

Jacobi, Osnat; Weiss, Avi

Working Paper

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Working Paper, No. 2010-02

Provided in Cooperation with:

Department of Economics, Bar-Ilan University

Suggested Citation: Jacobi, Osnat; Weiss, Avi (2010) : A model of fault allocation in contract law: Moving from dividing liability to dividing costs, Working Paper, No. 2010-02, Bar-Ilan University, Department of Economics, Ramat-Gan

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A Model of Fault Allocation in Contract Law – Moving From Dividing Liability to Dividing Costs

Osnat Jacobi^a

and

Avi Weiss^b

January 2010

^aDepartment of Economics, Bar-Ilan University

^bDepartment of Economics, Bar-Ilan University and IZA

We would like to thank Adi Ayal, Omri Ben-Shahar, Moshe Gelbard, Shachar Lifshitz, Kobi Nussim, Ariel Porat, Yuval Procaccia and participants of the Law, Business and Economics workshop in Bar-Ilan University for helpful comments. Special thanks to Gideon Parchamofski for the many helpful ideas and comments he shared with us while we were writing this article. All remaining errors are ours alone.

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Abstract

We consider default rules for instances in which parties to a contract did not allocate the risk of a certain contingency, and both sides could have helped avoid the occurrence of breach of the contract or lessen the damages from it occurring. We compare alternative regimes with a fault-based guideline suggested in the literature for assigning the liability between the parties and discuss the pros and cons of each. We present a new possibility and show how this solves the problems raised by the other solutions. Under this mechanism, the court announces that any party that invests half of the optimal level of precautionary costs, as determined jointly by the parties, is off the hook, and that if each side invests this amount, the damage will be split. We demonstrate that this achieves optimality by leading the parties to jointly determine the optimal level of precautionary costs and to allocate the steps to be taken to the low cost bearer.

JEL Classification: K12

Keywords: Contract Law, Breach of Contract, Unallocated Risk, Strict Liability Regime, Fault Regime.

1. Introduction

As a rule, contract law is considered a strict liability regime, i.e., the party to whom the contract allocates the risk must execute his promise or pay the damages incurred by the other party independent of whether or not either party took sufficient precautionary steps to reduce the likelihood of, or damages from, non-performance (Robert Scott 2009, pp. 1381-2 and Richard Posner 2009, pp. 1349, 1351).¹ What is unclear is what happens when the breach is caused by a "contractual accident," i.e., a contingency not covered by the contract (Yuval Procaccia, 2009).² Such situations arise regularly because, as is well recognized, contracts tend to be incomplete. We address this issue in a setting in which both parties are able to take precautionary steps in order to reduce the probability or cost of the accident.

In this article we first compare three alternative fault-based solutions offered in the literature, all of which are meant to provide the promisee an incentive to act, and then offer an alternative option. The first alternative suggests that when both sides could have prevented the breach and failed to do so, the court should split the damages between them in some manner (Ariel Porat 1994, p. 141, and Porat 2009, p. 1397). The second recommends a novel market mechanism called "anti-insurance" in which the liable party pays for the damages that occurred from the breach but the payment does not go to the other party; rather a third party pays for the privilege of receiving this payment in case of breach (Robert Cooter and Porat 2002, p. 203). The third advocates adoption of a negligence regime by which the court fills in the gap in the contract by assigning liability, but offers a way out of liability to the side that took appropriate precautionary step in order to avoid the damage that occurred (Eric Posner 2009, p. 1431).

We show that in a contractual accident setting an essential element of the dividing liability doctrine necessary to achieve the optimal outcome is neutralized, resulting in underinvestment in precaution in many cases. This is not the case with anti-insurance, but surprisingly this mechanism does not offer an optimal solution for situations in which the

¹ This issue of the *Michigan Law Review* was devoted in its entirety to the conference on Fault in Contract Law held at The University of Chicago in the summer of 2009. Some of the papers in this conference were concerned with building proper incentives for the promisee to act when he can do so, and helped inspire this paper.

² While Procaccia (2009) used this term to describe only cases in which the parties contract on the basis of a common misperception of reality, we use the term to indicate breach of contract created by contingencies not included in the contract whether the information about its occurrence was available pre-contracting or not.

parties are perfect substitutes in preventing the breach or in the steps they can take to lower the probability of its occurrence. In addition, it may not be reasonable for the parties to be able to price an unknown contingency for such an anti-insurance contract. A negligence regime, on the other hand, gives both parties the proper incentives to overcome the contractual accident, but depends on the court's ability to specify optimal behavior and verify the precautionary steps that were taken by the parties.³ Indeed, even if this is possible, it is unclear whether courts can create rules that will let the parties know with certainty ex-ante who the court will later determine is the liable party, or what precautionary steps will be deemed "sufficient."

We develop a new mechanism that proposes dividing the costs of precaution between the parties instead of dividing liability as suggested by the other models. In this mechanism, the court announces that any party that invests half of the optimal level of precautionary costs, as determined jointly by the parties, is off the hook, and that if each side invests this amount, the damage, if it occurs, will be split. We demonstrate that this gives the parties a clear incentive to communicate with each other, and leads the parties to jointly determine the optimal level of precautionary costs and to allocate the steps to be taken to the low cost bearer. In addition, each party will choose to pay half of the costs rather than bear the entire liability. In this manner the optimal outcome is reached.

The paper is organized as follows. In Section 2 we discuss incomplete contracts, and the solution of completion of the contract by the courts. This solution keeps us in the realm of strict liability, with the unallocated risk allocated ex-post (assumedly) to the low cost bearer. We explain that a problem arises with this solution when optimally both sides should be taking precautionary steps to prevent the contractual accident. Since the regime assigns the entire risk to one party, it gives the other party no incentive to take action, thus leading to an inefficient outcome. We then briefly present three alternative regimes considered in the literature aimed at achieving efficient precaution by assigning full liability to the low cost bearer when it is optimal for only one party to take precautions, but to divide the liability between them if the optimal level of precaution requires both sides to take steps to prevent a breach or damages. These solutions and the problems they raise are presented in the next three Sections.

³ For this problem in using a negligence regime in contract law see E. Posner (2009, p. 1434).

In Section 3 we discuss the solution of dividing the liability between the sides in some manner. We consider two alternative realities. In the first, the parties are perfect substitutes in providing the precaution. This is most likely to be the case when there is information to be gathered or permits to be acquired, and once gathered/acquired the accident is avoided, i.e., precaution is a discrete variable – either the information is gathered or it is not. In such a setting it matters not which party acquires the information, as long as it is acquired. We also consider a situation in which the precaution is a continuous variable – the more invested the lower the expected damage – but the sides remain perfect substitutes. The second reality is one in which the precautionary measures taken by each side are not perfect substitutes, but rather are distinct actions. An example of this is when one party can invest in lowering the probability of an accident, while the other can lower the damage in case of an accident, for instance by lowering his reliance expenditures. We show that in either setting, dividing the liability in a contractual accident setting is likely to lead to inefficient precautionary investments. In Section 4 we discuss the "anti-insurance" solution and in Section 5 we consider the possibility of dealing with contractual accidents through a negligence regime. In Section 6 we present our solution that is based on dividing the cost of precaution between the sides rather than dividing the liability. Section 7 summarizes.

2. The Challenge of Building a Systematic Mechanism

2.1 Incomplete Contracts and Contractual Accidents

There are many reasons contracts are often not complete, i.e., they do not tend to allocate every possible risk that can arise throughout the life of the contract. Theory tells us that the parties to a contract will allocate only those risks for which the contractual cost is lower than the benefit from allocating it (Steven Shavell 1980, pp. 466, 468-9, Gur Huberman and Charles Kahn 1989, pp. 49-50, and Ronald Dye 1985, p.233).⁴ In addressing this phenomenon, Scott (2009, p. 1390) suggests that commercially sophisticated parties would balance "between contracting costs (which he called "the front end of the contractual process") and the goal of improving contractual incentives

⁴ This conclusion depends on the presumption that parties enter a contract in order to maximize their profit from the transaction. For further discussion of incomplete contracts, see Benjamin E. Hermalin, Avery W. Katz, and Richard Craswell (2007) and Alan Schwartz (1998).

(which he called "the back end of contractual process")." This idea can be seen as a tradeoff between investing in writing contracts that will lend a solution to as many ex-ante recognized contingencies as possible, and investing in finding solutions to those disruptive events by allocating unexpected risks ex-post through renegotiation.

