LEARNING IN STANDARD FORM CONTRACTS: THEORY AND EVIDENCE

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ABSTRACT

Why are some contractual terms revised continuously while others are stubbornly fixed? We offer an account of both change and stickiness in standard form contracts. We hypothesize that drafters (sellers) are more likely to revise the terms they offer when they have an opportunity to learn about their value from experience. Consider a warranty. Offering a warranty in an initial period will expose sellers to claims about malfunction by purchasers, allowing sellers to learn whether it is desirable to offer it going forward. When drafters are unable to learn in this manner, either because they fail to offer such learning-enabling terms initially, or because the term in question is one where there is no increased opportunity to learn, such terms will be revised less frequently. While learning and change occur through various channels, we posit that terms that carry an opportunity to learn from experience will be revised more frequently, where terms or term modalities that do not will contribute to stickiness and stagnation. Our results support this hypothesis. Using a large sample of changes in consumer standard form contracts over a period of seven years, we find that sellers are more likely to revise terms that offer an opportunity to learn from experience than those that do not. The results suggest that standard form contract terms evolve over time as sellers learn experientially about their costs and risks. Our results have normative implications for the optimal design of default rules.

JEL classification: K12.
Keywords: standard form contract, boilerplate, evolution of contracts, learning.

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1. INTRODUCTION

One of the defining characteristics of standard form contracts is a high degree of standardization. Another is that their terms tend to be "sticky." In theory, contracting parties should revise their agreements when doing so enhances the value of their transaction. However, the literature has identified a number of factors that might reduce contracting parties' incentives to deviate from the norm or default rules, even when alternative arrangements enhance the value of the transaction.

Yet, stickiness is not a general phenomenon. Some terms seem to be resistant to change, like *pari passu* clauses in sovereign bond agreements,[2] while others get updated very quickly. We propose and examine empirically a novel account of both stickiness and change in standard form contracts. We begin from the reasonable premise that contract drafters may be initially uncertain about the net value of a particular term. Over time, however, drafters are able to learn the relative costs associated with such terms, leading them to drop some while adding or revising others. Firms learn in many ways, including learning about the terms offered by competitors, cases litigated in court, technological innovations, and news reports, among others. A common feature of these learning channels is that they tend to function largely independently of the specific contractual choices firms make.[3] Contrast this with experiential learning, where firms learn directly from experience with and feedback from consumers and contracting parties. That is, there are certain terms whose relative value is best ascertained through the *direct* feedback only their use generates. When learning is experiential, the firm's ability to learn depends on its past contractual choices.[4] This is the focus of our paper.

Consider a default implied warranty. A firm may contemplate including a disclaimer of implied warranties in its standard form contract. Offering the warranty may allow the firm to charge a higher price for the product but it will also expose the firm to some costs due to consumers claiming a remedy. During the time the firm must make its choice, the extent to which the costs outweigh the benefits of the warranty to consumers may be uncertain given that these values depend on factors that are harder to ascertain ex ante, such as on the frequency of product breakdown, the types of consumer losses, and the frequency at which consumers claim a remedy. If the firm offers the default implied warranty, it will risk exposure to future financial liability, but would also acquire a valuable opportunity to learn the true costs of the warranty and inform future choices. Opting for the disclaimer saves costs in the short run but also prevents the firm from learning. That is, the firm's choice as to the *mode* of this particular term (opting into the warranty default versus opting out) affects its ability to experience and learn the term's net value.

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[2] Gulati & Scott, id (explaining contracting parties' reluctance to revise *pari passu* clauses in sovereign bond agreements after unfavorable interpretations by courts).
[3] For a review of the literature on learning and innovation in the standard form contract setting, see Section 2.
[4] Our approach is related to the vast literature on strategic experimentation (Bolton and Harris).

Not all terms are created equal. Different terms are characterized by different probabilities of providing experiential feedback about their net value. We distinguish between two broad categories of terms. What we name "symmetric-learning terms" are such that future information about the net value of such terms to the drafter does not depend on contractual choices made at an initial period. That is, the firm either learns or fails to learn about the terms' value regardless of its contractual choice at an initial period. Learning can occur in many ways, all of which are largely unaffected by the initial contractual choice. When experiential learning is possible, it will occur regardless of the mode of the term used in an initial period. In "asymmetric learning" terms, instead, the firm may learn depending on whether it has adopted the default term or has opted out of it, as in the implied warranty example illustrated above. When learning is asymmetric, choosing a term in its learning mode (in this case, the default) has an additional value that adds what is known as a real option[5] to the firm's short-term gains and costs: the option to revise the contract following learning. This option allows the firm to capture additional profits in the future, hence inducing the firm to choose the learning mode more often at the outset.

The *ex ante* contractual choices of firms are thus likely to be affected by the information-generating capabilities of a particular term. *Ex post*, the firm can revise the contract and switch to (or away from) the default option if it has learned that it has low (or, respectively, high) costs. The prevalence of *ex post* switches will necessarily depend on the firm's *ex ante* choices and on whether those choices make the firm learn. Consequently, asymmetric-learning terms that are offered in their learning mode in an initial period allow firms to learn relatively more about the value of the term and are thus more likely to be revised at a later stage than similar terms who are adopted in their non-(experiential) learning mode.

Consider again the default implied warranty. Under our characterization, such as term is an "asymmetric learning" term because experiential learning occurs only when the default warranty is offered. The learning that results from adoption of the warranty is likely to increase the probability that firms that adopted it will revise it at a later stage relative to those firms who decided

[5] The literature on real options starts with Robert McDonald & Daniel Siegel, *The Value of Waiting to Invest*, 101 Q.J. ECON. 707 (1986) (showing that irreversible decisions to invest can be understood using the framework developed in finance for the study of option contracts). Real option theory has been applied to the study of diverse topics. *See* Alexander J. Triantis & George G. Triantis, *Timing Problems in Contract Breach Decisions*, 41 J. LEGAL STUD. 163 (1998) (applying option theory to the study of contract breach); Douglas G. Baird & Edward R. Morrison, *Bankruptcy Decision Making*, 17 J.L. ECON. & ORG. 356 (2001) (applying option theory to bankruptcy); Lee Anne Fennell, *Revealing Options*, 118 HARV. L. REV. 1399 (2005) (applying option theory to the study of property and liability); Joseph A. Grundfest & Peter H. Huang, *The Unexpected Value of Litigation: A Real Options Perspective*, 58 STAN. L. REV. 1267 (2006) (applying option theory to the study of litigation); Jacob E. Gersen & Eric A. Posner, *Timing Rules and Legal Institutions*, 121 HARV. L. REV. 543, 544-46 (2007); Christopher A. Cotropia, *Describing Patents as Real Options*, 34 J. CORP. L. 1127 (2009) (applying option theory to the study of intellectual property); Matthew Spitzer & Eric Talley, *On Experimentation and Real Options in Financial Regulation*, 43 J. LEGAL STUD. S121 (2014) (applying option theory to the study of financial regulation); Joe Vladeck, *Valuing Regulatory Flexibility: A Real Options Approach to Cost-Benefit Analysis*, 103 GEO. L.J. 797 (2015) (applying option theory to regulatory impact analysis). For an encompassing analysis of how option theory affects the study of the law see IAN AYRES, OPTIONAL LAW: THE STRUCTURE OF LEGAL ENTITLEMENTS (2005).

to disclaim it. That is, we expect that asymmetric-learning terms that are adopted in their "learning" mode at an initial stage will be revised more frequently at a later stage than when such terms are adopted in their "non-learning" mode (in this case, including a warranty disclaimer). In contrast, for those terms where learning is symmetric—that is, a firm learns or not irrespective of the mode of the term—, the probability of revision at a later stage is uncorrelated with the firms' contractual choice in an initial period.

Finally, a default terms will be revised more frequently when it is the learning mode of an asymmetric learning term than when it is part of a symmetric learning term. The firm learns in both cases and hence we would expect similar switching rates irrespective of whether the default is part of a symmetric or of an asymmetric learning term. However, if learning is asymmetric, the option to learn—that is, the real option—biases the initial contractual choices towards the learning mode. That is, firms will choose the default option more often at the outset and, consequently, will have a higher probability of switching away from it at a later stage.[6]

Stickiness, in our framework of analysis, is the result of the inability to learn. The dynamic of contractual innovation that results from experiential learning produces stickiness for those terms and term modalities where experiential learning doesn't occur. In the case of asymmetric-learning terms, however, stickiness occurs only when the initial balance of costs and benefits induces firms to opt for the non-learning mode. This is especially likely to occur when the non-learning mode of a term is particularly beneficial, such as when it corresponds to a default rule. Default rules, which are typically very attractive for firms and consumers alike because they are known and easily adoptable, might for this very reason also be more prone to become sticky over time.

Experiential learning is not the *only* channel that can lead firms to revise their terms. There are multiple drivers of stickiness and innovation, several of which have been identified in the literature. We posit, however, that these drivers are uncorrelated with terms' inherent potential to allow firms to learn from experience, thus allowing us to track experiential learning empirically.

We classify 32 terms into categories that reflect their opportunity to learn in each of a sample of End User License Agreements (EULAs) used by 246 firms that tracks contractual changes from 2003 to 2010. We first determine whether each term is associated with symmetric versus asymmetric experiential learning. For the latter, we identify whether the learning mode of the term occurs at default or when the firm opts out the default. Firms are initially more likely to adopt terms at their default mode, yet terms set at the default are more likely to be revised at a later stage regardless of their learning mode, suggesting that such defaults might have been chosen sub-optimally. Dividing terms into their respective learning categories yields a strikingly different result. Consistent with our hypothesis, we find that symmetric learning terms are equally likely to be revised at a later period irrespective of the mode selected at an initial period. In contrast, we find that asymmetric terms are several times more likely to be revised at a later stage if the firms

[6] In theory, the same applies to the opt out. However, the use of the opt out is curbed by the fact that defaults are used more often due to opt out costs.

chose to include the term in its learning mode at an initial period. We also find that asymmetric learning terms adopted in their learning mode are more likely to be revised than symmetric learning terms (and the reverse for asymmetric learning terms adopted in their non-learning mode). The results are statistically significant and robust.

The paper proceeds as follows. In Section 2, we review the literature on standard form contracts and contractual innovation. In Section 3, we propose a theory of experiential learning and derive testable predictions. In Section 4 we test these predictions using a unique dataset of standard form contracts. In Section 5, we conclude with additional considerations on the normative implications of our theory. The Appendix contains all the details of the empirical analysis and the proof related to the theoretical model.

2. LEARNING, STICKINESS, AND INNOVATION IN STANDARD FORM CONTRACTS

2.1. Stickiness and change

The benefits of standardization are well understood and have been explored extensively in the literature. As terms become increasingly common and well-known, they are easier for contracting parties and courts to interpret. They also confer various spillover effects, such as lower reading costs, increased certainty of legal interpretation, and reduced litigation risk (Kahan and Klausner; Choi and Gulati; Gillette). Yet these, and other, benefits resulting from the use of boilerplate may stand in the way of change, even when doing so might be efficient (Kahan and Klausner). Reluctance to change in light of a superior alternative could give rise to agreements with terms that no longer serve the contracting goals of the parties, either because they no longer reflect the optimal allocation of rights and risks between them, or because they might be interpreted unfavorably by a court, among others.

A number of factors contribute to stickiness. Stickiness tends to be associated with markets that experience network benefits that arise from firms' simultaneous adoption of a term (Kahan and Klausner), as well with agreements drafted by law firms, whose hierarchical structure and tendency to re-use old forms (Gulati and Scott; Hill). Firms' incentives to innovate are further diluted by weak property rights in contractual innovations (Davis) and the existence of default rules. When states enact particular defaults, contracting parties might find it cost effective to just adopt them (Goetz and Scott; Schwartz and Scott (1995; 2003)), a tendency further reinforced by the status quo bias (Korobkin). Such parties might also be reluctant to deviate from them when they perceive that opting out might signal negative information, even if value generating (Spier; Johnston; Ben-Shahar and Pottow; Bernstein; Kahneman, Knetsch, and Thaler).

Despite these obstacles, change and innovation can and does still happen. Large repeat players, such as law firms and investment banks, can find it profitable to invest in innovation—even in the absence of strong property rights—through their ability to spread costs among clients

(Kahan and Klausner; Gulati and Scott). In-house counsel in legal departments of firms engaged in mass-market commerce work closely with management and understand changes in technology that might give rise to new terms. In-house counsel are also more likely to receive feedback from offering or refraining to offer particular types of terms, allowing them to revise the agreements to adapt to new legal and market environments (Macaulay; Triantis). Finally, change and innovation can be spurred by exogenous "shocks," such as new laws, changes in legal interpretations of terms, or technological advances, driving firms to revise their agreements.

Most of the empirical evidence on contract change, innovation, and stickiness comes from studies of bond covenants and financial products. Kahan and Klausner, and Choi and Gulati (2006), found evidence of switching and learning costs in the corporate bond covenant context. Choi, Gulati, and Posner (2013) found an S-shaped innovation pattern in sovereign debt contracts, where parties slowly move from the old standard to a new one in response to various exogenous shocks. In the law firm context, Gulati and Scott found that lawyers in law firms failed to revise terms even after those terms had acquired ambiguous meanings that increased litigation risk. In the insurance context, Schwarcz (2011) found evidence of innovation away from the ISO form, which is the standard insurance document. Coates (2018) found significant changes in merger agreements over time, unveiling that such contracts had doubled in size, and that about 20% of such change were attributed to new terms. Finally, Marotta-Wurgler and Taylor (2013) found evidence of terms changing in reaction to litigated cases and changes in the enforceability of terms.

