these parties, default rules that mimic what they would have chosen eliminate unnecessary drafting costs and make more exchanges possible.

But this scenario fits poorly the reality of consumer contract formation. There, a long “boilerplate” contract is produced to govern the transaction anyway, and attaching to it an additional term is costless. Therefore, the provision of off-the-rack default rules does not reduce drafting costs. Indeed, commentators often lament that the legally provided default rules are too easily “deleted” by drafters of standard form consumer contracts, who simply override the default rules by providing their own pre-drafted comprehensive terms.1 Some have even proposed to make such drafting artificially costly, to reduce its incidence. It seems, then, that the savings of drafting costs does not provide much traction as guidance for design default rules for consumer contracts.

In fact, the mismatch between existing theories of default rules and the reality of consumer contracts is even more profound. The mimic-the-parties’-will principle of default rule design assumes that otherwise, if default rules fail to match a party’s preferences, opt out would occur (or at least be sought by that party). This prediction stems from the very standard assumption that people know their preferences with respect to issues governed by the default rules, and that they know whether any specific default rule is consistent with these preferences. Both assumptions are highly unrealistic in the consumer transaction context, and relaxing them affects how default rules ought to be designed. This is what we plan to demonstrate in this article.

Why are these assumptions invalid? First, people might not know their preferences regarding the issues governed by default rules. These issues are often technical, complex, and numerous. Unlike features that have to do with the product’s performance (e.g., memory capacity of a laptop), those that deal with legal rights remain largely obscure because they are invoked so rarely that consumers gain little or no experience in dealing with them. For example, many consumers may not know if they prefer that sellers have a

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1 Radin, *Boilerplate*; Kim, *Wrap Contracts*. 

right to cure nonconforming tender, or—to take a more prominent example—whether they prefer to resolve any future dispute in arbitration or in litigation, because they rarely if ever faced this question.

Moreover, people might not know their preferences regarding the issues governed by default rules because of the quality/price trade off. If you asked a consumer, she might intuitively respond that she prefers to be governed by pro-consumer terms, like one that gives a broader warranty or more generous remedies. But is the consumer willing to pay the price of such higher quality? To know whether a pro-consumer default rule is desirable the consumer would need to calculate the expected value of this arrangement and the higher price that would be charged for it. Both are computations that require information people rarely have, especially given the multitude of such concurrent issues governed by consumer contracts, and the occasional incentive of firms to lure consumers to pay for features they don’t really need.2

Second, even if they succeed in figuring out what their preferences are with respect to some issue, people need to compare these preferences to the actual language of the default rule. But default rules are notoriously complex and require much knowledge to interpret. What does it mean when the default rule says, for example, that buyers are entitled to “consequential damages” in the event of breach? Or that buyers are entitled to goods that are “merchantable”? Few consumers, if any, have enough savvy in the rules and practice of sales law to know whether the default rule, as processed by legal precedent, matches their preferences.

This environment of imperfect information fits well the problem of contracting over privacy. True, privacy deals with personal information that people care about, and indeed consumers report in surveys a preference for more privacy protection and for less personal data collection by businesses.3 The salience of reports about incidents of data security breach surely fuels such sentiments. But the strength of this preference is debatable; there is not much evidence that consumers back their intuitive statements with any significant willingness to pay for anonymity or for greater protection.4 Moreover, even if consumers knew their preferences and their willingness to pay to promote them, they rarely know the default rules governing data collection. In what circumstances must firms obtain consumers’ consent to collect personal information, and may not do so otherwise?5 Absent such knowledge, consumers cannot know if contractual silence over this issue serves their preferences.

In these environments of imperfect information, how should default rules be designed? To answer this question, the article develops a contracting model in which consumers are initially uninformed about their preferences and how the default rule serves them. The main ingredient this model offers beyond the standard account of contractual design is the decision by consumers whether to invest time and money to figure out their

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2 Footnote citing evidence regarding purchase of extended store warranties
3 Footnote citing surveys on people’s preference for privacy
4 Footnote citing studies measure the value of privacy
5 Footnote on the uncertainty we have regarding the default rule.
preferences. Consumers can spend some cost and acquire information necessary to know if they prefer high or low quality terms. Do they want to pay for more privacy protection? For an extended warranty? Does the value of such “high quality” terms justify the higher price that would be charged for their inclusion in the contract?

Consumers may decide to remain uninformed. Since there are numerous areas covered by default rules, surely consumers cannot become informed about all, and in these cases the information that they have is only a rough estimate of their preferences. We consider what happens when consumers form rational expectations about “average preferences,” an expectation reflecting the true ex ante distribution of preferences among all consumers of this product. Later, we also consider the possibility of systematic bias in the formation of such estimates over average preferences. Either way, consumers have to decide whether to opt out of the default rule, and will do so if they conclude that it is ill-matched with their uninformed estimate of their preferences. We call this “uninformed opt out.”

Consumers may also decide, in some cases, to invest in information acquisition and become informed about their own preferences. Once acquired, such information will lead them to opt out if they conclude that the default rule is ill-matched with their now-known actual preferences. We call this “informed opt out.” Because informed opt-out is better tuned to serve a consumer’s preferences than uninformed opt-out, there is a value to acquiring information, and so some consumers—those for whom the cost of information is low enough—will become informed.

We take into account one additional cost—the cost of opting out. Both informed and uninformed opt out require consumers to make a costly affirmative contracting move. In commercial contexts, it is common to think of the cost of opt out as the cost of writing a new term. In consumer markets, contracts are not redrafted per consumer, but an opt out may nevertheless occur by searching for a firm that offers the desired pre-drafted terms. The cost of such opt out might be incurred in reading different firms’ contracts and identifying the one that offers desirable terms. Or, a single seller may offer a menu of pre-drafted contracts; and, again, consumers must read the contracts and identify the one with desirable terms. In some markets, and for some terms, the seller may offer a simple opt-out option—for instance, “click here if you want to disable “cookies””; in this instance opt-out costs are very low.

Each possible default rule has these effects—of inducing some consumers to become informed and a subset of those to opt out, as well as generating some uninformed opt out—but different default rules create different incentives for information acquisition and for subsequent opt out. Each default rule creates a different set of consumers that are matched with their preferences, and imposes different transactions costs of information acquisition and of opt out.