While one may think that contingencies not included in the contract may be, in principle, unimportant, in reality contractual accidents are likely to be far more common than expected. Firstly, parties may err in their appraisal of the ex-ante probability of a certain contingency, thinking a certain risk is quite unlikely and not worth allocating, while, in fact, had they known the true probability of occurrence they would have wanted to allocate it.⁵ Secondly, changes in market conditions could be quite common and their implications substantial. Unforeseeable events may be quite likely, and contingencies purposely not contracted for because the probability of occurrence was so small could become far more probable later on.⁶

Interestingly, the contract itself could be another source for contractual accidents (Hermalin, Katz, and Craswell 2007, pp. 66-70). A contract is not a sterile environment that allocates risks; rather, it is a collection of clauses that specifies obligations. The fact that the contract itself can actually become an obstacle to the parties allocating the unallocated risk through renegotiation is quite surprising. The reason for this phenomenon is that, in general, contracts specify two types of clauses that can be used to interpret the parties' will (assuming they actually had mutual will) about the matter at hand. The first of these clauses describes the services or the goods that are to be provided, and the second describes the agreed upon price. As a result, in the case of a contractual accident (such as an unexpected increase in the cost of fulfilling the contract) one party may believe that the risk of the unforeseen event was allocated to the side that priced the deal, while the other may feel that the risk was allocated to the side that placed the order.⁷

⁵ For a comprehensive discussion about the party's inability to fully capture reality while drafting the contract see Procaccia (2009, pp.3-4, 6-10).

⁶ This is a type of bounded rationality pertaining to the sides' inability to gather and process all the necessary information to write a complete contract. The degree of cognitive difficulty that actually exists is unresolved, with scholars in the field of economic analysis to contract law attributing greater weight to this likelihood than their colleagues in the field of incomplete contracts in economics. For a discussion of this idea, see E. Posner (1999-2000, pp. 749, 753).

⁷ The idea that the contract itself may have different general clauses from which the parties can conclude that the risk for the realized contingency was nevertheless contractually allocated is not new. See George Triantis (1992, p. 450). Nevertheless, these general clauses might become an obstacle for the parties if they can be understood in a way that they allocated the same risk to different sides in the same case. For an

Another manner in which the contract can lead to contractual accidents is when there is an inconclusive clause in the contract from which one party concludes that the risk was allocated to the other party, while the other party believes this contingency is not covered in the contract, so that the ruling will be determined by a default rule designed to fill in the gap in the incomplete contract, which cuts in the opposite direction.⁸ In such a situation, it is difficult for the sides to know how the risk was, indeed, allocated since different clauses in the contract could lead to different interpretations. Thus, until the court determines to whom the risk was allocated (assuming the court can determine the parties' will), something that can only be done ex-post, the sides are likely to have difficulty resolving their differences and allocate the risk to the low cost bearer through renegotiation, because each side believes the risk was already allocated to the other party. In Coasean terms, rights are not sufficiently allocated, so we are in the zone of contractual accidents.

To help motivate the discussion of such contractual accidents, we present the following example to which we will refer throughout the paper.

Example: A client and a builder sign a contract whereby the builder is required to lay foundations for a pre-fabricated building being built by a company that specializes in making pre-fabricated buildings according to the specifications of the client. The value of the foundations to the client is v , the cost to the builder c and the contractual price is p . The client supplies the builder with the precise technical specifications of the desired foundations which he received from the company producing the building, and the contract with the builder is for a pre-determined fixed price. After the builder begins laying the foundations it is discovered that there are geological concerns on this land parcel that were not taken into consideration by the parties, and that will require changes in the foundations and/or in the building construction in order to guarantee that the

example how such non-clarity can lead to a contractual accident, see CA 3912/90 Eximin SA, a Belgian corporation v. Itel Style Ferrarri Textiles and Shoes Ltd The Supreme Court of Israel sitting as the Court of Civil Appeal [22 August 1993] (hereinafter "Eximin"). available at: http://elyon1.court.gov.il/files_eng/90/120/039/Z01/90039120.z01.htm.

⁸ See Eximin supra note 7.

building will not collapse or sink. The client refuses to pay for the required changes because the price was fixed ahead of time, placing all of the risk on the builder. The builder for his part feels that the agreed upon price was based on the plans given to him by the client, and so any risk related to undisclosed information, including those relating to the land quality, falls on the client. Therefore the client should bear the additional costs necessary to fix the foundations to make them appropriate. The quarrel between the sides escalates, eventuating in the builder abandoning the building site. As a result, both sides are harmed financially. In court it turns out that precautionary steps could have been taken to avoid the accident.

2.2 The Remedy

When parties to a contract failed to allocate all risks between them, the challenge in constructing a default rule that will allow the sides to protect themselves from a contractual accident stems from the necessity to design a sophisticated mechanism that can handle two distinct situations. In one situation it is optimal for only a single party to take the precautionary measures, since that party is the low cost bearer. In this case we desire a rule that will place the entire risk upon that individual, who will then have the proper incentive to take the necessary measures by internalizing all the damage incurred from that event. In the second case each party can take distinct actions, and some combination of actions will bring the total costs of precaution to a minimum. In this case we would like a mechanism that causes each party to internalize all of the damage for which he is liable, which will require dividing the liability so that each party is responsible for the damages he fails to prevent.

Put formally, the expected damages from a certain contractual accident is a function of the precautionary expenditures by one party (denoted X) and the other party (denoted Y), and the more spent by either party the lower the expected damages. The total cost from the contractual accident is the sum of the precautionary expenditures by the two sides and the expected damages. There is some optimal expenditure levels, denoted X^* and Y^* which bring this expected cost to a minimum. In some cases this minimum will be found

at a corner where only one party takes actions ($X^*=0$ or $Y^*=0$), and sometimes it will be internal ($X^*>0$, $Y^*>0$).

Traditional Contract law based upon a strict liability regime does not allow us this flexibility. The idea is simple. For a party to have an incentive to take precautionary steps, particularly when such steps are costly, it is generally necessary that they have an incentive to do so. While the incentive could stem from emotional/psychological feelings such as altruism, comradeship or a sense of duty, such steps are more likely to occur systematically when the party involved has a pecuniary self interest in the matter. For this reason, it is believed that any party who needs to take steps should have some of the risk placed upon him.⁹ Strict liability, however, places 100% of the risk on a single party. In such a regime, the court completes the incomplete contract by assigning the liability to one party (in which case, under strict liability, the parties' will is for court to allocate the risk to the low cost bearer). This party will have to pay expectation damages ($v-p$) to the innocent party in case of breach, thus causing him to internalize the entire cost from the accident. Such a ruling, however, leaves the other side with no incentive to act at all since, if a disruptive event occurs, the court will order the liable party to compensate him fully (Cooter and Porat 2004, pp. 162-3, and Porat 2009, pp. 1407-8). Thus, expectation damages can only be an optimal default rule in the case of a corner solution – when it is optimal for only one party to act.

In addition, even when one side is the low cost bearer and it is therefore optimal to place all of the liability on him; the court can only determine who the ex-post low cost bearer is after the breach. The parties, on the other hand, need to make decisions ex-ante based on whom they believe the court will determine ex-post was the low cost bearer ex-ante. It seems unlikely that the court can shape rules that will allow the sides to correctly determine the outcome of this process.¹⁰

An alternative option in a strict liability regime is to rule in favor of the innocent party, but to award him less than expectation damages. This will give him less than complete

⁹ The classical text on this issue is Guido Calabresi (1970, p. 70). For a numerical analysis see Cooter (1985, p. 73).

¹⁰ To the best of our knowledge, this question of whether courts can shape rules that allow the sides to know ex-ante who will be determined to be the low cost bearer has not been discussed in the literature. R. Posner and Andrew Rosenfield (1977, p. 90) stipulate that a party is a superior risk bearer if he is "in a better position to prevent the risk from materializing" or if he is the "superior insurer." However, the question remains whether the courts can give the sides guidance how they can determine which the court will consider the low cost bearer.

insurance. This can be done by awarding the innocent party only reliance damages (a sum of money that compensates him for investments made in order to increase the benefit from the contract) or restitution of the contractual price (p) in case of a breach. Both of these give the promisee less than his full harm and thereby cause him to internalize some of the risk, and thus (in principle) leave both sides with an incentive to take precautionary actions if these lower costs.¹¹ However, awards below expectation damages mean that the breaching party, as determined by the court, does not internalize all of the costs, and is thus not optimal for a case in which only one side is the low cost bearer for all of the damages.