To summarize, there have been numerous accounts to explain and document *either* stickiness *or* change in standard form contracts. In this paper, we propose a new mechanism to account for contract change: learning from experience. To the best of our knowledge, this is the first paper to explore this mechanism in the standard form contract setting and to offer an account explaining *both* stickiness *and* innovation in the absence of external shocks.

2.2. Experiential learning versus other forms of learning

Learning is a fundamental driver of change. Yet learning occurs in different ways. Firms can learn directly, by interacting with consumers, or through the experience earned from offering particular terms, or term modalities. Firms can also learn indirectly, in ways that are unrelated to the contractual choices made at an initial period. Consider a term in a EULA limiting the number of devices where the software can be installed, which can clearly affect demand for the product. Learning in this context occurs largely independently from the form of the contract term offered related to the number of devices. Rather, learning about consumer preferences and uses of software can be achieved by looking at purchasing patterns or examining the offerings of competitors in their own market and adapt terms accordingly.

This type of learning takes multiple forms. Firms can learn from litigated cases about possible contractual choices as well as about the enforceability of particular clauses (e.g., a "change of terms" clause that allows firms to modify standard agreements unilaterally) (Gulati and

Scott (2004); Marotta-Wurgler and Taylor (2013); Schwarcz). The literature on contractual innovation has also pointed out that firms can learn from each other's contracts, creating a well-known free rider problem (Goetz and Scott; Davis). Law firms are also a conduit of indirect learning by transmitting knowledge to their seller-clients, who can then revise their terms accordingly.

More recently, legal service firms like Bloomberg Law and Legal Zoom have begun offering standard terms for different types of contracts, allowing firms to innovate at a relatively low cost (Triantis 2013). Blogs, trade publications, word of mouth, and internet forums offer additional sources of free advice regarding terms. All of the aforementioned channels enable learning and change, but the mechanism by which this happens is unrelated to the firms' *experience* with its adoption of a term or term mode. We refer to these forms of learning as "indirect" learning mechanisms because they can occur independently from the contractual choices made or direct interactions with customers.

In other circumstances, learning is not indirect, but rather the result of firms' interactions with consumers and, to some degree, the result of the products and terms offered. This form of learning is experiential in nature but the experience is not conditioned on the occurrence of an event that might implicate the contract. For example, firms can acquire valuable knowledge from interacting with consumers through employees and customer service channels, where learning isn't necessarily mediated by the contract terms themselves (Hoffman).[7] Consumers can call firms and inquire about the meaning or implications of a particular term, without demanding rights under the contract. This might allow firms to learn about how consumers understand the contract or particular features of a product or service. Firms also gain valuable information from feedback offered through online customer reviews (Ghose and Ipeirotis), which can lead to change. We refer to these forms of learning as "direct" learning, because they result from customer interactions or aspects related to the product or term offered.

One particular form of direct learning is experiential with respect to the contract. In particular, firms can learn from experience resulting from the use and implication of a particular term. The most natural example is a warranty. A seller can offer it or not; if the seller offers the warranty and the product breaks, the consumer can bring a claim for breach of warranty. In honoring the warranty, the seller learns the costs of offering this particular term. Learning occurs if three conditions are met: the seller offers the warranty, the product breaks down, and the buyer brings a claim for breach of warranty. Note that the difference with this form of experiential learning as compared to other forms of direct learning, such as when consumers provide feedback, is that additional learning *only* occurs when a particular term or term mode is offered (and implicated) and not otherwise. There are some terms that tend to lend themselves to experiential learning more than others. Warranties, terms offering maintenance and support, and terms where firms get to experience the cost of offering them from consumer claims or actions tend to fit well

[7] *See* David Hoffman, *Relational Contracts of Adhesion*, 85 U. Chi. L. Rev. (forthcoming 2018).

in this category.

While there are several types of learning that may lead firms to revise their terms, we focus exclusively on the direct experiential learning that occurs when a particular mode of a term is invoked by an event that allows the firm to interact with the consumer or contracting party and thus experience and learn about the term's cost. We expand on the different forms of direct experiential learning in the next section.

3. A FORMAL THEORY OF EXPERIENTIAL LEARNING

3.1. Symmetric versus asymmetric experiential learning

A core feature of experiential learning in contracts is that learning may depend on the contract terms offered in the past. The firm's contractual choices in an initial period (time 0) determine learning in the interim period and, consequently, affect the firm's contractual choices in the subsequent period (time 1). (This simple timing matches the structure of our data and is replicated in the formal model that we will introduce momentarily.) Experiential learning may occur symmetrically, when the default and the opt out options offer analogous opportunities for learning, or asymmetrically, when the feedback generated by the two (or more) modalities is different. To illustrate, consider two stereotypical examples of symmetric (*S*) and asymmetric (*A*) learning terms.

Consider firms selling tax preparation software packages to consumers. Unless, modified or opted out, the standard default rules offered by Article 2 of the Uniform Commercial Code will apply to the transaction, including implied warranties. As they write their contract, firms can choose to keep the defaults or opt-out of them (Marotta-Wurgler 2008).[8]

Firms may consider offering a term restricting the use of the product by the consumer, a term opting out of the default term which imposes no restriction. A common example is a restriction on commercial use, where the consumer is only able to use the product for personal or household purposes. Consumers value unrestricted use, but the firm might benefit from carving out specific uses that, depending on market conditions, could be licensed separately. At the time of writing the contract, the firm might be uncertain about the relative costs of offering the default. These costs, however, may become known later on through the firm's interactions with its consumers, or from alternative information sources regarding consumer preferences. With this information at hand, at time 1, the firm can confirm or revise the contract. Crucially, the firm learns new information from interacting with consumers or through other means both if it adopted the default term of no restrictions at time 0 and if it opted out of it.

Consider a firm that adopted the default of no restriction. The firm might monitor use by

[8] For a detailed analysis of how firms adopt or opt-out of UCC Article 2 default rules, see Marotta-Wurgler (___).

consumers (a form of indirect learning) or receive feedback from them (a form of direct learning), and notice that a specific category of its consumers uses the product particularly intensely along a specific dimension. For instance, it may discover that small retailers use the software produced by the firm for marketing purposes. As a consequence, it could in the future restrict the use of the software and sell a license for marketing uses separately at a higher price. Yet, the firm would learn the same information even if it adopted the restriction-on-use opt-out term. The firm might start out by restricting use to non-marketing uses and then learn about the demand for the license for marketing uses directly by offering it for sale separately. In both cases, the firm may acquire valuable information on the market value of specific uses. Since the feedback generated by the two modalities of the term is unlikely to differ very much, we classify such terms as symmetric learning terms. Learning here might be direct or indirect. Regardless of the mechanism, learning is symmetric for both modalities of the term.

Consider now a different term that the same firms may offer: a warranty of merchantability implied by Article 2 of the Uniform Commercial Code (the default term) or they may disclaim some or all liability (the opt out term).[9] The decision whether to offer the default term or to opt out depends again on the price increase that the firm is able to capture if it offers the default—as consumers might be willing to pay more for the product if the firm offers the warranty—and on the costs of offering the default warranty and consequently being exposed to liability compared to opting out and facing no costs. At the outset, firms may not have enough information to assess the costs associated with offering the warranty with absolute accuracy, yet the available information may be enough to assess the probability to face high or low costs ex post. As before, the firm may learn new information by interacting with consumers; now, however, learning depends on the term offered at time 0.

Firms adopting the default warranty will face future claims with some probability and learn the amount of those damages, which will be related to the product, the way consumers use it, the activities consumers are involved in, interaction with other products, local conditions, and other factors that will typically be unknown at the outset. Faced with specific claims, the firm will learn the cost of being exposed to liability resulting from breach of warranty claims. Firms opting out of the default and disclaiming implied warranties will not face such claims or claims will not result in a judicial assessment of damages resulting from such claims, and hence will not learn the costs of offering a warranty. Of course, not offering a warranty at an initial period might still decide to revise its terms and offer one in a later period as a result of other factors, such as changes in

[9] For example, Intuit tax preparation software offers a version of such a warranty ("If you are a registered user and you pay an IRS or state penalty and/or interest solely because of a calculation error on a form prepared for you using TurboTax Online, and not as a result of, among other things, your failure to enter all required information accurately, willful or fraudulent omission or inclusion of information on your tax return, misclassification of information on the tax return, or failure to file an amended return to avoid or reduce an applicable penalty/interest after Intuit announced updates or corrections to the TurboTax Online software in time for you to file an amended return, then Intuit will pay you in the amount of the IRS or state penalty and/or interest paid by you to the IRS or state.") Available at https://turbotax.intuit.com/corp/license/online.jsp (last visited, May 30, 2018).

consumer demand or for competitive reasons. Still, a firm that offers a warranty at an initial period receives *additional* learning as a result of its experience with consumers. As a result, such firm would be marginally more likely to revise it at a later period as a result of such learning. The warranty is an asymmetric learning term; more precisely, this is a term where the firm learns only if it offered the default option.

Table 1. Information-types and modalities of contract terms

Information-type		Default	Opt-out
Symmetric-learning terms (S)		Learning	Learning
Asymmetric-learning terms (A)	From default	Learning	Nonlearning
	From opt out	Nonlearning	Learning

Table 1 provides an overview. Terms of type S are symmetric-learning terms and are such that the firm receives new information at time 1 irrespective of whether it adopted the default or opted out of it at time 0. An example of such terms are restrictions-on-use terms, described earlier. The distinctive characteristic of a symmetric term is that a decision of whether to revise a term at a later period will arise irrespective of a term's mode at an initial period. A symmetric learning term might be revised or not, but that will occur independently from the experiential learning mechanism that we focus on.

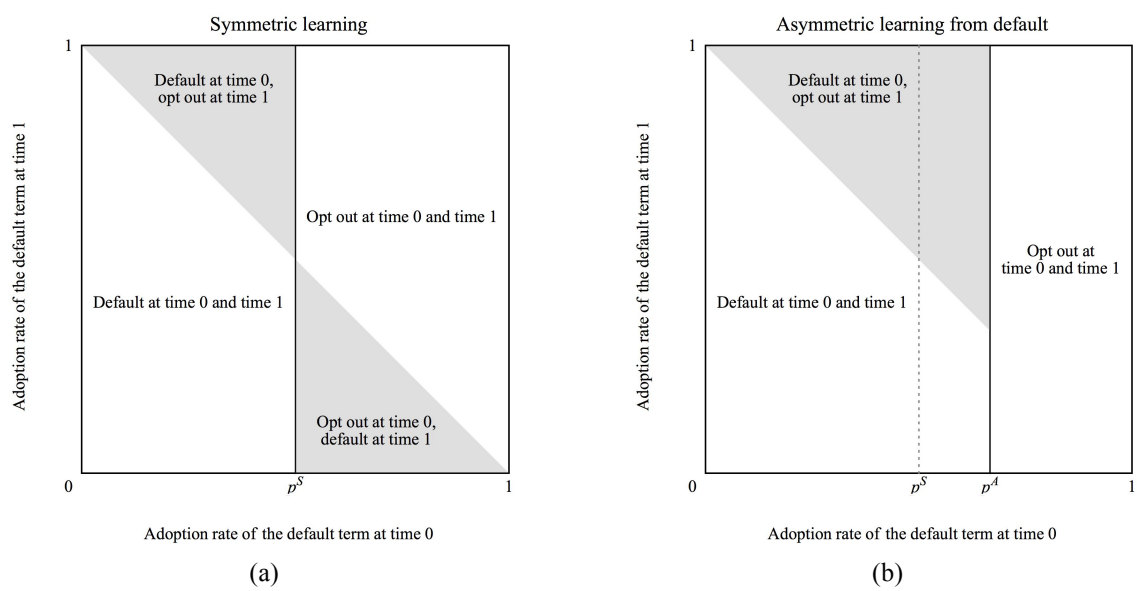
In contrast, terms of type A are asymmetric-learning terms: between time 0 and time 1, the firm learns the costs associated with the term only if it has adopted what we call the *learning mode* of the term, which could be either the default (as in the implied warranty example above) or the opt out. If the firm does not offer the learning mode at time 0, it will not learn anything—or, more generally, it will learn less—from interacting with consumers.

To anticipate the central take-away from the model introduced below, consider the following simplified example. Assume that consumers value the default term at v and that the default could cost the firm either $c_H > v$ with probability p or $c_L < v$ with probability $1 - p$. For simplicity, assume that $v = \frac{c_L + c_H}{2}$ and that the costs and value of the opt out are zero. With symmetric learning, the firm's decision at time 0 is purely driven by a balance of expected costs and hence will choose the default if $v > pc_H + (1 - p)c_L$, that is, it will choose the default $p < p^S \equiv \frac{1}{2}$ (low expected costs) and opt out otherwise (high expected costs). At time 1, adopters may discover that costs are high—this happens with probability p—and decide to switch to the opt out. The area of the grey triangle in the upper-left corner of the graph in Figure 1(a) depicts the ex ante probability mass of switches from adoption of the default term to opt-out. Conversely, firms with $p > p$ opt out at time 0 and decide to switch with probability $1 - p$. The grey triangle in this part of the graph depicts the ex ante probability of switches from opt out to default.

