

Incomplete Contracts and Strategic Ambiguity: Evidence From Silicon Valley

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Abstract

I present the first empirical test of the strategic ambiguity hypothesis, which posits conditions under which a formal contract is *deliberately* incomplete. The intuition is that if part of one party's performance is unverifiable, the optimal contract might give the other party discretion over its own (verifiable) performance. I first note that testing this prediction with real-world contracts would be infeasible. I then offer an equivalent, feasible prediction by developing a simple model that extends strategic ambiguity to repeated games with enforceability constraints. Using a unique dataset of contracts from S&P 500 tech companies, I find substantial evidence of strategic ambiguity: In California, where post-employment covenants not to compete are unenforceable, employment contracts grant employers discretion over severance payments; outside California, where noncompetes are enforceable, employers have no such discretion. These results demonstrate that sophisticated parties deliberately write incomplete contracts in order to overcome limits on legal enforcement. A policy aimed at eliminating such agreements would therefore require more powerful deterrents, such as a prohibition or whistleblower scheme.

Keywords. Incomplete contracts, strategic ambiguity, repeated games, covenant not to compete

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1 Introduction

The most robust empirical observation from the contracts literature is that real-world contracts are incomplete. We find routine incompleteness even when large sums of money and personal economic livelihoods are at stake. For example, employment contracts often give employers discretion over bonuses; a complete contract would instead condition bonuses on verifiable outcomes. Merger agreements often include provisions that condition a buyer's rights and duties on "material" changes in the target company; a complete contract would eschew such a nebulous standard in favor of precise rules. Finally, credit contracts are often renegotiated when the borrower's circumstances change; a complete contract would never be renegotiated because it anticipates every eventuality. Incomplete contracts give rise to holdup scenarios that lead to inefficient investment or market failure (e.g., Hart and Moore (1988); Edlin and Reichelstein (1996)) as well as losses from litigation and renegotiation. In light of such costs, why are contracts between sophisticated parties incomplete?

Traditional theories of incomplete contracts appeal to the all-powerful constraint of transaction costs. It is too costly to write a complete contract, so parties settle on one that is "complete enough." A similar line of reasoning posits that even sophisticated parties are boundedly rational and thus incapable of writing a complete contract; they simply cannot anticipate every state of the world (Simon, 1996). Much of the observed incompleteness can be explained by such theories for which incompleteness is essentially a feasibility constraint. Yet even these theories fail to explain contracts that conspicuously omit terms or grant one side "too much" discretion.

In this paper, I develop and test an alternative theory of incomplete contracts, the "strategic ambiguity hypothesis," which posits that optimal formal contracts may sometimes be *deliberately* incomplete (Bernheim and Whinston, 1998). That is, parties rationally add discretion or omit terms from their formal contract, even if those terms could have been drafted and legally enforced at no cost.

To give a simple example, suppose the only profitable exchange between two parties is $\{abc; xyz\}$, in which party 1 performs a , b , and c and party 2 performs x , y , and z . But suppose further that a court cannot verify whether party 2 has performed

x . Thus, even if the parties were to agree to $\{abc; xyz\}$, a court could only require party 2 to perform yz . Since $\{abc; yz\}$ is not profitable, a naive prediction would be that non-verifiability of x leads to no trade. Yet it may be that the parties could actually do better by omitting a verifiable term, say, a , from their formal contract. If the parties agree only to $\{bc; yz\}$, then party 1 might leverage her implicit discretion (over whether to perform a) to incentivize party 2 into performing x . If so, then a deliberately incomplete contract ($\{bc; yz\}$) would lead to profitable trade, while the “most complete” contract ($\{abc; yz\}$) would not. This example demonstrates that strategic ambiguity is an application of the theory of the second best: Neither non-verifiability nor contract incompleteness is optimal on its own; but given the former, the latter may become optimal. Bernheim and Whinston (1998) have shown that strategic ambiguity may arise in one-shot games when players move sequentially and a and x are strategic complements.

Strategic ambiguity has not, to the best of my knowledge, been empirically tested with real-world contracts. This is perhaps not surprising because actual contract data are difficult to gather. Moreover, a test for real-world strategic ambiguity seemingly demands an unlikely institutional setting. To use the notation from above, a direct test would compare contracts formed in one setting in which term x is verifiable, with contracts formed in an otherwise-identical setting in which term x is not verifiable. It would then ask whether contracts in the latter setting omit some strategically complementary term, a , which could be verified in either setting. Even were one to find courts that differ in their ability to *observe* performance, foundational results from implementation theory have shown that this would not be sufficient: A court that cannot directly observe x may still be able to implement a contract that includes x , so long as x is payoff-relevant (Maskin, 1999). Indeed, this empirical problem applies to any theory based on the assumption, pervasive throughout the incomplete contracts literature, that some aspects of performance are “observable, but not verifiable” (Tirole, 1999).

The first contribution of this paper is to avoid these problems by proposing an alternative approach to testing the strategic ambiguity hypothesis. The approach is based on two observations. First, although strategic ambiguity is canonically

framed as a response to non-verifiability of x , a similar logic holds for settings in which the law declares that x is void or unenforceable (even if it could be verified). Thus, rather than comparing courts with different abilities to verify performance, one may compare jurisdictions with different contract laws. The principal benefit of this approach is that differences in the law are often much clearer than differences in verification technologies. Indeed, the former are often dichotomous while the latter are fuzzy. The second observation is that a *formally* incomplete contract need not necessarily omit a from the document. It could instead include a but expressly grant a party discretion over performance, or similarly include a but exempt it from formal enforcement. Both approaches yield the same “less complete” formal contract because a is not subject to formal enforcement. But only the latter leads to observable data for the empiricist. One would be hard pressed to observe an unwritten agreement.

To fix ideas, section 3 presents a simple model of incomplete contracts in a two-player games. The model builds on the framework of Bernheim and Whinston (1998), who demonstrate strategic ambiguity in one-shot games. The main result of the model in this paper, given in proposition 1, is that even if strategic ambiguity does not arise in the one-shot game, it may still arise in the repeated game, but only if players have intermediate levels of discounting. The intuition is that strategic ambiguity is a partial commitment; it limits parties’ discretion in order to rule out extreme defection, but retains some discretion so that each side can punish or reward nonperformance of the unenforceable terms. If players were sufficiently patient, the usual folk theorem would apply and any contract (strategically ambiguous or otherwise) would be unnecessary; if they were insufficiently patient, then they would not value the future enough to resist even minor defection. Thus, strategic ambiguity arises in the repeated game only when players are moderately patient.

