Learning in Consumer Standard Form Contracts: Theory and Evidence

Giuseppe Dari-Mattiacci and Florencia Marotta-Wurgler[1]

Abstract

We explore learning and change in consumer 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. These opportunities arise only for those types of terms that allow drafters to experience the relative costs and benefits of offering them, circumstances, when sellers offer a warranty. When drafters are unable to learn, either because they fail to offer such terms initially, or because the term in question is one where there is no increased opportunity to learn, we expect that such terms will be revised less frequently. Indeed, a reduced opportunity to learn might create contractual "black holes," where terms that are less likely to be revised might lose their meaning over time or appear less related to the rest of the contract. Our preliminary 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 those terms that offer an opportunity to learn. Sellers that offer such terms in their standard form contracts in the initial period are more likely to revise them than when such terms are not offered.

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

[1] Giuseppe Dari-Mattiacci: University of Amsterdam. Florencia Marotta-Wurgler: New York University School of Law. The authors would like to thank…. for helpful comments and suggestions.

1 Introduction

One of the defining characteristics of standard form contracts is a high degree of standardization. Consumer products tend to be sold with limited warranties, disclaimers of implied warranties, limitations of damages, and dispute resolution clauses, among other terms.[2] Another characteristic of standard form contracts 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.[3]

In this paper, we propose a novel account of stickiness and change in consumer standard form contracts based on experiential learning by firms. We first outline our theory and then test it on a unique dataset of standard-form contracts that tracks the changes in the End User Software License Agreements (EULAs) from 264 firms across 114 different software markets during a period of seven years, from 2003 to 2010. We begin by observing that contract drafters may be uncertain about the exact value of a contract term. As they learn over time, they may drop some terms while adding other terms. Learning might depend on many factors, which include the behavior of competitors, cases litigated in court, technological innovations, and news reports, among others.[4] These channels may depend on the types of term that the firms include in the contract but tend to be largely independent of the specific contractual choices firms make. Firms, however, also learn directly from experience with and feedback from consumers. When learning is experiential, the firm's ability to learn depends on its past contractual choices.

Consider for instance a default implied warranty. The firm may contemplate including a waiver in the standard form contract. If the firm offers the warranty it might be able to charge a higher price for the product but it will also face some costs due to consumers claiming a remedy. The extent to which the warranty is costly and, most importantly, if such costs outweigh the value of the warranty to consumers, may be uncertain at the moment the firm makes its choice. Offering the default implied warranty exposes the firm to future financial liability but also offers a possibility to learn the true costs of the warranty and inform future choices. Opting for the waiver saves costs in the short run but also prevents the

[2] *See generally* Florencia Marotta-Wurgler, *What's in a Standard Form Contract? An Empirical Analysis of Software License Agreements*, 4 J. EMPIRICAL LEGAL STUD. 677 (2007); George Priest, *A Theory of the Consumer Product Warranty*, 90 YALE L.J. 1297 (1981).

[3] *See* generally MITU GULATI & ROBERT E. SCOTT, THE THREE AND A HALF MINUTE TRANSACTION: BOILERPLATE AND THE LIMITS OF CONTRACT DESIGN 33–44 (2013) (exploring theories of what makes contract terms "sticky"); Marcel Kahan & Michael Klausner, *Standardization and Innovation in Corporate Contracting (or "The Economics of Boilerplate")*, 83 VA. L. REV. 713 (1997) (examining how learning benefits and network effects may slow changes in terms); Michael Klausner, *Corporations, Corporate Law, and Networks of Contracts*, 81 VA. L. REV. 757 (1995) (examining how network effects may slow changes in terms).

[4] For a review of the literature on learning and innovation in the standard form contract setting, see Section 2.

firm from learning.

Different terms are characterized by different probabilities of receiving a signal in the future. We distinguish between two broad categories of terms. What we name "symmetric-learning terms" are such that future information does not depend on the current contract. 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 example illustrated above. Adoption of the term that guarantees learning carries with it a real-option value: the firm may effectively invest in information gathering by altering its choice of contract terms. Therefore, we should see an effect of the information-type of a particular contract term on contract choices by firms ex ante. 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.

Consider again the example of a default implied warranty. The firm learns the costs of offering the warranty only if it adopts the default term in the standard form contract. Better information about costs will allow the firm to revise the term later. If the firm opts out of the default by including a waiver in its contract, the firm protects itself against future liabilities but also forgoes the option to learn and hence will be less likely to revise the term at a later stage. The fact that the default offers an option to learn, which is absent when opting out, should increase the firm's propensity to adopt the default. Both heightened take-up rates and learning contribute to increase the probability that firms who adopted the default term will revise it at a later stage, as compared with the propensity to revise of firms who opted out of the default. (The same reasoning, appropriately modified, applies to cases in which the opt-out option provides learning.)

After reviewing the literature on standard form contracts and contractual innovation, we propose a simple model. In the model, a firm chooses between adopting a default contractual term or opting out of it. Later, the firm may or may not learn the true costs associated with this term and, consequently, revise its initial choices and amend the contracts that regulate future transactions. The model offers predictions, which we test in the data. We emphasize that a firm's decision to revise the terms of its standard for contract may crucially depend on the terms that the firm chose to start with. Since some terms allow the firm to learn asymmetrically, choosing the default or opting out of it has an effect on the firm's ability to revise the contract based on new information. Initial contractual choices generate a degree of path-dependency: firms that choose non-learning terms at the initial stage are less likely to revise them. We investigate also to what extent stickiness depends by the authoritative power of defaults or can be explained by lack of new information due to previous contractual choices and suggest that, in our context, the latter may be more important than the former.

2 Learning, Stickiness, and Innovation in Standard Form Contracts

The benefits of standardization are well understood and expand beyond the consumer setting, and have been explored extensively in the literature. Terms that become well known are easy for contracting parties and courts to interpret. Moreover, the use of known, similar, terms confers various spillover effects, such as lower reading costs, increased certainty of legal interpretation, and reduced litigation risk.[5] The benefits created by standardization, such as learning and network benefits, may stand in the way of change, reducing contracting parties' incentives to revise familiar terms.[6] Markets that experience higher network benefits might also encounter stronger resistance to change and higher degrees of stickiness. Other factors also contribute to stickiness. Law firms, which are usually involved in drafting and creating new terms, but which are also organized in hierarchical manners and likely benefit from re-using their old forms, are likely to experience switching costs.[7] Weak property rights in contractual innovations are likely to further reduce incentives to innovate.[8]

Default rules can also contribute to contractual stickiness. Status quo bias can create inertia that makes switching difficult.[9] When states enact particular defaults, parties might refrain from deviating from them because the cost of customizing a term outside of the default might prove too costly.[10] Contracting parties might also be reluctant to deviate when they perceive that opting out of the default, even if value generating, might signal negative information.[11] Reluctance to change in light of a superior alternative might give rise to

---

[5] l Kahan & Klausner, supra note 4, (discussing learning benefits and innovation); *See* Michael Klausner, *Corporations, Corporate Law, and Networks of Contracts*, 81 Va. L. Rev. 757 (1995) (discussing learning benefits, network benefits, and innovation); Avery Wiener Katz, *Standard Form Contracts*, *in* 3 THE NEW PALGRAVE DICTIONARY OF ECONOMICS AND THE LAW 502 (Peter Newman ed., 1998) (discussing network effects); Stephen J. Choi & G. Mitu Gulati, *Innovation in Boilerplate Contracts: An Empirical Examination of Sovereign Bonds*, 53 EMORY L.J. 929 (2004) [hereinafter Choi & Gulati, *Innovation in Boilerplate Contracts*] 37 (reviewing literature on innovation in contract terms); Clayton P. Gillette, *Lock-In Effects in Law and Norms*, 78 B.U. L. REV. 813, 819 (1998) (noting lock-in effects generated through extensive interpretation of a term).