This problem of creating a mechanism that is sufficiently flexible to handle extreme as well as intermediate optimal risk allocations finds its solution in a fault regime. Several scholars recently studied the impact of moving toward a fault regime in Contract Law on the promisee's incentives to assist the promisor in preventing a breach of contract or lowering damages when he is in a position to do so (Cooter and Porat, 2002, 2004).¹² Among the central issues studied was this question of how to build a regime that will lead to optimal behavior in both cases.

Adopting a fault regime into Contract Law, as suggested by these scholars, could be accomplished in one of two manners; either by decreasing the damages paid to the innocent party by the amount of damages he could have avoided (Scott 2009, p. 1382), or by giving the promisor a release from responsibility if he took the precautions required by the court (E. Posner, 2009). In the latter case, the promisor will be excused from damages he could not prevent, so the innocent party will internalize these damages, in similar fashion to the first solution.

In the next three Sections we will consider three general solutions all of which are meant to provide the promisee an incentive to act if he is in a position to do so – dividing the liability between the parties, anti-insurance, and a negligence regime.

¹¹ Note that with reliance damages the promisee has no incentive to limit his reliance expenditures to account for increased concerns since he will get these expenditures back in any case. Some authors have suggested that for this reason "the victim's damages should be limited to what his loss would be if he took efficient precautions." For a presentation of this issue, see, for instance, E. Posner (2009, pp. 1435-6).

¹² See also the conference on Fault in Contract Law held at The University of Chicago *supra* note 1.

3. Solution 1: Dividing the Liability

The first solution we consider is based on Porat (1994, 2009). Porat is concerned with giving the promisee proper incentives to take precautionary actions when he is able to assist in preventing a breach or lowering damages. The situation presented by Porat is one in which each side has full information about the steps taken and not taken by the other side, and the steps to be taken are sequential – first the promisee chooses whether and how to act, and then, after observing his actions, the promisor chooses whether and how to act. Under this scenario, the question is how to get the sides to act optimally. One way to achieve this is to transfer the entire damage to the promisee if he fails to act. This should have the result of making the promisee internalize the damages he can prevent and act accordingly (Porat 2009, p. 1407).

However, Porat is also concerned with a situation in which, despite being given incentives to act, the promisee fails to do so. In this situation, if the entire liability falls on the promisee, the promisor will have no incentive to fulfill the contract. Therefore, his suggestion is to adopt the comparative fault defense from tort law into contract law, and leave the promisor with some incentive to act by assigning less than full damages to the promisee (Porat 2009, p. 1408). Thus, if the court finds that the promisee was in a good position to act to prevent the breach or lessen the damages, the court will reduce the promisee's right to damages, but not eliminate it. On the other hand, if the promisee acts as expected, he is excused from bearing any damages, and the promisor will have to compensate him for full damages in the case of a breach.¹³

Returning to the formal discussion above, the promisee is excused from all responsibility if he carries out precaution of X^* .¹⁴ If not, he internalizes some proportion (say α) of the damages.¹⁵ This makes his damage function discontinuous at X^* . If he invests less than X^* he internalizes $\alpha D(X, Y)$ of the damages, where $D(X, Y)$ is the amount of damages, and is a decreasing function in both X and Y . Denoting by \hat{X} the

¹³ Note that Porat's desire to give the promisor incentives in case the promisee does not perform despite the incentives is an out of equilibrium concept, since in equilibrium the promisee performs. It is important to note that if this scenario plays out and the promisee indeed fails to perform, the incentives on the promisor will be insufficient (since he will not be responsible for the entire damage) and thus will, in general, lead to underinvestment in precaution, as demonstrated in Section 3.2 *infra*.

¹⁴ There are no actions the promisor can take to get excused from liability.

¹⁵ This could just as well be a lump sum payment instead of a proportion of damages.

optimal precautionary expenditure given α and by \hat{Y} the corresponding optimal expenditure by the promisor (the expenditure that minimizes $(1-\alpha)D(\hat{X}, Y)$), the promisee will spend X^* if $X^* < \hat{X} + \alpha D(\hat{X}, \hat{Y})$, and in this case the promisor will then invest Y^* . This condition will hold and the optimal outcome reached if α is sufficiently large. The optimality of this doctrine requires, in addition, that the promisee knows the levels of X^* and α that the court will determine, and that the court can verify whether the promisee took the correct precautionary steps.

When trying to apply this technique to contractual accidents a number of issues arise. While contractual accidents include numerous different types of situations, but what is common to all of them is that the identities of the promisee and promisor are not known, a prerequisite in Porat's model. Because of this, there is no party who knows for certain that he is the promisee, who will receive an excuse if he carries out certain steps. In addition, in some cases other essential elements of Porat's model are absent. Thus, for instance, precautionary steps could be simultaneous rather than sequential, or precautionary costs could be substantial. Thus, we are generally left with only the possibility to divide the liability between the parties, which, as we will now demonstrate, results in underinvestment in precaution in many cases. In what follows we will present models that test the incentives the sides have to act optimally, either unilaterally or through cooperation with the other party.

To this end, we present two cases, both based on the **Example** above:

Case A: Either of the parties can, for low cost, acquire the information regarding the geological problem which will tell them whether changes need to be made in the foundations and/or building materials. If this information is acquired before the builder begins laying the foundations and the company begins construction, certain sunk costs could be saved.

Case B: Even if the information is garnered before construction begins, it is not possible to guarantee that the building will not collapse or sink. However, both sides can take steps to lower the probability of this occurring.

3.1 The Discrete Case

Consider first a case such as Case A in which a survey needs to be carried out by either of the parties when the concern first arises, and if this is done the accident is avoided. Note also that if the information has been obtained by one party, it should optimally not be obtained by the other party since this will lead to an unnecessary duplication of costs. Until such time as the information has been attained the sides are substitutes in obtaining the information, and therefore the game is simultaneous.¹⁶ We call this the discrete case since the choice variable (whether to check) is a discrete choice.

Ex-ante such a survey was not contemplated either because no one considered the possibility that this might be an issue, or because it was recognized as a possibility, but the probability of a problem arising was so minute that the survey was not cost justified. At the point in time when the concern arises neither party carries out the survey since each believes it is the responsibility of the other party.

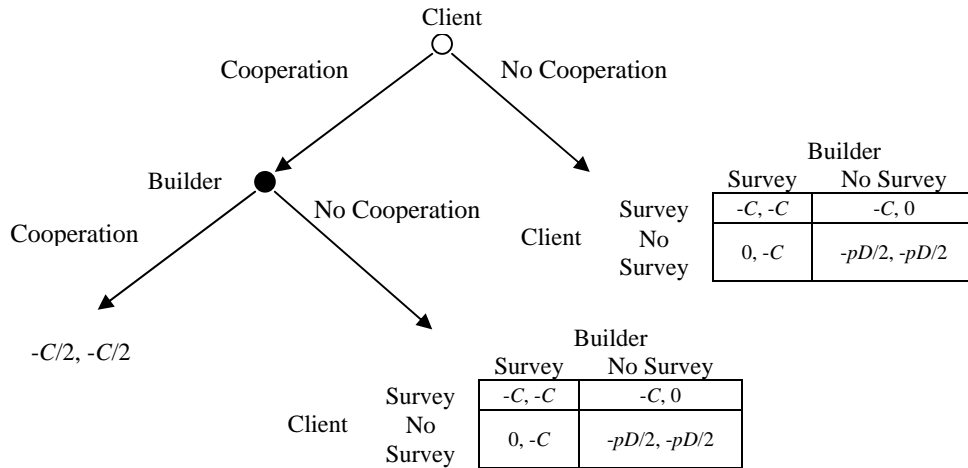
To investigate the incentives of the parties to conduct the survey, denote the probability that the survey will uncover a problem that requires changes by p , and the damage that can be saved by uncovering the information D . The cost of conducting the survey is C_i , $i=\{1, 2\}$, where 1 denotes the client and 2 the builder. Note that if the cost of the survey is the same for both parties, then $C_1=C_2$. Since this is the natural case for situations in which information is gathered this is the case we will consider. Also, this is the natural case for dividing the liability equally between the parties, and so most appropriate for extending Porat's model. Thus, we will drop the subscript in C . At the end of this section we will briefly discuss the case when the costs are not equal.