Consider now asymmetric learning from the default option. If the firm chooses the default

at time 0 it will face expected costs equal to $pc_H + (1 - p)c_L$ but will also have an opportunity to learn and be able to switch. After learning, the firm's time 1 payoff is $v - c_L$ with probability $1 - p$ (the firm learns that costs are low and confirms the time 0 choice) and zero with probability p (the firm learns that costs are high and switches to the opt out). This is a real-option value of the default option and pushes the firm to choose the default for its dynamic gains even though it yields static losses. Now the firm chooses the default if $v + (1 - p)(v - c_L) > pc_H + (1 - p)c_L$, which yields a higher threshold for opting out $p^A \equiv \frac{2}{3}$. We can visualize the firm's choices in Figure 1(b). Compared to the symmetric learning term, more firms choose the default at time 0. Adopters, however, switch to opt-out with relatively high probability, especially in the range $[p^S, p^A]$, that is, in those cases that would have resulted in opt-out at time 0 had the term been of a symmetric type. These are instances in which the default has a negative expected value and it is chosen purely for its learning value, that it, for the option to make a perfectly informed decision at time 1. Instead, Firms that choose to opt out irreversibly confirm that decision at time 1 because no new information is acquired in the meantime.

Figure 1. Adoption decisions at time 0 and time 1



3.2. Setup of the model

In the model there are two sets of players: (i) a monopolistic firm of type $p \in [0, 1]$, randomly drawn from the cumulative distribution function $F(p)$, and (ii) a population of homogeneous consumers. At time 0, the firm draws its type and offers all of its consumers the same standard form contract, which can come in two guises. The firm can either adopt a default term prescribed by the law or opt out of it. In the interim period, the firm has an opportunity to learn the costs associated with

the terms it offered. Then, at time 1, the firm can offer the same contract as at time 0 or revise it.

The default term and the opt out have different values for consumers: let v be the value of the default relative to the opt out. Similarly, they entail different costs for the firm: let $c \in \{c_L, c_H\}$ be the cost of offering the default term relative to the opt out, with $c = c_H$ with probability p and $c = c_L$ with the complementary probability $1 - p$. (Note that this is equivalent to normalizing the value and cost of the opt out to zero and is without loss of generality.)[10] Accordingly, the firm's type p is such that, when offering the default, high types face high expected costs and low types face low expected costs.

To capture the interesting scenarios, we focus on cases where $c_L < v < c_H$. The firm maximizes $v - c$; with full information, the firm should offer the default term if $c = c_L$ and opt out if $c = c_H$.[11] However, while v, c_L, c_H, and p are known to the firm, the cost c is unknown at time 0 and may or may not be known at time 1. Hence, time-0 choices are made in conditions of imperfect information.

Depending on the choices made at time 0, the firm may experience the costs associated with different clauses and learn. We postulate that the firm learns c with probability $\lambda^D \in [0,1]$ if it has adopted the default at time 0 and with probability $\lambda^O \in [0,1]$ if it has opted out. The pair (λ^D, λ^O) is term specific and can interpreted as the information-type of a term. Terms characterized by $\lambda^D = \lambda^O$ expose the firm to symmetric learning. In contrast, terms characterized by $\lambda^D > \lambda^O$ yield asymmetric learning, with the default offering more learning opportunities. That is, the default characterizes the learning mode of the term. Similarly, if $\lambda^D < \lambda^O$, the opt out characterizes the learning mode.[12] Note that the model allows for various degrees learning and of asymmetry in learning.

Before examining the firm's contractual choices, let us enrich the model with three additional ingredients. First, firms that opt out of the default term may incur an opt-out cost $k \geq 0$

[10] The normalization is without loss of generality More precisely, $v = v^D - v^O$, where v^D is the consumers' willingness to pay for the product if the contract includes the default term and v^O is their willingness to pay in case of opt out. Similarly, $c_H = c_H^D - c_H^O$ is the differential in costs when the term involves high costs and $c_L = c_L^D - c_L^O$ when costs are low. Note that we do not make any assumption as to the relationship between c_L^D and c_H^D and similarly for c_L^O and c_H^O: costs are *high* or *low* only in a relative sense. We only assume that $c_H > c_L$, implying that terms of type H should be offered in their default version while terms of type L should be offered in the opt out version. Yet, this is an innocuous labeling choice and assuming the opposite would only require us to change the interpretation of the results. Note also that our setup allows for situations where $c_L^D = c_H^D$ while $c_L^O \neq c_H^O$. In this case a firm offering the default option experiences costs without being able to infer whether the term is of type H or of type L: hence the firm offering the default does not learn c. In contrast, a firm offering the opt out would learn because c_L^O and c_H^O are different. This is a case of asymmetric learning from the opt out option and illustrates our framework where firms experience costs but may or may not learn. The same is true for learning from the default option only.

[11] Since a monopolist can charge homogeneous consumers for their willingness to pay, the firm can extract v through the price. If $v \geq c_H$ the firm offers the default irrespective of whether costs are high or low. Similarly, if $v \leq c_L$ the offers the opt out irrespective of costs. These are uninteresting cases for our purposes because (the lack of) information plays no role in the firm's choices and hence there is no scope for learning.

[12] See note 10 for a formal implementation of the asymmetry in learning.

that captures the costs of additional marketing and legal research, more risky litigation, and consumer aversion to unfamiliar arrangements.[13] To keep up with our normalization we operationalize this cost as an additional value of the default, which becomes $v + k$. To maintain our focus on the interesting cases, we assume:

Assumption 1 : $c_L < v + k < c_H$

which allows us to subsume opt out costs under v.[14]

Second, time-0 and time-1 profits might weigh differently on the firm's time-0 choices because the expected volume of sales at time 0 might be greater than that at time 0. Let $w > 0$ be the weight of time-1 sales. Firms that expect to grow are characterized by $w > 1$ while firms that expect to shrink are characterized by $w < 1$.[15]

Third, switching at time 1 entails a cost for the firm, denoted $s \geq 0$, which captures the costs of rewriting the contract, doing additional legal research, informing the consumers and so on. If the costs of switching are too high, then switching does not take place and learning becomes an uninteresting option. Therefore, we focus on cases in which:

Assumption 2 : $s < \min\{w(c_H - v), w(v - c_L)\}$

That is, the firm's switching cost is less than the efficiency gains from switching.

3.3. Learning

As usual, in the analysis we proceed backwards. In the last period, time 1, the firm is better-off adopting the term that maximizes its payoff given the information available. We need to distinguish between two scenarios. If the firm has learned c, the firm's payoff at time 1 is either $v - c_L$ if $c = c_L$ (because the firm chooses the default at time 1) or is equal to 0 if $c = c_H$ (because the firm chooses the opt out at time 1). If the firm does not learn, the firm will confirm the time-0 choice. We can write the time-1 expected payoff Π_1^τ of a firm that adopts term $\tau \in \{D, O\}$ at time 0—where D stands for default and O for opt out—as follows:

[13] There may be opt-out costs that are incurred only once if the firm opts out at time 0 and confirms this choice at time 1. To avoid additional notation, we do not take this case into account. Its inclusion, however, would not change the main results.

[14] As long as $c_L < v + k < c_H$—that is, if $k < c_H - v$—opt out costs affect the firm's contractual choice when costs are unknown but do not bar the firm's choice of the efficient contract after learning the cost. If instead $k \geq c_H - v$ the firm will never choose the opt out, making the model uninteresting. See also note 11.

[15] Note that it is immaterial whether w captures an accurate forecast of the firm's growth at time 1: time-0 decisions depend on the expected, not the actual growth; time-1 choices depend on per unit values and costs and hence are unaffected by growth. Finally, there may be an interaction between growth and switching costs, as a firm with a larger volume of sales may enjoy economies of scale with reduce the fixed costs of switching. We do not explore this possibility in the analysis.

$$\Pi_1^\tau = \lambda^\tau(1-p)(v-c_L) + (1-\lambda^\tau)\Pi_0^\tau \tag{1}$$

In turn, the expected time-0 payoff Π_0^τ, when information is lacking, is simply the difference between the value of the term and its expected costs and hence is $\Pi_0^D = v - pc_H - (1-p)c_L$ if the firm chooses the default option and $\Pi_0^O = 0$ if the firm opts out.

Backing up to the earlier period, time 0, the firm weighs two possibly opposing interests: maximize the expected time-0 payoff Π_0^τ and improving the time-1 payoff Π_1^τ by learning. If it learns and switches, the firm also pays a switching cost s. The probability of switching is $q^D = \lambda^D p$ if the firm chooses the default at time 0 and $q^O = \lambda^O(1-p)$ if the firm chooses the opt out, because switches occur only if the firm learns that the opposite choice is the efficient one.

Accordingly, if a firm of type p chooses the default at time 0, its expected payoff is

$$\Pi_0^D + w\Pi_1^D - q^D s = (1+w)\Pi_0^D + \lambda^D p[w(c_H - v) - s] \tag{2}$$

The expression reveals that, at time 1, the firm is guaranteed its time-0 payoff and an additional payoff that derives from learning. If the firm chose the default at time 0, the payoff from learning consists in the possibility to switch to the opt out if the cost is high (with probability p) and hence avoid the loss $c_H - v$, in which case the firm also pays a switching cost.

If, instead, the firm chooses the opt out at time 0, its expected payoff is

$$\Pi_0^O + w\Pi_1^O - q^O s = \lambda^O(1-p)[w(v - c_L) - s] \tag{3}$$

Again, at time 1, the firm is guaranteed its time-0 payoff (of zero) and an additional payoff that derives from learning, which now consists in the possibility to switch to the default if the cost is low (with probability $1-p$) and hence capture the gain $v - c_H$, in which case the firm also pays a switching cost.

By equating (2) and (3), we can derive a cutoff level of p such that the firm is indifferent between adopting the default at time 0 and opting out of it:

$$p^* \equiv \frac{(1+w)(v-c_L) - \lambda^O[w(v-c_L) - s]}{(1+w)(c_H - c_L) - \lambda^D[w(c_H - v) - s] - \lambda^O[w(v-c_L) - s]} \tag{4}$$

Note that the numerator consists of the gains from adopting the default directly in both periods minus the gains from switching to the default from the opt out after learning. The numerator thus captures the incentives to choose the default at time 0. The denominator is the sum of the incentives to choose the default option and of the incentives to choose the opt out.

Firms with $p < p^*$ face low expected costs and hence adopt the default term, while firms with $p > p^*$ opt out of it. The second measure in which we are interested is the mass of switches at time 1. The probability that a firm p switches away from the default to the opt out at time 1 is equal to the probability of learning λ^D, given that the firm has chosen the default at time 0, times the probability that the opt out is the superior choice—that is, that costs are high—which is equal to p. Considering all firms, we have:

$$\Delta(p^*) \equiv \int_0^{p^*} \lambda^D p dF(p)$$

Similarly, the mass of switches away from the opt out to the default at time 1 is equal to

$$\Omega(p^*) \equiv \int_{p^*}^{1} \lambda^O (1-p) dF(p)$$

We will now analyze how the firm's decisions depend on the information-type of a term, (λ^D, λ^O) and demonstrate two general results (all proofs are in the Appendix).

Proposition 1. The learning mode of a term is chosen increasingly often at time 0 as learning becomes more asymmetric.

Absent learning, expression (4) would be a ratio of the net value of the default ($v - c_L$) over the sum of the net values of the two options ($v - c_L + c_H - v = c_H - c_L$), weighed by the firm's time-0 and time-1 sales ($1 + w$). With learning, additional terms enter the expression, which capture the real-option value of choosing either version of the term. The marginal type p^* increases with λ^D, enlarging the set of firm types $p < p^*$ that choose the default at time 0. Similarly, p^* decreases with λ^O, expanding the use of the opt out. As learning becomes more asymmetric—that is as $|\lambda^D - \lambda^O|$ increases—the learning mode yields learning relatively more frequently and hence becomes more attractive for firms at time 0.

Proposition 2. Switches away from the learning mode of a term occur increasingly often at time 1 as learning becomes more asymmetric.

If learning is asymmetric, we know from Proposition 1 that the learning mode of the term is chosen more often at time 0. This effect expands the set of firms that can potentially switch to the other mode at time 1. In addition, those firms learn relatively more often—precisely because they have chosen the learning mode—and hence more of them will switch at time 1.

3.4. Other determinants of contractual choice

We now explore how a firm's contractual choice is affected by the costs of opting out of the default option at time 0 or at time 1, the firm's time-1 growth prospects and switching costs at time 1.

Opt-out costs. Opt-out costs k add to the value v of choosing the default and make it less likely that a firm will opt out of it both at time 0 and at time 1. However, if the firm learns in the interim period, opt out costs are irrelevant to the firm's choice as long as $c_L < v + k < c_H$ (Assumption 1). If the firm does not learn, the firm simply confirms its time-0 choice irrespective of k. Therefore, opt-out costs are felt particularly at time 0, when the firm chooses under imperfect information, and make the choice of the default option more likely. In turn, this expands the set of firms that,

having chosen the default, may learn and switch to the opt out option at time 1. Proposition 3 formalizes these intuitions.

Proposition 3. If opt-out costs increase, then the default term is chosen more often at time 0 and there are more switches away from the default at time 1.