[6] Kahan & Klausner, *supra* note 5, at 723–29 (finding that learning benefits may discourage switching).

[7] *See* GULATI & SCOTT, *supra* note 3 at 139–40 (positing that law firm structure and existing agency costs within firms further dilute incentives to innovate); Claire A. Hill, *Why Contracts Are Written in "Legalese,"* 77 CHI.-KENT L. REV. 59, 60, 80–81 (2001) (arguing that fear of mistakes may discourage attorneys from changing terms).

[8] *See* Kevin E. Davis, *The Role of Nonprofits in the Production of Boilerplate*, 104 MICH. L. REV. 1075, 1086 (2006) (arguing that "contractual innovations are forms of technological progress that can generate economic growth" and examining the process of contractual innovation more generally); Charles J. Goetz & Robert E. Scott, *The Limits of Expanded Choice: An Analysis of the Interactions Between Express and Implied Contract Terms*, 73 Calif. L. Rev. 261, 289–305 (1985)at 286 (noting public goods aspect of standard terms); Katz, *supra* note 5, at 503 (arguing that because innovations in standard terms are public goods, the absence of intellectual property rights diminishes the incentive to innovate).

[9] Russell Korobkin, *The Status Quo Bias and Contract Default Rules*, 83 CORNELL L. REV. 608 (1998) (identifying various behavioral biases that might deter parties from moving away from default rules or established terms).

[10] Goetz & Scott, *supra* note 8 (discussing how state regulation of contract terms creates barriers to innovation).

[11] Kathryn E. Spier, *Incomplete Contracts and Signaling*, 23 RAND J. ECON. 432 (1992) (showing that if opting out signals some private information, parties might be reluctant to opt-out); Jason Scott Johnston, *Strategic Bargaining and the Economic Theory of Contract Default Rules*, 100 YALE L.J. 615 (1990) (suggesting that it will be easier for parties to bargain around expansive default rules than around restrictive or

contractual "black holes," where parties enter 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 unfavourably by a court, among others.

Despite the obstacles, change and innovation can still happen. Large repeat players, such as law firms and investment banks, might find it profitable to invest in innovation—even in the absence of strong property rights—through their ability to spread costs among clients.[12] 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 addition, in-house counsel are 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.[13] There are some accounts that posit that the opportunity to experiment can result in learning and change.[14] Change and innovation can also be spurred by "shocks," such as new laws, changes in legal interpretations of terms, or technological advances.

Most of the empirical evidence on contract change and innovation comes from studies of bond covenants and financial products. Marcel Kahan and Michael Klausner, among others, found evidence of switching and learning costs in the corporate bond covenant context.[15] Stephen Choi, Mitu Gulati, and Eric Posner studied the evolution of sovereign debt covenants and found an S-shaped innovation pattern, where parties slowly move from the old standard to a new one in response to various exogenous shocks.[16] There is also evidence of

---

penalty default rules); Omri Ben-Shahar & John A.E. Pottow, *On the Stickiness of Default Rules*, 33 FLA. ST. U. L. REV. 651, 655–60 (2006) (arguing that deviations from known terms might raise suspicions and scare away potential counterparties). Others have identified additional sources of stickiness. Lisa Bernstein, *Social Norms and Default Rules Analysis*, 3 S. CAL. INTERDISC. L.J. 59 (1993) (explaining how social norms and negotiation strategy might lead parties to stick to default rules).

[12] See Kahan & Klausner, *supra* note 5; Gulati & Scott, *supra* note 3.

[13] *See* Stewart Macaulay, *Private Legislation and the Duty to Read—Business by IBM Machine, the Law of Contracts and Credit Cards*, 19 VAND. L. REV. 1051 (1966) (observing in 1966 that in-house counsel drafted the fine print of contracts used by large corporations, while the fine print in small firms' contracts had come from trade associations or by copying the terms used by other firms.) See also George G. Triantis, *Collaborative Contract Innovation* (April 30, 2010) (unpublished manuscript) (on file with the *New York University Law Review*). For a discussion of modular integration more generally, *see* YOCHAI BENKLER, THE WEALTH OF NETWORKS: HOW SOCIAL PRODUCTION TRANSFORMS MARKETS AND FREEDOM 1–2 (2006) (noting the "greater scope for individual and cooperative nonmarket production" in the modern information economy).

[14] Patrick Bolton and Christopher Harris, *Strategic Experimentation*, 67 ECONOMETRICA, 349 (1999) (providing the first model of strategic experimentation among many agents who can free ride on the results obtained by others). *See also* Godfrey Keller, Sven Rady, and Martin Cripps, *Strategic Experimentation with Exponential Bandits,* 73 ECONOMETRICA, 39 (2005) for a tractable model of experimentation.

[15] *See* Kahan & Klausner, *supra* note 5, 743–53 (finding evidence of switching and learning costs in a study of the emergence and adoption of event risk covenants—terms designed to protect bondholders in the event of a leveraged acquisition); *see also* Stephen J. Choi & G. Mitu Gulati, *An Empirical Study of Securities Disclosure Practice*, 80 TUL. L. REV. 1023 (2006) at 1062–66 (finding that terms were slow to change after courts interpreted a term in a new and unfavorable way, and that when change occurred, high-volume issuers' counsel spurred it).

[16] Stephen J. Choi, Mitu Gulati & Eric A. Posner, *The Dynamics of Contract Evolution*, 88 N.Y.U. L. REV. (2013) (finding that innovation in business-to-business boilerplate occurs in three stages roughly similar to product innovation). See also Stephen J. Choi & G. Mitu Gulati, *Innovation in Boilerplate Contracts: An*

switching costs in law firms. Mitu Gulati and Robert 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 handful of cases where terms were revised, this was often achieved by including additional terms and not by correcting the perceived errors in existing ones.[17] In a recent study of change and innovation in a large sample of merger agreements, John Coates found significant changes over time, finding that such contracts have doubled in size, and that about 20% of such change can be attributed to new terms.[18]

To summarize, there have been numerous accounts to explain and document both stickiness and change in standard form contracts. In this paper, we propose a new mechanism that can account for contract change: learning from experience. To the best of our knowledge, this is the first paper to explore this mechanism in the consumer standard form contract setting. We offer some evidence in support of our hypothesis by examining a large sample of consumer EULAs over a period of time.

3 Model

We introduce a simple model of contractual choice. At time 0, a firm drafts a standard-form contract that applies to purchases effected by its consumers between time 0 and time 1. From these contractual relationships, the firm may or may not learn useful information about the actual costs of a certain contract term; there are no other sources of information.[19] Then, at time 1, the firm has an opportunity to revise the standard-form contract. The revised form will apply to all subsequent transactions. For simplicity, switching at time 1 is costless[20] but choices both at time 0 and at time 1 are affected by the default term provided by law.