Since we want the survey to be worthwhile, we consider only the case in which $C < pD$. Each player must decide what to do, where his choice set is to conduct a survey, to not conduct a survey or to cooperate with the other party regarding the survey (for instance, to decide that one will conduct the survey and the other will pay half the cost).

Consider a situation in which the liability is split 50-50. This means that in the case of an accident, each side will bear 50% of the damages. The situation is depicted in Figure 1:

¹⁶ Note that this differs from Porat's (2009) setting in two key manners. First, we deal with a simultaneous and not a sequential game. Second, each side cannot see the steps taken by the other side.

Figure 1
The Discrete Case



While we present the decision whether to cooperate as being sequential, in reality it is simultaneous; it takes two to cooperate, and so if either the client or the builder refuses to cooperate, they end up in the table displayed (the same table is repeated twice) in which each must choose on his own whether to conduct the survey. If either conducts the survey the accident does not occur, while if neither of them conducts and the accident occurs, each pays 50% of the damages. Finally, if they cooperate, one of the parties undertakes the survey, but the cost is split between them (we assume it is split 50-50). The equilibrium outcome depends upon the relative sizes of C and $pD/2$. There are two cases.

If $C > pD/2$ the equilibrium in the table is for neither party to undertake the survey; for each player, not undertaking the survey is superior (Pareto dominates) to undertaking the survey independent of the choice of the other player. Thus the outcome along the no cooperation branches is $-pD/2$ for each party. Since $C/2 < pD/2$, the equilibrium in the entire decision tree is for the parties to cooperate and have one of the parties undertake the survey. This is the desired result.

The problem arises, interestingly, specifically when the cost of the survey is low. When $C < pD/2$ there are two pure strategy Nash equilibria in the table – the client undertaking the survey and the builder abstaining, or the opposite, the builder undertaking the survey and the client not. The result is a game of "chicken" in which each can try to outlast the other hoping he will take the required steps. An equilibrium in mixed strategies also exists in the table, however, the cooperative equilibrium Pareto dominates it. Given that

there are multiple equilibria, the question becomes what will happen in practice. The answer, unfortunately, is that we do not know. If, for instance, both parties believe that the responsibility to conduct the survey belongs to one of the parties and both expect that party to carry out the survey, then that is what will occur and no problem arises. The point is that such consensus will not necessarily exist. Let us recall that we are considering a case where the risk has not been assigned. It is likely that the sides will not have the same views with respect to what should happen or what will happen.¹⁷

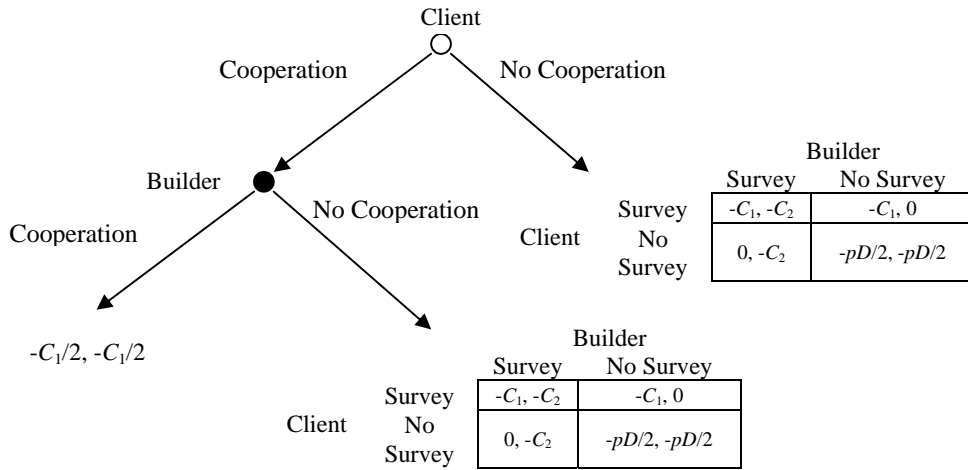
Thus, for instance, the client may feel that the builder is liable and will therefore be very likely to carry out the survey, while the builder may feel the exact opposite. While this is not a Nash equilibrium it can nonetheless happen in a one-shot game, and if it does, neither party will agree to cooperate since each will expect the other to carry out the survey, and the survey will not be taken. The opposite could also occur, of course, with each believing that the other will not carry out the survey, and we could end up with the survey being taken twice. In short, the presence of multiple equilibria makes the outcome uncertain.

It is most instructive to note that the result is the opposite of the accepted doctrine; while in general it is believed that lower precautionary costs will make sharing the liability more successful, we find the opposite – lower precautionary costs lead to multiple equilibria which can potentially lead to contractual accidents.

Generalizing the result, assume that, for instance, $C_1 < C_2$, i.e., the client is the low cost avoider. This is depicted in Figure 2.

¹⁷ For a discussion of over-optimism in the legal process, see Oren Bar-Gill (2006) and references therein.

Figure 2
The Discrete Case



In this case, cooperation is exemplified by the lower cost avoider (the client) undertaking the survey and the sides somehow splitting the cost. The rest of the results are retained but there is one additional possibility not presented before. If $C_2 > pD/2 > C_1$ the builder has a dominant strategy in the non-cooperative part of Figure 2 to not carry out the survey. Given this, the client will prefer carrying out the survey over having the contractual accident occur. Working our way backwards, the builder will prefer not cooperating over cooperating since he knows that the survey will be conducted and the accident will not occur. The desired outcome will be achieved, with the low cost avoider carrying out the task (but bearing the entire cost).

3.2 The Continuous Case

Consider Case B in which each side can take steps that decrease the expected damage from a contractual accident, and these steps are not of an all-or-nothing nature; rather, the more invested by either party the lower the expected damage. First we consider the specific case in which the parties are perfect substitutes in avoiding the accident, then the case in which they can both take steps to mitigate the damages, but they are not perfect substitutes in precaution. For instance, one party can affect the probability of the accident while the other can lessen the damages from the accident if it occurs.

3.2.1 Perfect Substitutes

Consider a case in which, even if the information is garnered before construction begins, there are no steps that can be taken that will guarantee that the building will not sink or collapse, but the probability of this happening, and hence the expected damage, can be lowered by either strengthening the foundations of the building or by having the building built with lighter but more expensive materials. Assume the tradeoff between the two is constant, so that each a dollars spent on making the building lighter is as effective as spending b dollars on strengthening the foundations. This is a situation of perfect substitutes in avoiding the accident, with the probability of the accident given by $p(X/a + Y/b)$, $p' < 0$, $p'' > 0$, $a, b > 0$, where X is the precautionary investment by the client and Y the precautionary investment by the builder. a and b are inverse measures of efficiency; the greater a , for instance, the more the client must spend to lower the probability of the accident (i.e., the less efficient is the client in lowering the probability of an accident). When $a=b$ the parties are equally adept at avoiding the accident, while if, for instance, $a > b$ the builder is the more efficient avoider. Note that the expenditures of the parties are weighted and then summed, showing that actions by one do not negate the value of actions by the other.

In such a setting, the optimal solution is generally a corner solution. If $a > b$ the optimal solution is for only the builder to invest, while if $a < b$ the client should be the one to invest in precaution. When $a=b$ either can invest or the investment could be split in any manner between the parties.

Assume, arbitrarily, that $a < b$. The optimal level of precaution will be achieved when $Y=0$ and X is chosen to minimize the total expected cost, $C = X + p(X/a)D$. This cost contains two parts. The first component is the amount spent on precaution, X . The second part is the expected damage. The solution is found when X is chosen such that $1 + p'D/a = 0$, or $p' = -a/D$. At this point an extra dollar spent on precaution is precisely offset by a fall in the expected damage by a dollar.

In this case, it's preferable from an efficiency perspective that the court completes the incomplete contract by placing the entire liability on the client since he is the low cost bearer. If the sides know that the court will rule that the client is liable he will choose the optimal level of precaution, while if the parties know that court will rule that the builder

is liable he will either choose a level of precaution given by $p' = -b/D$ which is less than the optimal level, or, if economically and practically feasible, pay the client to assume the risk. This optimal result, however, depends on the sides knowing on whom the court will place the risk.