The model explains how strategic ambiguity may arise in the specific empirical setting studied here: contracts between employers and employees. In the model, two parties form a contract in which: (1) some terms are unenforceable and (2) one party (employer) is a repeat player while the other (employee) is not. As a one-time player, employee cannot credibly commit to perform an unenforceable term, and so an optimal contract will leave employer some (but not absolute) discretion over its

own performance in order to reward or punish the employee. The employer’s reward strategy is in turn disciplined by future employees, who can punish a deviating employer by seeking employment elsewhere.

Strategic ambiguity is a pivotal result for contract theory because it unites two of its largest literatures: relational contracts and incomplete contracts. Theories of relational contracts invoke repeated interaction and public reputation to explain why legally unenforceable agreements are performed. Theories of incomplete contracts invoke transaction costs and bounded rationality to explain why formal contracts are incomplete. The strategic ambiguity hypothesis unites these by positing that parties form incomplete contracts in order to incentivize relational contracts.

The final contribution of this paper is to provide the first empirical test of the strategic ambiguity hypothesis. I test this hypothesis by analyzing a unique data set of executive employment contracts from S&P 500 tech companies, which I gathered by using a combination of machine- and hand-coding techniques to parse disclosures to the Securities and Exchange Commission. I specifically consider the case of covenants not to compete (or “noncompetes”) in employment contracts. A covenant not to compete is a promise by an employee not to compete with the employer’s business after leaving the employer. Such provisions typically prohibit the employee from joining a competitor or starting their own competing business for 1 to 2 years. The enforceability of a noncompete depends on the jurisdiction: Under California law, they are void and not legally enforceable. Outside California, they are generally enforceable.¹

If the strategic ambiguity hypothesis were true, then we would expect to find at least two differences between California and non-California contracts. First, covenants not to compete should be less prevalent in California contracts, but not necessarily absent. This is because non-enforcement only eliminates *formal* covenants not to compete, that is, those for which the threat of legal enforcement is necessary to incentivize performance. Noncompetes that can be relationally enforced may continue to be written into California contracts. Second, and most importantly, California contracts should be strategically ambiguous: They should intentionally make

¹See section 2 for details on the legal setting.

some terms unenforceable, and do so in a way gives the employer discretion to reward an employee for performing an unenforceable noncompete.

I find robust evidence of both predictions. First, covenants not to compete are less prevalent but not absent in California. Twenty-six percent of California contracts include a noncompete, compared to 85 percent of non-California contracts. Second, there is substantial evidence of strategic ambiguity in California. California contracts with noncompetes almost always include severance packages that (1) are paid out in installments over the term of the noncompete and (2) are legally unenforceable.² Thus, the California employee has discretion over whether to compete and the California employer has discretion over whether to pay severance. By contrast, non-California contracts with noncompetes typically include severance packages that (1) are paid in an immediate, non-discretionary lump sum and (2) are always legally enforceable. These results are the first direct evidence of strategic ambiguity in real-world contracting. They show that even the largest companies in the world deliberately form incomplete contracts in order to incentivize legally unenforceable terms.

I draw two main implications for law and policy. First, sophisticated contract parties will write (and presumably perform) agreements even when the law formally voids them. Simply put, sophisticated parties form relational contracts in order to enforce unenforceable agreements. In order to prevent employees from agreeing to noncompetes, the law would have to make such agreements not only legally unenforceable, but also relationally unenforceable. More precisely, the law would have to eliminate the ability of the employer or the employee to credibly commit to such an agreement. One way to achieve this is to prohibit post-employment transfers (i.e., to require that any severance be immediate and lump-sum) and further to provide whistleblower incentives to employees who receive a prohibited transfer.

Second, some have argued that California's policy of voiding employment covenants not to compete significantly contributed to the development of Silicon Valley (see, e.g., Gilson (1999)). The idea is that this policy promotes labor market mobility and information spillovers. To the best of my knowledge, that claim has not been empir-

²See section 2 for details.

ically tested. Though this paper does not directly test it, the results do shed light on its main premise—that the policy actually deters formation of noncompetes. The results suggest that it indeed deters, but not completely. It remains to be seen, however, both whether such agreements are actually performed and, more importantly, their ultimate effect on labor mobility and productivity.

Strategic ambiguity is a member of a large class of contract theory results that characterize interactions between so-called explicit and implicit incentives. Explicit incentives come from express formal commitments; a contract provision that requires a party to either do x or pay damages explicitly incentivizes x . Implicit incentives, on the other hand, come from parties’ discretion and emerge in equilibrium; their existence and effect are less clear because they depend on strategy, environmental parameters, and solution concepts. Previous theoretical work in this area includes Bernheim and Whinston (1998), who study strategic ambiguity in one-shot games and were the first to offer the term “strategic ambiguity” to describe the optimality of an incomplete contract. There is also considerable theoretical work in the employment setting, including MacLeod and Malcomson (1989) on self-enforcing agreements when employee and employer are both repeat players, Levin (2003) on the optimality of discretionary bonuses, Bénabou and Tirole (2016) on the effect of labor market competition on the optimality of discretionary bonuses, and Che and Yoo (2001) on implicit incentives in team production. Scott (2003) further argues that if parties strategically omit terms, then judicial attempts to “fill in the gaps” will inadvertently unravel optimal contracts (see also Ayres and Gertner (1989); Ben-Shahar (2004)). The explicit-implicit tradeoff has also been studied outside contract theory, for example, to model how (explicit) laws and (implicit) social norms can complement or crowd-out each other as enforcement mechanisms. See, e.g., Cooter (1998) and Bénabou and Tirole (2011).

The remainder of this paper is organized as follows. Section 2 gives the legal background. Section 3 provides the theoretical framework and formalizes strategic ambiguity. Section 4.1 describes the data collection and section 4.2 presents the results. Section 5 concludes.

2 Legal Background

This section summarizes the variance in the enforceability of covenants not to compete inside versus outside California. This variance is used in section 4 to test the strategic ambiguity hypothesis.