We assume for simplicity that the firm is a monopolist and has all the bargaining power that is, it can set the price at the consumers' willingness to pay given the specific combination of terms included in the contract. Therefore, the firm chooses the contract terms that maximize the net value of the contract. We assume that the volume of purchases does not change between time 0 and time 1 and that there is no discounting, so that, for the firm's profits, the time-1 contract has the same weight as the time-0 contract.

In the model, we focus on the firm's decision whether to adopt the default term

---

Empirical Examination of Sovereign Bonds, 53 EMORY L.J. 929 (2004) (examining boilerplate innovation in the context of reinterpretation of terms); Stephen J. Choi, G. Mitu Gulati & Eric A. Posner, *Pricing Terms in Sovereign Debt Contracts: A Greek Case Study with Implications for the European Crisis Resolution Mechanism*, 6 Capital Markets L.J. (2011).

[17] GULATI & SCOTT, *supra* note 3, at 10–11; *see also* Hill, *supra* note 7, at 80–81 (arguing that fear of mistakes may discourage attorneys from changing terms).

[18] John C. Coates, IV, *Why Have M&A Contracts Grown? Evidence from Twenty Years of Deals,* Harvard Law School John M. Olin Center Discussion Paper No. 889, European Corporate Governance Institute (ECGI) - Law Working Paper No. 333/2016 (2017).

[19] Learning from competitors, news reports, court cases and other sources is not considered in the model because it occurs irrespective of the distinctions we make here.

[20] Adding a switching cost would not alter the gist of our results.

provided by the law or to opt out of it.[21] The default term has a known value v for consumers but costs the firm either $c = c_L < v$ (with probability p) or $c = c_H > v$ (with the complementary probability $1 - p$). Opting out of the default has value 0 to consumers and costs nothing to the firm. For example, think of a default term that provides an implied warranty to consumers. The firm can either retain the default term in the standard-form contract or opt out of it by specifying a waiver. The warranty is valuable for consumers but exposes the firm to potentially uncertain future costs.

Note that this modeling choice is without loss of generality. Assigning value 0 and no cost to the opt-out is just a normalization to capture uncertainty about whether the joint contract surplus is maximized by adopting the default option or by opting out of it. The results would be the same if we assigned value 0 to the default and positive value but uncertain costs to the opt-out (which is the case when the opt-out provides consumer broader protection than the default). The model captures also these cases.

We distinguish different contract terms along two characteristics (p, T). The characteristic p of the term captures the probability that the default has a low cost. In expectation, the default is worth more to consumers than it costs to the firm if $pc_H + (1 - p)c_H < v$ and vice versa. Default terms, however, are sticky, so that opting out costs $k > 0$ to the firm or, equivalently, consumers value at k the fact that the firm includes the default term in the contract, which adds to the economic value of the term v. Then, the default is worth more to consumers than it costs to the firm if $pc_H + (1 - p)c_H < v + k$ and vice versa. Let

$$p^* \equiv \frac{c_H - v - k}{c_H - c_L}$$

It follows that default terms characterized by $p > p^*$ have lower expected costs than the value of the term and hence, in expectation, enhance the net contract surplus if adopted. In contrast, default terms with $p < p^*$ detract from the contract surplus in expectation because they impose larger expected costs than their value. (If $p = p^*$, expected costs are exactly equal to the value of the term; for ease of notation we disregard this possibility.) The p-characteristic of the term has an ex ante probability distribution on [0,1], which, for simplicity, we assume to be uniform. This assumption is useful to visualize the results but is largely irrelevant for the analysis.

The second relevant characteristic of a term is its information type $T = N, L, D, O$. The information type relates to whether and how the firm learns about the cost of the default term after time 0. We first consider two types of symmetric-learning terms. Terms of type N are "nonlearning" terms and are such that the firm receives no new information after time 0. Terms of type L are "learning" terms and are such that the firm receives new information at time 1 irrespective of adoption at time 0. In particular, between time 0 and time 1, the firm learns the value of c. The last two types of terms involve asymmetric learning. Terms of type D are learning-from-default terms: between type 0 and time 1, the firm learns the value of c

[21] An important restriction of the model is that it only considers one alternative to the default option, while in reality there may be many.

only if it has adopted the default term at time 0. Conversely, terms of type *O* are learning-from-opt-out terms: between type 0 and time 1, the firm learns the value of *c* only if it has opted out of the default at time 0.

Table 1. Information-types and modalities of contract terms

Information-type		Default	Opt-out
Symmetric learning terms	Nonlearning terms	Nonlearning	Nonlearning
	Learning terms	Learning	Learning
Asymmetric learning terms	Learning-from-default terms	Learning	Nonlearning
	Learning-from-opt-out terms	Nonlearning	Learning

Table 1 illustrates the information-types of terms that we consider in the analysis and emphasizes when each term is in a learning or nonlearning modality. The symmetric-learning terms are always in the same modality: *N*-terms are always in nonlearning modality and *L*-terms are always in learning modality, irrespective of whether the firm adopts the default contract term or opts out of it. In contrast, asymmetric-learning terms can be in either learning or nonlearning modality depending on the contractual choice. We will analyze adoption decisions at time 0 and at time 1 by the firm for the four types of terms.

1.1. Symmetric-learning terms

1.1.1. Nonlearning terms

Nonlearning terms (*N*) have the feature that no new information is available at time 1, when the firm as the option to revise the contract. Nonlearning terms are likely to reflect product attributes, such as a term limiting the number of devices to which a user can download a software program or licensed song. (Recall that we focus on experiential learning. Information through other channels is not considered in the model.)

The choices at time 0 and at time 1 are made under the same information and, *a fortiori*, will be the same. It is advantageous for the firm to adopt the default term if the expected costs of the term are lower than its value. Following our discussion above, it is advantageous to adopt the default term if $p > p^*$ and to opt out of the default otherwise. Note that if it is advantageous to adopt the default term at time 0, it will be advantageous to keep adopting the default term at time 1 and vice versa. There are no switches at time 1. This leads to the following lemma.

Lemma 1. With nonlearning terms (N) the default term is adopted both at time 0 and at time 1 iff $p > p^*$.

Figure 1 illustrates the adoption decisions of the firm at time 0 and time 1.