Say, on the other hand, that the parties disagree who the court will determine to be the low cost avoider, and the court, for practical reasons, prefers, in such a situation, to divide the liability between the sides in order to give both incentive to act. In this case the client, for instance, will choose X to minimize $C = X + p(X/a + Y/b)D/2$. This suffers from two shortcomings. Firstly, to properly optimize, the client will need to know the amount spent by the builder on precaution. Secondly, even if this is known, the margin has changed; while with strict liability the last dollar spent was equated with a dollar saved on damages, currently it is equated with a savings of two dollars since only half of that will accrue to him. For this reason he will under-invest in precaution.

A simple example will demonstrate this. Assume $p = \left(1 - \sqrt{\frac{X+Y}{100}}\right)$ and $D=100$. Note that we have assumed that $a=b=1$. In this case the optimal investment will bring to a minimum the sum of the investment cost and the accident cost, $C = X + Y + \left(1 - \sqrt{\frac{X+Y}{100}}\right) * 100$. The solution to this is $X + Y = 25$. Thus, optimally, the two parties together should spend 25, with the division of the burden between the sides unimportant for optimality. In a strict liability regime, the responsible party would choose to invest precisely 25. Were we to change the function to, say, $p = \left(1 - \sqrt{\frac{X + 0.5 * Y}{100}}\right)$ the optimal strategy would be for the client to invest 25 and the builder 0, but if the risk were nonetheless placed on the builder, he would invest only 12.5 (or pay the client to invest for him).

Returning to the original equation, consider now what happens when we divide the liability between the parties. Each party knows he is responsible for only 50% of the

damages. The client brings $C = X + \left(1 - \sqrt{\frac{X+Y}{100}}\right) * 50$ to a minimum, with the corresponding equation for the builder. The result for each is $X + Y = 6.25$.

This result suffers from two faults. First, there are multiple equilibria, for instance $X=6.25, Y=0$; $X=4, Y=2.25$; etc. If the parties act independently neither knows what the other party will do, and thus each may choose an investment level out of equilibrium. Second, even if each party chooses, erroneously, to not depend on the other party and to invest the optimal amount assuming the other party invests 0, we still get a total investment of 12.5, which is half of the optimal investment. Thus, splitting liability in a contractual accident setting leads to underinvestment in precaution.

3.2.2. Joint Precaution

Return now to Case B, but assume that the sides are not perfect substitutes in avoidance. The basic point remains as above. Total cost is given by $C = X + Y + D(X, Y)$, $\frac{\partial D}{\partial X}, \frac{\partial D}{\partial Y} < 0$ and the optimum is the pair (X^*, Y^*) such that $1 + \frac{\partial D}{\partial X} = 0$ and $1 + \frac{\partial D}{\partial Y} = 0$. In a strict liability regime, when only one party is liable for all the damages that occurred, the other party will choose to spend zero, thus leading to sub-optimality. Splitting the liability also leads to under-precaution. The result of each paying half the damages is that equilibrium yields the pair (\hat{X}, \hat{Y}) such that $1 + \frac{1}{2} \frac{\partial D}{\partial X} = 0$ and $1 + \frac{1}{2} \frac{\partial D}{\partial Y} = 0$, with both parties under-investing. Thus, the concern discussed above continues to hold.

However, consider a situation in which both the builder and the client can take steps to lower the probability of the breach, and in addition, the client can lessen his reliance in order to limit the damage in case of breach. In this case, if the client will be held responsible for damages caused by his reliance, he will reduce his reliance in order to be excused from the damages directly related to his over-reliance. However, with respect to the other steps that need to be taken aimed at lowering the probability of breach, the analysis and concern will remain as above.

3.3 Discussion

It seems, then, that dividing liability in a contractual accident setting is somewhat problematic. It should be clear from the discussion above, however, that there is one instance in which dividing liability will work perfectly – when the actions needed from the parties differ from each other, and they are discrete (which is the natural setting under which the promisee can assist in a contract in which the risk is well allocated, but not necessarily for a contractual accident setting). In this case, if costs are sufficiently low each party will have a dominant strategy to take the precautionary actions ascribed to him rather than have to bear his portion of the costs. This is, we believe, a case in which Porat's mechanism can be successfully extended to contractual accidents.

4. Solution 2: Anti-Insurance

Much of the problem presented above stems from the fact that division of liability means that neither side is responsible for the entire damage. As a result, each party internalizes only the portion of the damages for which he is responsible, and therefore the marginal conditions are not optimal – instead of spending each dollar for which the reduction in expected damages is at least a dollar, they spend each dollar for which their portion of the reduction in expected damages is at least a dollar. Thus, if, for instance, each party is responsible for 50% of the damages, each will spend each dollar that will reduce damages by at least two dollars, since he will bear the burden of only one of those dollars.

To solve this problem, Cooter and Porat (2002) recommended a mechanism they call "anti-insurance" which places the entire risk on each of the parties. The way this is done is by introducing a third player, an "anti-insurer," whose job it is to place risk on the players rather than remove or lessen the risk as done in standard insurance markets. In short, if there is breach of the contract the anti-insurer breaks the connection between the promisor and the promisee so that the promisor pays for the entire damage, but the money does not go to the promisee; rather, it is the anti-insurer who receives the payment. To attain this right, the anti-insurer pays both the promisor and promisee ex-ante. The result is that each side takes the entire risk upon him, and so carries out the optimal

precautionary investment. In fact, any mechanism that separates the parties in case of breach will yield this result. For instance, if the payment of the damages by the promisor would be given to the court or to charity, the result would be identical.¹⁸ Of course, one difference between anti-insurance and this solution is that in anti-insurance the party that benefits when the contract is breached (the anti-insurer) pays for this right ex-ante.

While this solution solves, in most cases, the problem of under-investment in precaution, it surprisingly does not lend a solution to two of the cases above. In Case A, the discrete case, the sides must choose whether to cooperate, and if not, whether to conduct a survey. The equilibrium outcomes do not change qualitatively, except that now there will be more cases where the dilemma arises; there will no longer be cases in which cooperation is a dominant strategy. In addition, in the perfect substitute example of Case B minimization of costs will yield the correct result ($X + Y = 25$ in the numerical example), but the indeterminacy regarding how much each party should spend on precaution remains. Thus, each party could depend on the other to take care of things, resulting in underinvestment, or each could take it upon himself, in which case there will be overinvestment. In the more general continuous case, titled joint precaution, anti-insurance produces (X^*, Y^*) as desired.

As a final note on this solution, the authors discuss the fact that such a market does not exist, and discuss the difficulty in creating such a market (Cooter and Porat 2002, p. 226). Given that contractual accidents are common occurrences, one would think that the sides would have a great interest in the existence of such a market. One reason such a market might not exist despite its appeal is because it may be difficult to include unknown contingencies in such an anti-insurance policy, and even more difficult to price them.¹⁹

5. Solution 3: A Negligence Regime

E. Posner (2009, p. 1431) recommends using a negligence regime in Contract Law, whereby the promisor would be liable for the damages if and only if he is at fault. This means that if he took the ex-ante proper precautionary steps, or if there are no optimal

¹⁸ Note that having the money go to courts gives the courts an interest in the outcome of the trial, a result that might be thought by some to be objectionable.

¹⁹ Cooter and Porat (2002) recognize the difficulty in pricing, and therefore suggest this mechanism only for widely used contracts where pricing is not an issue.

precautionary steps he can take, he receives an excuse from paying damages. This can occur, for instance, if unexpectedly the promisee can more efficiently avoid or lessen the damages from the breach. This has the effect of making the promisee internalize them and take optimal precautionary steps. This solution is particularly elegant since it retains the original allocation of risks in the contract, yet when circumstances change so that the promisor can no longer avoid the breach he receives an excuse from liability and full liability is transferred to the promisee. Consequently, adopting a negligence regime into contract law brings a sophisticated device that prompts the promisee to act when he becomes the low cost bearer, thereby saving renegotiation costs to relocate the risk to the promisee. The problem, as Posner (2009, p. 1434) points out, is that while a negligence regime, if properly specified, gives both parties the proper incentives to act, the plethora and complexity of issues covered in contracts brings into question the court's ability to specify optimal behavior and verify the precautionary steps that were taken by the parties.