2.1 Enforceability of covenants not to compete

In general, a covenant not to compete is a contractual provision in which one party agrees not to compete with another. In the employment context, it is a promise by the employee not to compete with the employer’s business after leaving the employer. Such agreements might prohibit, for example, the employee from working for a competitor, starting their own competing business, or owning or otherwise exerting control over a competing business.

In California, all such agreements are void. California statute provides that

every contract by which anyone is restrained from engaging in a lawful profession, trade, or business of any kind is to that extent void.³

California state courts have held categorically that there is no exception to this rule in the employment context.⁴ A few other small states also categorically void employment covenants not to compete.⁵ However, none of the contracts analyzed in this paper are governed by any of these states’ law.

All other states enforce covenants not to compete in employment contracts as long the restriction is “reasonable.” The reasonableness test is typically formulated as a limitation on the time and geographic scope of the noncompete.⁶ Though one

³California Business and Professions Code § 16600.

⁴*Whyte v. Schlage Lock Co.*, 101 Cal. App. 4th 1443 (2002) at 1463. See also *Edwards v. Arthur Andersen LLP*, 44 Cal. 4th 937, 949–50 (2008) (rejecting the Ninth Circuit’s “narrow restraint” exception). The only exception to this rule is outside the employment context: A covenant not to compete may be enforceable if it is in connection with the sale of business. California Business and Professions Code §§ 16601–16602.5.

⁵See, e.g., Okla. Stat. Ann. tit. 15, § 217. Garmaise (2009) provides a 50-state survey.

⁶See, e.g., *Reed, Roberts Associates, Inc. v. Strauman*, 40 N.Y.2d 303, 307 (1976) (“a restrictive

cannot say for certain, it is very likely that all of the covenants not to compete considered here (which are typically for 1 or 2 years and limited to firms in the same industry) would pass the reasonableness test of any state.⁷

The strategic ambiguity hypothesis—as formulated in this paper—posits that contract parties deliberately omit legally enforceable terms from formal enforcement in order to incentivize performance of other, unenforceable terms. In the employment setting, perhaps the most straightforward evidence of strategic ambiguity would take the form of an example like the following:

Example 1. (Stylized evidence of strategic ambiguity) *Suppose a non-California employment contract provides: “Employer agrees to pay Employee w per hour. Upon leaving the Company, Employer will pay Employee s severance and Employee will not work for a competing company for t years.” Meanwhile, a comparable California employment contract simply omits the noncompete and severance provisions and provides that: “Employer agrees to pay Employee w per hour.” Further, in an unwritten and unenforceable side-deal, the California parties agree to exchange severance installments over time for ongoing compliance with an (unwritten) noncompete.*

Presuming the empiricist could observe the side-deal, this would be a clear instance of strategic ambiguity. The ambiguity would lie in the California parties’ deliberate exclusion of an otherwise enforceable term (the severance payments) from the formal contract. Crucially, this is caused by the unenforceability of the covenant not to compete.

In practice, the California contracts in this study are drafted differently. But the end result is similar.⁸ These contracts differ from the example above because they expressly include both a severance package and a covenant not to compete in the written agreement. A key feature, however, is that the California severance packages

covenant will only be subject to specific enforcement to the extent that it is reasonable in time and area, necessary to protect the employer’s legitimate interests, not harmful to the general public and not unreasonably burdensome to the employee”).

⁷See, e.g., *Gelder Medical Group v. Webber*, 41 N.Y.2d 680 (1977) (upholding a five-year covenant not to compete).

⁸See the Appendix for an example.

are disbursed in installments, rather than the lump-sum and immediate disbursement typical in non-California contracts. Further, and most importantly, California severance payments are expressly conditioned on the employee’s ongoing compliance with the noncompete. Since California noncompetes are void, these contracts are seemingly drafted as an option for the employee. In each post-employment period, the California employee can either not compete and collect severance, or compete and forgo all future severance.

However, as explained below, this is not an enforceable option. This is because conditioning the severance payments on compliance with the noncompete renders the severance payments themselves unenforceable (or, as explained below, very likely unenforceable). Thus, neither party can legally enforce the severance-for-noncompete bargain in California. If the employee begins to compete, then the employer has no recourse but to halt severance payments. On the other hand, if the employer halts severance payments, the employee also has no formal recourse. Even if the employee continues to comply with the noncompete, a court will not enforce the employer’s promise to pay severance because it is conditioned on a term that violates public policy. In short, the California contracts studied here do not omit the severance package from the written document, but they do deliberately omit it from *formal* enforcement. The former fact makes this empirical study feasible; the latter makes these contracts deliberately incomplete.

2.2 Enforceability of provisions conditioned on noncompetes in California

The California statute, quoted above, makes clear that noncompetes contravene California public policy. Section 178 of the Restatement (Second) of Contracts provides that a contract term is “unenforceable on grounds of public policy if [among other reasons] legislation provides that it is unenforceable.” Thus, it is clear that an employer could not enforce a noncompete against an employee.

But what about a promise, like a severance payment, that is conditioned on a noncompete? Section 185 of the Restatement covers this kind of case. It contem-

plates the situation in which one party tries to incentivize the other into performing a term that is unenforceable on grounds of public policy (under § 178), specifically by conditioning its own promise on the term. In this situation, the Restatement provides for two options for a court:

1. The court may hold the promise that is conditioned on the unenforceable term is itself unenforceable, or
2. The court may excuse the condition.⁹

In the first case, the severance term is unenforceable and so the employer *never* has to pay severance, regardless of the employee's performance. In the second case, the condition is ignored (or "excused") and the employer *always* has to pay severance, even if the employee competes.

If we are to interpret the observed California contracts as strategically ambiguous, then it must be that California courts choose option 1, or at least that the risk of option 1 is significant. The commentary in Section 185 explains that a court will choose option 1 if the condition was an "essential part of the agreed exchange."¹⁰ To give an easy example of this, consider a bribery contract between a citizen and politician, in which the citizen promises to pay cash in exchange for a political favor. A promise to pay cash, were it within an ordinary commercial deal, would have been enforceable. But in this case, the promise to pay becomes unenforceable because it is conditioned on an act that violates public policy.¹¹ It seems very likely that the noncompete condition would be considered an "essential" part of the bargain for severance installments in contracts studied here.¹² Its essentiality is expressly

⁹See Restatement (Second) of Contracts § 185, Comment *a*. See also § 178, comment *d* and illustration 9.

¹⁰See Section § 185, Comment *b*.