Growth prospects. Growth prospects have two effects: they magnify the (dynamic) gains from learning but also magnify the (static) net value of a term. Hence, an increase in growth prospects may or may not result in more learning depending on which effect dominates. To elaborate, the two modalities of a term may or may not be symmetric with respect to their net values. If $v = \frac{c_L+c_H}{2}$, we have $v - c_L = c_H - v$ (the net values of the default and the opt-out are the same) and the firm's contractual choices are driven purely by learning. In this case, growth prospects stimulate learning: firms with greater growth prospects choose the learning mode of a term more often at time 0 and hence also switch away more frequently from the learning mode at time 1. However, if the former condition does not hold true, we may have $v - c_L > c_H - v$ (or vice versa). In this case, growth stimulates learning only if the net value of the learning mode is large enough. Otherwise, the result is reversed. Proposition 4 provides a general formulation of these results.

Proposition 4. There is a neighborhood of $v = \frac{c_L+c_H}{2}$ such that, if the firm's growth prospects increase, then the learning mode is chosen more often at time 0 and there are more switches away from the learning mode at time 1. This result is reversed if the net value of the learning mode is sufficiently small.

An obvious corollary to Proposition 4 is that in case of symmetric learning terms, both modalities of the term imply learning and hence the choice is purely driven by the term's net values. In particular, greater growth opportunities result in a more frequent choice of the default option if $v - c_L > c_H - v$, and of the opt out if $v - c_L < c_H - v$.

Switching costs. Switching costs add an implicit tax on learning, thereby making learning a less attractive option, restricting the choice of the learning mode at time 0 and, consequently, the frequency of switches away from the learning mode at time 1. This result, however, may be reversed if the learning mode also guarantees the smaller static net value, which, as above, weighs against learning. Proposition 5 formalizes these observations.

Proposition 5. There is a neighborhood of $v = \frac{c_L+c_H}{2}$ such that, if switching costs increase, then the learning mode is chosen less often at time 0 and there are fewer switches away from the learning mode at time 1. This result is reversed if the net value of the learning mode is sufficiently small.

As above, Proposition 5 implies that in case of symmetric learning terms contractual choice is purely driven by the term's net values. In particular, greater switching costs result in a more frequent choice of the default option if $v - c_L < c_H - v$, and of the opt out if $v - c_L > c_H - v$.

3.5. Discussion of the main assumptions

3.5.1. Market structure (other than monopoly)

In the model we focus on monopolistic firms. Considering firms with less than full market power would not qualitatively alter the results. Some degree of competition would reduce the firm's ability to capture consumer surplus thereby requiring us to distinguish between the (relative) value consumers attach to the default, v, and the price increase that the firm is able to sustain when offering the default, which could be less than v when firms compete. This, however, would not alter our analysis, as we allow v to vary.

However, in a fully competitive market, prices track costs, not consumer surplus. Hence firms might adjust the price they charge to consumers after learning the costs of different clauses. These adjustments may erode firms' profits but should not affect the key mechanism behind our model: firms would still be induced to offer the cheapest option, which is unknown at the outset in our model. Yet, a formal model of standard form contracts in competitive markets might unveil additional implications.

Competing firms might also learn from each other, which both boosts learning—because it magnifies the effects of any individual firm's experimentation with new clauses—and hinders it—because it creates a free-riding problem that reduces a firm's incentives to experiment. While this aspect of the problem would add a layer of complexity to the analysis, it would not affect our basic distinction among contract terms based on their learning characteristics and hence would not qualitatively alter our results.

Finally, competitive forces might induce firms to follow what most of their competitors do because, for instance, consumers might be unwilling to buy a product that is offered together with an unfamiliar set of clauses. We already consider in the model the costs of opting out of the default term. A similar analysis could be applicable to the case of opting out of the industry standard terms.

3.5.2. Heterogeneous consumers, tailoring and screening

Our framework applies to cases in which firms offer standard form contracts to consumers. Yet, firms routinely attempt to tailor their contracts to the specific characteristics of individual or groups of consumers. Firms in our model offer standard form contracts to consumers, but costs associated with offering a specific term may vary with consumer characteristics. Moreover, different consumers may value the same term (say a warranty) differently. In these cases, firms might find it advantageous to tailor contracts to specific consumers or consumer groups rather than offering

all of their consumers the same contract.

A widely-studied way for a firm to tailor a contract to the specific characteristics of its consumers is to "screen" consumers by offering different contracts at different prices and letting consumers choose their preferred contract (Stiglitz (1975); Akerlof (1970)).[16] However, firms in our model cannot do so because consumers are uniform with respect to the value, v, that they attach to the default term and ignorant about the costs that alternative terms impose on the firm.[17] If offered different contracts, consumers in our model would all choose the same contract, defeating the firms' attempt to screen among them.[18]

We think this is a realistic assumption. First, consumers often know *less*, rather than more, than firms do about their own future use patterns, exposure to risk, probability of accidents and other important factors that determine both the value and the costs of different terms (Bar-Gill (2012)).[19] Second, contract standardization offers numerous advantages to firms, which would be lost if the firm were to tailor the contract to individual consumers, making standardization advantageous even in those cases in which tailoring would be theoretically possible. Empirical evidence confirms this. For example, Della Vigna and Gentzkow (2018) find that retail chains in the United States do not adapt their prices to easily identifiable groups of consumers living in different states with markedly different preferences, wealth, education and, ultimately, willingness to pay for certain products. Price terms are allegedly the easiest terms to vary in a contract; the fixed costs associated with tailoring other, more difficult to individualize, terms might be prohibitive as well.

Finally, even if firms were able to discriminate among consumers depending on their use patterns, there is no guarantee that they will have incentives to do so perfectly. In a recent study, Xinyu Hua and Kathryn Spier (2018) show that a monopolist may fail to supply the optimal level

[16] In a screening model, the uninformed party makes an offer to the informed party. The offer allows the informed party to choose between two different contracts, say, one with a warranty and one without, at two different prices. If appropriately designed, such offer results in a separation between the two (or more) types of consumers; in our context, this means that consumers of type L would choose the contract with the default warranty and consumers of type H would choose the (cheaper) contract without warranty.

[17] In many cases the value that a consumer attaches to a contract term varies with the consumer's use patterns, which in turn determine the costs borne by the firm. A warranty may provide the typical example: high-risk consumers both value the warranty more and impose larger costs to the firm. Under these conditions, heterogeneous valuations are correlated with consumer types and allow the firm to adopt a screening strategy. We do not consider these cases for reasons explained below in the text.

[18] From a different perspective, our problem is similar in structure to the insurance market, where insurance companies ignore the risk-characteristics of those who purchase coverage (Rothschild and Stiglitz, 1976). There is an important difference between our setup and the traditional insurance analysis. The latter is a problem of asymmetric information where one party is informed and the other is uninformed. In our setup, both parties are uninformed about the costs of different terms. This difference makes the traditional solutions to this problem unworkable in our setting. There also is an equally extensive literature on the opposite problem, the one that consumers face when they are unable to distinguish between "good" and "bad" products, while firms are informed (Schwartz and Wilde, 1979; Priest, 1981). We do not deal with these issues in the present article.

[19] For an early recognition of this problem see Alan Schwartz & Louis Wilde, *Imperfect Information in Markets for Contract Terms: The Examples of Warranties and Security Interests*, 69 VIRGINIA L. REV. 1387 (1983).

of product warranties even when it can price discriminate among consumers. The intuition is that the monopolist will tend to cater to the interests of the marginal consumer, which is typically not representative of the population of consumers. Therefore, the possibility to learn may also alter the behavior of price-discriminating firms. By abstracting from price discrimination, we zero in on the important details of the analysis and offer insights that might be more generally applicable.

3.5.3. Uncertainty about value versus uncertainty about costs

One of the building blocks of our model is that the value of offering particular terms is known while its costs are not. While there is nothing in our learning mechanism that hinges upon this assumption—and hence the analysis would carry on unchanged if we reversed it—uncertainty about value would introduce additional complications into the model because value is known to consumers. If value is uncertain, the firm can learn about it from the purchasing behavior of consumers in response to the particular contract that the firm offers. However, the firm would observe if (or how many) consumers are willing to buy for a certain price irrespective of the terms offered. Hence, with uncertain valuations, all terms would be reclassified as symmetric learning terms. In reality, firms may be somewhat uncertain both about costs and about value. Our analysis implies that firms will use the kind of experiential learning we describe to learn about costs and will gather information about value by experimenting with the price or through other channels.

3.5.4. Many ways to opt out and continuous learning

The model only considers one alternative to the default option, while in reality there may be many. With many alternatives to the default term, the firm not only faces a decision of whether to opt out but it also has to choose among many possible terms, each of them with possibly different feedback mechanisms. Learning in this context becomes more complex and may bring about interesting interactions. After learning that, say, alternative I has high costs, the firm may decide to switch back to the default or to start experimenting with, say, alternative II, and so forth. Moreover, while we allow only one learning period, in reality the firm might learn continuously and be able to switch between one term and the other at several time periods, possibly going back to terms it had discarded in the past. This more general approach would be close to a version of the well-known "multi-armed bandit problem" in probability theory (Lai and Robbins, 1985). While there is a large literature on problems of strategic experimentation, to the best of our knowledge this literature has not dealt with learning in contracts.

3.5.5. Endogenous investments in learning

In the model, we take the probability of learning to be exogenous. However, the firm might be in control of these probabilities by, for instance, deciding to experiment with a term on a subset of its consumers. By doing so, the firm may reduce short-term losses in exchange for a reduced

probability of learning (because of more limited feedback). While this is an interesting extension of our model it is unlikely to affect our results: after the firm has set (λ^D, λ^O) our model would carry on virtually unchanged. In addition, the extent to which firms can treat similar consumers differently is limited both by law and by reputational concerns.

3.5.6. Reasons not to revise a term after learning

The theoretical framework presented above focuses on learning direct costs, but the choice of terms can generate other forms of learning that affect contractual choices at a later stage. Consider, for example, a retailer that sells products manufactured by a number of suppliers and is uncertain about the quality of the products of each supplier. Offering a secondary warranty to consumers could be a way to obtain feedback on the quality of the firm's suppliers. If the product breaks down frequently, the firm learns that its supplier delivers low-quality products. The interesting implication is that, in this case, the firm's response to learning is a change of supplier rather than a change of term. The firm may want to keep offering the warranty in order to learn about the new supplier. We do not elaborate on this alternative learning motive but we stress that this is also a form of experiential learning. Conversely, a choice of law clause may or may not be desirable depending on whether it lowers or raises the costs of litigating a case in court for the firm depending on unknown factors, determining whether the firm faces high or low costs. Learning about these costs may induce the firm to amend the clause at a later time. Our analysis applies to these cases.

4. EMPIRICAL ANALYSIS

We now put our theory to bear on the contractual choices made by real firms. We first derive empirically testable predictions from our theory. Next, we present our dataset and empirical results.

4.1. Empirical implications of the theory

While it is difficult to disentangle empirically the reasons behind firms' adoption of terms in an initial period (given the multitude of factors likely affecting such decisions, many of which are hard to measure), examining firms' decisions to revise such terms at a later period can offer some interesting insights regarding possible drivers of contractual choice. We explore learning from previous contractual choices against the attractiveness and stickiness of default terms. Limitations in data availability allow us to test only a subset of the model's predictions following from Propositions 1 to 5, which we restate below.

Prediction 1. The probability that a firm will amend an asymmetric-learning term at time 1 is

higher if the firm has chosen the learning mode at time 0.

The firm's decision to revise an asymmetric-learning term is largely affected by the firm's choice at time 0. Adopting a term in its learning mode at an initial period allows the firm to re-evaluate past contractual choices and amend them if new information suggests that a different choice is more advantageous. Prediction 1 also identifies a mechanism by which "black holes" could come about. If the firm has chosen a nonlearning mode at time 0, it will not see new information and might fail to revise the term in question at time 1. Inefficient or meaningless terms might survive due to the asymmetric nature of learning. In contrast, firms adopting the learning mode of the same term at time 0 stay away from them. Such "black holes" or pockets of inefficiency might affect only a portion of the firms in the market, especially when other learning channels play weak roles.

Prediction 2. The probability that a firm will amend a symmetric-learning term at time 1 does not depend on the term chosen at time 0.

Contrary to asymmetric-learning terms, here the firm's initial choice does not affect the firm's propensity to revise the term. For these terms, experiential learning, or learning from other channels, occurs (or not) irrespective of the contractual choice at time 0. If the firm learns from experience, learning will occur symmetrically from both the default and the opt-out option. We should observe revisions motivated by experience as well as other learning modes in this case but such revisions should be equally likely for firms that adopted the default and for firms that opted out of it at time 0. The same is true for when the firms learns from other means. Revisions of the term at a later date will be uncorrelated with the contractual choices made during the earlier period.

Prediction 3. If default terms are inefficiently often chosen at time 0, default terms will be amended more frequently than non-default terms if they offer an opportunity to learn.

Default contractual terms have long been recognized as important determinants of contractual choice. Implications of this observation come in two guises. On the one hand, if default terms are more frequently chosen, this could apply both at time 0 and at time 1. If, however, the choice of a term is largely determined by the term being a default, default choices at time 0 are more likely to result in inefficient outcomes. We anticipate that such defaults will be more likely to be amended at time 1 if the firm has had an opportunity to learn in the meantime. This effect should be visible both in symmetric and in asymmetric-learning terms. In the symmetric ones, the learning terms will be revised at time 1 more often towards the opt-out option if the default was inefficiently chosen at time 0. In asymmetric-learning terms, revision should be more frequent when the default is the learning mode than when it is the nonlearning mode.

Both implications point to an important role of default contractual terms in determining firm choices going forward. If this is the case, switches at time 1 should be largely explained by the fact that a term is a default. This prediction will allow us to contrast defaults to learning as

alternative explanations for change in standard form contracts. We turn to the empirical analysis in the next section.