Figure 1. Nonlearning terms: adoption decisions at time 0 and time 1

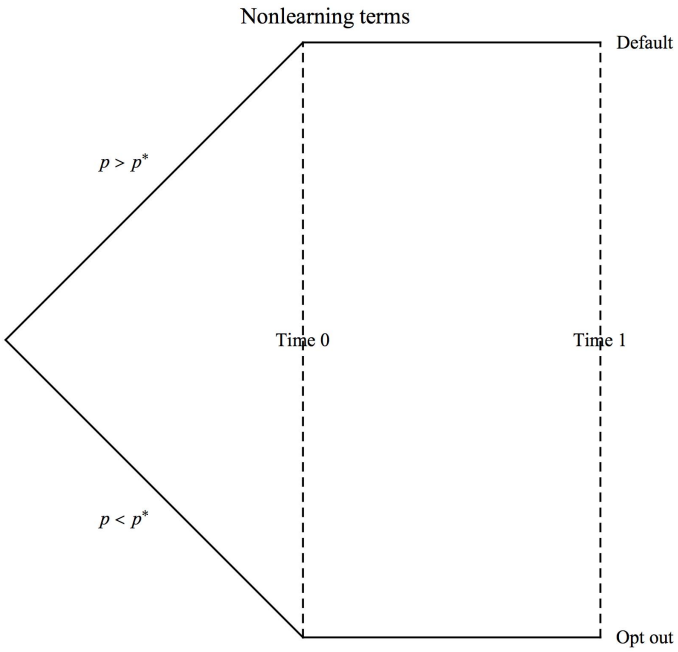
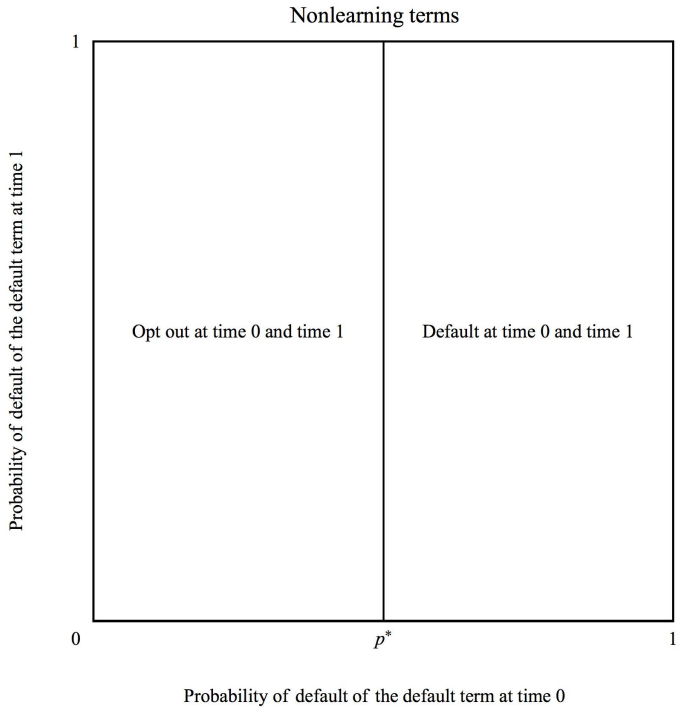


Figure 2 shows the ex ante probabilities of adoption of the default term at time 0 and time 1. Given the ex ante uniform distribution of p, the probability of adoption of the default term at time 0 is equal to the probability that $p > p^*$, which is equal to $1 - p^*$. At time 1, there are no switches and hence the probability of adoption of the default term for time-0 adopters is equal to 1, while the probability of adoption for time-0 non-adopters is equal to 0. The graph shows no switches. Note that the graph has been drawn using a simple example in which v falls exactly half-way between c_L and c_H and $k = 0$, so that $p^* = ½$, but this is of course only a special case.

Figure 2. Nonlearning terms: adoption decisions at time 0 and time 1



1.1.2. Learning terms

Consider now a term *L*, which is characterized by learning after at time 0. That is, while the real cost of the term is unknown to the firm at time 0, it is known at time 1 due to the firm's experience with consumers. The optimal choice at time 0, when *c* is still unknown, is again to adopt the default term if $p > p^*$ and not to do so if $p < p^*$. At time 1, the firm observes *c* irrespective of its adoption decision at time 0 and may revise either choice. The optimal decision at time 1 is adoption of the default term if $c = c_L$ and opt-out if $c = c_H$.

Lemma 2. With learning terms (L) the default term is adopted at time 0 iff $p > p^*$ *and is adopted at time 1 iff* $c = c_L$.

Therefore, the firm might decide to switch at time 1, as depicted in Figure 3.

Figure 3. Learning terms: adoption decisions at time 0 and time 1

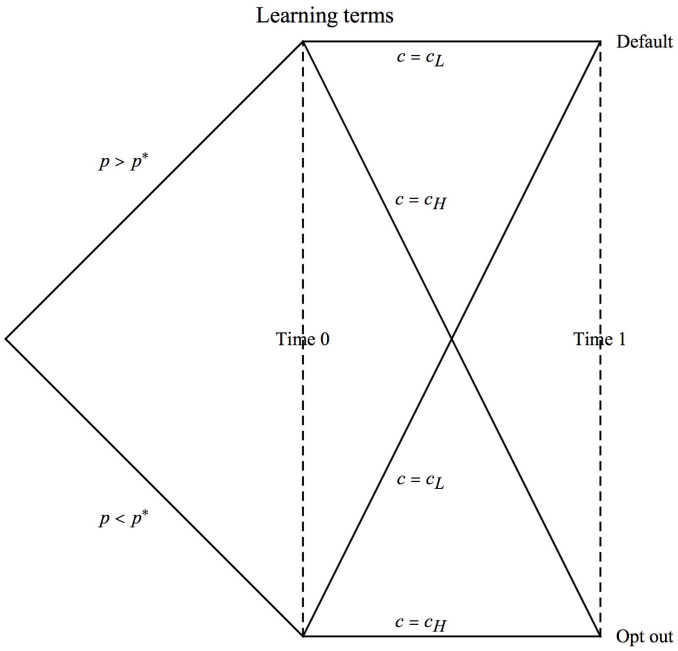
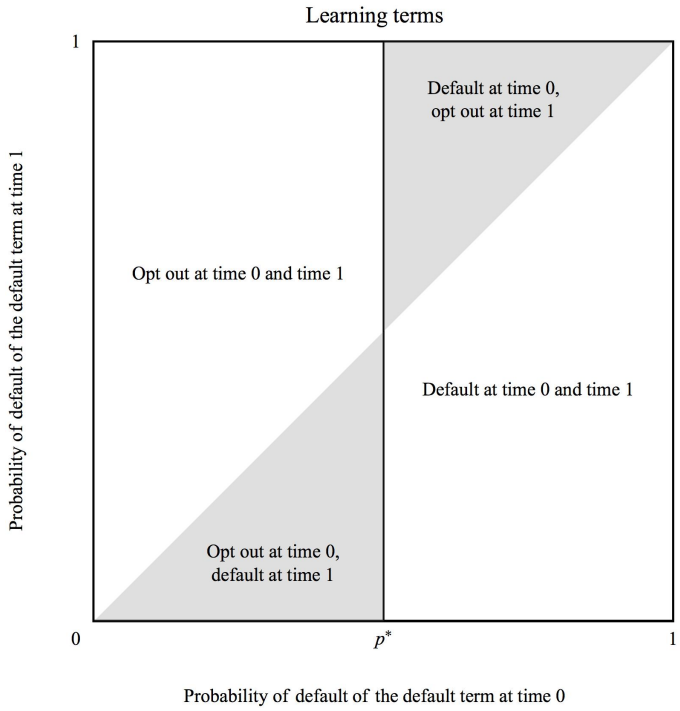


Figure 4 shows again the ex ante probabilities of adoption of the default term at time 0 and time 1, using the same simple example as before. The probability of adoption of the default term at time 0 is again the probability that $p > p^*$, which is equal to $1 - p^*$. At time 1, however, there is new information available and with probability $1 - p$ an adopter discovers that $c = c_H$ and decides to switch and opt out of the default (the other fraction p discovers that $c = c_L$ and keeps adopting the default term). The grey triangle depicts the ex ante probability mass of switches from adoption of the default term to opt-out.