¹¹See, e.g., *Sinnar v. Le Roy*, 44 Wash.2d 728 (1954) (on the unenforceability of a bribery agreement for a liquor license).

¹²Some of the observed California contracts are separation agreements that lay out the terms of an employee's release. These often consist of little more than severance installments conditioned on a noncompete. Option 1 would apply to such cases. Such cases are also extreme examples of strategic ambiguity, in which the optimal formal contract is null. In fact, the Restatement further suggests that in such cases as these, the court may refuse to enforce the entire contract. Section § 185, Comment *b*.

acknowledged by the language of the condition. It is also implicitly acknowledged by the structure of the severance itself—as installments that cease the moment an employee competes, rather than as a lump-sum that is common in non-California contracts.¹³

Finally, one may wonder why, if a court will not enforce it, the provision conditioning severance on a noncompete is written at all. I defer discussion of this question to the end of section 3.2.

3 Theoretical Framework

Two players, an employee and employer labeled $i = 1, 2$ respectively, play a two period game. In the first period, the players may constrain their second-period actions by forming a contract. A contract is a pair, $k = (k_1, k_2) \in \mathcal{K}$, where \mathcal{K} is the set of enforceable contracts, $k_i \subseteq A_i$ is a non-empty set of permissible actions that i may take in the second period, and A_i is a the finite set of all possible actions i could take. A contract is “complete” if it constrains each player to exactly one action, and “incomplete” otherwise. If the players do not form a contract, then the “no-contract” $\bar{k} = (A_1, A_2)$ governs and neither player’s second-period actions are constrained.

In the second period, the players play a one-shot game. Each player chooses a permissible action $a_i \in k_i$ and gets payoff $u_i(a_i, a_j)$. Note that a complete contract determines the outcome of this game, while an incomplete contract induces a subgame, the outcome of which is determined by strategic interaction. Following Bernheim and Whinston (1998), I assume that players only play pure strategies, that they only form contracts for which a pure strategy Nash equilibrium exists, and that they can coordinate in case the subgame admits many equilibria.

3.1 The set of enforceable contracts

Unenforceable terms are modeled in the following way. Each action, $a_i \in A_i$, is a vector of finite terms. If a term is unenforceable, I assume a court will sever that

¹³[Insert note on California case law and the “employee’s choice” rule here.]

term and enforce the remainder.¹⁴ For example, suppose $A_1 = A_2$ and each action is a vector with three entries. The first two entries can be 0 or 1, while the third can be 0, 1, or 2. Each player then has 12 possible actions:

$$\begin{array}{l}
 p_1 \left\{ \begin{array}{l} a_1 = 0 \ 0 \ 0 \\ a_2 = 0 \ 0 \ 1 \\ a_3 = 0 \ 0 \ 2 \end{array} \right. \qquad p_3 \left\{ \begin{array}{l} a_7 = 0 \ 1 \ 0 \\ a_8 = 0 \ 1 \ 1 \\ a_9 = 0 \ 1 \ 2 \end{array} \right. \\
 \\
 p_2 \left\{ \begin{array}{l} a_4 = 1 \ 0 \ 0 \\ a_5 = 1 \ 0 \ 1 \\ a_6 = 1 \ 0 \ 2 \end{array} \right. \qquad p_4 \left\{ \begin{array}{l} a_{10} = 1 \ 1 \ 0 \\ a_{11} = 1 \ 1 \ 1 \\ a_{12} = 1 \ 1 \ 2 \end{array} \right.
 \end{array}$$

Now suppose the third term (which can be 0, 1, or 2) is unenforceable. Under this enforceability constraint, it is no longer possible to enforce any complete contract. For example, consider the complete contract $k = (a_1, a_5)$, in which player 1 commits to a_1 and player 2 commits to a_5 . Given such a contract, a court will sever the final term and only require player 1 to play a_1 , a_2 , or a_3 . This is because those three actions are identical except for the third term. Similarly, player 2 could only be required to play a_4 , a_5 , or a_6 . Many incomplete contracts are also unenforceable. For example, if $k = (\{a_1, a_2, a_3\}, \{a_4, a_5\})$, then player 2 could still play a_6 .

The only enforceable contracts are selections of one or more elements of $P = \{p_1, p_2, p_3, p_4\}$. For example, $(p_1, p_2) = (\{a_1, a_2, a_3\}, \{a_4, a_5, a_6\})$ is enforceable because, even after severing the third term, neither player has the option to play an action that is outside the contract. Similarly, $(p_1, \{p_1, p_2\})$ is also enforceable.

In general, the enforceability constraints will induce a partition over each players' action space. The set of enforceable contracts available in the first period will be $\mathcal{K} = \{2^{P_1} \times 2^{P_2}\}$. When all contracts are enforceable, the contract space is unconstrained and $\mathcal{K} = \overline{\mathcal{K}} \equiv \{2^{A_1} \times 2^{A_2}\}$. If some terms are not enforceable, then the contract space is missing some contracts and \mathcal{K} is a proper subset of $\overline{\mathcal{K}}$. In this way, unenforceability

¹⁴One may imagine that certain terms elicit penalties or other kinds of reactions from a court. Since the action space includes all possible combinations of all actions, this could be easily incorporated into the model by removing or relabeling some action vectors.

is a constraint on the contract space.¹⁵ Finally, note that if even some terms are unenforceable, it may still be possible to write a complete contract. For example, if the third term is unenforceable, but instead $A'_1 = A'_2 = A_1 \setminus \{a_{11}, a_{12}\}$, then the resulting partition is

$$\begin{array}{cc}
 p_1 \left\{ \begin{array}{l} a_1 = 0 \ 0 \ 0 \\ a_2 = 0 \ 0 \ 1 \\ a_3 = 0 \ 0 \ 2 \end{array} \right. & p_3 \left\{ \begin{array}{l} a_7 = 0 \ 1 \ 0 \\ a_8 = 0 \ 1 \ 1 \\ a_9 = 0 \ 1 \ 2 \end{array} \right. \\
 \\
 p_2 \left\{ \begin{array}{l} a_4 = 1 \ 0 \ 0 \\ a_5 = 1 \ 0 \ 1 \\ a_6 = 1 \ 0 \ 2 \end{array} \right. & p'_4 \left\{ \begin{array}{l} a_{10} = 1 \ 1 \ 0 \end{array} \right.
 \end{array}$$

and it would be possible to write one complete contract, (p'_4, p'_4) .