4.2. Data and methodology

We test our hypotheses using a sample of software license agreements governing the use of pre-packaged software. End-User License Agreements (EULAs) typically present a rich set of standard terms; while the terms typically vary both across and within markets, EULAs follow a predictable structure (Marotta-Wurgler). This allows for meaningful comparisons across contracts. We examine the rate of change of terms from 2003 to 2010 in accordance with sellers' opportunity to learn from their presence or absence.

We use the sample of EULAs introduced by Marotta-Wurgler and Taylor (2013), which tracks the changes in the terms of EULAs found in typical "prepackaged" (i.e., non-customized) software products and compare their content in 2003 and 2010. That study examined the change in 32 EULA terms from 246 firms that sell their software on their corporate Internet sites, including large, well-known, software publishers, as well as smaller companies. For each of the companies, the dataset includes a representative product along with data on various market, product, company characteristics, and of course, the EULA both in 2003 and in 2010.

For each EULA in each period, we tabulate the presence of 32 standard terms across seven categories of related terms, such as scope, warranties, limitations of damages, etc. We further classify each term into categories reflecting the extent to which offering a given term gives sellers an opportunity to learn directly from experience, either symmetrically or asymmetrically. We also take account of other factors that might affect firms' decisions to revise terms at a later time, such as their size, age, and whether they have in-house counsel.

4.2.1. Summary statistics

Table 4 presents summary statistics. Panel A reports company characteristics for the sample firms. Average revenue in 2003 was $287.5 million and the median was $1.7 million. Average and median revenue in 2010 were $539.1 million and $2.2 million, respectively. The percentage of public companies grew from 11% in 2003 to 14% in 2010.

The sample includes data on legal sophistication in 2010, proxied by firms' choice of legal advice, including whether they have in-house counsel, at least one internal lawyer, or routinely hire outside counsel. All public companies are assumed to receive sophisticated legal advice. In total, 74% of firms for which these data were available received relatively intensive legal advice, which might affect firms' propensity to revise terms at a later date.

Panel B lists product and market characteristics in 2003 and 2010. The average price of the products in the sample was $812 in 2003 and $841 in 2010. Thirty-six percent of the products are oriented toward consumers or small home businesses, rather than large businesses. One percent of

the products in the sample were discontinued, but the company used the same EULA for all their products in 2003 and 2010. Save for some update, the products and their functions were essentially the same at the beginning and the end of the period. Firms are classified firms into 114 distinct software markets, as classified by Amazon.com, the largest Internet software retailer.[20]

Panel C reports contract characteristics. We first record whether at least one of the thirty-two terms we track was revised in any way during the sample period. Of the entire sample, 40% of contracts changed at least one substantive term. Of the 103 contracts that had at least one change (39% of 264), change was limited to one or two terms, but a few firms changed their contracts significantly, including some that changed more than ten terms. Contract length increase, from 1,517 words in 2003 to 1,938 in 2010, or an average of 27 percent. The median word increase in contracts with no material changes was one word, whereas the median word increase in the EULAs with material changes was 435 words.

4.2.2. Classifying symmetric and asymmetric-learning terms

We classify the 32 terms into four categories that reflect drafters' opportunity to learn from experience. Each term is described in detail in Marotta-Wurgler and Taylor (2013) and its presence is measured against the benchmark of the default rules of Article 2 of the Uniform Commercial Code. We note if a term matches the default rule provided in Article 2 (given that such rules would fill any gaps to the extent a contract is silent on a given issue) and if a term deviates or opts-out of such default rule. A contract can adopt the default rule either by including a term that matches such rule or by remaining silent. These classifications are outlined in Table 3.

Not all terms give sellers the same opportunities to learn from direct experience. The first column of Table 3, labelled "Learning Category," reports how we classify each term depending on whether some terms allow for symmetric learning (or failure to learn), whether directly or indirectly, or whether learning is asymmetrically tied to the seller adopting the default rule or opting out of it. A further explanation of the reasons behind the learning classification of each term is in the Appendix. As noted earlier, symmetric learning terms might allow firms to learn about the cost of offering such terms from experience under all modalities of the term or under none of them. Sometimes learning from experience is not the most direct form of learning for a particular term. The mechanism by which sellers learn, whichever it may be, will not depend on the initial choice on a particular mode of the term.

The table labels such terms as "S"—i.e., symmetric learning. We identify fourteen such terms, including the one described above. One term in this group relates to limitations on transfers. Sellers might consider revising the scope of this right by evaluating consumer demand, by studying

[20] These markets are very finely defined and can be grouped into larger, more general, markets. For example, Amazon defines one market as "Office Suites," which is included in a larger market labelled "Business and Office." For a detailed account of these variables and the methodology used, see Florencia Marotta-Wurgler, *Competition and the Quality of Standard Form Contracts*, 5 J. EMPIRICAL LEGAL STUD. 447, 457–67 (2008).

what competitors do, or through direct feedback from consumers related to their transfer rights preferences, whichever those are at an initial period. Two terms in this group are related to dispute resolution: the seller gets to experience whether the chosen law (or the failure to offer one) or whether who pays for attorneys' fees is optimal. Another allows the seller to disable the software remotely in case the buyer breaches. Again, regardless of its mode, a seller learns whether it is desirable to have such a clause (assuming it is feasible for the seller to offer it) whenever the seller experiences a buyer breach. Additional terms, where the seller may or may not learn from experience in all term modalities, include: a term notifying the consumer that the product can be returned if she declines terms; one "change of terms" clause that allows the seller to unilaterally amend the contract; one term noting whether the licensed product includes updates or upgrades; one term delineating the scope of the use rights granted by limiting the buyer's ability to modify or alter the program; three terms explaining whether there are transfer limitations or other license grant restrictions; one noting whether the disclaimer is in caps or otherwise conspicuously presented (this is not a term *per se*, but one that tracks a requirement under Magnuson Moss Warranty Act); two terms related to the rights of third parties; and one term informing consumers of their statutory rights outside the contract.

We now turn to asymmetric experiential learning clauses, labeled as "A". We separate these terms into those where sellers learn by direct experience only when they opt out of the default (or "A(O)") and when then they learn only when they adopt the default (or "A(D)"). Narrowing the classifications in this manner allows us to examine the relative attractiveness of default rules. There are no default express warranties, so the seller learns only by opting out of the default. We identify five such clauses. These include: one term allowing the drafter to install software to monitor users' activities, three tracking whether the seller offers limited or full warranties, and one tracking whether the software includes maintenance and support services (here, the sellers is not obligated to do so unless this is promised in the contract; such promise exposes the seller to consumer demands).

In contrast, if the seller offers default implied warranties, it might learn the value of such offering. In this case, adopting the default allows the seller to learn. We find twelve such terms. These include two clauses allowing the buyer to create derivative works and reverse engineering (which are allowed under intellectual property law), a choice of forum clause (where the seller learns the costs of not providing one if sued in inconvenient forum), as well as nine clauses disclaiming implied warranties, various risks, or damages.

For each term and category of term, Table 3 reports the mean opt-out from the relevant default rules in both 2003 and 2010, as well as the mean change during the sample period. For example, in 2003, 55.3 percent of firms included a term capping damages at less or equal the purchase price, a term we classify as A(D)—which our hypothesis predicts sellers would be more likely to revise in the later period if they offer the learning mode of the term. This number decreased slightly in 2010, to 51.9 percent of firms choosing to opt out of the default rules. The

difference of 3.4 percent, while small, is statistically significant at the 10% level.

4.3. Analysis

We now explore the extent to which the changes reported in Table 3 are more likely depending on the initial choice of terms as well as when sellers have an opportunity to learn. The nature of our data prevents us from making any inferences regarding the initial choice of terms, as these are also likely the result of past contractual choices. We can, however, measure the extent to which default rules are predominantly chosen and measure the extent to which these are revised in a later period. Panel A in Table 7 begins by exploring the stickiness of default rules in the data by reporting the extent to which sellers chose to match the default rules of the UCC at the initial period as well as the probability of revising a term given their initial mode in the previous period. The top right figure shows that among 32 terms in total, and 8,448 EULA-term observations, 30.8% of all terms in 2003 were at the opt-out value, whereas the remainder, or 69.2%, matched the default rules, indicating a strong gravitational pull towards the default previously identified in the literature.

Yet default terms are not set in stone. In 2010, the fraction of terms that match the default decreased to 66.7%. Indeed, 65.3% of all terms were at default values in both 2003 and 2010, but 3.9% were at default values in 2003 and opted out in 2010. In terms of probabilities, the right panel shows that the probability of changing a term in 2010 given that a term was in an opt-out and default value in 2003 was 0.045 and 0.056, respectively. The 0.011 difference is statistically significant at the 5% level. While terms are more likely to begin at the default, the probability that they will be revised at a later period is larger if the term starts at the default, offering support to the known view that sellers might be inefficiently choosing default terms in the initial period due to opt-out costs.

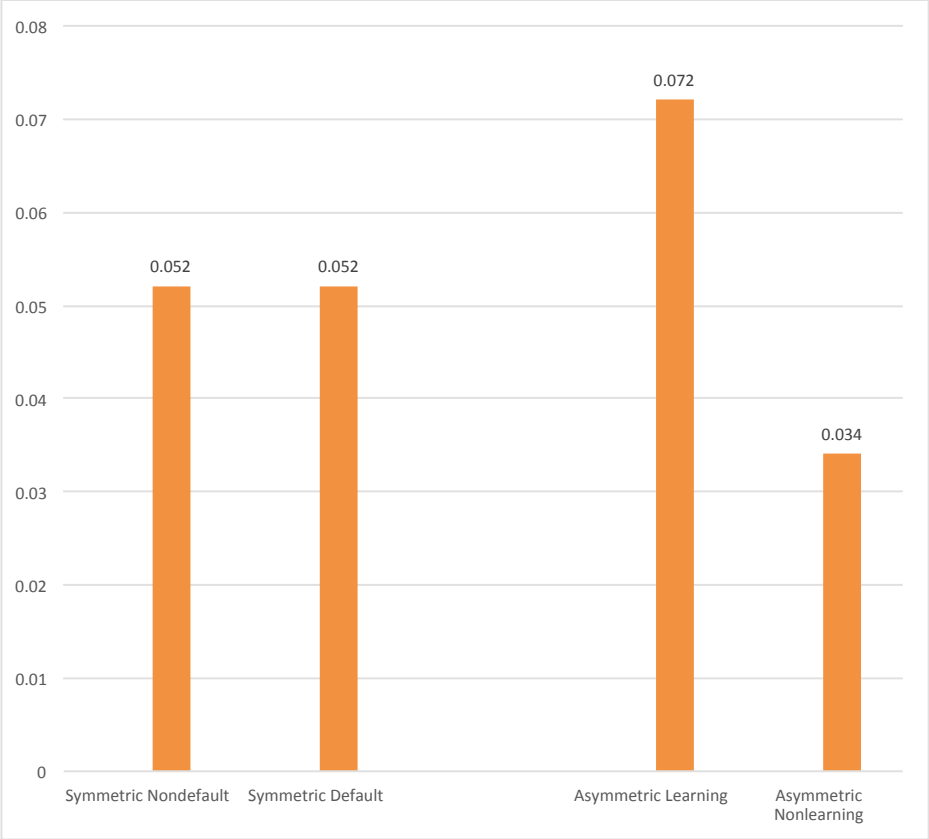
With this baseline in mind, we test predictions 1 and 2 by dividing the data into whether the term generates symmetric or asymmetric experiential learning opportunities. Panel B presents data on symmetric learning. As noted earlier, sellers might be learning about these terms through other means, independent from experience and irrespective of whether the term matches the default rule or not. We have no a priori hypotheses as to how these additional sources may inform sellers. For our purposes, all we care is to know whether change is more likely to be associated with one mode of the term or the other.

The results show that, again, defaults are powerful determinants of contract terms in the initial period. In this case 75% of symmetric terms match the default rule in 2003, only to change to 72.4% in 2010, indicating some change away from defaults. More interesting for our purposes, however, is the probability of change conditional on the starting point. Recall that we predicted that the starting point for these types of clauses would be a poor predictor of change. In fact, the probability of changing a term is precisely the same, or 5.2% depending on where the term is in 2003.

Contrast this with Panel C, the results for asymmetric terms. In 2003, 64.2% of all such terms matched the default rules of the UCC, a number that shrank to 61.8% in 2010. The right panel shows that the probability of change for terms that matched the default in 2003 is 6.1%, in contrast to 4.2% for non-defaults. The difference is significant at the 5% level. Even for the asymmetric learning clauses—and consistent with the findings in Panel A examining all terms—terms are more likely to be revised when they start at the default rule, regardless of the learning mode.

Once we divide asymmetric terms up into their learning modalities, a new picture emerges, as seen in the bottom panel of Panel C. In 2003, asymmetric terms are included in their learning and nonlearning modalities about equally. However, and in contrast to the symmetric terms, where the probability of changing a term was independent of the original allocation of the term between default and nondefault, in the asymmetric scenario, the original learning mode matters. The probability of changing a term given that the 2003 contract included such term in its learning mode is 0.072, in sharp contrast to the 0.034 that occurs when the term is not in its learning mode. They also support the prediction that asymmetric learning terms adopted in their learning mode at an initial stage are more likely to be revised than symmetric learning terms (7.2% vs. 5.2%, respectively); while the reverse is true for asymmetric learning terms adopted in their non-learning mode at the initial stage (with a 3.2% revision probability). The findings support the basic prediction that opportunity to learn helps explain contractual change and innovation. That being said, while the findings are consistent with our theoretical predictions, observational data can never prove that learning is one of the causes of changes in terms. Future work could complement the large-sample evidence with case studies and interviews with general counsel to give a nuanced, descriptive view of why standard terms change over time.