Conversely, with probability p^* the firm considers a term with characteristic $p < p^*$ and decides not to adopt the default term at time 0. At time 1, with probability $1 - p$, the firm discovers that the cost is in fact high, $c = c_H$, and confirms the opt-out decision, while with probability p it discovers $c = c_L$ and switches. The grey triangle depicts the ex ante probability of switches in this simple example.

Figure 4. Learning terms: adoption decisions at time 0 and time 1



1.2. Asymmetric-learning terms

1.2.1. Learning-from-default terms

We now consider asymmetric learning terms, starting for the "learning-from-default" type, *D*. Here the firm learns the value of *c* only if it has adopted the default contract term at time 0. Adoption of the default gives the firm the option to learn and revise its decision at a later time. In contrast, the opt-out alternative does not imply any learning and hence the optimal decision for the firm at time 1 is to confirm the decision taken at time 0. The value of the real option to switch at time 1 enhances the value of adoption of the default term at time 0. Therefore, the optimal decision at time 0 is no longer to adopt the default term if $p > p^*$, but it must be to do so at a lower level of p.[22]

Formally, the firm considers that if it opts out of the default it will earn 0 from it at both times. If it adopts default term, it will earn $v + k - pc_L + (1 - p)c_H$ at time 0, then it will learn *c* and will keep adopting the default term only if $c = c_L$, which occurs with probability p and earns the firm $v - k - c_L$ for sure. The condition for the total payoff from adoption of the default term at time 0 to be larger than the payoff from opt-out at time 0—which is equal to 0—is $v + k - pc_L - (1 - p)c_H + p(v + k - c_L) > 0$. The latter inequality yields the following cutoff level of p:

$$\underline{p} \equiv \frac{c_H - v - k}{c_H - c_L + v + k - c_L}$$

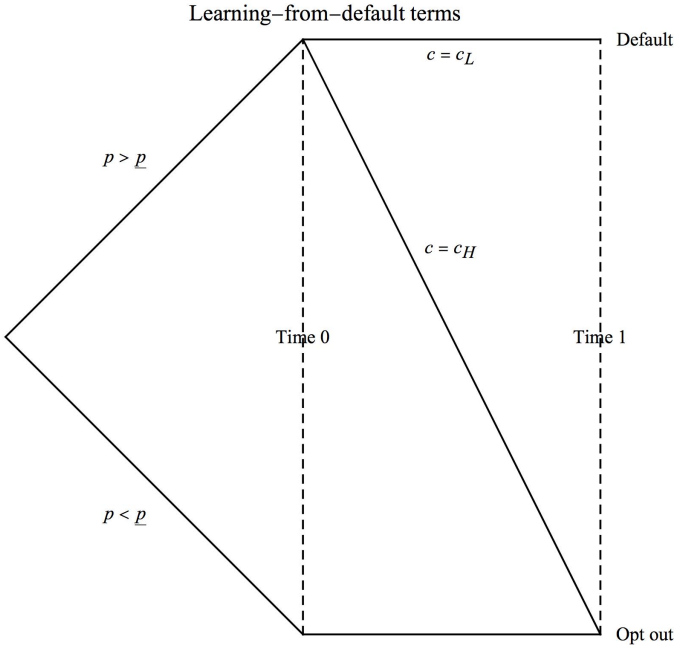
[22] McDonald, Robert, and Daniel Siegel (1986), "The Value of Waiting to Invest", *Quarterly Journal of Economics*, 101: 707–728.

Note that the term $v + k - c_L$ embeds the option value of adopting the default term and makes $\underline{p}$ less than p^*: the firm adopts the default more easily—that is, at lower levels of p—with a learning-from-default term than with a symmetric learning term.

Lemma 3. With learning-from-default terms (D) the default term is adopted at time 0 iff $p > \underline{p}$*, where* $\underline{p} < p^*$*. The default term is adopted at time 1 iff* $p > \underline{p}$ *and* $c = c_L$*.*

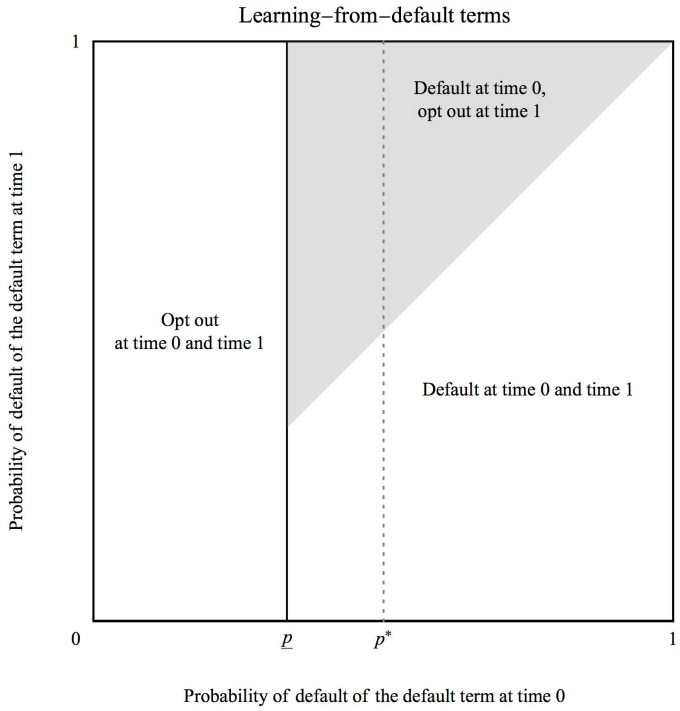
Figure 5 illustrates the decision tree of the firm for learning-from-default terms. By adopting the default term at time 0, the firm learns and may adopt or opt out of the default at time 1, depending on its cost. In contrast, by opting out of the default at time 0, the firm forgoes the opportunity to learn and, possibly, revise its decision later. Note that the threshold $\underline{p}$ decreases with the parameter k, capturing the stickiness of the default option; that is, ceteris paribus, if the default option is stickier, the default will be chosen more often.

Figure 5. Learning-from-default terms: adoption decisions at time 0 and time 1



The following Figure 6 shows the effects of asymmetric learning from the default. The cut-off level of p at time 0 is reduced as compared to learning and nonlearning terms. This implies higher adoption rates at time 0 for the default term. Adopters, however, switch to opt-out with relatively high probability, especially in the range $\left[\underline{p}, p^*\right]$, that is, in those cases that would have resulted in opt-out at time 0 had the term been of a different type. In the simple example that we are considering in the graphs—the one with v falling exactly half-way between c_L and c_H and $k = 0$—we have $\underline{p} = \frac{1}{3} < \frac{1}{2} = p^*$.