This framework allows us to see a new tradeoff in the design of the optimal default rule. It might be thought that the default rule should simply satisfy the “opt-out cost minimization principle.” Under this principle, the law ought to provide a default rule that induces opt out by fewer people. The intuitive appeal of this principle might seem
straightforward: more consumers would be matched with the “correct” default rule and thus fewer will have to incur the cost of opting out. In our model, it might even seem that the intuitive appeal of the opt-out cost minimization principle would be bolstered, because knowing that the default rule is likely to “get it right” and to require no opt out, fewer consumers would find it necessary to spend the additional cost of acquiring information about their preferences.

But this intuitive conjecture that opt-out cost minimization is the sole governing principle is not valid. Our model allows us to identify a competing intuitive consideration – “expected value maximization.” This principle tells us which default rule is superior, assuming no opt out. It is different than the opt-out cost minimization rule because it also takes into account the match between a sticky default rule and preferences. That some consumers do not opt out does not mean that the rule is optimal, because while not incurring opt-out costs they still incur a mismatch cost. And vice versa: a rule that satisfies expected value maximization may be optimal for an environment in which no opt-out ever occurs (e.g., when the legal rule is mandatory), but it does not take into account the cost of contracting around it—here, both the cost of acquiring information and of opting out.

The optimal default choice, then, depends on the relative weight of opt-out cost minimization versus expected-value-maximization. The model will help us draw out some of the subtlety involved in this tradeoff. Some of the main lessons are the following.

First, if the cost of acquiring information about preferences is large enough that it does not happen often, the type of opt out that is likelier to occur is uninformed opt out—reversing the default if it is thought to be poorly matched with average preferences. In this case the expected value maximization criterion is the dominant one for selecting the default rule. It gets things right on average and minimizes such uninformed opt out.

Second, if the cost of acquiring information about preferences is low enough that many consumers incur it and become informed, the type of opt out that is likelier to occur is informed opt out—reversing the default if it is poorly matched with the actual preferences. In this case, the opt-out cost minimization criterion is the dominant one for selecting the default rule.

Third, the choice of default rule also affects the value of becoming informed about preferences, and a default rule for which the value of information is higher is more desirable because it leads to more informed and thus more efficient opt-out. Our model draws out the factors that affect the value of becoming informed. For example, we see two effects crossing. The first corresponds to the expected value maximization principle, operating “in reverse.” It is a counter-majoritarian effect (that can also be thought of as an information-eliciting effect): the value of information under each default rule increases the more consumers have (uninformed) preferences that don’t match it. The second effect corresponds to the opt-out cost minimization principle: When the expected opt-out costs are higher, the value of becoming informed diminishes, because information is less likely
to lead to opt out. Notice that these two effects often pull in opposite directions. A counter majoritarian mismatch may perform well under the expected value maximization principles (because it increases the value of becoming informed), but it may perform poorly according to the criterion of opt-out cost minimization, because it requires more frequent opt outs.

Some of the important insights of prior literature on the optimal design of default rules can be viewed as specific cases within our framework. For example, when consumers know their type in advance (as assumed in the standard model), there are two cases: (1) Opt-out costs are sufficiently low that mismatched consumers opt out. In this case, opt-out cost minimization is the sole guiding principle, and majoritarian defaults are desirable. (2) High opt-out costs create sticky defaults such that mismatched consumers do not opt out. In this case, the default rule is equivalent to a mandatory rule, and the expected value maximization principle solely determines the optimal default. Since it is possible that a minority of consumers suffer greatly from a mismatch (while the majority suffer only mildly), counter-majoritarian defaults may be optimal.\(^6\)

When consumers do not know their type in advance (as in our model), a new dimension is added to the tradeoff between opt-out cost minimization and expected value maximization. Moreover, the very notion of a majoritarian (and counter-majoritarian) default needs to be reconsidered. Specifically, among consumers who choose to remain uninformed there is no majority or minority; they are all the same behind the veil of their ignorance.

The framework also allows us to explore additional factors. In particular, while our basic model assumes that consumers are perfectly rational, an extension explores the implications of consumer misperception. Consumers’ decisions whether to become informed may be distorted by misperceptions. For example, consumers might overestimate the likelihood that they value a high-quality default, because they notoriously overlook the price effect. Consumers might also underestimate the likelihood that they value a high-quality default, say, greater privacy protection, because they do not fully understand the potential uses and misuses of their private information. We show how such misperceptions distort consumers’ decisions to acquire information and thus reduce social welfare.

Our paper is structured as follows. Section 1 presents our basic insights through a numerical example. We then turn to the formal model. Section 2 presents our framework of analysis. In Section 3, we derive market outcomes under different default rules and calculate welfare implications. Section 4 compares the two default rules and identifies the factors that determine which default is optimal. In Section 5, we consider two extensions. First, while Sections 3 and 4 focus on scenarios where only informed opt-out occurs, Section 5.1 adds the prospect of uninformed opt-out. Second, Section 5.2 explores the implications of consumer misperception.

1. Informal Analysis

Consider a market with two types of consumers. Some, labeled H, assign high value to privacy protections, and others, labeled L, assign low value. For simplicity, assume that there are only two possible levels of protection, High and Low. Assume that the value of High protection is $100 for H consumers and and $0 for L consumers. The cost to sellers of providing High protection is $30 and the cost of providing Low protection is 0. Assume also that H consumers constitute 40% of the market, and Ls the remaining 60%.

A contract stipulates two things: the level of protection and the price. The level of protection is initially determined by a legally supplied default. We consider two possible default rules, “L Default” and “H Default.” This level can be changed by contract. Consumers can individually opt out and agree with the firm on a different level of protection, at a different price. We assume that sellers are operating in a competitive market, such that price exactly equals to cost. Accordingly, sellers charge a price of $100 for High protection and zero for Low protection. As explained in the introduction, in consumer contracts opt outs and price adjustments are not individually negotiated and drafted, but the market can sustain an environment in which consumers may choose to shift from the default level of protection into a different one by adding features from a menu of choices or by dealing with another firm. We assume, initially, that the transaction cost to opt-out and to adjust the price is $15.