I will refer to a contract as “strategically ambiguous” if it does not constrain each player to one element of the partition. In this sense, a strategically ambiguous contract constrains the parties partially, but not as much as possible (given constraints on enforcement). It is deliberately incomplete because the parties could have further constrained their actions. To use the example above, $(p_3, \{p_2, p_4\})$ is strategically ambiguous, while (p_3, p_2) and (p_3, p_4) are not.¹⁶

¹⁵One could alternatively allow players to form contracts outside \mathcal{K} and then imagine a court maps any unenforceable contract to an enforceable one. For convenience, here I simply skip the mapping step and assume parties can only form enforceable contracts. There is no difference in this setting, but one could imagine a difference emerging if, for example, the choice of contract in the first stage signals information about the players.

¹⁶It is worth comparing the set up here with the model of Bernheim and Whinston (1998). They model constraints on verifiability by imagining that a court cannot distinguish among some groups of actions. This, too, induces a partition on the action set and constrains the set of feasible contracts to the cartesian product of the power set of these partitions. Here I have shown that a similar class of restrictions on the contract space is obtained if some terms of the action vector are not enforceable. (This particular type of restriction on the contract space is not strictly necessary, but it does make strategic ambiguity easier to define.) Also, Bernheim and Whinston (1998) demonstrate strategic ambiguity in a two-player, one-shot game in which the players move sequentially and each chooses an action from a finite interval on the real line. In the next section, I produce a similar result in repeated games with discrete actions, in which only one player (the employer) is a repeat player.

| | | Employer | | | |
|-----------------|----------------|-------------------|-------------|---------------|-------|
| | | q_1 | q_2 | q_3 | |
| | | <i>wage-sev</i> | <i>wage</i> | <i>renege</i> | |
| Employee | p_1 { | <i>no-compete</i> | 3, 1 | 1, 2 | -2, 3 |
| | <i>compete</i> | 4, -2 | 2, -1 | -1, 2 | |
| | p_2 { | <i>reject</i> | 0, 0 | 0, 0 | 0, 0* |

Figure 1: An employment game. * denotes pure strategy Nash equilibrium.

3.2 Strategic ambiguity in one-shot and repeated games

This section will show that strategic ambiguity may arise in one-shot and repeated games. By “may arise,” I mean that for some games, there is an equilibrium that involves a strategically ambiguous contract that Pareto-dominates all equilibria involving non-strategically ambiguous contracts. The results in section 3.2.1, on one-shot games, come from Bernheim and Whinston (1998). Section 3.2.2 then extends this to a repeated-game setting. It shows how strategic ambiguity may arise in the repeated game even if it does not arise in the one-shot stage game. This result motivates the empirical test in section 4.

Consider the employment game in figure 1 as a motivating example. Each player in this game has three possible actions. The employee can work and not compete after employment, work and compete after employment, or not work and reject the employer. These are respectively denoted *no-compete*, *compete*, and *reject*. The employer can pay wages and severance, pay only wages, or renege and pay nothing. These are respectively denoted *wage-sev*, *wage*, and *renege*. Note that payoffs are intuitive in that if employee works, then (1) employee prefers *wage-sev* over *wage* and *wage* over *renege*, while employer prefers the opposite ordering and (2) competing is always good for employee and bad for employer. Throughout, I assume that covenants not to compete are not enforceable. This induces the partitions

| | | | | | |
|-----------------|-------|-----------------|-------------------|-------|--------|
| | | Employer | | | |
| | | q_1 | q_2 | | |
| | | <i>wage-sev</i> | <i>wage</i> | | |
| Employee | p_1 | { | <i>no-compete</i> | 3, 1 | 1, 2 |
| | | | <i>compete</i> | 4, -2 | 2, -1* |

Figure 2: Subgame of the employment game induced by the strategically ambiguous contract $k^{sa} = (p_1, \{q_1, q_2\})$. * denotes pure strategy Nash equilibrium

$P = \{p_1, p_2\}$ and $Q = \{q_1, q_2, q_3\}$ given in figure 1.

3.2.1 One-shot game

First consider the one-shot game. Bernheim and Whinston (1998) have shown that strategic ambiguity does not arise in the general case of one-shot, two-player games with simultaneous moves. The intuition is that, given any strategically ambiguous contract k with equilibrium a^* , the players may alternatively form the non-strategically ambiguous contract \hat{k} that simply selects the partition elements that contain a^* . Since a^* is an equilibrium of k , it is also an equilibrium of \hat{k} .¹⁷ Thus, there is no pure-strategy equilibrium that can only be achieved with a strategically ambiguous contract, so the players do no worse by ignoring such contracts.

In the employment game, it is straightforward to see that strategic ambiguity will not arise. That is, there is no strategically ambiguous contract that Pareto-improves over all non-strategically ambiguous contracts. To see this, first note that there are only two Pareto-improving contracts, $(no-compete, wage-sev)$ and $(no-compete, wage)$. These contracts are not strategically ambiguous. They are also not available to the players because of the enforcement constraint. No other contract

¹⁷Bernheim and Whinston (1998) show how this does not hold under alternative assumptions, specifically, if players are not limited to pure strategies or if they cannot coordinate in case of multiple equilibria. For example, if players can play mixed strategies, then this argument fails because the support of a player's strategy may extend across multiple elements of the partition.

| | | Employer | | | |
|-----------------|---------|-------------------|-------------|---------------|-------|
| | | q_1 | q_2 | q_3 | |
| | | <i>wage-sev</i> | <i>wage</i> | <i>renege</i> | |
| Employee | p_1 { | <i>no-compete</i> | 3, 2 | 1, 1 | -2, 3 |
| | p_2 { | <i>compete</i> | 4, -2 | 2, -1 | -1, 2 |
| | p_2 { | <i>reject</i> | 0, 0* | 0, 0* | 0, 0* |

Figure 3: Alternative employment game. * denotes equilibria in which Employee moves first.

Pareto-improves upon the no-contract outcome. For example, consider the strategically ambiguous contract $k^{sa} = (p_1, \{q_1, q_2\})$. Figure 2 gives the subgame induced by k^{sa} . This contract gives the employee discretion over whether to compete (from the enforceability constraint) and the employer discretion over whether to pay severance (the strategically ambiguous component). The unique equilibrium for k^{sa} is (*compete*, *wage*). Note that k^{sa} is not individually rational for employer; further, the same outcome could also be achieved with the non-strategically ambiguous contract $k = (p_1, q_1)$.