Extending this to contingencies not included in the contract is not difficult conceptually, but may be difficult practically. The court would first have to fill in the gap in the contract by assigning liability, and then offer an excuse to the promisor if he took the appropriate precautionary steps in order to avoid the damage that occurred. In terms of the model presented in the general version of Case B above, the court must determine which side is the promisor, and then specify rules that will allow the sides to discern the level of Y^* that will furnish him with an excuse. If this is done, he will indeed take this level of precaution, and the promisee will, in turn take a level of precaution of X^* .

The increased difficulty in making such a regime operational in a contractual accident setting stem from two sources. First, the nature of the contractual accidents may be unpredictable, making the task of creating sufficiently clear rules to cover all contingencies even more difficult. In addition, even if this is possible, it is unclear whether courts can create rules that will let the parties know with certainty ex-ante who the court will later determine is the liable party, or what precautionary steps will be deemed "sufficient." This is particularly troubling because the contractual accident, such as in Case A above, can often stem from a disagreement about who is liable. If the court cannot give a clear signal and each party believes the other is liable, a negligence regime does not solve the problem of contractual accidents.

6. A Change in Focus – Moving From Dividing Liability to Dividing Costs

Our analysis of the three solutions recommended to date in the literature showed that they cannot always be smoothly adopted to cover situations of contractual accidents. The problems that arose result from two main sources. First, when the parties are substitutes in the steps that can be taken in order to avoid the accident, splitting liability between them or putting full liability on each can cause them to act strategically, i.e., to depend on the other party to take the steps instead of them, leading to opportunism rather than cooperation. Second, while placing full liability on the low cost bearer can avoid such strategic behavior, such a rule's optimality depends on the court's ability to create rules that will let the parties know with certainty ex-ante who the court will later determine is the liable party.

In what follows, we suggest a mechanism we believe can alleviate these problems. The idea is to change the focus of the analysis, and instead of trying to formulate rules that will give the sides the proper incentives to perform, give them instead the proper incentives to communicate. If a rule can be formed that will give the sides a mutual interest to operate together to allocate the unallocated risk when there is an unexpected turn of events, then there is a possibility that they will be able to formulate the optimal solution by themselves instead of counting on the courts to do it for them. If, in addition, the rule can give the sides an economic incentive to jointly find this optimal solution, then the goal will have been attained. The result will not only be more optimal behavior and fewer accidents, there will also be far less burden on the courts. The way we suggest to do this is to shift the rules from dealing with the burden of the damages to deal instead with the burden of the cost of preventing or mitigating the damages.

The rule we recommend is the following:

Rule: When a certain contingency is not covered in the contract, and the sides are in disagreement about to which party this risk has been allocated or agree that it has not been allocated, each side must bear 50% of the cost of the precautionary steps *as determined by the parties*. Any party who bears his share of the agreed costs will be granted an excuse from the damages and will be reimbursed by the other side for his costs. If both parties pay their share of the prevention cost, the

damages and costs will be split. If the parties fail to reach agreement the damages will be split, but any costs incurred unilaterally will not be reimbursed.

It is important to note at the outset, as we will explain below, that by granting each side an excuse if he cooperates, we have made cooperation a dominant strategy for each of the parties.²⁰

At first glance the 50% division seems arbitrary, and, indeed, any other fixed division will work equally well. For this reason, it might seem more natural, for instance, to divide the cost proportionally to the expected benefit from avoiding the accident.²¹ The choice of an equal split, however, accomplishes two goals. First and foremost, it eliminates the need for court involvement; any split that is not equal will require the court to determine what the optimal split should be. Thus, the sides will be able to avoid the contractual accident without ending up in court. Second, the arbitrariness and possible unfairness of the equal split rule can actually play a positive role in getting the sides to invest in writing more complete contracts ex-ante (Ian Ayres and Robert Gertner 1989, p. 91). Thus, a rule that one or both sides will view as punitive will give that side an incentive to raise the issue during the contractual stage.

Note in particular the fact that determination of the optimal precautionary steps and evaluation of the economic feasibility of these steps are carried out by the parties themselves without court involvement. Our claim is that this **Rule** will lead to communication between the parties, cooperation in determining the optimal steps to take, truth-telling with respect to these steps and optimal precaution by both sides. In addition, it will lead to termination of the contract if and only if the contract is inefficient.

The reason this works is that making them split the cost gives the parties a shared incentive to bring costs to a minimum. One result of this shared incentive is that transaction costs are drastically reduced. To understand this, note that, in general, renegotiation is thought to be expensive because "[i]n order to acquire more of the gains from trade, or to establish reputations as tough bargainers, parties adopt "hold out" tactics." As a result "[i]f both parties are stubborn, they may never reach an agreement"

²⁰ This is as opposed to models that split the liability or allocate the entire liability to both sides, where the initial reaction is to hope that the other side will solve the problem.

²¹ For a discussion of dividing precontractual reliance costs according to a value-based sharing rule, see Lucian Arye Bebchuk and Omri Ben-Shahar 2001, p. 438-9.

(A. Mitchell Polinsky 1980, p. 1092).²² Under the **Rule**, however, this does not hold for two reasons. First, as soon as it becomes clear to one of the sides that there is a contractual accident, his first reaction will be to contact the other side and cooperate to solve the problem. Second, **it predetermines the split**, thus making positioning and posturing irrelevant. Since the sides share the costs and damages equally they will both want precaution to be done optimally, which will require, for instance, that they assign the physical action to be taken to the low cost bearer. For these reasons, in what follows we assume that renegotiation costs are zero, however even if they are positive our results will generally hold, as discussed below.²³

Consider the cases we discussed above. In Case A the sides have information to gather. One side will turn to the other, and since they know they must split the costs they will simply assign the duty of carrying out the task to one of them, split the cost, and arrive at the cooperative result. If, however, one side took steps, optimal or not, without consulting the other side, he is not eligible for reimbursement of half the costs. In the continuous cases the same result is achieved. In case B with perfect substitutes the sides have an incentive to coordinate their actions to bring the total cost of the accident to a minimum. This requires them to not only choose the optimal expenditure, but also to decide what steps each party is to take such that optimality is achieved. If the sides do not agree what steps should be taken and one or both parties take unilateral steps, optimal or not, then no

²² For more on this, Ayres and Eric Talley (1995, p. 1029-30). For a general discussion, see Cooter and Thomas Ulen (2008, p. 93-4, 264-5).

²³ The same does not occur in the liability-based regimes discussed in the paper. In a negligence regime, if the sides disagree regarding to whom the liability is allocated, and until such time as this issue is determined by the courts, they will have difficulty renegotiating because each believes the court will rule in his favor. In a regime that splits the liability the sides know the court outcome, so conceptually they should be able to renegotiate. Unfortunately, this may not be easy. Consider a case, such as Case A, in which optimal precaution requires only one party to act. Since each party knows that the other party will act if he does not, and since each party wants the other party to bear the cost, renegotiations may never get off the ground. The same will occur when the sides are perfect substitutes in providing precaution (Case B). In the more general version of Case B ("joint precaution") in which each side must take specific actions, with the amount of precaution taken by each side affecting the effectiveness of the steps by the other side, an additional problem arises, whereby if each side has private information about the precautionary steps he should optimally take, he will have no incentive to reveal this information to the other side. We discuss this issue of revelation in our model in Lemma 2 and in the splitting the liability model in Footnote 27 *infra*. Therefore, effective renegotiation will be difficult, if not impossible, to attain. In addition, if the sides renegotiate under incomplete information and are unaware of the extent to which their costs will grow if they do not reach an immediate agreement, the side with the greater bargaining power will have an incentive to use holdup tactics in order to pay less of the precautionary costs. This will considerably increase the cost of the renegotiation. As explained above, this does not occur under the **Rule** because the split is predetermined.

reimbursement will be given. Similarly, when the sides can take joint actions, such as when the client can lower his reliance while they can both take steps to lower the probability of the building collapsing, they will jointly determine the amount of precaution necessary and allocate the task to the low cost bearer, all this in order to bring the total cost to a minimum.²⁴ There is no concern about the courts being able to specify the necessary steps to be taken by each side since it is the sides themselves who determine the optimal actions necessary to avoid or mitigate the accident.