Our analysis differs from prior work on the following key assumption: Consumers do not know their individual preferences—whether they are H consumers or L consumers—unless they spend some upfront cost to figure this out. Otherwise, they only know the distribution of types—namely, that for each of them there is a 40% chance that High protection adds $100 worth of value. To determine whether consumers would want to incur this upfront information cost, we need to calculate the value of information—how much better off consumers would be if they knew their types and could opt out of the default rules if (and only if) it is poorly matched with their actual preferences. We perform this calculation for each of the two default rules.

Under L Default uninformed consumers do not opt out. Even though the expected value of opting out and securing High protection is positive—the expected benefit is $40 (40% of $100) and the price increase is only $30, for a net gain of $10—the transaction cost of $15 exceeds this net gain. Informed consumers behave differently: those who discover that they are H consumers, and gain $100 from High protection, opt out and enjoy a payoff increase of $55 ($100 protection value, minus $30 price increase, minus $15 opt-out cost); and those who discover that they are L consumers stick with the default rule’s Low protection and get a payoff of $0. Thus, consumers expect a 40% chance of increasing their ex-post payoff from $0 to $55. The value of information is $22 (40% × $55).

Under H Default, uninformed consumers also do not opt out. The expected net payoff from sticking with High protection is $10 (40% of $100 minus the $30 price), and there is no reason to spend the transaction cost of $15 and shift to Low protection that would
yield an expected payoff of $0. But here too informed consumers behave differently: those who discover that they are L consumers opt out and enjoy a net payoff increase of $15 (they no longer have to pay the price of $30 for the protection that they do not value, but they do incur an opt out cost of $15); and those who discover that they are H consumers stick with the default rule’s High protection. Thus, consumers expect a 60% chance of increasing their payoff by $15. The value of information is $9 (60% × $15).

Two insights are worth noting. First, when the default rules are sticky, it is best to choose the one that maximizes the expect value. Here, under both default rules uninformed consumers stick with the default because of the relatively high opt out costs. Since there is no opt out by anyone, H Default is more efficient than L Default, because it provides a higher expected value: consumers get $10 (40% × $100 – $30) with H Default and $0 with L Default.

Second, and more interestingly, we see that the value of information in this example is $22 under L Default and only $9 under H Default. The value of information is higher under L Default for two reasons: (1) The informed opt-out that would occur under L Default is more valuable than the informed opt out that would occur under H Default, because the 40% of consumers who would shift from L to H would gain $70 whereas the 60% of consumers who would shift from H to L would gain only $30. This is a difference in expected value of $10 (40% × $70 – 60% × $30 = $10). (2) Informed opt out is less frequent under L Default, imposing the transaction cost of $15 only 40% of the time, as compared to 60% under H Default. This is a difference in value of $3.

Therefore, H Default is more efficient if no opt out occurs. But if opt out may occur L Default can become more efficient, because the value of information is higher under L Default and thus the rule provides more incentive to acquire information and to opt out. Let’s examine, then, how the comparison between the two rules depends on the cost of information.

Case 1: Information is very costly, no consumer acquires the information

Assume, for example, that the cost of acquiring information about preferences is $25 for each consumer, greater than the value of information under either L Default or H Default. In this case, the potential advantage of L Default—namely, inducing more information acquisition and more valuable informed opt out—vanishes. Without information acquisition, and given our assumption of high transactions costs, the default rules are completely sticky. H Default is superior, generating an expected value of $10, compared to $0 under L Default. In this case, the only criterion in choosing the efficient default rule is expected value maximization. It is equivalent to choosing the efficient mandatory rule.

Case 2: Information is very cheap, all consumers acquire the information

Assume, instead, that the cost of acquiring information about preferences is $5 for each consumer, lower than the value of information under either L Default or H Default. In this case, all consumers acquire the information, and opt out if they find that the default
The rule does not match their actual preferences. L Default is superior, generating an expected value of $22, compared to $19 under H Default. Here, both rules lead to ex post efficient levels of protection to all consumers and to the same expenditure on acquisition of information, so the only difference between them is in the opt out cost that they impose. Therefore, the only criterion in choosing the efficient default rule is \textit{opt-out cost minimization}, and L Default is superior because it imposes this cost on 40% of consumers, rather than 60% under H Default.

Case 3: Information costs vary, only some consumers acquire the information

Assume now that information costs vary across consumers. Some consumers can figure out their preferences cheaply and others more expensively. Specifically, assume that the cost of information is either $8 or $16, with equal likelihood, regardless of whether the consumer is an H type or an L type. That is, among each group of consumers, H consumers and L consumers, half of the group can become informed at a cost of $8 and the other half at a cost of $16.

Under L Default, all consumers acquire the information. Even if the cost is $16, it is still less than the value of information, which we saw equals $22. The expected total welfare is:

\[
40\% \times (100 - 30 - 15) - (50\% \times 8 + 50\% \times 16) = $10
\]

It equals the expected payoff from perfectly tailored ex post protection, minus the cost of opt out for H consumers (who all opt out because they all become informed), minus the average cost of information.

Under H Default, only consumers with information cost of $8 acquire the information. Those with information cost of $16 will not become informed, because the value of information under this rule, we saw, is only $9. The expected total welfare under H Default is:

\[
50\% \times [40\% \times (100 - 30) + 60\% \times (-15) - 8] + 50\% \times [40\% \times 100 - 30] = $10.5
\]

Half of consumers acquire information at a cost of $8, and among them 60% learn that they are L consumers and opt out, at a cost of $15. The other half remain uninformed and stick with the default High protection.

In this case, the total welfare is higher under H Default, even though the value of information under H Default is lower and fewer consumers acquire information, and even though L Default gets more consumers matched with their privately optimal level of protection. The reason H Default does better here is that it reduces transactions costs. First, H consumers get their preferred outcome with less wasteful acquisition of information. Second, there is less incidence of costly opt out under H Default, because

\[
\text{Under L Default, expected welfare is } 40\% \times (100 - 30 - 15) = $22; \text{ under H Default, expected value is } 40\% \times (100 - 30) + 60\% \times (-15) = $19
\]
only half of the L types become informed and opt out. These two advantages – saving information costs and opt out costs – more than offset the downside of H Default, which leaves half of L consumers with an inefficient level of protection.