Figure 2. Probability of Term Change



These findings are illustrated in Figure 2. The left bars show the probability of change conditional on their 2003 starting point (default versus opt-out). The bars are the same height, consistent with the mode of the term conferring no consistent learning advantage. Contrast this to the bars on the right. Change is more likely to happen if the terms are switched on their experiential learning modes in 2003, as opposed to their nonlearning mode.

Table 5 reports ordinary least squares regressions including company, product, and market control variables. The first column just repeats the results from the bottom of Panel C of Table 4. The second column adds firm (contract) fixed effects, controlling for the overall propensity of a given contract to change. The fact that the coefficient on learning does not budge indicates that there is not a tendency for some firms to make wholesale changes to their policies, including their learning terms; a given learning term is equally likely to change "within" a contract whether the same firm is changing many or few other terms. The third and fourth columns show that the probability of changing away from a term at the default in 2003 is robust to the overall propensity to change the contract, but the effect is only half that of the probability of changing the term as a function of the term's learning status, and is a distinct effect.[21] Logit regressions yield very similar

[21] The terms more likely to change when set in their learning modes are those that address the buyer's ability to reverse engineer the product, and those that determine the sellers' implied warranty obligations and liability for consequential damages of the buyer (unreported).

results and are omitted for brevity.

The last two columns add a variety of potentially interesting control variables, but with no effect on the learning coefficient of interest. Note that fixed effects cannot be included here because the variables do not vary within a given contract. We see that multi-user licenses are less likely to change. One hypothesis, which we cannot test, is that such licenses were, in general, given more thought in the first place. It also appears that when the firm is selling increasingly expensive products, its contract terms are more likely to change. Finally, the presence of lawyers is associated with change, suggesting that lawyers might be part of the mechanism by which experiential knowledge generates change in standard terms.

Table 6 presents some refinements by dividing asymmetric terms into whether the learning mode is at the default or at opt out. It repeats the exercise in Table 4 and reveals that, when learning occurs by keeping the default, firms are more likely to include the term at the initial period (59.9%, as compared to 40.1%, as seen in the left portion of Panel A). This is not the case for when learning occurs at opt out (where only 25.5% of such terms are operationalized in their learning mode), as noted in Panel B. The latter might be the result of the stickiness of defaults. Change in the later period, however, is more likely when terms are set in their learning mode in their initial period, regardless of whether learning occurs at the default or at opt-out, consistent with our prediction. The right hand of Panel A shows that when learning occurs at the default, terms that were offered in their learning mode in 2003 had a 7.3% probability to change, compared to 3.2% of terms that were in their nonlearning mode. The difference is significant at the 1% level. The same is true for terms where learning occurs from opt-out. These are 7.1% likely to change when offered in their learning mode, compared to 3.5% when they are not. Again, the results are highly statistically significant. Note that the results in Panel A support Prediction 3, which states that terms are more likely to be revised from inefficiently chosen defaults when such defaults carry and opportunity to learn.

4.4. Discussion

While the stickiness of default rules is apparent from the findings, the results support the hypothesis that learning plays a role in how standard form contract terms change over time. Our study focuses on a particular setting—consumer EULAs—, but the learning mechanism we present could be present and examined in other markets and settings, involving other types of contracting parties. For example, we would expect to observe even more experiential learning in insurance markets, given the nature of the terms and the stakes at issue.[22]

Of course, there are competing hypotheses that could explain the desire to revise terms, such as opting out of defaults. After all, defaults may be chosen because firms are unaware about a term

[22] A recent study of Terms and Conditions in online dating sites also finds support for this hypothesis. Eisenberg, Swipe Right for Love (and Liability, Licensing, and Limits on User Behavior): Change and Innovation in Dating Application Terms of Service (unpublished draft, 2018)).

and might revise them because they become aware of it later. Also, default terms tend to benefit consumers, so sellers might revise as a way to allocate part of the surplus to themselves. Assuming all (or most) default terms benefit consumers relative to the opt-out, then we would expect a shift away from *all* defaults with the same frequency. Yet we don't see this (unreported). Rather, it's those defaults that carry an opportunity to learn those that get revised more frequently. Defaults that possess different learning modalities also tend to benefit consumers (e.g., a contract without a choice of law clause gives consumers more options in where to bring suit; similarly, a contract that doesn't include restrictions on the consumer's ability to modify the software is also more beneficial to consumers, all else equal). Yet only those that carry an opportunity to learn are more likely to be revised. Of course, both motivations could co-exist. Sellers could be opting out of consumer-friendly defaults with the motive of drafting more self-serving contracts, but also be more likely to revise those terms and term modalities that are associated with learning.

There are alternative hypotheses that could explain change as well. The changes we observe could, in theory, be explained by a general trend to revise terms in a particular direction. Yet we established earlier that experiential learning had its own effect despite general tendencies to revise a contract. Or sellers offering terms to learn about a supplier's reliability would respond by switching suppliers and not necessarily terms. This could be the case, and it would work against finding any changes in the contract. Finally, a note on learning. It would be natural to expect in many cases for experiential learning to be sequential, where sellers learn by trial and error with different iterations. Our findings are consistent with this version of learning as well.

Our theory and findings suggest that, to the extent that having an opportunity to learn from direct experience with consumers encourages contracting parties to revise their terms in ways the increase the benefits from the contract. Some normative implications arise, which we will explore in more detail in future work. First, law makers' deciding whether to create or modify default rules (e.g., in the context of revising Articles or provisions of the U.C.C) might want to factor the extent to which certain default rules allow for experiential learning, especially when default rules are sticky. All else equal, it might be more desirable to adopt defaults that carry an opportunity to learn. Second, when learning occurs by opting out of the default, the stickiness inherent (and oftentimes built up) in default rules hampers learning. This offers an additional reason for not making default rules sticky in these particular circumstances.[23] Finally, experiential learning weighs against the implementation of mandatory rules, which are more common in the European Union, since, all else equal, these never allow learning.

[23] See Schwartz, Alan, and Robert E. Scott, *The Common Law of Contract and the Default Rule Project,* 102 Va. L. Rev. 1523, 1566-68 (2016) (offering a critique of projects of law reform that seek to establish contract default rules and discussing the problems with the creation of such default rules).

5. CONCLUSION

Standard form contracts include terms that may benefit consumers and generate costs for the firm in ways that are not perfectly predictable at the outset. Adopting a contract term is often akin to experimentation: the firm may accept the risk of short-term losses in order to learn the net value of the term and take a better-informed decision in the future. Yet, only some terms offer an opportunity to learn and may do so in different ways.

We have introduced a distinction between two main categories of terms: symmetric-learning terms are terms that offer symmetric opportunities to learn experientally to firms that adopt them and to firms that do not adopt them; asymmetric-learning terms are those that offer an opportunity to learn either to adopting firms or to non-adopting firms, but not to both. Exploiting differences in the way firms learn from their contractual choices, we have built a theory of experiential learning in standard form contracts. The theory predicts that firms will be more likely to revise terms that offer an opportunity to learn and might fail to revise terms that do not offer such an opportunity. Through this lens, we have examined and classified the terms included in the End User Software License Agreements (EULAs) by a sample of 264 firms across 114 different software markets in 2003 and in 2010. We found that learning opportunities are a determinant of change, overcoming the stickiness of defaults. When such opportunities are absent, terms may survive long enough to appear obsolete and out of touch with the rest of the contract.

The analysis we present in this article opens, we hope, interesting avenues for further theoretical and empirical inquiry. To our knowledge, we are the first to identify the learning modalities of different terms and to draw conclusions for contractual choices. Yet, we use a rather rigid, binary classification that does not allow us to distinguish modalities that imply more or less learning. Further research could provide interesting insights into the learning potential of different terms: which terms allow firms to learn the most? Learning also occurs through different channels, as we have emphasized. Understanding how these interact, as well as how new technology affects the way in which firms learn, are important questions that are the subject of future work.

Our analysis focuses on learning from direct experience and we have stressed the firm's behavior in response to information about the costs of offering certain clauses.[24] In general, such learning is beneficial because it allows the firm to offer terms that maximize the value of consumer contracts. This observation speaks against the stickiness of default terms: defaults should not be sticky because stickiness distorts the process of learning and prevents firms from opting out of a default terms in cases in which this choice would otherwise be optimal. From a normative viewpoint, the law should make contractual choices as neutral as possible as leveraging on the attractiveness of default provisions comes with a possibly high cost.

[24] We recognize that firms may also experiment ways in which they could exploit consumers. There is a large literature about this and similar problems and we do not examine it here.

5.1. Tables

Table 2. Company, Product, Market, and Contract Characteristics

	Obs	Mean	SD	Min	Median	Max
Panel A. Company Characteristics						
Revenue 2003 ($000)	259	287,499	2,490,751	30	1700	36,800,000
Revenue 2010 ($000)	259	539,091	4,225,384	90	2200	60,400,000
Change Revenue ($)	254	256,679	1,917,968	-723,200	111.5	23,600,000
Change Revenue (%)	254	226	627	-90	24.08	5000
Public 2003	264	0.11	0.32	0	0	1
Public 2010	264	0.14	0.35	0	0	1
Age 2003 (Yrs)	264	13.62	8.01	0	13	68
Age 2010 (Yrs)	264	20.62	8.01	7	20	75
Lawyers	118	0.74	0.44	0	1	1
Pro-Consumer State	264	0.32	0.61	-1	0	1
Panel B. Product and Market Characteristics						
Trial 2003	264	0.73	0.45	0	1	1
Trial 2010	264	0.77	0.42	0	1	1
Median Price 2003 ($)	264	812	1,310	14.99	360	12,000
Median Price 2010 ($)	256	841	1,686	8.99	350	20,995
Consumer Product	264	0.36	0.48	0	0	1
Multi-User License	264	0.08	0.28	0	0	1
Developer License	264	0.08	0.27	0	0	1
H-H Index	236	0.37	0.24	.065	.30	1
Panel C. Contract Characteristics						
Any Terms Changed	264	0.39	0.49	0	0	1
Number of Words 2003	264	1,517	1,365	33	1,152	8,406
Number of Words 2010	262	1,938	2,077	106	1,354	13,416

Table 3. EULA Terms and Bias: 2003 vs. 2010

EULA terms are classified into 32 common terms that allocate rights and risks between buyers and sellers across seven categories of related terms, according to the degree the terms either match the default rules of UCC Article 2 (Adoption of Default = 0) or deviate from them (Opt-out= 1). "Learning Category" refers to the type and mode that allows sellers to learn from a term. Terms allow for symmetric learning, denoted S, when learning occurs or not regardless of the mode of the term. Some terms allow for asymmetric learning, allowing sellers to learn as long as the mode adopted enables learning. Terms that enable learning when the seller adopts the default rule but not otherwise are denoted A (D) (i.e., asymmetric learning by adopting the default). Terms that enable learning when the seller opts out of the default are denoted A (O) (i.e., asymmetric learning by opting out of the default). The table reports the mean opt-out of UCC Article 2 default in 2003 and 2010, as well as the mean change and statistical significance. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Learning Category	**Category and Term**	**Adoption of Default=0 Opt-out=1**	**Mean 2010 (SD)**	**Mean 2003 (SD)**	**Mean Change (SE)**
	Acceptance	1 = yes 0 = no	**0.458** **(0.499)**	**0.470** **(0.500)**	**0.011** **(0.022)**
S	Does license alert consumer that product can be returned if she declines terms?				
	Modification and Termination		**0.227** **(0.539)**	**0.167** **(0.439)**	**0.061***** **(0.021)**
S	Are license's terms subject to change?	0 = no 1 = yes	0.106 (0.309)	0.076 (0.265)	0.030** (0.012)
S	Does license allow licensor to disable the software remotely if licensee breaches any EULA terms, according to licensor?	0 = no 1 = yes	0.121 (0.327)	0.091 (0.288)	0.030** (0.013)
	Scope		**1.792** **(1.169)**	**1.659** **(1.162)**	**0.133***** **(0.046)**
S	Does definition of "licensed software" include regular updates such as enhancements, versions, releases, etc.?	1 = yes 0 = no or no mention	0.170 (0.377)	0.136 (0.344)	0.034** (0.015)
S	Can licensee alter/modify the program?	0 = yes or no mention 1 = no	0.640 (0.481)	0.598 (0.491)	0.042*** (0.015)
A (D)	Can licensee create derivative works?	0 = largely unrestricted or no mention	0.379	0.352	0.027*