Sequential game. Next suppose instead that the players move sequentially, with player 1 (employee) moving first. There are now three Nash equilibria in the no-contract case, (*reject*, *wage-sev*), (*reject*, *wage*), and (*reject*, *renege*); each yields payoffs of (0, 0). In the example game studied here, there is still no strategically ambiguous contract that Pareto-improves over all others (e.g., k^{sa} still leads to the same outcome as in the simultaneous game).

However, it is possible to construct games for which strategic ambiguity does arise in sequential play. Bernheim and Whinston (1998) show this for sequential games in which players choose an action within an interval along the real line. Here I give an example in which it arises in discrete games: Consider the alternative game in figure 3, which is identical to figure 1 except employer's payoff from (*no-compete*,

wage-sev) is swapped with (*no-compete*, *wage*). This game has the same three no-contract equilibria, all of which again yield payoffs of (0, 0). However, k^{sa} now leads to the unique equilibrium (*no-compete*, *wage-sev*) with payoffs of (3, 2). It is straightforward to check that only one other contract, $(\{p_1, p_2\}, \{q_1, q_2\})$, which is also strategically ambiguous, Pareto-improves over \bar{k} .

3.2.2 Repeat play

Return again to the main stage game, given in figure 1. In this game, strategic ambiguity does not arise even when players move sequentially. However, it may arise in the repeated game. To see this, suppose that, in addition to sequential play, the employer is infinitely-lived¹⁸ and faces a series of one-off employees. In each period, employer faces a new employee, forms a contract with the employee, and plays the subgame induced by that contract.

There are now many equilibria in which the players form the strategically ambiguous contract $k^{sa} = (p_1, \{q_1, q_2\})$ in each period. For example, one equilibrium is a grim strategy in the style of Friedman (1971). In the first period, form k^{sa} and play (*no-compete*, *wage-sev*). In each subsequent period, form k^{sa} and play (*no-compete*, *wage-sev*) so long as (*no-compete*, *wage*) was *not* played in the previous period. Otherwise, form the no-contract (A_1, A_2) and revert to the no-trade Nash equilibrium (*reject*, *renege*) with zero payoffs for all subsequent periods.

Intuitively, this can be thought of as the strategy in which future employees punish an employer for defecting from an implicit bargain with the current employee. The implicit bargain is that employer will pay severance if employee does not compete. If employer discounts future payoffs by δ , then this is an equilibrium so long as employer's single-period deviation is less than its continuation payoff, that is, if

$$1 < \frac{\delta}{(1 - \delta)},$$

¹⁸Instead of being infinitely-lived, one may alternatively suppose that the employer's hazard of playing the stage game in the next period is strictly greater than zero. This allows for the possibility of bankruptcy risk.

which implies $\delta > 1/2$. Notably, this Pareto-dominates the same strategy played with the no-contract \bar{k} only if δ is also less than $2/3$. This is because when $\delta > 2/3$, the same payoff profile $(3, 1)$ may be supported by a similar strategy with no contract. Thus, strategic ambiguity may arise in this setting, but only for intermediate levels of δ ; it will not arise if employer is too impatient (very low δ) or if employer is too patient (very high δ).¹⁹ In general, intermediate δ is a necessary condition for strategic ambiguity to arise only when the game is repeated.

Proposition 1. (Strategic ambiguity in repeated games.) *Consider a two-player game with enforceability constraints in which players move either simultaneously or sequentially. Suppose strategic ambiguity does not arise in the one-shot stage game. If strategic ambiguity arises in the δ -discounted repeated game, then for at least one $i \in \{1, 2\}$ there exist $\underline{\delta}, \bar{\delta} \in (0, 1)$ with $\underline{\delta} < \bar{\delta}$ such that strategic ambiguity arises if and only if $\delta_i \in (\underline{\delta}, \bar{\delta})$.*

It may seem odd that strategic ambiguity arises only when players' patience enables them to commit a little but not a lot. The logic is that strategic ambiguity is itself a "goldilocks" strategy. It limits players' actions partially (in order to rule out extreme defection) but not completely (so that players can still discipline each other). When players are sufficiently patient, the usual folk theorem applies and so using contract to rule out defection becomes unnecessary. When players are insufficiently patient, players do not value the future enough to resist defection; thus, if strategic ambiguity did arise in the repeated game, then it must have also arisen in the one-shot game. (The example above, in which employee is a one-time player, can be thought of as the extreme case in which $\delta = 0$ for employee.) Finally, when all contracts are enforceable, the goldilocks strategy is unnecessary because any payoff profile can be selected by contract.

As a final note, I remarked in section 2 that the contracts studied here include terms that both parties know to be unenforceable, specifically, a severance provision

¹⁹These are not the only equilibria that exist in this game. One may construct others that involve finite periods of penalty. The only point here is that, since employer's single-period deviation is larger in the no-contract case of \bar{k} , any Pareto-improving equilibrium strategy involving \bar{k} in each period will require a higher δ than the analogous equilibrium strategy involving k^{sa} .

that is expressly conditioned on a noncompete. One natural question is why the parties would bother writing unenforceable terms. I interpret their inclusion not as an attempt to make a legal commitment to the current employee, but rather an attempt to make a reputational commitment to future employees. This interpretation is natural because the grim strategy described here requires that each employee can observe the previous-round’s play. Further, it is empirically valid because the contracts studied in this paper are publicly available, so future employees can indeed view past employees’ agreements. In this way, the act of writing and publicizing unenforceable provisions is a public announcement of grim.

4 Evidence of Strategic Ambiguity

This section tests the strategic ambiguity hypothesis with real-world contracts. It demonstrates that in California, where noncompetes are not enforced, we observe strategically ambiguous contracts that resemble the kind discussed in section 3. By contrast, outside California, where covenants not to compete are enforced, we do not find such contracts.

4.1 Data Collection and Summary Statistics

The contracts analyzed in this paper come from the 67 companies that are on Standard and Poor’s 500 and classified as “Information Technology” by the Global Industry Classification Standard. Federal securities law requires these companies to disclose “material” contracts to the SEC. This includes, amongst others, employment contracts with directors and officers.²⁰ Beginning in 1996, all of the SEC’s filings are available on the SEC website.