**Effect of lower information costs**

We just saw that H Default is superior, in part because it requires less wasteful acquisition of information. What happens when information costs are lower?

Assume, as before, that information costs vary across consumers, and that some people can still spend only $8 to become informed. But now assume that for those who have to spend the higher cost of information, the cost is not $16 but rather $12.

The expected welfare under H Default does not change, because consumers with high information costs remain uninformed, as before (the value of information to them is still only $9), and so the decline in the high-cost of information does not affect them. Expected welfare remains $10.5.

The expected welfare under L Default changes – it goes up. This is because consumers do spend the high cost of information, but now they only have to spend $12, not $16. Now expected welfare under this rule is:

$$40\% \times (100 - 30 - 15) - (50\% \times 8 + 50\% \times 12) = \$12$$

Total welfare is now higher under L Default. Here is why the comparison reversed: Like before, L Default continues to lead to better ex post levels of protection (all consumers get their preferred levels), and like before it continues to impose higher transactions costs—more opt out costs and more information acquisition costs. But now these higher costs are less burdensome given the assumption of lower information costs for half of the population.

**Effect of Lower Opt-Out Costs**

Similarly, we can show how the ranking of the default rules changes when opt out costs change. Return to the case in which information cost is {8, 16}. In this case, H Default generated higher welfare, under our initial assumption that opt out costs are $15. Now assume that opt out costs are $5.

Welfare under L Default rises to:

$$40\% \times (100 - 30 - 5) - (50\% \times 8 + 50\% \times 16) = \$14$$

(Note that, with the lower opt-out cost, uninformed opt-out becomes a viable option. But, in this example, informed opt-out is more attractive, even for consumers with high information costs. These consumers enjoy a payoff of $40\% \times (100 - 30 - 5) - 16 = \$10$, if
they become informed; whereas they would get \(40\% \times 100 - 30 - 5 = 5\), if they opt-out without becoming informed.)

Welfare under H Default also rises, from $10.5 to:

\[
50\% \times [40\% \times (100 - 30) + 60\% \times (-5) - 8] + 50\% \times [40\% \times 100 - 30] = 13.5
\]

Welfare increased under both rules when opt out costs went down, but the increase was larger under L Default because this rule led to more opt out (due solely to the fact that the value of information is higher under this rule).

2. Framework of Analysis

A certain product includes a binary quality dimension \(q \in \{L, H\}\). For example, \(q = L\) could represent a low level of privacy protection and \(q = H\) could represent a high level of privacy protection.

We normalize the cost, to the seller, of providing a product with \(q = L\) to zero, and denote by \(c\) the cost, to the seller, of providing a product with \(q = H\). We assume that the seller is operating in a competitive market and just covers her cost of doing business. Accordingly, the seller sets two prices – a price of zero for low quality and a price \(c\) for high quality.

We normalize the value, to consumers, of a product with \(q = L\) to zero. The benefit from high quality, \(q = H\), varies among consumers. For a share \(\alpha \in [0,1]\) of consumers, the benefit from high quality is \(V\); the remaining consumers (i.e., for a share \(1 - \alpha\) of consumers) get no benefit from high quality. We assume that \(V > c\).

Initially, consumers do not know if whether they are high types who benefit from high quality or low types who do not benefit from high quality. Consumers can invest \(x\) and learn their type. The investment \(x\) that is required to learn one’s type varies among consumers. Specifically, the distribution of \(x\) across consumers is characterized by the cumulative distribution function \(F(\cdot)\). There is a threshold \(\hat{x}\) (derived below), such that consumers with \(x < \hat{x}\) invest and learn their type, while consumers with \(x \geq \hat{x}\) remain uninformed about their type.

Of the \(F(\hat{x})\) consumers who learn their type, \(\alpha F(\hat{x})\) learn that they benefit from high quality and \((1 - \alpha)F(\hat{x})\) learn that they do not benefit from high quality. A share \(1 - F(\hat{x})\) of consumers remain uninformed about their type and believe that with a probability \(\alpha\) they benefit from high quality and with probability \(1 - \alpha\) they do not benefit from high quality. This group of uninformed consumers can be further divided into the \(\alpha(1 - F(\hat{x}))\) consumers who benefit from high quality and the \((1 - \alpha)(1 - F(\hat{x}))\) consumers who do not benefit from high quality.
To summarize: There are four groups of consumers – Group 1, with a measure of $\alpha F(\hat{x})$ who know that they benefit from high quality; Group 2 with measure $(1 - \alpha)F(\hat{x})$ who know that they do not benefit from high quality; Group 3 with measure $\alpha(1 - F(\hat{x}))$ who benefit from high quality but are uninformed about their type; and Group 4 with measure $(1 - \alpha)(1 - F(\hat{x}))$ who do not benefit from high quality but are uninformed about their type. We assume that the seller does not know the consumer’s type. Specifically, the seller does not know if the consumer belongs to Group 1, Group 2, Group 3 or Group 4.

We consider two possible default rules: L Default, where the seller offers $q = L$ as the default; and H Default, where the seller offers $q = H$ as the default. Consumers can opt out of either default at a cost $k$ (born by the consumer). Specifically, consumers can opt out from L Default to $q = H$; and consumers can opt out from H Default to $q = L$.

When consumers know their type in advance (as in the standard model), there are two cases: (1) Opt-out costs are sufficiently low that mismatched consumers opt out, specifically $k < c$ ensures opt out from H Default to L Default and $k < V - c$ ensures opt out from L Default to H Default. In this case, opt-out cost minimization is the sole guiding principle: When $\alpha < \frac{1}{2}$, L Default is optimal, and when $\alpha > \frac{1}{2}$ H Default is optimal. (2) High opt-out costs create sticky defaults such that mismatched consumers do not opt out. In this case, the default rule is equivalent to a mandatory rule, and the expected value maximization principle solely determines the optimal default: When $\alpha(V - c) < 0$, L Default is optimal, and when $\alpha(V - c) > 0$, H Default is optimal.