		1 = strict prohibition, derivative works owned by licensor, or need permission of licensor	(0.486)	(0.479)	(0.015)
A (D)	Does license prohibit reverse engineering of the software?	0 = no or no mention 1 = yes	0.716 (0.452)	0.663 (0.474)	0.053*** (0.017)
S	Are there license grant restrictions?	0 = no or no mention 1 = yes (e.g., for business tgbnhoriented products, "for business purposes" or "internal purposes only" language; for consumer-oriented products, restrictions on commercial use)	0.227 (0.420)	0.182 (0.386)	0.045*** (0.018)
	Information Collection		**0.117** **(0.367)**	**0.061** **(0.269)**	**0.057*** **(0.017)**
S	Does license allow licensor to collect and /or distribute licensee's personally identifiable information?	0 = no or no mention 1 = yes	0.102 (0.304)	0.053 (0.225)	0.049*** (0.014)
A (O)	Does license allow licensor to install software that will track licensee's activity?	0 = no or no mention 1= yes	0.015 (0.122)	0.008 (0.087)	0.008 (0.005)
	Transfer		**1.466** **(0.584)**	**1.394** **(0.595)**	**0.072*** **(0.021)**
S	Are there limitations on transfer?	0 = no or no mention 1 = some or full restrictions (licensee cannot assign, transfer, lease, sublicense, distribute, etc.; or, needs written consent of licensor)	0.955 (0.209)	0.943 (0.232)	0.011* (0.007)
S	Can licensee transfer the software to an end user who accepts the license terms without licensor's prior permission?	0 = yes or no mention 1 = no	0.511 (0.501)	0.451 (0.499)	0.061*** (0.017)
	Warranties and Disclaimers		**0.871** **(0.994)**	**0.875** **(0.973)**	**0.004** **(0.028)**
A (O)	Are there express warranties?	1 = yes 0 = no	0.042 (0.200)	0.042 (0.200)	0.000 (0.005)

A (O)	Is there a limited warranty stating that software is free from defects in materials and workmanship or that the software will work according manual specifications in force for a limited period?	1 = yes 0 = no	0.311 (0.464)	0.295 (0.457)	0.015 (0.017)
A (O)	Is there a limited warranty stating that the media of software distribution and documentation are free from defects in force for a limited period?	1 = yes 0 = no	0.280 (0.450)	0.269 (0.444)	0.011 (0.017)
S	Is the disclaimer in caps, bold, or otherwise conspicuously presented?	0 = yes or no disclaimers appear 1 = no	0.231 (0.422)	0.261 (0.440)	0.030** (0.013)
A (D)	Disclaims IWM and IWFPP or contains "AS IS" language?	0 = no 1 = yes	0.913 (0.283)	0.890 (0.313)	0.023** (0.009)
A (D)	Disclaims warranty that software will not infringe on third parties' intellectual property rights?	0 = no 1 = yes	0.360 (0.481)	0.330 (0.471)	0.030** (0.014)
	Limitations on Liability		**2.413** **(1.221)**	**2.273** **(1.187)**	**0.140*** **(0.047)**
A (D)	Who bears the risk of loss?	0 = licensor, for losses caused by factors under licensor's control, or no mention 1 = licensee	0.167 (0.373)	0.152 (0.359)	0.015 (0.012)
A (D)	Who bears the performance risk?	0 = licensor (for causes under licensor's control), or no mention, or licensee (for uses expressly forbidden by licensor) 1 = licensee (language "licensee assumes responsibility of choice of product and functions," etc)	0.299 (0.459)	0.277 (0.448)	0.023 (0.015)
A (D)	Disclaims consequential, incidental, special, or foreseeable damages?	0 = no or no mention 1 = yes	0.924 (0.265)	0.902 (0.299)	0.023** (0.009)
A (D)	Are damages disclaimed under all theories of liability (contract, tort, strict liability)?	0 = no or no mention 1 = yes	0.299 (0.459)	0.273 (0.446)	0.027* (0.015)
A (D)	What is the limitation on damages?	0 = no mention or cap on damages greater than purchase price	0.553 (0.498)	0.519 (0.501)	0.034* (0.019)

		1 = cap on damages less than or equal to purchase price			
A (D)	Is there an indemnification term?	0 = no, no mention, or twoway indemnification 1 = indemnification by licensee	0.170 (0.377)	0.152 (0.359)	0.019 (0.015)
	Maintenance and Support	1 = yes 0 = no or no mention	**0.667** **(0.472)**	**0.663** **(0.474)**	**0.004** **(0.014)**
A (O)	Does base price include M&S for 31 days or more?				
	Conflict Resolution		**0.341** **(0.513)**	**0.284** **(0.476)**	**0.057*** **(0.019)**
A (D)	Forum specified?	0 = court, choice of licensee, or no mention 1 = specific court or mandatory arbitration	0.322 (0.468)	0.273 (0.446)	0.049*** (0.017)
S	Law specified?	0 = same as forum or no mention 1 = yes and different from forum	0.011 (0.106)	0.008 (0.087)	0.004 (0.004)
S	Who pays licensor's attorney fees?	0 = paid by losing party or no mention 1 = paid by licensee	0.008 (0.087)	0.004 (0.062)	0.004 (0.004)
	Third Parties		**0.216** **(0.574)**	**0.098** **(0.346)**	**0.117*** **(0.028)**
S	Does license require licensee agree to third party licenses or terms?	0 = no or no mention 1 = yes	0.121 (0.327)	0.064 (0.246)	0.057*** (0.015)
A (D)	Does license disclaim licensor's liability for any included third party software?	0 = no or no mention 1 = yes	0.080 (0.271)	0.034 (0.182)	0.045*** (0.015)
S	Does license allow licensor or third parties to install additional software?	0 = no or no mention 1 = yes	0.015 (0.122)	0.000 (0.000)	0.015** (0.008)
	Consumer Protection	1= yes, contract informs consumer about state law rights they may have	**0.473** **(0.500)**	**0.417** **(0.494)**	**0.057*** **(0.017)**
S	Does license inform licensee of statutory rights?	0= no or no mention			
	Total Mean Change				**0.583*** **(0.128)**

Table 4. Learning and Changing Terms

Fraction of terms that change between 2003 and 2010 depending on whether their 2003 values are at the default or, for asymmetric terms, at the learning value. In Panel A, for example, 29.4% of terms were at opt-out values in both 2003 and 2010 and 1.4% were at a opt-out value in 2003 and changed to a default value by 2010. The probability of a change for a term that was at a opt-out value in 2003 is 0.045 (0.014/0.308), while the probability of a change for a term that was at the default in 2003 is 0.056 (0.039/0.692), which is a statistically significant difference of -0.011. Asymmetric terms can also be at a learning or nonlearning value. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel A. All Terms (32 terms; 8,448 EULA-term observations)

		2010 term				
	(Fractions)	opt-out	default	total		
2003 term	opt-out	0.294	0.014	0.308	Prob(change | 2003 at opt-out)	0.045
	default	0.039	0.653	0.692	Prob(change | 2003 at default)	0.056
	total	0.333	0.667	1	difference	-0.011**

Panel B. Symmetric-learning terms (15 terms; 3,696 EULA-term observations)

		2010 term				
		opt-out	default	total		
2003 term	opt-out	0.238	0.013	0.251	Prob(change | 2003 at opt-out)	0.052
	default	0.039	0.711	0.750	Prob(change | 2003 at default)	0.052

total	0.277	0.724	1	difference	0

Panel C. Asymmetric-learning terms (17 terms; 4,752 policy-term observations)

		2010 term				
		opt-out	default	total		
2003 term	opt-out	0.344	0.015	0.359	Prob(change | 2003 at opt-out)	0.042
	default	0.039	0.603	0.642	Prob(change | 2003 at default)	0.061
	total	0.383	0.618	1	difference	-0.019**

		2010 term				
		learning	nonlearning	total		
2003 term	learning	0.461	0.036	0.497	Prob(change | 2003 at learning)	0.072
	nonlearning	0.017	0.485	0.502	Prob(change | 2003 at nonlearning)	0.034
	total	0.478	0.521	1	difference	0.038***

Table 5. *Learning and Changing Terms: Robustness*

The sample is asymmetric terms only in 264 contracts. Least squares regressions where the dependent variable is a 0-1 indicator that the term changed between 2003 and 2010. Learning means that the term was set at a learning value in 2003. Default means that the term was set at the default in 2003. Standard errors in parentheses are clustered by firm. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1) Change	(2) Change	(3) Change	(4) Change	(5) Change	(6) Change
Learning	0.0392***	0.0402***		0.0394***	0.0401***	0.0420**
	(0.00920)	(0.00801)		(0.00815)	(0.00984)	(0.0145)
Default			0.0187**	0.00204	0.0003	0.0138
			(0.00818)	(0.00831)	(0.00958)	(0.0152)
Multi-User License					-0.0417***	-0.0778***
					(0.0147)	(0.0173)
Developer License					-0.0104	-0.00121
					(0.0280)	(0.0328)
Ln Price					0.0103	0.0338**
					(0.00627)	(0.0128)
Change Ln Price					0.0497**	0.0647
					(0.0223)	(0.0404)
Consumer Product					0.00400	0.0376
					(0.0159)	(0.0265)
Ln Revenue					0.00393	-0.000247
					(0.00348)	(0.00564)
Change Ln Revenue					0.0219***	0.0290***
					(0.00662)	(0.0100)
Ln Age					0.00122	0.0142
					(0.0117)	(0.0214)
Lawyers						0.0611*
						(0.0329)
Pro-Consumer State					-0.00448	-0.0298
					(0.0110)	(0.0198)
H-H Index					0.0279	0.0217
					(0.0247)	(0.0377)
Constant	0.0337***	0.0332***	0.0412***	0.0323***	-0.0757	-0.246**
	(0.00533)	(0.00399)	(0.00525)	(0.00588)	(0.0507)	(0.0996)

Fixed Effects	None	Firm	Firm	Firm	None	None
Observations	4,488	4,488	4,488	4,488	3,791	1,751
Adjusted R^2	0.007	0.160	0.154	0.160	0.026	0.050

Table 6. Asymmetric Learning by Default vs. Opt-out

Rate of learning values chosen for asymmetric terms, where asymmetric terms are broken down into those where learning is by adoption of the default rules of UCC and those where learning is by opting-out of such default rules.

Panel A. Asymmetric-learning terms -- Learning from Defaults (12 terms; 3,168 EULA-term observations)

		2010 term				
		learning	nonlearning	total		
2003 term	learning	0.555	0.044	0.599	Prob(change | 2003 at learning)	0.073
	nonlearning	0.013	0.388	0.401	Prob(change | 2003 at nonlearning)	0.032
	total	0.568	0.432	1	difference	0.041***

Panel B. Asymmetric-learning terms -- Learning from Opt-out (5 terms; 1,320 EULA-term observations)

		2010 term				
		learning	nonlearning	total		
2003 term	learning	0.237	0.018	0.255	Prob(change | 2003 at learning)	0.071
	nonlearning	0.026	0.719	0.745	Prob(change | 2003 at nonlearning)	0.035
	total	0.263	0.737	1	difference	0.036***

Table 7. Asymmetric Learning by Default vs. Opt-out

Rate of learning values chosen for asymmetric terms, where asymmetric terms are broken down into those where learning is by adoption of the default rules of UCC and those where learning is by opting-out of such default rules.

Panel A. Asymmetric-learning terms -- Learning from Defaults (12 terms; 3,168 EULA-term observations)

		2010 term				
		learning	nonlearning	total		
2003 term	learning	0.555	0.044	0.599	Prob(change | 2003 at learning)	0.073
	nonlearning	0.013	0.388	0.401	Prob(change | 2003 at nonlearning)	0.032
	total	0.568	0.432	1	difference	0.041***

Panel B. Asymmetric-learning terms -- Learning from Opt-out (5 terms; 1,320 EULA-term observations)

		2010 term				
		learning	nonlearning	total		
2003 term	learning	0.237	0.018	0.255	Prob(change | 2003 at learning)	0.071
	nonlearning	0.026	0.719	0.745	Prob(change | 2003 at nonlearning)	0.035
	total	0.263	0.737	1	difference	0.036***

5.2. Term Classification

EULA terms are classified into 32 common terms that allocate rights and risks between buyers and sellers across seven categories of related terms, according to the degree the terms either match the default rules of UCC Article 2 (Adoption of Default = 0) or deviate from them (Opt-out= 1). "Learning Category" refers to the type and mode that allows sellers to learn from a term. Terms allow for symmetric learning, denoted S, when learning occurs or not regardless of the mode of the term. Some terms allow for asymmetric learning, allowing sellers to learn as long as the mode adopted enables learning. Terms that enable learning when the seller adopts the default rule but not otherwise are denoted A (D) (i.e., asymmetric learning by adopting the default). Terms that enable learning when the seller opts out of the default are denoted A (O) (i.e., asymmetric learning by opting out of the default). For each term, the Table reports the rationale support a particular experiential learning classification, as noted in the last column, "Classification Rationale."