To gather the data, I first wrote scraping software to collect every contract disclosed by each of the companies in the sample. I then parsed these contracts for variables of interest, including: type of contract (employment or not), governing law, name and position of employee, existence and details of the covenant not to compete,

²⁰See Securities Exchange Act § 12(g) and 17 C.F.R. 229.601(a) and (b).

and existence and details of the severance package. The parsing program is subject to error because contract structure is not standardized. To remove these errors, I read through every contract to double-check each observation by hand.

Table 1 presents summary statistics. Panel A lists summary statistics in which the unit of observation is the contract. There are 422 total contracts. Of these, 43 percent are governed by California law; for these contracts, a covenant not to compete would not be legally enforceable. About half of all contracts have severance terms; conditional on having severance, the severance payments are made over a 17-month period (typically in monthly installments). About 60 percent of all employment contracts include a covenant not to compete, with the average term again being about 17 months.

I refer to a covenant not to compete as “self-enforcing” (or “relational”) if severance payments are spread out over a term that is at least as long as the noncompete. This structure gives the employer the self-help remedy of stopping the severance payments if the former employee breaches the noncompete. About 35 percent of all contracts include a self-enforcing noncompete; conditional on including a noncompete, about two-thirds are self-enforcing.

The employee positions are roughly a third for each of the following: (1) top level (CEO, President, or Chairman of the Board), (2) non-CEO but “C-level,” such as CFO, COO, or general counsel (sometimes titled “CLO” for Chief Legal Officer), and (3) below C-level, such as Vice President. Finally, about 75 percent of contracts include non-solicitation provisions, which prohibit the former employer from actively encouraging fellow-employees to leave the employer; these terms are, on average, about 16 months.

Panel B lists summary statistics in which the unit of observation is the employer. Contracts were reported by 45 companies, about half of which are based in California.²¹ Nearly 90 percent of companies have written an employment contract that includes a severance provision, 76 percent have written one that includes a covenant not to compete, and 42 percent have at least one with a self-enforcing non-compete. About 70 percent have at least one contract with a non-solicitation provision. Finally,

²¹[*Investigate non-reporting problems*]

24 percent of companies have at least one employment contract that uses California law as well as at least one that uses non-California law.

4.2 California versus non-California contracts

Table 2 presents the main results. It compares California with non-California contracts. The first two rows include all contracts. California contracts are nearly 60 percentage points less likely to include a covenant not to compete (26 compared to 85 percent), and this difference is statistically significant. By contrast, the difference in the likelihood of including a severance package (49 versus 56 percent) is not statistically significantly different from zero. This suggests there is no systematic difference between California and non-California companies in the likelihood of awarding severance. This is important because it is not the existence of a severance package, but rather its structure (discretionary installments versus non-discretionary lump sum) that is used to identify strategic ambiguity.

The next row limits the sample to only the contracts that include a noncompete. Conditional on including a noncompete, California contracts are 59 percentage points more likely to include and structure severance payments to “self-enforce” the noncompete (83 versus 24 percent). In practice, this means the contract includes a severance payments disbursed in installments over the life of the noncompete, rather a lump-sum severance (or no severance at all). Thus, where noncompetes are legally unenforceable, parties are more likely to structure severance packages that self-enforce the noncompete.

The final two rows restrict the sample of contracts to those that include both a noncompete and a severance provision. This is arguably the most natural comparison between California and non-California contracts. When the sample is so restricted, 98 percent of California contracts structure the severance in order self-enforce the noncompete, compared to 39 percent of non-California contracts. There was only 1 California contract that included both a noncompete and immediate lump-sum payout of severance.

The final row presents the first direct evidence of “strategic ambiguity” among

real-world contracts. Since all of the California contracts that include both a non-compete and an installment severance package specifically condition the latter on the former, these severance provisions are legally unenforceable (or very unlikely to be enforced; see section 2) and thus discretionary. Since the severance package is not a *formal* commitment, these contracts are, strictly speaking, incomplete. They rely instead on *relational* enforcement of the kind predicted by the model in section 3. By contrast, this structure of relationally-enforced severance does not arise outside California, where noncompetes are enforceable. No non-California contract structures the severance package in a way that leaves any doubt to its enforceability. In short, California contracts deliberately make their severance payments legally unenforceable in order to incentivize unenforceable noncompete provisions.

Finally, it is worth emphasizing on precisely what is meant here by “strategic ambiguity.” In the theory, strategic ambiguity refers to the hypothesized phenomenon that formal agreements are deliberately incomplete. Above, I have argued that this is conceptually equivalent to a writing that makes an (otherwise enforceable) provision unenforceable. In this setting, this is accomplished by conditioning the severance payments on performance of the noncompete. This condition makes the severance payments legally unenforceable: If the employee competes, the employer has no recourse beyond stopping the payments. Similarly, if the employee does not compete but the employer does not make good on the severance payment, again the employee, too, has no formal recourse.

5 Conclusion

This paper presented the first empirical test of the strategic ambiguity hypothesis. The hypothesis posits that parties deliberately form an incomplete formal contract (by omitting enforceable terms or adding discretion) in order to incentivize performance of unenforceable terms. This result was first extended to the specific setting studied here, employer-employee contracts, by developing a simple model of incomplete contracts in the context of repeated games. It was then tested using a unique set of employment contracts from 1996 through 2015 from S&P 500 tech

companies. I gathered these data by parsing filings with the Securities and Exchange Commission with a combination of machine-coding and hand-coding techniques.

The results validate the strategic ambiguity hypothesis: In California, where noncompetes are void, companies continue to write noncompetes but make them self-enforcing by conditioning severance installments on their performance. In the process, these employers render the severance payments legally unenforceable and therefore discretionary. Outside California, severance packages are never deliberately made legally unenforceable; they are also much more likely to be unconditional and disbursed in an immediate, lump-sum payment. These results demonstrate that the largest companies in the world write formal contracts that are deliberately incomplete and unenforceable.

A principal policy implication is that a law that voids these agreements is not sufficient to prevent their formation and performance. To eliminate such agreements, the law would have to making them both legally and relationally unenforceable. This could be done, for example, through a whistleblower scheme in which employees become entitled to large penalties (payable by the employer) if they receive any post-employment transfer from the employer. Such a policy would require severance payments to be immediate and lump-sum.