When consumers do not know their type in advance, things are more complicated. We study these complications in the following sections. At this stage, we only note that: (1) The concern for opt-out cost minimization is mediated by the decision to become informed. Informed opt-out resembles the opt-out in the standard model, but it occurs only when consumers choose to become informed. And uninformed opt-out is completely absent from the standard model. (2) The expected value maximization principle guides the choice of the optimal default not only when informed consumers stick to the default, but also when consumers choose to remain uninformed.

3. Outcomes and Welfare with Different Default Rules

We assume that opt-out costs are sufficiently low to permit opt-out by informed consumers. Specifically, consumers who invest $x$ and learn that they benefit from high quality (Group 1) would opt out of L Default, namely, $k < V - c$. And, consumers who invest $x$ and learn that they do not benefit from high quality (Group 2) would opt out of H Default, namely, $k < c$. Taken together, we assume $k < \min(c, V - c)$.

3.1 L Default

We assume that informed consumers opt out of L Default if they benefit from high quality. What about uninformed consumers? These consumers would not opt out of L
Default when $\alpha V < c$. However, when $\alpha V > c$, uninformed consumers would opt out of L Default if $k < \alpha V - c$. Assume initially that $k > \alpha V - c$ (when $\alpha V > c$), such that only informed consumers opt out. The alternative assumption is studied in Section 5.1.

To characterize consumer behavior and calculate the social welfare level, we begin by identifying the value of information, namely, the expected benefit from becoming informed. The uninformed consumer will choose low quality and enjoy an expected (net) benefit of zero. The informed consumer enjoys an expected (net) benefit of $\alpha(V - c - k)$. The value of information is $I_L = \alpha(V - c - k)$. (Note that the value of information is increasing in $\alpha$.) Therefore, consumers with $x < I_L$ invest $x$ and learn their type, whereas consumers with $x \geq I_L$ remain uninformed. Social welfare is given by:

$$W^L = \int_0^{I_L} (I_L - x)f(x)dx$$

Define a general function $W(I) \equiv \int_0^I (I - x)f(x)dx$ and notice that $W(0) = 0$ and that $W(I)$ is increasing in $I$: $W'(I) = \int_0^I f(x)dx = F(I) > 0$. We can write: $W^L = W(I_L)$.

3.2 H Default

We assume that informed consumers opt out of H Default if they do not benefit from high quality. What about uninformed consumers? These consumers would not opt out of H Default when $\alpha V > c$. However, when $\alpha V < c$, uninformed consumers would opt out of H Default if $k < c - \alpha V$. Assume initially that $k > c - \alpha V$ (when $\alpha V < c$), such that only informed consumers opt out. The alternative assumption is studied in Section 5.1.

We first calculate the value of information. The uninformed consumer sticks to the default and gets $\alpha V - c$ (which can be either positive or negative). The informed consumer enjoys an expected (net) benefit of $\alpha(V - c) - (1 - \alpha)k$. The value of information is $I^H = [\alpha(V - c) - (1 - \alpha)k] - [\alpha V - c] = (1 - \alpha)(c - k)$. (Note that the value of information is decreasing in $\alpha$.) Social welfare is given by:

$$W^H = \int_0^{I^H} [\alpha(V - c) - (1 - \alpha)k - x]f(x)dx + [1 - F(I^H)](\alpha V - c) = \int_0^{I^H} [I^H - x]f(x)dx + (\alpha V - c)$$

Using the general function $W(I)$, we can write: $W^H = W(I^H) + (\alpha V - c)$. 

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4. Choosing the Optimal Default Rule: L Default vs. H Default

With L Default, social welfare is $W^L = W(I^L)$; and with H Default, social welfare is $W^H = W(I^H) + (\alpha V - c)$. To choose the optimal default, we must compare $W^L$ and $W^H$. The comparison can be divided into two components:

(1) Pre-information Welfare: Uninformed consumers stick with the default. With L Default, they get zero; with H Default they get $\alpha V - c$. When $\alpha V - c < 0$, L Default has a pre-information advantage. And when $\alpha V - c > 0$, H Default has a pre-information advantage.

(2) Information-based Welfare: With L Default, the welfare generated by information acquisition and (possible) opt-out is $W(I^L)$; with H Default, the welfare generated by information acquisition and (possible) opt-out is $W(I^H)$. When $I^L > I^H$, $W(I^L) > W(I^H)$ and L Default generates more information-based welfare. When $I^H > I^L$, $W(I^H) > W(I^L)$ and L Default generates more information-based welfare.

We must therefore compare the value of information with L Default, $I^L = \alpha(V - c - k)$, to the value of information with H Default, $I^H = [\alpha(V - c) - (1 - \alpha)k] - [\alpha V - c] = (1 - \alpha)(c - k)$. We first look at the expected benefit from opt-out: $\alpha(V - c)$ is the benefit of opt-out from L Default, whereas $\alpha(V - c) + (c - \alpha V) = (1 - \alpha)c$ is the benefit of opt-out from H Default. When $\alpha V - c < 0$, the benefit of opt-out is larger by $c - \alpha V$ with H Default. When $\alpha V - c > 0$, the benefit of opt-out is smaller by $\alpha V - c$ with H Default. When $\alpha V - c = 0$, the benefit of opt-out is the same with both rules. We next look at the expected cost of opt-out: $\alpha k$ is the cost of opt-out from L Default, and $(1 - \alpha)k$ is the cost of opt-out from H Default. When $\alpha < \frac{1}{2}$, the cost of opt-out is larger by $(1 - 2\alpha)k$ with H Default. When $\alpha > \frac{1}{2}$, the cost of opt-out is smaller by $(2\alpha - 1)k$ with H Default. When $\alpha = \frac{1}{2}$, the cost of opt-out is the same with both rules. The overall comparison between $I^L$ and $I^H$ depends on both the relative benefits and the relative costs of opt-out, as detailed below.