Note that while some might view this **Rule** as excessively rigid, our aim is not to place punitive damages on parties, but rather to create a clear and unambiguous threat point (disagreement point) that gives the sides certainty and obviates court involvement. The only exception to our rule would be when the steps that need to be taken cannot be pushed off until the sides discuss the issue and agree what steps need to be taken, for instance, if immediate action must be taken to stop the building from collapsing. In this case, and in this case only, the steps should be carried out first and then reimbursement sought, if necessary then in court. Note, however, that in this case and all cases, under the **Rule** the dispute will reach the courts, if at all, only after the efficient contract has been saved. This is our goal.

We posit the following proposition:

Proposition 1: The **Rule** gives proper incentives for optimal behavior by both sides to the contract and obviates court involvement.

We will prove this Proposition by showing in the following simple Lemmas that the sides will choose to cooperate by both choosing the optimal precautionary steps to take and by not unilaterally deviating from these steps. Recall, first, that the total cost is the sum of the expenditures on precaution and the expected damages from the accident, i.e., $C(X, Y) = X + Y + D(X, Y)$. The values of X and Y that bring C to a minimum are X^* and Y^* , and we will denote this cost $C(X^*, Y^*)$, with similar notation for other values of X and Y .

²⁴ Note that the client has a dominant strategy to reveal the cost of overreliance in order to split those costs with the builder rather than split the damages if he does not reveal this information. This will be made clear in Proposition 2.

The **Rule** states that the sides should jointly determine X and Y , and each should bear the cost $(X+Y)/2$. Operationally this can be done by having the party with the lower expenditure pay the other party half of the difference. If this is done, each will, in expectation, bear $D(X,Y)/2$ of the damages. Thus, the total cost to each side in this instance is $C(X,Y)/2$. If, however, one side refuses to cooperate in determining X and Y , or if the side cooperates but then fails to carry out the steps jointly agreed upon, the entire burden, costs plus damages, shifts to him. Operationally, a side determining a danger could turn to the other side and request cooperation. Such a request should be documented in case of refusal and later court procedures. The Proposition states that the sides will choose to cooperate, will choose X^* and Y^* , and will proceed to carry out the steps decided upon without requiring court involvement.

Note first that it is trivial that if the sides each know the cost function and choose the levels of X and Y together, they will choose X^* and Y^* ; since each party pays half of the total cost, this will be minimized for each party when the total cost is minimized. To prove the proposition, we first show that if the sides choose X^* and Y^* , no party will have an incentive to deviate from this. We then show that even if there is private information regarding the optimal level of X or Y , the **Rule** leads to truth-telling, i.e., each side will reveal the relevant information he has. Finally, we will demonstrate the incentive to cooperate.

Lemma 1 (Incentive Compatibility): No party has an incentive to deviate from the jointly chosen precautionary levels of X^* and Y^* .

Proof: We will prove this for the party responsible for X with an analogous proof for the party who does Y .

Assume first that the other party invests Y^* as agreed. If the party chooses X^* he pays $C(X^*, Y^*)/2$. If he chooses $\hat{X} \in [0, X^*)$ he bears all of the cost, and since $C(\hat{X}, Y^*) > C(X^*, Y^*) > C(X^*, Y^*)/2$, he is better off if he invests X^* .²⁵

²⁵ It is simple to see that there is never an issue of investing more than agreed upon. If the party chooses $\hat{X} > X^*$ his total cost will be $C(\hat{X}, Y^*)/2$, while if he chooses X^* he pays $C(X^*, Y^*)/2$. By definition $C(X^*, Y^*)/2 < C(\hat{X}, Y^*)/2$, and so he will never overinvest.

Even if there is concern that the other player will under-invest, it is still optimal to invest as agreed. If the other player chooses $\hat{Y} < Y^*$, the party can receive an excuse if he invests X^* , i.e., in that case his total cost will be 0. If, instead, he chooses $\hat{X} \in [0, X^*)$ he pays $C(\hat{X}, \hat{Y})/2 > 0$. Thus, it is optimal to invest X^* .

Q.E.D.

This Lemma was fairly trivial given the **Rule**, yet it demonstrates how the rule directs people to optimal behavior. We now show that even if each of the sides knows only his own function and not that of the other party, they will still arrive at X^* and Y^* ; i.e., each has an incentive to announce the truth.

Lemma 2 (Revelation): Each party will fully reveal proprietary information regarding the optimal level of precaution.

Proof: Assume that the second party says that his optimal level of precaution is Y^* . If the first party announces X^* his total cost will be $C(X^*, Y^*)/2$. If he does not reveal full information and instead recommends a level of precaution $\hat{X} \in [0, X^*)$ his total cost will be $C(\hat{X}, Y^*)/2 > C(X^*, Y^*)/2$. Therefore, his choice will be X^* . By symmetry, (X^*, Y^*) is a Nash equilibrium. It is also clearly the Pareto optimal solution.

Since the second party knows that Y^* by him will yield X^* by the first party and give him the best outcome, he will choose Y^* . *Q.E.D.*

This Lemma is less obvious and somewhat surprising since in most situations each side might be thought to try to cheat a little and not reveal full information. This generally occurs because the optimal solution is such that at the margin the last dollar spent on precaution yields a dollar of savings, while from a private perspective the dollar is spent by one party but accrues to both, thereby causing under-investment (as discussed above in Section 3). This, however, is not the case with the **Rule** mechanism since both the dollar spent and the dollar saved are divided equally between the sides.^{26, 27}

²⁶ A notable exception is when the low cost bearer can overstate his expenses, and the other party is unable to verify these costs. For instance, assume that the builder in our example has equipment already in the field, and he can therefore carry out the required tests for less than others. In addition, assume the client cannot verify the builder's actual costs, but knows the cost of having it done by another party. In this case

Finally, the incentive given by the **Rule** to cooperate is clear. Any party initiating contact in the case of a contractual accident will achieve one of two goals – either optimal precaution, thus bringing his cost to a minimum, or refusal by the other side to participate, thus receiving an excuse from the damage. There is nothing to lose from initiating contact, and everything to gain. This is true even if the party believes there is a high probability that the court will rule that the risk was initially allocated to the other party since the **Rule** states that the court will divide the costs down the middle if there is disagreement about who is responsible.

The same is true if contacted by the other side about a possible accident. Refusal to cooperate will lead to the entire burden being placed on him, and there is nothing to lose from such cooperation. Thus, cooperation both by the person learning of the possible accident and by the person approached is a dominant strategy.

The two Lemmas, together with the incentive to communicate when a concern arises, complete the proof of Proposition 1.

A number of salient features of the **Rule** are worth emphasizing. First and foremost, the **Rule** gives the sides a joint incentive to act to save the deal. Second, it requires only a one time announcement by the court; which then becomes self motivating. Third, it not only places the burden of determining the optimal precautionary steps squarely on the shoulders of the parties that are in the best position to determine these values – the contracting parties (and not on the courts who are not experts in the industry under concern and certainly not in the specific deal being undertaken by the sides), it gives the parties incentives to jointly determine these steps – a result not achieved in previous models. Finally, it is sufficient for one of the sides to initiate contact in order to guarantee that action will be taken. The other party would certainly agree to speak since if he does not do so he is likely to end up bearing the entire burden of the accident.

the builder has an incentive to announce that his costs are higher than they really are, but he is limited in how much he can cheat by the outside option. The result will be that the investment will be made optimally by the low cost bearer, but the cost won't be evenly split. Note, of course, that if the client can determine the price other builders would charge were they in the same situation as the builder, the builder will not be able to overcharge at all.

²⁷ This result will not be attained under splitting the liability even if renegotiation costs are low because only the damages are split, and not the costs. When parties have private information optimality is not necessarily attained even under the Coase Theorem (see, e.g., Steven G. Medema and Richard O. Zerbe Jr. 2000). In the case at hand, each side will have a clear incentive to understate the size of his optimal investment, so that renegotiation will not attain optimality. If the sides recognize this, renegotiation costs will also not be low.

An additional benefit of the **Rule** is set out in the following Proposition.

Proposition 2: The **Rule** is a mechanism that leads to efficient termination of inefficient contracts and fulfillment of efficient contracts when faced with a contractual accident.

Proof: As above, assume the value of the contract to the first party is v and the cost to the second party is c . The agreed upon price is p . The additional cost from the contractual accident under optimal precaution (guaranteed by Proposition 1) is C .²⁸ If $v-c-C>0$ the contract is efficient and should optimally be carried out, and if $v-c-C<0$ it is not and should be stopped.