Term #	**Learning Category**	**Term (t)**	**Classification Rationale**	**Learning (0=no; 1=yes)**
		Acceptance		
x_1	S	Does license alert consumer that product can be returned if she declines terms? 1=yes; 0=no	Notice term giving pure information to the consumer. Feedback about the value of such term is unlikely to arise from direct experience.	0
		Modification and Termination		
x_2	S	Are license's terms subject to change? 0=no; 1=yes	Term altering the process of contractual modification. Feedback about the value of such term is unlikely to arise from experience.	0
x_3	S	Does license allow licensor to disable the software if licensee breaches any EULA terms, according to licensor? 0=no; -1=yes	Clause makes enforcement of the contract easier. Feedback, through various means, can occur in either case.	1
		Scope		
x_4	S	Does definition of "licensed software" include updates, enhancements, versions, releases, patches, etc.? 1=yes;0=no mention/no	Feature likely linked to consumer preferences and market characteristics. Feedback occurs in either case, though not necessarily from experience.	0
x_5	S	Can licensee alter/modify the program? 0=yes or no mention; -=no	Feature likely linked to consumer preferences and market characteristics. Feedback occurs in either mode, though not necessarily from experience.	0

x_6	A (D)	Can licensee create derivative works? 0=largely unrestricted or no mention; 1= strict prohibition, derivative works owned by licensor, or need permission of licensor	Seller does not know value of derivative work for consumers. Prohibiting it hinders learning, while allowing it possibly also allows the seller to learn.	1 if t = 0
x_7	A (D)	Does license allow reverse engineering of the software? 0=yes 1=no	Seller might not know whether reverse engineering is possible, cost-effective and damaging for seller. Prohibiting it impairs learning.	1 if t = 0
x_8	S	Are there restrictions on use? 0=no or no mention; 1=yes (e.g., for business-oriented products, "for business purposes" or "internal purposes only", or "within the same building" language; for consumer-oriented products, restrictions on commercial use)	Feature likely linked to consumer preferences and market characteristics. Feedback occurs in either mode, though not necessarily from experience.	0
		Information Collection		
x_9	S	Does license allow licensor to collect and /or distribute licensee's information? 0=no/no mention 1=yes	Some feedback in either case. Seller will learn in the future whether collecting information gives him a competitive advantage or not-collecting information makes the product more appealing to consumers.	1
x_{10}	A (O)	Does license allow licensor to install software that will track licensee's activity? 0=no or no mention 1=yes	Seller learns the value of the clause of if allows to track activity (for enforcement purposes).	1 if t = 1
		Transfer		
x_{11}	S	Are there limitations on transfer? 0=no or no mention; 1=some or full restrictions (licensee cannot assign, transfer, lease, sublicense, distribute, etc.; or, needs written consent of licensor)	Feature likely linked to consumer preferences and market characteristics. Feedback occurs in either mode, though not necessarily from experience.	0

x_{12}	S	Can Licensee transfer the software if end user accepts license terms? 0=yes or no mention; 1=no	Feature likely linked to consumer preferences and market characteristics. Feedback occurs in either case, though not necessarily from experience.	0
		Warranties and Disclaimers		
x_{13}	A (O)	Are Express Warranties made? 1=yes; 0=no	Seller learns the value of the warranty only if warranty is included.	1 if t = 1
x_{14}	A (O)	Is there a limited warranty (e.g. stating that software is free from defects in materials and workmanship or that it will perform substantially in accordance to material documentation) in force for 31 days or more? 1=yes; 0=no	Seller learns the value of the warranty only if warranty is included.	1 if t = 1
x_{15}	A (O)	Is there a limited warranty stating that the media of software distribution and documentation are free from defects in force for 31 days or more? 1=yes; 0=no (RECORD AS #)	Seller learns the value of the warranty only if warranty is included.	1 if t = 1
x_{16}	S	Is the disclaimer in caps? 0=yes or no disclaimers appear; 1=no	Feature likely linked to consumer preferences and market characteristics. Feedback occurs in either case, though not necessarily from experience	0
x_{17}	A (D)	Disclaims IWM, EW, and IWFPP or contains "AS IS" language? 0=no; 1=yes	Seller learns the value of the warranty only if warranty is included.	1 if t = 0
x_{18}	A (D)	Disclaims warranty that software will not infringe on third parties' intellectual property rights? 0=no ;1=yes	Seller learns the value of the warranty only if warranty is included.	1 if t = 0
		Limitations on Liability		

x_{19}	A (D)	Who bears the risk of loss? 0=licensor, for losses caused by factors under licensor's control, or no mention; 1=licensee	Seller learns exposure to liability only if bears the loss.	1 if t = 0
x_{20}	A (D)	Who bears the performance risk? 0=licensor, for causes under licensor's control, or no mention, or licensee, for uses expressly forbidden by licensor; 1=licensee (language "licensee assumes responsibility of choice of product and functions, etc.)	Seller learns exposure to liability only if bears the loss.	1 if t = 0
x_{21}	A (D)	Disclaims incidental, consequential and special damages? 0=no or no mention; 1=yes	Seller learns exposure to liability only if there is no disclaimer.	1 if t = 0
x_{22}	A (D)	Are damages waived under all theories of liability (contract, tort, strict liability)? 0=no; 1=yes	Seller learns exposure to liability only if there is no waiver.	1 if t = 0
x_{23}	A (D)	What is the limitation on damages? 0=no mention or cap on damages greater than purchase price; 1=cap on damages less than or equal to purchase price	Seller learns exposure to liability only if there is no limitation.	1 if t = 0
x_{24}	A (D)	Is there an indemnification clause? 0=no, no mention, or two-way indemnification; 1=indemnification by licensee	Sellers from exposure by being liable for any infringement.	1 if t = 0
		Maintenance and Support		
x_{25}	A (O)	Does base price include M&S for 31 days or more?1=yes; 0=no or no mention	Seller learns only if M&S included.	1 if t = 1
		Conflict Resolution		
x_{26}	A (D)	Forum specified? 0=choice of licensee or no mention; 1=specific court or mandatory arbitration	Seller learns risks of non-specified forum only if no choice of forum is made.	1 if t = 0

x_{27}	S	Law specified? 0=same as forum or no mention; 1=yes and different from forum	Sellers receives feedback in either mode.	1
x_{28}	S	Who pays licensor's attorney fees? 0= paid by losing party or no mention; 1=paid by licensee	If there is litigation, seller learns anyway the costs.	1
		Third Parties		
x_{29}	S	Does license require licensee agree to third party licenses or terms? 0=no; 1=yes	Feature likely linked to consumer preferences and market characteristics. Feedback occurs in either case, though not necessarily from experience.	0
x_{30}	A (D)	Does license disclaim licensor's liability for any included third party software? 0=no - 1=yes	Seller learns exposure to liability only if there is no disclaimer.	1 if t = 0
x_{31}	S	Does license allow licensor or third parties to install additional software? 0=no; 1=yes	Feature likely linked to consumer preferences and market characteristics. Feedback occurs in either case, though not necessarily from experience.	0
		Consumer Protection		
x_{32}	S	Does license inform licensee of statutory rights? 0=no; 1=yes	Pure information term. Feedback occurs in either case, though not necessarily from experience.	0

6. APPENDIX

Proof of Proposition 1. The proposition implies that, if $\lambda^D > \lambda^O$, the default is chosen more often at time 0 as the difference $\lambda^D - \lambda^O$ increases. Since $F(p)$ increases monotonically in p, this is the case if p^* increases in λ^D and decreases in λ^O. Analogously, if $\lambda^D < \lambda^O$ the opt out is chosen more often at time 0 as the difference $\lambda^O - \lambda^D$ increases; this is the case if $1 - F(p^*)$ decreases in λ^D and increases in λ^O, which occurs, again, if p^* increases in λ^D and decreases in λ^O. Thus, it is enough to show that $\frac{\partial p^*}{\partial \lambda^D} > 0$ and $\frac{\partial p^*}{\partial \lambda^O} < 0$. We have:

$$\frac{\partial p^*}{\partial \lambda^D} = \frac{[w(c_H - v) - s][(1 + w - w\lambda^O)(v - c_L) + \lambda^O s]}{\left[(1 + w)(c_H - c_L) - \lambda^D[w(c_H - v) - s] - \lambda^O[w(v - c_L) - s]\right]^2}$$

The latter expression is positive if $s < w(c_H - v)$, that is, if switching costs are not so high as to prevent switching at time 1, which follows from Assumption 1. Similarly, we have:

$$\frac{\partial p^*}{\partial \lambda^O} = -\frac{[w(v - c_L) - s][(1 + w - w\lambda^D)(c_H - v) + \lambda^D s]}{\left[(1 + w)(c_H - c_L) - \lambda^D[w(c_H - v) - s] - \lambda^O[w(v - c_L) - s]\right]^2}$$

which is negative if $s < w(v - c_L)$ as we assume in Assumption 1. *Q.E.D.*

Proof of Proposition 2. The proposition implies that if $\lambda^D > \lambda^O$, there are more switches away from the default at time 1 as the difference $\lambda^D - \lambda^O$ increases; that is, it implies that $\Delta(p^*)$ increases as the difference $\lambda^D - \lambda^O$ increases. Note that $\Delta(p^*)$ increases in p^*. Proposition 1 shows that as the difference $\lambda^D - \lambda^O$ increases, then p^* increases, which implies that $\Delta(p^*)$ also increases. Conversely, the proposition also implies that if $\lambda^D < \lambda^O$, there are more switches away from the opt out at time 1 as the difference $\lambda^D - \lambda^O$ increases; that is, it implies that $\Omega(p^*)$ increases as the difference $\lambda^D - \lambda^O$ increases. Note that $\Omega(p^*)$ decreases in p^*. Proposition 1 shows that as the difference $\lambda^D - \lambda^O$ increases, then p^* decreases, which implies that $\Omega(p^*)$ increases. *Q.E.D.*

Proof of Proposition 3. Since by Assumption 1 we can subsume k under v, it is sufficient to examine the following derivative:

$$\frac{\partial p^*}{\partial v} = \frac{(c_H - c_L)[1 + (2 - \lambda^D - \lambda^O)w + (1 - \lambda^D)(1 - \lambda^O)w^2] + \left[\lambda^D + \lambda^O + \left(\lambda^D(1 - \lambda^O) + \lambda^O(1 - \lambda^D)\right)w\right]s}{[c_H - c_L + (\lambda^D + \lambda^O)s + [c_H(1 - \lambda^D) - c_L(1 - \lambda^O) + (\lambda^D - \lambda^O)v]w^2]^2}$$

Which is positive. *Q.E.D.*

Proof of Proposition 4. We need to consider the following derivative:

$$\frac{\partial p^*}{\partial w} = \frac{(\lambda^D - \lambda^O)(c_H - v)(v - c_L) - [\lambda^O(1-\lambda^D)(c_H - v) - \lambda^D(1-\lambda^O)(v - c_L)]s}{[c_H - c_L + (\lambda^D + \lambda^O)s + [c_H(1-\lambda^D) - c_L(1-\lambda^O) + (\lambda^D - \lambda^O)v]w^2]^2}$$

Which is positive iff

$$\lambda^D - \lambda^O > \left[\frac{\lambda^O(1-\lambda^D)}{v - c_L} - \frac{\lambda^D(1-\lambda^O)}{c_H - v}\right]s \tag{5}$$

Assume the default term is the learning mode, that is, $\lambda^D > \lambda^O$. Then, the learning mode is chosen more often as growth opportunities improve if the derivative above is positive, that is, if the condition in (5) is verified. We have that $\lambda^D(1 - \lambda^O) > \lambda^O(1 - \lambda^D)$ and hence the inequality in (5) is verified unless $v - c_L$ is sufficiently smaller than $c_H - v$. That is, the condition is violated if v is sufficiently less than $\frac{c_H+c_L}{2}$. Vice versa, if the opt out is the learning mode, we have $\lambda^D < \lambda^O$. Now, the learning mode is chosen more often as growth opportunities improve if the derivative above is negative, that is, if the condition in (5) is not verified. We have that $\lambda^D(1 - \lambda^O) < \lambda^O(1 - \lambda^D)$ and hence the inequality in (5) is verified unless $c_H - v$ is sufficiently smaller than $v - c_L$. That is, the condition is violated if v is sufficiently greater than $\frac{c_H+c_L}{2}$. Therefore, growth prospects increase adoption of the learning mode at time 0 and switches away from the leaning mode at time 1 in a neighborhood of $v = \frac{c_H+c_L}{2}$. With symmetric learning terms, $\lambda^D = \lambda^O$, the condition in (5) is verified iff $v - c_L > c_H - v$, in which case an increase in growth prospects results in more frequent adoption of the default, and vice versa. *Q.E.D.*

Proof of Proposition 5. We need to consider the following derivative:

$$\frac{\partial p^*}{\partial s} = \frac{(c_H - v)\lambda^O[1 + w(1-\lambda^D)] - (v - c_L)\lambda^D[1 + w(1-\lambda^O)]}{[c_H - c_L + (\lambda^D + \lambda^O)s + [c_H(1-\lambda^D) - c_L(1-\lambda^O) + (\lambda^D - \lambda^O)v]w^2]^2}$$

Which is negative iff

$$\frac{\lambda^D}{\lambda^O} > \frac{(1 + w - \lambda^D w)(c_H - v)}{(1 + w - \lambda^O w)(v - c_L)} \tag{6}$$

Assume the default term is the learning mode, that is, $\lambda^D > \lambda^O$. Then, the learning mode is chosen less often as switching costs increase if the derivative above is negative, that is, if the condition in (6) is verified. We have that $1 + w - \lambda^D w < 1 + w - \lambda^O w$ and hence the inequality in (6) is verified unless $v - c_L$ is sufficiently smaller than $c_H - v$. That is, the condition is violated if v is sufficiently less than $\frac{c_H+c_L}{2}$. Vice versa, if the opt out is the learning mode, we have $\lambda^D < \lambda^O$. Now, the learning mode is chosen less often as switching costs increase if the derivative above is positive, that is, if the condition in (6) is not verified, which is in turn true unless $c_H - v$ is sufficiently smaller than v

– c_L. That is, the condition is violated if v is sufficiently greater than $\frac{c_H+c_L}{2}$. Therefore, switching costs reduce adoption of the learning mode at time 0 and switches away from the leaning mode at time 1 in a neighborhood of $v = \frac{c_H+c_L}{2}$. Note that with symmetric learning terms, $\lambda^D = \lambda^O$, the condition in (6) is verified iff $v - c_L > c_H - v$, in which case an increase in switching costs results in more frequent adoption of the opt out, and vice versa. *Q.E.D.*

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