To establish some basic intuition, we begin with the symmetric case where $\alpha = \frac{1}{2}$ and $\alpha V = c$. In this case, the benefit from out-out and the cost of opt-out are the same with both default rules; and there is no initial advantage or disadvantage to one rule ($\alpha V = c$). Therefore, the two defaults generate the same welfare level: $W^L = W^H$.

First, increase $\alpha$ (so that $\alpha > \frac{1}{2}$), while holding $\alpha V = c$. The benefit from opt-out is the same with both default rules, but the cost of opt-out is smaller with H Default. This means that the value of information is larger with H Default. And, since there is no pre-information advantage or disadvantage to one rule ($\alpha V = c$), H Default is the efficient rule. The results flip if we decrease $\alpha$ (so that $\alpha < \frac{1}{2}$), while holding $\alpha V = c$. As before, the benefit from opt-out is the same with both default rules, but now the cost of opt-out is
smaller with L Default. This means that the value of information is larger with L Default. And, since there is no pre-information advantage or disadvantage to one rule ($\alpha V = c$), L Default is the efficient rule. To summarize, when $\alpha V = c$, the expected value maximization principle is neutral and the opt-out cost minimization principle solely determines the optimal default.

Next, we deviate from the symmetric case by moving away from $\alpha V = c$, while holding $\alpha = \frac{1}{2}$. The cost of opt-out is the same with both default rules (since $\alpha = \frac{1}{2}$). At $\alpha V = c$, the benefit from opt-out is also the same for both defaults. When we change the parameters to get $\alpha V < c$, namely when we reduce $V$, increase $c$ or reduce $\alpha$, $W^H$ falls below $W^L$ and L Default becomes the efficient rule. Conversely, when we change the parameters to get $\alpha V > c$, namely when we increase $V$, reduce $c$ or increase $\alpha$, $W^H$ rises above $W^L$ and H Default becomes the efficient rule. To summarize, when $\alpha = \frac{1}{2}$, the opt-out cost minimization principle is neutral and the expected value maximization principle solely determines the optimal default.

In the Appendix, we generalize the analysis allowing for simultaneous deviations from both $\alpha = \frac{1}{2}$ and $\alpha V = c$. The results of this analysis are summarized in the following Table:

<table>
<thead>
<tr>
<th>$\alpha$</th>
<th>$\alpha V &lt; c$</th>
<th>$\alpha V = c$</th>
<th>$\alpha V &gt; c$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha &lt; \frac{1}{2}$</td>
<td>L Default is better</td>
<td>L Default is better</td>
<td>L Default is better when $\alpha$ is smaller and $\alpha V$ is closer to $c$. H Default is better when $\alpha$ is closer to $\frac{1}{2}$ and $\alpha V - c$ is larger</td>
</tr>
<tr>
<td>$\alpha = \frac{1}{2}$</td>
<td>L Default is better</td>
<td>Both rules are equally efficient</td>
<td>H Default is better</td>
</tr>
<tr>
<td>$\alpha &gt; \frac{1}{2}$</td>
<td>H Default is better when $\alpha$ is larger and $\alpha V$ is closer to $c$. L Default is better when $\alpha$ is closer to $\frac{1}{2}$ and $\alpha V - c$ is smaller</td>
<td>H Default is better</td>
<td>H Default is better</td>
</tr>
</tbody>
</table>

Table 1: Identifying the Optimal Default Rule
Table 1 highlights the interaction between the two key forces that determine the optimal default rule: majoritarianism and expected value. In the middle of the table, both forces are neutral and thus the two rules are equally efficient. Moving up and down the middle column, we see the standard majoritarian principle at work – when $\alpha < \frac{1}{2}$, L Default is better; and when $\alpha > \frac{1}{2}$, H Default is better. Moving left and right on the middle row, we see the expected value consideration at work – when $\alpha V < c$, L Default is better; and when $\alpha V > c$, H Default is better. At the top-left corner of the table and at the bottom-right corner, the two considerations push in the same direction: L Default is better at the top-left corner, when $\alpha < \frac{1}{2}$ and $\alpha V < c$; and H Default is better at the bottom-right corner, when $\alpha > \frac{1}{2}$ and $\alpha V > c$.

The most interesting cases are at the top-right corner of the table and at the bottom-left corner, where the two considerations push in opposite directions. At the top-right corner, $\alpha < \frac{1}{2}$ makes L Default more attractive, whereas $\alpha V > c$ makes H Default more attractive. The optimal default is determined by the relative strength of the two considerations, namely, how far are we from $\alpha = \frac{1}{2}$ and how far are we from $\alpha V = c$.

Conversely, at the bottom-left corner, $\alpha > \frac{1}{2}$ makes H Default more attractive, whereas $\alpha V < c$ makes H Default more attractive. Again, the optimal default is determined by the relative strength of the two considerations.

5. Extensions

5.1 Opt-out by Uninformed Consumers

We have thus far assumed that opt-out costs are low enough to induce opt-out by informed consumers, but not by uninformed consumers. We now relax this assumption and allow for opt-out by uninformed consumers as well.

Starting with L Default: when $\alpha V > c$ and $k < \alpha V - c$, uninformed consumers will opt out of L Default. To find the social welfare level in this scenario, we start by calculating the value of information. The uninformed consumer opts out and gets $\alpha V - c - k$. The informed consumer gets $\alpha(V - c - k)$, as before. The value of information is $I^L_1 = \alpha(V - c - k) - (\alpha V - c - k) = (1 - \alpha)(c + k)$. Intuitively, information is valuable for L types who stick with L Default and save opt-out costs ($k$) and get a lower price (lower by $c$). [Note that the value of information is decreasing in $\alpha$.] Social welfare is given by:

$$W^{L1} = \int_0^{I^L_1} (\alpha(V - c - k) - x)f(x)dx + [1 - F(I^L_1)](\alpha V - c - k)$$
\[\int_{I_{L1}}^{I_{L1}} (I_{L1} - x)f(x)\,dx + (\alpha V - c - k)\]

Using the general function \(W(I)\), we can write: \(W_{L1} = W(I_{L1}) + (\alpha V - c - k)\). [Do we need this? Note that \(W_{L1} < W_L\), since \(I_{L1} < I_L\).]