Consider first an efficient contract. Under the **Rule** the first party will receive $v-p-C/2$ and the second will get $p-c-C/2$. Although the sum of these is assumed to be positive (since it is an efficient contract), there is no guarantee that both parties will have positive payoffs. If the second party, for instance, has a negative income he could be expected to breach the contract unless the first party compensates him for his loss. However under the **Rule** the alternative for a party that unilaterally breaches is to bear all of the cost and damages, and therefore he will not breach the efficient contract, and the other side cannot be profitably convinced to terminate the contract since his gain is greater than the loss to the losing party.

If, however, the contract is not efficient, the gain to one party (if there is one) will be less than the loss to the other, so renegotiation will always lead to termination of the inefficient contract. Note that termination of the contract will occur only through agreement and not through breach. This is because breach will result in the entire damages of the accident, if it occurs, falling on the breacher. Thus, a side contemplating breach will prefer contacting the other party and paying only half of the damages. *Q.E.D.*

²⁸ As explained above, the **Rule** has the effect of making the renegotiation process between the sides simple because the division of costs is already given in the **Rule** and not open for discussion. Thus, the renegotiation costs are close to zero. If, however, these costs are positive, the sides will include this cost in C when deciding whether to terminate the contract.

7. Summary

In this paper we propose a new default rule for instances in which the parties to a contract did not allocate the risk of a certain contingency, and it turns out that both sides could have helped avoid the occurrence of breach of the contract or lessen the damages from it occurring. This rule divides the costs of precaution between the parties instead of dividing liability as suggested by the other models. Aside from resolving the difficulties that exist in models that divide liability (such as insufficient incentives to act by the sides to the contract, uncertainty about the actions of the other party, difficulty of the courts to choose optimal actions for the sides, and difficulty for the courts to fashion rules that will help guide the parties to optimal behavior in future cases), this mechanism has the added advantages of having the people closest to the matter determine jointly the optimal steps to be taken, bringing renegotiation costs to a minimum, yielding termination of inefficient contracts and continuation of efficient ones, and lessening the burden on the courts. In addition, it opens a communication channel between the parties that can be used to iron out other differences that might arise, and it does so even when only one of the parties is interested in such communication.

One concern that may arise from our model is the finality of the rule that anytime a disagreement about allocation of risk arises, the initial allocation is set aside and costs and damages are split (assuming cooperation). One benefit from such a rigid rule is that it gives the sides an incentive to invest in writing clear and fairly comprehensive contracts rather than leave open issues to be ironed out if and when a problem arises. This comes at a cost, of course, since this will make contracts more expensive to write. One could adapt the **Rule** to allow the sides to turn to court after cooperating in order to restore the initial allocation as the court interprets it. For such an idea to work would require a necessarily more complicated rule since it would have to account for situations in which the sides have vastly asymmetric beliefs regarding the initial risk allocation, and act strategically as a result. Thus, for instance, if each side believes the other party is responsible each will want a large investment in precaution (in the continuous case) in order to lower the probability of an accident as much as possible, since in any case he believes that the court will determine that he will not have to bear any of the cost. If such situations are likely (as they seem to be), there may be significant overinvestment in precaution, an

undesirable outcome. Controlling this will require some form of more substantial intervention by the courts. While most of the central benefits of the **Rule** discussed above will remain, the involvement of the courts once again raises some of the concerns which we attempted to eliminate. We leave consideration of such a possibility to future research.

Our model, like all models of cooperation designed to supplement incentives above and beyond those that already exist to fulfill efficient contracts, brings back to mind the tradeoff discussed by Scott (2009). By offering a new solution to contractual accidents, it lowers the harm from such accidents, but correspondingly reduces the need and desire to write complete contracts. This sharpens Scott's question whether parties should optimally invest in making the contract as complete as possible or to invest in the back end by making more efficient mechanisms to deal with contractual accidents. Our solution reduced the cost to courts to just a one time announcement about the **Rule**, and brings renegotiation costs between the parties close to zero by predetermining the division of the pie. If complete contracts can be written our solution is not necessary. If, on the other hand, renegotiation costs can be completely eliminated, there may be no need to invest in writing complete contracts. It seems, then, that the question of how best to allocate resources between the front end and the back end must remain open, and the quest for ever more efficient solution mechanisms will undoubtedly continue.

Bibliography

- Ayres, Ian, and Robert Gertner. 1989. Filling Gaps in Incomplete Contracts: An Economic Theory of Default Rules. *The Yale Law Journal* 99: 87-130.
- Ayres, Ian, and Eric Talley. 1995. Solomonic Bargaining: Dividing a Legal Entitlement to Facilitate Coasean Trade. *Yale Law Journal* 104: 1027-1117.
- Bar-Gill, Oren. 2006. The Evolution and Persistence of Optimism in Litigation. *Journal of Law, Economics, and Organization* 22: 490-507.
- Bebchuk, Lucian Arye, and Omri Ben-Shahar. 2001. Precontractual Reliance. *The Journal of Legal Studies* 30: 423-457.
- Calabresi, Guido. 1970. *The Cost of Accidents: A Legal and Economic Analysis*. New Haven and London: Yale University Press.
- Cooter, Robert. 1985. Unity in Tort, Contract and Property: The Model of Precaution. *California Law Review* 73: 1-51.
- Cooter, Robert, and Ariel Porat. 2002. Anti-Insurance. *The Journal of Legal Studies* 31: 203- 232.
- Cooter, Robert, and Ariel Porat. 2004. Decreasing-Liability Contracts. *The Journal of Legal Studies* 33: 157-197.
- Cooter, Robert, and Thomas Ulen. 2008. *Law & Economics (5th edition)*. Boston: Pearson Education Inc.
- Dye, Ronald A. 1985. Costly Contract Contingencies. *International Economic Review* 26: 233-250.
- Hermalin, Benjamin E., Avery W. Katz, and Richard Craswell. 2007. The Law & Economics of Contracts. Pp.64-75 in *The Handbook of Law & Economics*, edited by A. Mitchell Polinsky and Steven Shavell, Amsterdam: North-Holland.
- Huberman, Gur, and Charles Kahn. 1989. Default, Foreclosure and Strategic Renegotiation. *Law & Contemporary Problems* 52: 49-61.
- Medema, Steven G., and Richard O. Zerbe Jr. 2000. The Coase Theorem. Pp. 36-92 in *The Encyclopedia of Law and Economics* edited by Boudewijn Bouckaert and Gerrit de Geest, Cheltenham: Edward El-Gar.
- Polinsky, A. Mitchell. 1980. Resolving Nuisance Disputes: The Simple Economics of Injunctive and Damage Remedies. *Stanford Law Review* 32: 1075-1112.
- Porat, Ariel. 1994. Contributory Negligence in Contract Law: Toward a Principled Approach. *University of British Columbia Law Review* 28: 141-169.
- Porat, Ariel. 2009. A Comparative Fault Defense in Contract Law. *Michigan Law Review* 107: 1397- 1412.
- Posner, Eric A. 1999-2000. A Theory of Contract Law Under Conditions of Radical Judicial Error. *Northwestern University Law Review* 94: 749-774.
- Posner, Eric A. 2009. Fault in Contract Law. *Michigan Law Review* 107: 1431- 1444.

- Posner, Richard A. 2009. Let Us Never Blame a Contract Breaker. *Michigan Law Review* 107: 1349- 1363.
- Posner, Richard A., and Andrew Rosenfield. 1977. Impossibility and Related Doctrines in Contract Law: An Economic Analysis. *The Journal of Legal Studies* 6: 83-118.
- Procaccia, Yuval. 2009. Contractual Accidents. Working Paper *Radzyner School of Law, Interdisciplinary Center, Herzlia, Israel*. Electronic copy available at: <http://ssrn.com/abstract=1352358>.
- Scott, Robert E. 2009. In (Partial) Defense of Strict Liability in Contract. *Michigan Law Review* 107: 1381- 1396.
- Shavell, Steven. 1980. Damage Measure for Breach of Contract. *Bell Journal of Economics* 11: 466- 490.
- Schwartz, Alan. Incomplete Contracts. Pp. 455-459. in *The New Palgrave Dictionary of Economics and the Law*, edited by Peter Newman, 1998.
- Triantis, George. 1992. Contractual Allocations of Unknown Risks: A Critique of the Doctrine of Commercial Impracticability. *University of Toronto Law Journal* 42: 450- 483.

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