Figure 6. Learning-from-default terms: adoption decisions at time 0 and time 1



1.2.2. Learning-from-opt-out terms

We now consider other type of asymmetric learning term, the "learning-from-opt-out" type, *O*. Here the firm learns the value of *c* only if it has opted out of the default at time 0. This is the mirror-image of the type *D* studied above and the results are reversed. Now exclusion, rather than adoption, has an added option value with increased opt-out rates at time 0 and brings along switches to the default term at time 1. Adoption of the default term at time 0, conversely, implies no learning and hence no switches at time 1. The optimal decision at time 0 is no longer to adopt the default term if $p > p^*$, but it must be to do so at a higher level of p.[23]

Formally, the firm considers that if it opts out of the default it will earn 0 at time 0 but it will switch to the default if $c = c_L$, which occurs with probability p and earns the firm $v + k - c_L$ for sure. Adoption of the default term yields $v + k - pc_L + (1 - p)c_H$ at both times. The condition for the total payoff from the default at time 0 to be larger than the payoff from opting out at time 0 is $2(v + k - pc_L - (1 - p)c_H) > p(v - c_L)$. The latter inequality yields the following cutoff level of p:

$$\underline{p} \equiv \frac{c_H - v - k}{c_H - c_L - \frac{v + k - c_L}{2}}$$

Note that again the term $v - c_L$ embeds that option value of asymmetric learning but this time makes $\overline{p}$ greater than p^*: the firm adopts the default term more conservatively—that

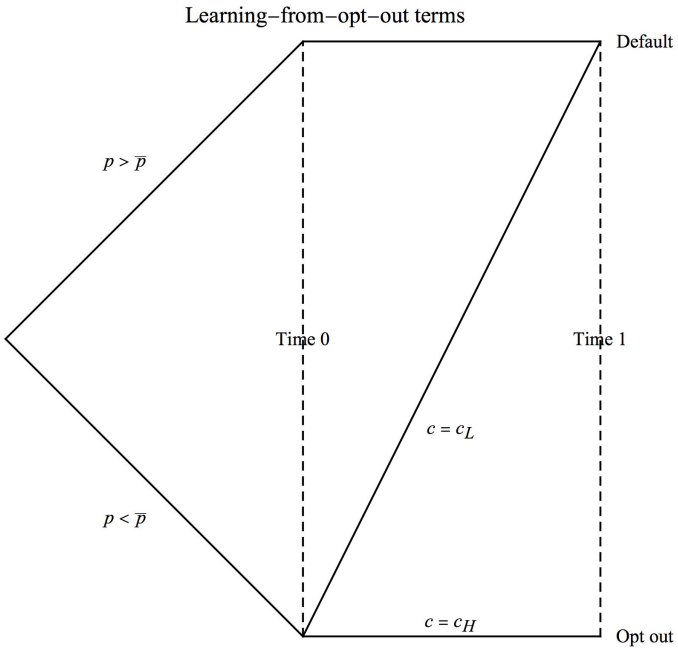
[23] This result is analogous to those relating to the optimal timing of investment when investment as a real-option component. See McDonald, Robert, and Daniel Siegel (1986), "The Value of Waiting to Invest", *Quarterly Journal of Economics*, 101: 707–728.

is, at greater levels of p—a learning-from-opt-out term than a learning or a nonlearning term.

Lemma 4. With learning-from-opt-out terms (O) the default term is adopted at time 0 iff $p > \overline{p}$*, where* $\overline{p} > p^*$*. The default term is adopted at time 1 iff either* $p > \overline{p}$ *or* $p < \overline{p}$ *and* $c = c_L$*.*

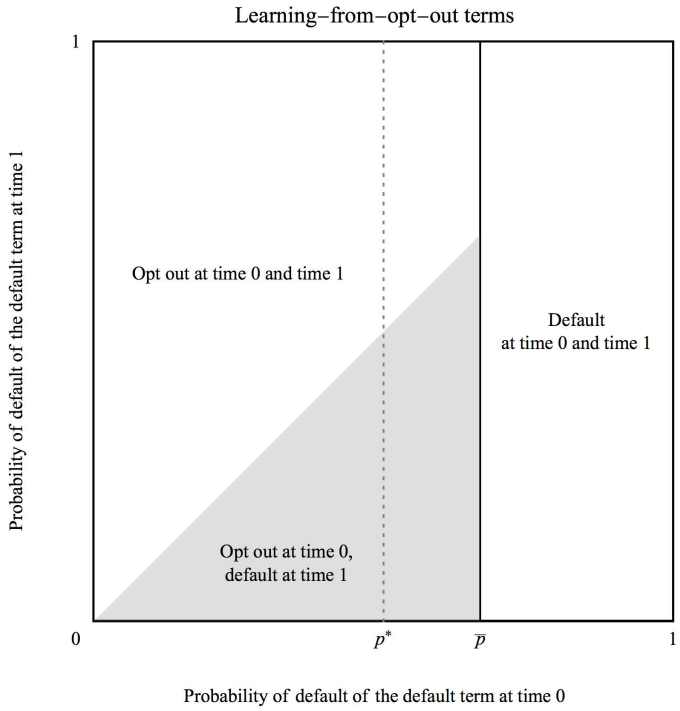
Figure 7 illustrates the decision tree of the firm for learning-from-opt-out terms. By opting out at time 0, the firm learns and may adopt or opt out of the default at time 1, depending on its cost. In contrast, by adopting the default term at time 0, the firm forgoes the opportunity to learn and, possibly, revise its decision later. Note that also in this case the threshold $\overline{p}$ decreases with the parameter *k*, capturing the stickiness of the default option; that is, ceteris paribus, if the default option is stickier, the default will be chosen more often.

Figure 7. Learning-from-opt-out terms: adoption decisions at time 0 and time 1



The following Figure 8 shows the effects of asymmetric learning in learning-from-opt-out terms. The cut-off level of *p* at time 0 is increased if compared to learning and nonlearning terms. This implies lower adoption rates at time 0 for the default term. Those who opt out, however, switch to the default with relatively high probability, especially in the range $[p^*, \overline{p}]$, that is, in those cases that would have resulted in adoption of the default term at time 0 had the term been of a different type. In the simple example that we are considering in the graphs—the one with *v* falling exactly half-way between c_L and c_H and $k = 0$—we have $\overline{p} = \frac{2}{3} > \frac{1}{2} = p^*$.

Figure 8. Learning-from-opt-out terms: adoption decisions at time 0 and time 1



4 Predictions

While it is very difficult to disentangle empirically the reasons why firms adopt certain terms to start with—because of the interference of many factors that we cannot control—looking at change over time offers interesting insights into the drivers of contractual choice. The model presented in the previous section produces empirically testable implications about the main determinants of a firm's decision to amend the terms of its standard form contract over time. We contrast the attractive power of default terms with learning from previous contractual choices.

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 modality at time 0.

Asymmetric-learning terms are the most exposed to the effects of learning because only one of the modalities in which the term comes allows the firm to learn, while the other precludes the acquisition of experiential information. Some terms allow the firm to learn only if the default option is chosen (the learning-from-default terms) so that the learning modality is the default. In other cases it is opting out that generates learning.

Prediction 1 emphasizes these implications: the firm's decision to revise an asymmetric learning term is largely affected by the firm's choice at time 0. Learning puts the firm in the position 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 modality at time 0, it will not see new information and might fail to revise its terms at time 1.

Inefficient or meaningless terms might survive due to the asymmetric nature of learning. What is particularly interesting, inefficient terms might resist at time 1 in the contracts offered by some firms—those that choose the nonlearning modality at time 0—at the same time when other firms—those choosing the learning modality at time 0—stay away from them. Such "black holes" might affect only a portion of the firms in the market.

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.

Prediction 2 focuses on the effect of learning in symmetric learning clauses. Contrary to asymmetric-learning terms, here the firm's initial choice does not affect the firm's propensity to revise the term. With nonlearning clauses, the result is obvious: the firms does not learn from experience and hence does not revise its terms based on new information. Revisions will only come from information acquired elsewhere, which is not connected with the firm's contractual choices at time 0. With learning terms, the result is less intuitive. The firms does learn from experience in this case. However, the firm learns symmetrically from both the default and the opt-out option. As a result, new experiential data informs the firm's decision at time 1 irrespective of the contractual choices made at time 0. We should observe revisions motivated by experience 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.