6 Data Appendix

The next two sections give examples of contracts that include both (1) severance paid in installments and (2) a covenant not to compete.

Section 6.1 gives an example governed by non-California law (specifically, New York). In non-California contracts, these two provisions are drafted as independent promises. This way, neither side can legally halt performance.

Section 6.2 gives an example of a California contract. In California contracts, the noncompete is unenforceable. For this reason, they are drafted as options on the side of the employee, with continued severance installments conditional on performance of the noncompete. Further, because the severance provision is conditioned on a void provision, it is very likely that even the option is not legally enforceable. (See

section 2.) Thus, if either side halts performance, the other side's only recourse is to also halt performance. This part of the employment agreement (severance payments in exchange for the noncompete) is therefore not part of the formal contract.

Both contracts are available on the Securities and Exchange Commission's online EDGAR database. The first comes from MasterCard Inc.'s Form 8-K filed on June 19, 2009. The second comes from Symantec Corporation's Form 8-K filed on December 12, 2007. Employee names are available online but have been redacted here. All emphasis has been added in order to highlight distinctions between the two methods of drafting.

6.1 Example of a non-California contract with enforceable severance and covenant not to compete

* * *

Agreement made and entered into this 16th day of June, 2009, (the 'Effective Date') by and between MasterCard International Incorporated, a Delaware corporation (the 'Company') and [employee name redacted] (the 'Executive')

* * *

[Severance installments]

5.2.5 . . . If . . . the Executive's employment is terminated by the Company [without cause, or by the Executive for Good Reason, or by non-renewal of the employment term] . . . the Executive shall be entitled to: . . . severance pay, in the form of Base Salary continuation . . . payable [monthly] . . . for a twenty-four (24) month period following the Executive's Date of Termination (the 'Severance Pay Period').

* * *

[Covenant not to compete]

6.3 ...the Executive agrees that ...**through the duration of the Severance Pay Period ...the Executive will not** ...render any ...services to ...any business or activity that competes with ... [MasterCard.] This prohibition includes, but is not limited to the Executive ... performing services for the following...: (i) VISA Inc., VISA Europe, American Express, Discover, China Union Pay, JCB, Diners Club International, PayPal, Revolution, Tempo, Bill Me Later, Inc., First Data Corporation, Metevant, Star Network Inc. or NYCE ...

* * *

[New York Law]

9.1 This Agreement shall be construed and enforced in accordance with the laws of the State of New York without reference to principles of conflict of laws.

6.2 Example of a California contract with unenforceable severance and covenant not to compete

* * *

November 5, 2007

* * *

Dear [employee name redacted],

This letter sets forth the agreement between you and Symantec Corporation ('Symantec') regarding severance benefits and your release of certain claims.

* * *

[Severance]

4. . . . Symantec shall pay you severance in the amount of \$191,253.76, equal to 21.62 weeks of pay, payable as follows: fifty percent (50%) of the severance amount upon termination of your employment, and the remaining fifty percent (50%) at the end of the nine-month (9) month period measured from the Termination Date. **This severance will be paid only after all of the following conditions are met: . . .**

* * *

[Covenant not to compete]

9. . . . You agree that for a period of nine (9) months from and after the Termination Date, you shall not: (a) accept employment with or establish any consulting or advisory relationship . . . with the following companies: EMC Corporation, Network Appliance, Oracle, Sun, HP, BladeLogic, CommVault Systems, Inc., Microsoft Corporation, IBM, Computer Associates and Cisco . . .

* * *

[California law]

11. . . . This Agreement shall be interpreted and enforced in accordance with the laws of the State of California.

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Table 1: Summary Statistics:
Employment Contracts of S&P 500 Tech Companies

| <i>Panel A: Contracts</i> | Mean | Obs. |
|--|-------|------|
| Governed by California law | 0.43 | 422 |
| Severance (indicator) | 0.53 | 422 |
| Severance (term in months) | 16.65 | 117 |
| Covenant not to compete (indicator) | 0.59 | 422 |
| Covenant not to compete (term in months) | 16.67 | 251 |
| Covenant not to compete (self-enforcing) | 0.35 | 251 |
| Employee is CEO, Chairman, or President | 0.34 | 422 |
| Employee is C-Level (besides CEO) | 0.30 | 422 |
| Non-solicitation (indicator) | 0.74 | 422 |
| Non-solicitation (term in months) | 15.50 | 311 |
| <i>Panel B: Companies</i> | Mean | Obs. |
| California headquarters | 0.51 | 45 |
| Severance (indicator) | 0.87 | 45 |
| Covenant not to compete (indicator) | 0.76 | 45 |
| Covenant not to compete (self-enforcing) | 0.42 | 45 |
| Non-solicitation (indicator) | 0.69 | 45 |
| Used California and non-California law | 0.24 | 45 |

Notes. The unit of observation is the contract in panel *A* and the employer in panel *B*. There are 422 total contracts from 45 total employers.

Table 2: Evidence of Strategic Ambiguity:
California versus non-California Employment Contracts

| | <i>Cal.</i> | <i>non-Cal.</i> | <i>diff.</i> | <i>s.e.</i> | Obs |
|--|-------------|-----------------|--------------|-------------|-----|
| <i>Sample is all contracts</i> | | | | | |
| Covenant not to compete (indicator) | 0.26 | 0.85 | -0.59 | (0.04)* | 422 |
| Severance (indicator) | 0.49 | 0.56 | -0.07 | (0.05) | 422 |
| Covenant not to compete and severance | 0.22 | 0.53 | -0.30 | (0.05)* | 422 |
| <i>Sample is contracts with CNC</i> | | | | | |
| Covenant not to compete (self-enforcing) | 0.83 | 0.24 | 0.59 | (0.07)* | 251 |
| <i>Sample is contracts with CNC and severance</i> | | | | | |
| Covenant not to compete (self-enforcing) | 0.98 | 0.39 | 0.59 | (0.08)* | 167 |
| Severance is legally unenforceable ('strategic ambiguity') | 0.98 | 0.00 | 0.98 | (0.01)* | 167 |

Notes. The unit of observation is an employment contract. The full sample is all executive employment contracts between 1996–2015 that were disclosed to the SEC by S&P 500 tech companies. * indicates statistically significantly different from zero at 99 percent confidence.