Moving on to H Default: when \(\alpha V < c\) and \(k < c - \alpha V\), uninformed consumers will opt out of H Default. The uninformed consumer opts out and incurs a cost of \(k\). The informed consumer enjoys an expected (net) benefit of \(\alpha(V - c) - (1 - \alpha)k\). The value of information is \(I_{H1} = [\alpha(V - c) - (1 - \alpha)k] - [-k] = \alpha[V - c + k]\). Intuitively, information is valuable for H types who stick with H Default and save opt-out costs \((k)\) and gain a (net) value of \(V - c\). [Note that the value of information is increasing in \(\alpha\).]

Social welfare is given by:

\[
W_{H1} = \int_{I_{H1}}^{I_{H1}} [\alpha(V - c) - (1 - \alpha)k - x]f(x)\,dx - [1 - F(I_{H1})]k
\]

Using the general function \(W(I)\), we can write: \(W_{H1} = W(I_{H1}) - k\).

When \(\alpha V > c\), opt out by uninformed consumers occurs only with L Default. With H Default, uninformed consumers stick with the default. To identify the optimal rule, we must therefore compare: \(W_{L1} = W(I_{L1}) + (\alpha V - c - k)\) and \(W_{H} = W(I_{H}) + (\alpha V - c)\). H Default has the pre-information advantage, since \(\alpha V - c > \alpha V - c - k\).

Moving on to information-based welfare, we compare \(I_{L1} = \alpha(V - c - k) - (\alpha V - c - k) = (1 - \alpha)(c + k)\) to \(I_{H} = [\alpha(V - c) - (1 - \alpha)k] - [\alpha V - c] = (1 - \alpha)(c - k)\). L Default generates more information-based welfare, since \(I_{L1} > I_{H}\).

Specifically, \(I_{L1} = I_{H} + (1 - \alpha)(2k)\). Intuitively, L Default is more costly for uninformed consumers, as it induces costly opt-out. By learning their type, consumers can potentially avoid these opt-out costs (specifically, if they learn that they are low type).

When \(k = 0\), H Default’s pre-information advantage disappears and L Default’s added information-based welfare also disappears. Hence, the two rules are equally efficient. Formally, when \(k = 0\), we have \(I_{L1} = I_{H} = (1 - \alpha)c\) and \(W_{L1} = W_{H} = W((1 - \alpha)c) + (\alpha V - c)\). What happens when \(k\) is larger? Let \(\Delta W \equiv W_{H} - W_{L1} = W(I_{H}) - W(I_{L1}) + k\) and take the derivative of \(\Delta W\) w.r.t. \(k\):

\[
\frac{d\Delta W}{dk} = W'(I_{H}) \frac{dI_{H}}{dk} - W'(I_{L1}) \frac{dI_{L1}}{dk} + 1 = -F(I_{H})(1 - \alpha) - F(I_{L1})(1 - \alpha) + 1
\]

\[
= 1 - (1 - \alpha)(F(I_{H}) + F(I_{L1}))
\]

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When $\alpha \geq \frac{1}{2}$, we have $\frac{d\Delta W}{dk} > 0$ (since $F(I^H) + F(I^{L1}) \leq 2$) and so H Default is better.
When $\alpha < \frac{1}{2}$, we may get $\frac{d\Delta W}{dk} < 0$, which means that L Default may be better.

Parallel analysis applies when $\alpha V < c$, such that opt out by uninformed consumers occurs only with H Default. With L Default, uninformed consumers stick with the default. To identify the optimal rule, we must therefore compare: $W^L = W(I^L)$ and $W^{H1} = W(I^{H1}) - k$. L Default has the pre-information advantage. Moving on to information-based welfare, we compare $I^L = \alpha(V - c - k)$ to $I^{H1} = [\alpha(V - c) - (1 - \alpha)k] - [-k] = \alpha[V - c + k]$. H Default generates more information-based welfare, since $I^{H1} > I^L$. Specifically, $I^{H1} = I^L + \alpha(2k)$. Intuitively, H Default is more costly for uninformed consumers, as it induces costly opt-out. By learning their type, consumers can potentially avoid these opt-out costs (specifically, if they learn that they are high type).

When $k = 0$, L Default’s pre-information advantage disappears and H Default’s added information-based welfare also disappears. Hence, the two rules are equally efficient. Formally, when $k = 0$, we have $I^L = I^{H1} = \alpha(V - c)$ and $W^L = W^{H1} = W(\alpha(V - c))$.

What happens when $k$ is larger? Let $\Delta W \equiv W^L - W^{H1} = W(I^L) - W(I^{H1}) + k$ and take the derivative of $\Delta W$ w.r.t. $k$:

$$
\frac{d\Delta W}{dk} = W'(I^L) \frac{dI^L}{dk} - W'(I^{H1}) \frac{dI^{H1}}{dk} + 1 = -F(I^L)\alpha - F(I^{H1})\alpha + 1
$$

When $\alpha \leq \frac{1}{2}$, we have $\frac{d\Delta W}{dk} > 0$ (since $F(I^L) + F(I^{H1}) \leq 2$) and so L Default is better.
When $\alpha > \frac{1}{2}$, we may get $\frac{d\Delta W}{dk} < 0$, which means that H Default may be better.

5.2 Misperception

We have thus far assumed that consumers are perfectly rational. In particular, we assumed that, while initially uninformed about their type, consumers hold accurate beliefs about the relevant parameters: $V$, $c$, $\alpha$ and $k$ (and also about the distribution function $F(\cdot)$). We now relax this assumption and explore the implications of consumer misperception.

We return to the baseline case, where informed consumers, and only informed consumers, opt out. In this baseline case, the only decision that a consumer makes is whether to become informed. Misperception might distort this decision. Specifically, the decision whether to become informed will now be determined by the perceived value of information, rather than the actual value of information. With L Default, the perceived value of information is $\hat{I}^L = \hat{\alpha}(\hat{V} - \hat{c} - \hat{k})$, where $\hat{\alpha}, \hat{V}, \hat{c}$ and $\hat{k}$ represent the perceived
values of the relevant parameters. Similarly, with H Default, the perceived value of information is \( \hat{I}^H = (1 - \hat{\alpha})(\hat{c} - \hat{k}) \).