Prediction 2 also points to a second channels through which "black holes" can emerge. Symmetric nonlearning terms might fail to be revised. Differently from the "black holes" emerging with asymmetric learning terms, the prediction here is that now the "black hole" should affect most firms in the market because it is generated to the nonlearning nature of the term rather than by the firm's choice of the nonlearning modality at time 0.

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. On the other hand, if 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 and hence will more frequently be amended 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 modality (learning-from-default terms) than when it is the nonlearning modality (learning-from-opt-out terms).

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.

5 Empirical analysis

1.3. Data and Methodology

We test our hypothesis using a sample of software license agreements governing the use of pre-packaged software. We examine the rate of change of terms from 2003 to 2010 in accordance to sellers' opportunity to learn from the presence of absence of each term. EULAs typically present a rich set of standard terms; while the terms typically vary both across and within markets, EULAs follow a predictable structure.[24] This allows for meaningful comparisons across contracts.

We use the same sample of EULAs used in a previous study examining other questions of change and innovation in standard form contracts.[25] The sample consists of the EULAS from 264 firms with comparable data in 2003 and 2010, ranging from well-known software publishers to smaller companies. For each company and its representative EULA we include information on a representative product as well as various market and company characteristics.

For each EULA in each period, we tabulate the presence of 32 standard terms across seven categories of related terms, such as terms related to scope, warranties, limitations of damages, etc. We further classify each term into different categories, reflecting the extent to which offering a given term gives sellers an opportunity to learn. This is discussed further below.

1.3.1. Summary Statistics

Table 2 presents summary statistics for the data set introduced in Marotta-Wurgler and Taylor (2013). 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.

[24] Florencia Marotta-Wurgler, *supra* note 2.
[25] For a full description of the data collection process, see Florencia Marotta-Wurgler and Robert Taylor, *Set in Stone? Change and Innovation in Consumer Standard Form Contracts*, 88(1) N.Y.U. L. Rev. 240 (April 2013).

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. Firms are classified firms into 114 distinct software markets, as classified by Amazon.com, the largest Internet software retailer.[26] The average Herfindahl-Hirschman index (HHI), which measures market concentration, is 0.37, with a standard deviation of 0.24. Some markets are highly competitive and others have just one or very few major players.

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 1517 words in 2003 to 1938 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.

1.3.2. Determining Symmetric and Asymmetric Learning in Consumer Standard Form Contracts

We classify the 32 terms into four categories that reflect drafters' opportunity to learn. 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. Table 3 also reports how we classify each term depending on whether some terms allow for symmetric learning (or failure to learn) or whether learning is asymmetrically tied to the seller adopting the default rule or opting out of it. Consider a term that allows the seller to collect and/or share the consumer's personal information. Whether that term is offered or not, the seller is likely to receive feedback regarding the value of such activity. The act of collecting information will inform seller about the value of the activity. Failure to collect may also inform the seller over time whether the product or service is hurting the seller's competitive advantage or whether it makes the product more appealing to consumers. Learning is symmetric for all modalities of the term. The table labels such terms as "S (L)"—i.e., symmetric learning. We identify three additional terms as symmetric learning terms. These include terms that specify a choice or

26 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).

forum, where the seller who gets to experience these particular clauses learns whether the chosen law or forum, or failure to specify one, is optimal. Another such term is one that allows the seller to disable the software remotely in case the buyer breaches. Again, regardless of its modality, 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. All terms and the rationale for coding decisions are explained in the Appendix.

Terms that never allow learning regardless of their modality are labelled "S (N)"—symmetric nonlearning. We identify eleven such terms, which include one noting whether the licensed product includes updates or upgrades, another delineating the scope of the right granted by limiting the buyer's ability to modify or alter the program, and terms explaining whether there are transfer limitations, among others. A common element of these terms is that they either supply information about the product or define the features of the product, as opposed to allocating rights and risks between sellers and buyers. Hence, such terms, while important, might not allow sellers to learn from experience with that particular term. This doesn't mean that such terms will not be revised. Indeed, demand for more flexible products, or products that can be installed in multiple devices, might lead sellers to revise these terms. But the mechanism through which sellers learn will be less direct.

The coding for most of these clauses is straightforward. Of course, one could disagree with our classification and argue that a nonlearning term would actually allow the seller to learn, very much like a symmetric learning term. Consider a change of terms clause, which allows the seller to modify the agreement. We currently code such clause as nonlearning, but one could imagine that a seller that uses that clause and fails to adequately inform consumers of the modification or does not provide them with an opportunity to reject the modification, might find itself without an enforceable modification or, worse, without any term to enforce if the court decides such an expansive term renders the contract illusory. In this circumstance, the clause exposes the seller to learning. Failure to include the clause also allows a seller who wishes to modify the agreement in a simple, streamlined way, and thus also allows the seller to learn. For this reason, we group symmetric learning clauses together in our empirical analysis.

We now turn to asymmetric learning clauses. In contrast to the pure information terms, a term like an express warranty results in asymmetric learning, as the seller only learns its relative value by offering one. There are no default express warranties, so the seller learns only by opting out of the default (or, A (O)). We identify seven such clauses, including whether the seller offers limited or full warranties. In contrast, if seller offers default implied warranties, the seller might learn the value of such offering. In this case, adopting the default allows the seller to learn. We label these clauses A (D)—i.e., asymmetric default. We find ten such terms. These include clauses allowing the buyer to create derivative works and reverse engineering (which are allowed under intellectual property laws), as well as clauses not disclaiming implied warranties or damages, among others.

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 modality 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 significant at the 10% level.

1.4. 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. Panel A 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 modality in the previous period. The top right figure shows that among 32 terms in total, and 8448 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 matching the default, the probability that they will be revised at a later period is larger if the term starts at the default. Marotta-Wurgler and Taylor (2013) posit that this may be caused by sellers' incentives to opt-out of consumer-friendly UCC defaults, despite any stickiness or inertia.

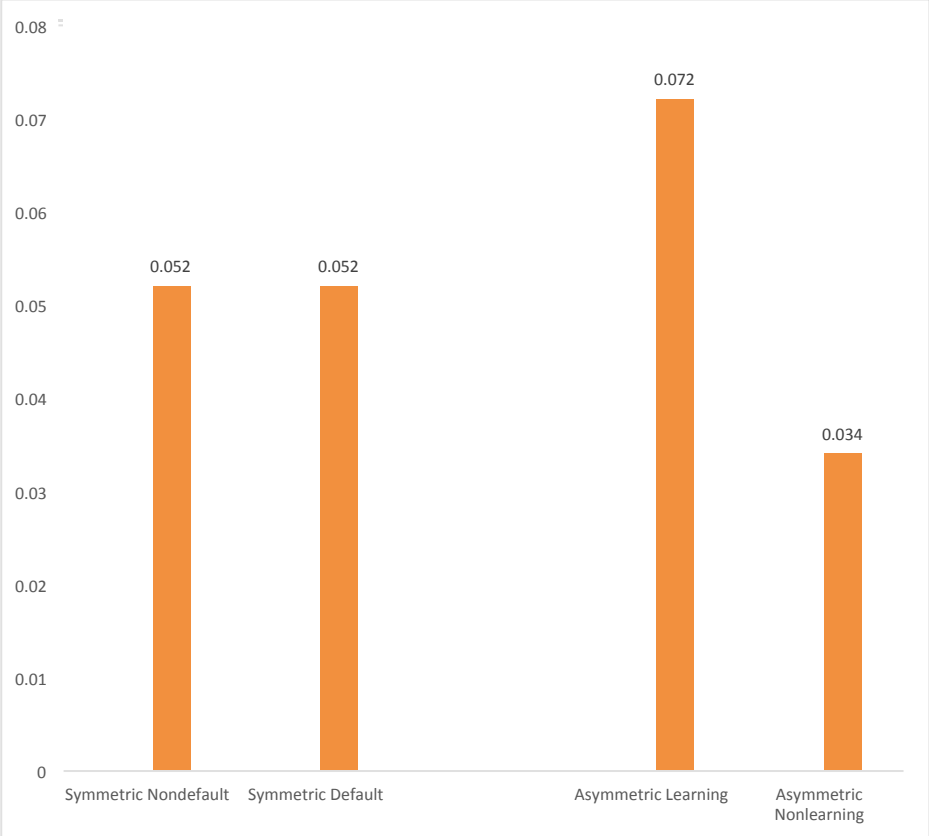
With this baseline in mind, we next seek to test predictions 1 and 2 by dividing the data into whether the term generates symmetric or asymmetric learning opportunities. Panel B presents data on symmetric learning by grouping both learning and non-learning terms alike. As noted earlier, sellers might 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. We thus combine all symmetric terms. For our purposes, all we care is to know whether change is more likely to be associated with one modality 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% 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 percent, in contrast to 4.2 percent 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 modality.

Once we divide asymmetric terms up into their learning modalities, a new picture emerges, as seen in the bottom panel of Panel C. The left matrix shows that in 2003, asymmetric terms are included in their learning and non-learning modalities about equally. Note the right table, however. 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 modality matters. The probability of changing a term given that the 2003 contract included such term in its learning modality is 0.072, in sharp contrast to the 0.034 that occurs when the term is not in its learning mode. The findings support the prediction that opportunity to learn helps to explain contractual change and innovation.

Figure 9. Probability of Term Change



These findings are illustrated in Figure 9. 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 modality 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 learning modes in 2003, as opposed to their non-learning mode.

Table 5 reports regressions including company, product, and market controls. The first column simply 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 terms. The third and fourth columns shows that the probability of changing away from a term set at the default in 2003 is also 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.

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.

Finally, Table 6 presents some refinements by dividing asymmetric terms into whether the learning modality 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%, 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 modality), 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 modality 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 non-learning 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 significant at the 1% level.

1.5. Implications

…discussion of possible objections to be added…

6 Conclusions

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 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.

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 allocation 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 modality that allows sellers to learn from a term. Terms allow for symmetric learning, denoted S (L), when learning either happens regardless of the modality of the term, and S (N) when learning never happens regardless of the modality of the term. Some terms allow for asymmetric learning, allowing sellers to learn as long as the modality 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 (N)	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 (N)	Are license's terms subject to change?	0 = no 1 = yes	0.106 (0.309)	0.076 (0.265)	0.030** (0.012)
S (L)	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 (N)	Does definition of "licensed software" include regular updates such as enhancements, versions, releases, etc.?	1 = yes 0 = no; no mention	0.170 (0.377)	0.136 (0.344)	0.034** (0.015)
S (N)	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; no mention 1 = yes	0.716 (0.452)	0.663 (0.474)	0.053*** (0.017)
S (N)	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 (L)	Does license allow licensor to collect and /or distribute licensee's personally identifiable information?	0 = no; 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; 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 (N)	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 (N)	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 (N)	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 1 = cap on damages less than or equal to purchase	0.553 (0.498)	0.519 (0.501)	0.034* (0.019)

		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)**
S (L)	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 (L)	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 (N)	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 (N)	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 (O)	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 (N)	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 (N)	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; 8448 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	2010 term: 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	2010 term: 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*** (0.00533)	0.0332*** (0.00399)	0.0412*** (0.00525)	0.0323*** (0.00588)	-0.0757 (0.0507)	-0.246** (0.0996)
Firm Fixed Effects	No	Yes	Yes	Yes	No	No
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
	nonlearning	0.013	0.388	0.401
	total	0.568	0.432	1

Prob(change | 2003 at learning)	0.073
Prob(change | 2003 at nonlearning)	0.032
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
	nonlearning	0.026	0.719	0.745
	total	0.263	0.737	1

Prob(change | 2003 at learning)	0.071
Prob(change | 2003 at nonlearning)	0.035
difference	0.036***

7 Appendix

Term #	Learning Category	Term (t)	Classification Rationale	Learning (0=no; 1=yes)
		Acceptance		
x_1	A (O)	B license alert consumer that product can be returned if she declines terms? 1=yes; 0=no	Pure information given to consumer; no feedback.	0
		Modification and Termination		
x_2	S (N)	Are license's terms subject to change? 0=no; 1=yes	Pure information given to consumer; no feedback.	0
x_3	S (L)	Does license allow licensor to disable the software if licensee breaches any EULA terms, according to licensor? 0=no; -1=yes	Clause makes enforcement easier. Feedback occurs in either case.	1
		Scope		
x_4	S (N)	B Does definition of "licensed software" include updates, enhancements, versions, releases, patches, etc.? 1=yes;0=no mention/no	Pure information given to consumer; no feedback.	0
x_5	S (N)	B Can licensee alter/modify the program? 0=yes or no mention; -=no	Product feature; no feedback in either case.	0
x_6	A (D)	B 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	1 if t = 0

			damaging for seller. Prohibiting it impairs learning.	
x_8	S (N)	B 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)	Product feature, no feedback in either case.	0
		Information Collection		
x_9	S (L)	Does license allow licensor to collect and /or distribute licensee's information? 0=no/no mention 1=yes	Product feature. Some feedback in either case. Seller will learn in the future whether collecting information gives him a competitive advantage or not-collecting information makes his 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 (N)	B 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)	Product feature; no feedback in either case.	0
x_{12}	S (N)	B Can Licensee transfer the software if end user accepts license terms? 0=yes or no mention; 1=no	Product feature; no feedback in either case.	0
		Warranties and Disclaimers		

x_{13}	A (O)	B 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)	B 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)	B 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 (N)	B Is the disclaimer in caps? 0=yes or no disclaimers appear; 1=no	Pure information given to consumer; no feedback.	0
x_{17}	A (D)	B 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)	B 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)	B 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)	B 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)	B 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)	B 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)	B 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)	B 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)	B 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 (O)	B 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 (L)	B Law specified? 0=same as forum or no mention; 1=yes and different from forum	Seller learns risks of non-specified law only if no choice of law is made.	1
x_{28}	S (L)	B 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 (N)	Does license require licensee agree to third party licenses or terms? 0=no; 1=yes	Pure information given to consumer; no feedback.	0

x_{30}	A (O)	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 (N)	Does license allow licensor or third parties to install additional software? 0=no; 1=yes	Product feature; no feedback in either case.	0
		Consumer Protection		
x_{32}	S (N)	Does license inform licensee of statutory rights? 0=no; 1=yes	pure information given to consumer; no feedback.	0