In terms of social welfare, with L Default, social welfare is:

\[
W^L = \int_{0}^{I^L} (I^L - x)f(x)dx
\]

Define a general function \( W(I, \hat{I}) = \int_{0}^{\hat{I}} (I - x)f(x)dx \) and notice that misperception can lead to excessive investment (in becoming informed) when \( \hat{I} > I \) and to insufficient investment when \( \hat{I} < I \). We can thus write \( W^L = W(I^L, \hat{I}^L) \).

With H Default, social welfare is \( W^H = W(I^H, \hat{I}^H) + (\alpha V - c) \).

To choose the optimal default, we must compare \( W^L \) and \( W^H \). The comparison can be divided into two components: (1) Pre-information welfare, and (2) Information-based welfare. Pre-information welfare is not affected by the misperception. Information-based welfare, however, is distorted by the misperception.

We focus initially on misperception about the likelihood that the consumer benefits from high quality, \( \alpha \). With such misperception, the perceived value of information with L Default is \( I^L = \hat{\alpha}(V - c - k) \), and the perceived value of information with H Default is \( I^H = [\hat{\alpha}(V - c) - (1 - \hat{\alpha})k] - [\hat{\alpha}V - c] = (1 - \hat{\alpha})(c - k) \). When consumers overestimate the probability of being high-type, i.e., when \( \hat{\alpha} > \alpha \), they overestimate the value of information with L Default and underestimate the value of information with H Default. This means that we get excessive investment in information with L Default and insufficient investment with H Default. Conversely, when consumers underestimate the probability of being high-type, i.e., when \( \hat{\alpha} < \alpha \), they underestimate the value of information with L Default and overestimate the value of information with H Default. This means that we get insufficient investment in information with L Default and excessive investment with H Default.

These results contrast with what we would expect in a model without investment, namely, when consumers know their type initially (without investigation) but can also be mistaken about their type. The no investment model generates clear predictions. For example, if most consumers benefit from high quality (\( \alpha \) is large) but mistakenly think they don’t (\( \hat{\alpha} \) is small), then H Default is better when opt-out costs are large and L Default is better when opt-out costs are small. In our model, with investment in information, the results are more nuanced. Specifically, H Default can be better also when opt-out costs are small: with misperception, H Default results in an increased level of investigation; if the benefit from more investigation – more efficient decisions to opt-out or not to opt-out – outweighs the cost of excessive investigation, then H Default would be the better rule.
Appendix: Simultaneous deviations from both $\alpha = \frac{1}{2}$ and $\alpha V = c$

We repeat the exercise, from Section 4, of starting at $\alpha V = c$ and changing the parameter values, but without assuming $\alpha = \frac{1}{2}$. We begin by establishing a few results. Let $\Delta W \equiv W^H - W^L = W(I^H) - W(I^L) + (\alpha V - c)$ and take the derivative of $\Delta W$ w.r.t. the relevant parameters:

\[
\frac{d\Delta W}{dV} = W'(I^H) \frac{dI^H}{dV} - W'(I^L) \frac{dI^L}{dV} + \alpha = -F(I^L)\alpha + \alpha = (1 - F(I^L))\alpha > 0
\]

\[
\frac{d\Delta W}{dc} = W'(I^H) \frac{dI^H}{dc} - W'(I^L) \frac{dI^L}{dc} - 1 = F(I^H)(1 - \alpha) + F(I^L)\alpha - 1 < 0
\]

\[
\frac{d\Delta W}{d\alpha} = W'(I^H) \frac{dI^H}{d\alpha} - W'(I^L) \frac{dI^L}{d\alpha} + V = -F(I^H)(c - k) - F(I^L)(V - c - k) + V
\]

Since $k < \min(c, V - c)$, we can write:

\[
\frac{d\Delta W}{d\alpha} = -F(I^H)(c - k) - F(I^L)(V - c - k) + V > -(c - k) - (V - c - k) + V = 2k > 0
\]

At $\alpha V = c$, the benefit from opt-out is the same for both defaults. When $\alpha > \frac{1}{2}$, the cost of opt-out is smaller with H Default. This means that the value of information is larger with H Default: $I^H > I^L$, which implies $W(I^H) > W(I^L)$. We thus have:

\[
\Delta W(\alpha V = c) = W(I^H) - W(I^L) > 0
\]

Welfare is higher with H Default. When we change the parameter values, to get $\alpha V > c$, namely, when we increase $V$, decrease $c$ or increase $\alpha$, this reinforces the advantage of H Default (since $\frac{d\Delta W}{dV} > 0$, $\frac{d\Delta W}{dc} < 0$, and $\frac{d\Delta W}{d\alpha} > 0$, as shown above). When we change the parameter values, to get $\alpha V < c$, namely, when we reduce $V$, increase $c$ or reduce $\alpha$, this reduces the advantage of H Default. For each of the three parameters, there exists a threshold value beyond which L Default becomes the efficient default [not so clear: we might hit $c = 0$ or $\alpha = 1$ first, or we might exit the domain of the baseline case].

When $\alpha < \frac{1}{2}$, the cost of opt-out is smaller with L Default. This means that the value of information is larger with L Default: $I^L > I^H$, which implies $W(I^L) > W(I^H)$. We thus have:

\[
\Delta W(\alpha V = c) = W(I^H) - W(I^L) < 0
\]

Welfare is higher with L Default. When we change the parameter values, to get $\alpha V < c$, namely, when we reduce $V$, increase $c$ or reduce $\alpha$, this reinforces the advantage of L
Default (since $\frac{d\Delta W}{dv} > 0$, $\frac{d\Delta W}{dc} < 0$, and $\frac{d\Delta W}{d\alpha} > 0$, as shown above). When we change the parameter values, to get $aV > c$, namely, when we increase $V$, decrease $c$ or increase $\alpha$, this reduces the advantage of L Default. For each of the three parameters, there exists a threshold value beyond which H Default becomes the efficient default. [not so clear: we might hit $c = 0$ or $\alpha = 1$ first, or we might exit the domain of the baseline case].